



ADDIS ABABA UNIVERSITY
COLLEGE OF NATURAL SCIENCE
SCHOOL OF INFORMATION SCIENCE

**Potentials for IT Adoption in Distance Education: The Case of
Ethiopian National Defense Distance Education**

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TSEHAYE ABREHA

July, 2016

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A Thesis Submitted to the School of Information Science College of
Natural Science Addis Ababa University in Partial Fulfillment of the
Requirements for the Degree of Master of Science in Information Science

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LIST OF ACRONYMS

DE.....	Distance Education
EME.....	Educational Media Agency
EICTDA.....	Ethiopian ICT Development Agency
E-government.....	Electronic Government
E-learning.....	Electronic Learning
ICT.....	Information and Communication Technology
ICT4D.....	Information and Communication Technology for Development
IT.....	Information Technology
MoE.....	Ministry of Education
UNDP.....	United Nations Development Program
UNESCO.....	United Nations Educational Scientific and Cultural Organization

ABSTRACT

The purpose of this study was to investigate the potentials for IT adoption in Distance Education particularly in the Ethiopian National Defense Distance Education system. The populations of this study included Administrators and Coordinators, tutors and students. A total of 196 respondents have participated in this study.

For a better understanding of the situation a mixed (Quantitative and Qualitative) research approach was employed. Questionnaire, Interview, Focus Group Discussion and Observation were used as means of data collection. Frequency and Percentiles were used for analyzing the quantitative data while the qualitative data were thematically organized, categorized and examined to understand the emerging patterns of responses.

The findings of the study reveal that, in the current practice of the army Distance Education system, there are limitations on the distribution method, delivery media, completeness and quality of learning materials. The survey responses from students showed that the availability of library service is very poor. Furthermore, even though the learners' access level for information technology is limited to some technology types, their level of skill on using IT is encouraging. The findings also revealed that administrators and tutors have positive attitude towards IT use in education specially, in their distance education activities and they have good level of IT skill. In addition, the study has identified that there are already established different Information Technology infrastructures around the army locations and they are developed for educational purposes. Finally, based on the findings, recommendations are forwarded.

CHAPTER ONE

1. Introduction

1.1. Background of the Study

Countries across the globe are embracing a vision for development of Knowledge Societies and adopting policies and strategies to encourage this development. And they recognized that education is vital tool in the knowledge society, as a source of basic skills, as a foundation for development of new knowledge and innovation, and as an engine for socio-economic development. Education is, therefore, a critical requirement in creating knowledge societies that can stimulate development, economic growth, and prosperity (Butcher, 2011; Birhanu, 2014). Following the recognition given to the importance of education, with the developing and adopting of policies and strategies, huge capital has been invested in education which was mostly the conventional education (Holmberg, 2008). Because of the fact that this conventional (face to face) education practice has become unable to meet the increasing demand for education, the need for alternative mode of education that is distance education has been recognized many years ago.

Wedemeyer (1978) realized that conventional face-to-face instruction would not be able to attain the increasing demand for education, because it was not possible for everybody to attend classes at specific places and at specific times. For example, adults who had to leave school and begin working would not be able to attend conventional education (in classroom) that taught at specific places and specific times. And he understood that the *vision of “access to education should be and could be open”* could not be achieved unless the barriers of time and space associated with face-to-face teaching could be broken, hence his passion and extensive research to promote and refine distance education (Wedemeyer, 1978 as cited in UNESCO, 2002).

Based on its successful alternative and vital role in education, its acceptance is increasing and academic institutions and countries are working on Distance Education to make it more effective. “As a force contributing to social and economic development, open and distance learning is becoming today as one of the most rapidly growing fields of education and training” (Mulatu, 2014). “It is fast becoming an accepted and indispensable part of the mainstream of educational systems in both developed and developing countries” (Mulatu, 2014). Immense attention is given

to open and distance learning to meet the educational needs of the adult population, with a view to provide new and alternative learning opportunities for those who were initially far from education for one or another reason.

Following the view to provide new and alternative learning opportunities, in Ethiopian national defense force, most of the army members are direct beneficiary from the distance education (better to say correspondence education because the teaching/learning activities are carried out using the printed media and course materials are distributed manually). It has gained wide acceptance as one of the successful modes of extending education in a context of reach, acceptance, and productivity in the Ethiopian army.

Nowadays, for the effectiveness and successful practice of Distance Education the role of information and communication technology is intensively used. This is because of that in this information era, ICT is exhibiting its influence on every sector of the world: like economy, education, military, health, social and others. The works of Porter et al. (1985) and Agboh (2015) have shown that development in ICT leads business companies to invest big money on ICT adoption with the desire and goal of achieving lower costs, improved productivity, higher product quality, higher customer satisfaction, and ability to focus on core areas of business.

According to McNamara (2007), ICTs have the potential to impact almost every aspect of the health sector. Nowadays, this potential to impact is mainly seen in dissemination of public health information and facilitated public discourse and dialogue around major public health threats. Furthermore, it enables remote consultation, diagnosis and treatment through Tele-medicine as well as in strengthened the ability to monitor the incidence of public health threats and respond in a more timely and effective manner.

Therefore, ICT is potentially powerful tool for extending educational opportunities to previously underserved groups who are excluded from conventional classroom education due to different reasons such as cost, time or geographical constraints and others for reasons persons with disabilities, the elderly. ICTs make possible asynchronous learning or learning characterized by a time lag between the delivery of instruction and its reception by learners. The educational effectiveness of ICTs depends on how they are used and for what purpose. And like any other

educational tool or mode of educational delivery, ICTs do not work for everyone, everywhere in the same way (Birhanu, 2014).

According to Birhanu (2014), Educational systems around the world are under increasing pressure to use the new Information and Communication Technologies (ICTs). ICT has made an impact on the quality and quantity of teaching, learning and research in the traditional and/or distance education institutions using it. Since Distance Education is a form of educational provision where the acts of teaching and learning are separated in terms of time and/or space, to bridge the barriers of time and space, distance education must necessarily use a variety of ICT/IT potentials to present the learning materials and provide environment for interaction (serving as teaching learning media) (UNESCO, 2002). Nowadays, without ICT/IT Distance Education seems not be possible, the IT adoption is found to be important especially in the Ethiopian army distance education.

This research will examine the current practice of the army Distance Education system, identify the factors and challenges that affect the system and investigate the available potentials for information technology adoption on the system.

1.2. Statement of the Problem

Distance Education (DE) in the Ethiopian national defense is taking place in almost all parts of the country where the army is accomplishing its mission. Because of the fact that the mission area of the army is very wide and the characteristics of the mission by itself, it is difficult to get access to the traditional face to face education. Hence, distance education is the main and preferable modes of extending education in a context of reachable, acceptance, and productivity in the army. Furthermore, as Wedemeyer (1978) realized that conventional face-to-face instruction would not help to attain the increasing demand for education, because it is not possible for everybody to attend classes at specific places and at specific times.

While ICT is considered to have a significant value in distance education (UNESCO, 2002), the distance education system in the army is not practicing ICT use. As such, the current DE system in the army is paper based (using land transport) and it has effect on use of time and resources as

well as on the quality of outcomes (the learners at the end). As it has been realized from the foregoing, the current DE is less productive and has unfavorable image (learners' attitude).

Even though, the importance of Distance Education is globally accepted as the main alternative mode of education to resolve the drawbacks of the conventional education (Mulatu, 2014), the system can't meet the increased demand for education without its integration with ICT. This is because, in this information era, the widespread uses of ICTs are changing the way people or companies work that is, ICT is exhibiting its influence on every sector of the world: like on economy, military, health, education, social and others (Brady et al., 2002).

To this end, the potentials for IT/ICT adoption in the army Distance Education needs to be studied to come up with better ground for implementing IT/ICT in the system. Therefore, the purpose of this research is to examining current practices in the army distance education system and find out potentials for ICT adoption in the system.

1.3. Research Questions

As the army is deployed in different areas of the country and characteristics of the mission by itself, it is difficult to get access to the traditional face to face education and hence DE is the main and preferable modes of extending education. With the importance of DE in the army, learners' interest to continue their education is increasing from time to time. As facts have shown the number of learners was 4,269 in 2002 but currently, 26,000 students are enrolled for grades 9-12 only and class levels were grade 5 up to grade 8 in 2002 and now it reaches up to grade 12 (source: document from army DE department).

While it is believed that IT is playing significant role in education specially, in distance education, the army distance education system is not practicing IT use. As such, the current DE system in the army is paper based and it has effect on use of time and resources as well as on the learners' satisfaction. As per the researcher knowledge, no research has been done in the army DE in general and particularly related to IT adoption and the research would benefit all concerned if there is an aim to make it technology based. Therefore, the research aims to answer the following questions.

- What modes of distribution for learning materials are utilized in the army Distance Education system?
- To what extent does the Distance Education system support the learning programs with library services?
- What is the level of administrators' and teachers' awareness and attitude towards using IT in Distance Education?
- What is the level of teachers'/students' access and skill in using IT?
- To what extent is the availability of ICT infrastructure in and around the Distance Education centers or learning area?

1.4. Objective of the study

1.4.1. General objective

Distance education is the main and preferable modes of extending education mostly for those who do not get the chance of attending for the traditional face to face education. Therefore, upgrading (transforming) the process of the system will play a great role in enhancing the efficiency and effectiveness of the institution in producing quality and competitive manpower. Hence, the main objective of this research is to examine current practices of the army distance education system and discover potentials for Information Technology adoption in the system.

1.4.2. Specific objectives

To achieve the general objective, the study has the following specific objectives:

- To examine the current practice of the army distance education.
- To identify the level of teachers'/students' awareness and attitudes towards use of ICT in Distance Education.
- To explore access and skill level of the teachers/students in using technology/IT.
- To discover and determine the availability of appropriate ICT infrastructure.
- To identify the challenges relating to the implementation of IT in the system.
- To provide recommendations and further research directions.

1.5. Significance of the Study

As a force contributing to social and economic development, Distance Education is today one of the most rapidly growing fields of education and training. It is fast becoming an accepted and

indispensable part of the mainstream of educational systems in both developed and developing countries (Mulatu, 2014). Therefore, if an organization (like Ethiopian National Defense Force) needs to achieve its educational goal through distance education/learning, the overall instructional functions should be supported with information technology.

The research will help to identify the process of teaching-learning taking place in the Ethiopian defence force distance education system which will help to easily understand the concepts and identify effect of adopting information technology in the system. Since the study aimed at discovering the potentials for information technology adoption within the system, it will provide the organization a ground for transforming the paper based Distance Education to IT enabled Distance Education system. Furthermore, the research will create the idea of considering and using the identified potentials/opportunities for the adoption.

1.6. Scope and Delimitation of the Study

Distance education is implemented by many academic institutions in Ethiopia today. However, the scope of this study is limited to identify the potentials for IT adoption in Ethiopian defense force distance education system.

In distance education, course delivery (instructional processes) may be carried out using the synchronous delivery technology system such as online video conferencing and teleconferencing as well as the asynchronous delivery technology, such as message board forums, e-mail, text, video and audio recordings, print materials. And therefore, this study basically has focused on identifying the potentials for the adoption that are enabling to implement both modes of delivery.

1.7. Organization of the Study

The paper is organized into five chapters. The first chapter is the introductory part which comprises the background of the study, statement of the problem, research questions, objective of the study, significance of the study, scope and delimitation of the study and organization of the study. The second chapter presented review of related literatures to Distance Education (DE), information technology based Distance Education, the potentials for IT adoption on Distance Education and discussed related works on benefits and challenges of adopting IT on Distance

Education. The third chapter contained the methodologies and procedures employed for the data collection, analysis and interpretations. The fourth chapter also presented the study findings, and presentation of the results. The fifth chapter came to an end of this survey research with summary, conclusion and recommendations.

CHAPTER TWO

2. Literature Review

2.1. Overview

The emergence of advanced technology, specially, at the end of twenty century and the beginning of twenty first century, has changed both view of the society on the distance education and its practices by adding dimensions (Holmberg, 2008).

With the rapid changes taking place in information technology and the Internet, educational institutions must continue in adjusting themselves with this changing environment in order to meet growing demand for educational opportunities /achieve their intended goals/. In other way, only educational institutions (traditional face to face and distance education) adopting and implementing IT for learning and teaching activities, such as developing infrastructure for the availability of e-resources and its utilization, can hope to enjoy the rewards of educational reform in today's IT based practices (Holmberg, 2008).

It is important that educational institutions (traditional face to face and distance education) should have the vision that their students, teachers and other stakeholders will use IT effectively as a tool for enhancing the effectiveness of learning and teaching with a view to prepare their students for the information age, turning schools into dynamic and interactive learning institutions, and fostering collaboration among schools, parents and the community (UNESCO, 2002).

2.2. Distance Education

As many literatures indicated, there are several definitions for distance education; a number of other terms (distributed learning, e-learning, online learning, etc.) are also used roughly synonymously with distance education. However, distance education is the oldest and most commonly used term globally. According to (Bozkurt et al, 2015), Distance Education is a generic term used to define the field of distance learning. Distance Education is a mode of delivering education and instruction, often on an individual basis, to students who are not physically present (such as full-time workers, military personnel, and individuals in remote regions) to attend classroom lectures in a traditional setting. Distance Education provides "access

to learning when the source of information and the learners are separated by time and distance, or both" (Honeyman et al., 1993).

Even though the emergence and widely spread of the Internet eliminates the boundaries, technological modes of delivery in Distance Education are divided as synchronous learning and asynchronous learning (Duffy et al, 2007).

In synchronous learning, all participants are "present" at the same time. In this regard, it resembles traditional classroom teaching methods despite the participants being located remotely. It requires a timetable to be organized. Web conferencing, videoconferencing and educational television are examples of synchronous technology. Web conferencing software such as Adobe Connect help to facilitate meetings in distance learning courses and usually contain additional interaction tools such as text chat, polls, hand raising, etc.

In asynchronous learning, participants access course materials flexibly on their own schedules. Students are not required to be together at the same time. Mail correspondence, which is the oldest form of distance education, is an asynchronous delivery technology, as are message board forums, e-mail, video and audio recordings, print materials, voicemail, and fax.

Distance education has become one of the best successful alternative modes of extending education in a context of reach, acceptance, and productivity. "Reach in a sense that it has been instrumental in addressing the educational needs of speckled communities in different locations; whereas acceptance is in the sense that it has emerged as a feasible alternative delivery system and an option to the conventional system and productivity in the sense that "Research & Development in this area has contributed in many ways to more general educational research and development" (Mulatu, 2014). Furthermore, according Mulatu (2014), "The provision of an opportunity to learn without being restricted by geographical or time constraints is a major factor behind the growth of distance education programs".

2.2.1. Distance education in Africa

For the developing world, particularly for Africa, Distance Education is a promising and practical strategy to deal with the challenges of widening access and increasing participation in education. It is increasingly being seen as an educational delivery model which is cost-effective without sacrificing quality. On the African Continent where resources are scarce and education provision is poor, Distance Education is viewed as a viable and cost effective means of

expanding provision without costly outlay infrastructure like for the conventional education (Pityana, 2009). “Prior to the emergence of distance learning providers in Africa, many African students obtained various qualifications through distance learning providers in Europe and North America. Later in 1946, one of the oldest distance education universities that emerged in the African continent is the University of South Africa (UNISA), which has been offering correspondence courses” (Anyona, 2009). Following the success of UNISA, other Open Distance Learning providers, like Open University in Nigeria, Tanzania and Zimbabwe were established in the African continent (Juma, 2003 as cited by Anyona, 2009).

African universities have established distance education departments, the delivery platform to date has been text and correspondence based, supported by print materials. Some of the institutions are beginning to explore the use of the Internet, video conferencing, and other forms of multimedia (Association for the Development of Education in Africa, 1999).

Furthermore, in addition to applying distance learning for extending higher education, developing countries in Africa and elsewhere like Nigeria, Egypt, India, Bangladesh and Pakistan are using distance education extensively to meet the demand for education in the lower grades (primary, junior secondary and senior secondary schools level) other than college and university levels (UNESCO, 2001). According to UNESCO, 2001, distance education in those countries is also serving as an alternative for educating teachers to solve an emergency of shortage of teachers.

2.2.2. Distance education in Ethiopia

Distance education in Ethiopia is a recent phenomenon as compared with similar institutions in other countries. Even if it is difficult to know the exact time of emergence, we can say that the age of distance education in Ethiopia is about three to four decades.

The Continuing Education Program at Jimma University was first started in 1980 at Jimma College of Agriculture to train the students in general agriculture at diploma level. Even though there was high demand of distance and off campus programs from different stakeholders, due to various reasons there was only one program in Distance Education, management at certificate and diploma level at the College. Gradually the office expands its programs to the summer in-service and in 2003 the office started two summer programs namely: teachers’ education at

degree level and Law at diploma level. Soon the office expands these programs to other disciplines (<https://www.ju.edu.et/office-continuing-and-distance-education>).

The present Alpha University College (AUC) grew out of the distance education institution established by an Ethiopian in 1981. The objective of the institution was to give vocational and technical training to those who are unable to attend regular classes. The Ministry of Education (MoE) recognized the institution originally as Institution of National Vocational and Technical Distance Education Enterprise. It was under this name that the institution started to play an active role of expanding education services in the country. At that initial stage the training programs included Auto Mechanics, General Mechanics, Wood Work, Electricity, Home Economics, Agriculture, Personnel Management, Purchasing and Production Management. With this institution as its foundation, Alpha Education and Training Share Company (AETSCO) as established in 1994.

The founders of the company were Ethiopian businessmen and other experienced people with a wide range of professional training in different fields. The founding members are dedicated to the cause of education of citizens. As a result, just from the outset, the motto of the company has been to provide relevant, accessible, affordable and quality education to citizens who would later on hopefully exert their efforts and contribute to the capacity building in Ethiopia. Since its establishment, AETSCO has been engaged in accredited distance higher education programs leading to certificates, diplomas and degrees. Tens of thousands of distance education students have graduated and other tens of thousands are currently following different diploma and degree programs including Economics, Accounting, Business Management, Information Technology, Public Administration and Development Management. (<http://www.ict-innovation.fossfa.net/contact-data/organisation/alpha-university-college>).

Furthermore, it is provided at higher education level including diploma and degree. Nowadays, there is also the beginning at masters' level. In fact most of the masters' level programs are given in cooperation with foreign institutions. Some examples in this respect include the cooperation between St. Merry University College and Indira Gandhi National Open University and Addis Ababa Commercial College and UK Open University. University of South Africa (UNISA) has also opened a distance education campus in Addis Ababa and started offering programs at second degree level (<http://www.ethiopianembassy.org>).

According to (Yilfashewa, 2008) “the commitment to sustaining its private institutions to make wider use of open and distance learning, Ethiopian government gives priority to national capacity-building essential to the establishment and management of efficient distance Education systems. “Distance Education as an educational method and a philosophical construct has been identified as the strongest instrument for combating the educational problems overwhelming nation like Ethiopia” (Marew, 2002). “Despite the splendid role and increased popularity of the Distance Education, the quality of higher education via distance education has been called to question” (Helland, 2002).

Dereje (2010) and Mulatu (2014) have examined the distance education in Ethiopia with regard to the following constructs to show the status of the system.

- Tutors’ experience and qualification
- Tutors punctuality
- Infrastructure and Student support service
- Learning materials (preparation and distribution)
- Tutors’ course load

Tutors’ experience and qualification: it is concerning about the amount of years in which each tutor (educator) has worked in distance education and the academic status with which he/she is serving. With regard to experience, most of the tutors are with more at least five years of service and they have minimum of first degree. Even though their experience and qualification is suitable, the knowledge they have with regard to Distance Learning methodology is insufficient and not satisfactory (Mulatu, 2014; Dereje, 2010).

Tutors punctuality: this is meaning that about the tutors’ behavior of attending in the tutorial centers as per schedule set by the institution. Accordingly, some tutorial centers are (but most of them are not) frequently observed and few students have a chance to contact with tutors to discuss what they do not understand. They relate this not only to academic problems, but also to personal study difficulties. This shows that there was lack of strict follow up to the management side to ensure tutors availability for the face to face tutorial. The extent to which tutors are not engaged in tutorial related activities is the indication of tutors’ less commitment to their learners, tutorial services and their profession.

Infrastructure and Student support service: this is all about the availability and quality of facilities supporting the learning/teaching process. Mulatu (2014) and Dereje (2010) have described this as poor because, the quality of tutorial centers are not suitable for learners even for the tutors which are not equipped with laboratory facilities and inadequate or no libraries around the tutorial centers. In addition, there is no standard timetable for running the distance education program. The principal purpose of the tutorial programs is to provide opportunities where by students receive immediate feedback on their learning progress and also on their performance in solving the assignment questions (Holomberg, 1989). But here, feedback on the assignments was not immediate and individual support was inadequate. “The personal observations of the researcher also revealed that these areas were faced deep rooted problems” (Mulatu2014).

Learning materials (preparation and distribution): it is dealing with the production and the whole distribution of learning materials. In distance education system where print medium is employed as the sole means of content delivery, students should receive the course module long before the exact date of tutorial program. According to the researches indicated that print medium is employed as the sole means of content delivery, the production of learning materials is not significantly standardized. In the distance education institutions, the ability levels of the majority of distance learners are given less/not consideration while preparing the course modules and assignments.

With regards to the assignment, it is prepared by the module writers and is sometimes inappropriate about content coverage and its organization. There are too many (redundant and irrelevant) questions set for some courses, and there is no enough time to give feedback to students (Mulatu, 2014).

With regard to modules preparation, Even though, in some cases there are self learning modules which make a possibility for learning in a better way i.e. they are very useful, self contained, friendly and are best suited to the distance mode of delivery, most of them are insufficiently updated so as to fit the changing curriculum, some of the contents need to be revised , examples and illustrations given in some of the modules did not reflect the existing situations and needs to be updated, unnecessary duplications of topics in successive year materials (Dereje, 2010).

With regard to learning materials (modules) distribution, it is not provided well in advance of tutorial sessions and students are forced to share modules each other. This caused inevitable delays regarding preparation by tutors of effective tutorial sessions.

Tutors' course load: it is about the number of course to which each educator (tutor) is assigned during a tutorial program and to corresponding assignments. A distinctive feature of the Distance Education system is an interaction with other learners and tutors during tutorial sessions. In order for this to be implemented effectively, the number of students in the class needs to be reduced to the standard and the course load of a tutor also should be minimized as much as possible.

With this regard, most of the time, tutors are responsible for two or more than two courses at a time. It is clear that this, in turn, makes instructors responsible for the corresponding assignments and tutorial class preparation. According Mulatu (2014), Experience in this regard showed that it was not advisable for tutors to take more than two Distance Learning courses at a time. Because of tutors are overloaded during tutorial, the principal services of a tutorial program such as involvement of the students in enquiry based tasks and discussion, individualized academic support and counseling were completely overlooked (Dereje, 2010).

2.2.3. The Promises of Distance Education

Many of the promises of distance learning are financial in nature. Education institutions hope to save money by delivering education to students that are unable to attend classes because of time or distance. The theory is that class size increases while the overhead remains the same. Bollag et al. (2001) said that developing countries are turning to the state of run distance education programs to take the place of ever increasing enrollments and a lack of physical building space. Places such as Beijing, Jakarta, and South American countries such as Brazil and Argentina have all begun to use distance learning techniques to reach those that would by any other means be unreachable. Bollag et al. have said that countries like China are moving from “elite to mass education,” and that “traditional universities cannot meet the demand”. China uses a radio and television delivery system to serve 1.5 million students, two-thirds of which are in a degree program.

The convenience of time and space is a big promise made by distance learning. Students do not have to physically be with the instructor in space and depending on the method used, they do not

have to be together in time as well. This is a great advantage for non-traditional students who cannot attend at regular times. Nowadays many of adult students in small towns and high school graduates of Distance Education don't want to go away to a bigger city to get an education.

Another benefit of distance education is providing opportunity for societies which have complex socio-cultural trends like nomads or pastoralist. According to Kenyan strategy (2010) "A strategy to provide education to nomadic communities in Kenya is through distance learning". Because of the forced separation of children in school from their family, their wider social environment and their cultural background, current educational practices for nomads tend to result in an unfavorable choice between these two types of learning (education through the school system, and the informal learning about their own cultural, social and economic. To avoid this problem, the Distance Education strategy (Kenyan strategy (2010)) uses a wider range of delivery mechanisms than in the past, bringing together boarding and mobile schools as well as radio instruction. At the same time the content can be better adapted to the significant differences in livelihood between urban and settled farming areas on the one hand, and the arid and semi arid pastoral areas on the other.

Furthermore, distance education can also provide a learning environment for those who are constrained with their professional occupation to attend the conventional (classroom) education. It is obvious that military is one of the occupational profession in which the military personnel are always engaged either in standby situation or in mission area (i.e. live is most often determined by the available situation but not up to individuals). Therefore, most of the time, getting access opportunity for classroom education is difficult.

According to Tung, et al. (2009), "in behalf of cost and accessibility, the military has a growing need for training on an "anywhere and anytime" basis through distance learning technologies". Even though Tung, et al. (2009) proposed the transformation of the correspondence program in Taiwan army to e-training courses, distance education is working in a series of training programs which are starting from preparatory fundamental education, in-service education, to advanced education. In addition to their proposal for advanced educational system in the Taiwan army, they also witnessed for the importance of the correspondence education (distance education).

“Furthermore, since there is also a significant downsizing in military personnel, military officers cannot leave their post to attend residential education for a long period of time. Correspondence program in advance military education is presently one of the proposed solutions to resolve this problem. Under this program, officer students use their leisure time to read course materials and complete their assignments. Their learning progresses are then reported to their instructor during the monthly faculty meeting” (Tung, et al. 2009).

2.3. Information Technology based Distance Education

As discussed in many literatures, before the emergence of IT in the distance education, old trend was rely on the self-paced learning of the students as it did not include any face-to-face interaction at all (i.e. an instructor-centered not student-centered and one-way communication). It is that all the course materials (printed materials) are given to the learners via mail (postal delivery system) so that he/she can master the materials on his/her own at his/her own pace. But now, the area of Distance Education is reaching at its bright age (transformation period: old to new) with the support of information technology and the internet.

Applying information technology in the distance education is a sign of a new period for the area. Education which is based on information technology is characterized by its flexibility, communication, active learning, collaborative and motivational nature (Farajollahi et al, 2010). Thus, using information technology transforms and changes mental models of distance education, enriches the present educational trends more than before and brings new developments. These trends and developments share the features of education that is based on technology and suggest modern educational and learning approaches in which the learner plays an important role and emphasizes on Self-directed learning, independent, flexibility and communication. In current thinking, there are two ways in which IT in education is considered: IT supported education and IT enabled education.

IT Supported Education: A large number of Distance Education institutions and programs use IT to support the print content that they deliver to students. These include broadcast audio and video such as radio and television programs, audio and video tapes delivered to students as part of a learning kit, and in more recent times, multimedia content such as lessons which are

delivered off line, i.e. on CDs. This is also sometimes called multimedia education, where multiple media are used to support learning.

IT Enabled Education: Any educational program that is purely delivered through ITs, or with IT delivered content as the primary backbone of the teaching-learning process, such as on line courses through the web, is IT enabled education. In other words, this form of education requires IT access and requires that the learner use IT as a primary or basic medium of instruction.

When deciding to use ITs, you must always decide the purpose for which you have made the decision and what you expect to achieve from the content that will be produced: to support the learning process, or to instruct through the ITs itself? Like other IT based applications, IT based Distance Education also has its own strengths and weaknesses. We should identify these because it is important to know what they are especially if we are to plan and use them effectively (Fisseha, 2011).

Strengths:

- ***Individualization of learning:*** This means that people learn as individuals and not as a homogenous group. Information Technologies allow each individual to relate to the medium and its content.
- ***Interactivity:*** Interactivity is the way in which a person can relate to the content, go forward and backward in the content, start at any point depending upon prior knowledge instead of always in a sequential way.
- ***Distance and time insensitive:*** It does not matter where you are, or at what time you are even how the weather is, you can still access and learn from Information Technologies.
- ***High speed delivery and wide reach at low cost:*** There is instant delivery of information.
- ***Uniform quality:*** If content is well produced and is of good quality, the same quality can be delivered to the rich and the poor, the urban and the rural equally and at the same cost.

Weaknesses:

- ***High infrastructure and start up costs:*** It costs money to build ICT systems and to maintain them.

- ***Problems of reach and access:*** Everyone may not have equal access and skill; so not everyone benefits equally from the use of ICTs.
- ***Tend to create new class of knowledge rich/knowledge poor:*** Those who have access and knowledge through the media become richer and those who do not become poorer, widening the “knowledge or digital gap” between rich and poor.
- ***Hard to assess impact:*** Learning from ICT delivered content is difficult to assess since such learning is of a multidimensional and long term kind, rather than from immediate learning assessment as in a classroom test.

Since they are a mixed bag and it is necessary that we recognize both the strengths and weaknesses before planning to use them in our distance learning setup. It is more important that we need to recognize both sides because if we use a technology thinking it to be ideal one, but not aware of its limitations, we are likely to fail in our effort and then to believe that all Information Technologies are useless and inadequate in education.

Distance education is an educational activity, and therefore the core teaching functions of presenting the learning content, providing for assessment, planning for dialogue that we see in the classroom situation should also be present in the distance teaching situation. However, bridging the separation of time and space in Distance Education by using ICTs influences the way in which the specific processes of teaching are conducted as well as the ways that Distance Education institutions are organized to deliver teaching in this form.

2.4. Information Technology Adoption

The development of science and technology, especially the application of information and communication technologies (ICT) in the new era has greatly influenced life and working style of every society including teaching and learning in education. Before the detail review of information technology adoption, it is important to describe some definitions given on it. Different definition of IT adoption in organizations has been provided by different literatures such as decision to accept and use the innovation (Tan et al., 2009), the full use of innovation as intended by the designer (Bøving et al., 2004), and effectiveness and success of adopted IT based on acceptance of or satisfaction with IT (Al-Gahtani et al., 2007). Furthermore, Thong and Yap (1995) defined IT adoption as applying computer hardware and software solutions that provide

support of operations, management, and decision-making in organizations. Within this context, "adoption" refers to the stage in which a technology is selected for use by an individual or an organization. Typically, past adoptions of a new technology for education have signaled a confidence in its potential to alleviate a particular problem or to make a job easier or more efficient. Internet and World Wide Web technology, however, may provide a means of creating totally new learning environments, and it may be to that end that adoption is initiated.

Educational transformation and reform have become an urgent issue across the globe to meet the demands of new educational objectives in the knowledge-based economy (Barone et al., 2001). In order to realize the need for educational transformation, it is obvious that adopting (integrating) ICTs or educational technologies in the educational system is the first and the main issue. Educational technology is the practice of using ICT to facilitate learning and improve performance by applying appropriate technological processes and resources (Richey, 2008).

Since adoption is the process of accepting and continued use of product, service or idea, IT adoption in educational setting is the process of accepting and integrating educational technologies and hence it needs to consider passing through appropriate stages. According to Rogers et al. (1971), the process that need to be considered to go through before any adopting activities of technologies or product, service or idea are knowledge, persuasion, decision, implementation and confirmation. A potential adopter has to pass through certain stages before decision is made on whether adopt or reject an innovation or technologies. Rogers has been one of the number of researchers who has focused upon the adoption process which he defines as "the process through which an individual or other decision maker unit passes from first knowledge of an innovation or technologies, to form an attitude to the innovation to a decision of adoption or rejection to implementation of the new product, service or idea and to confirmation of his/her decision" (Frambach, 1993).

Knowledge: socio-economic characteristics, personality variables and communication behavior all relate to innovativeness. Innovativeness is the degree to which an individual or other adoption unit is relatively early in adopting new product, service or idea compared to other members of a system. According to Rogers, early adopters have more formal education than later adopters and are more likely to be (socio-economic characteristics).

Persuasion: the potential adopter's attitude towards the innovation is formed in this stage. By anticipating and predicting future use satisfaction and risk of adoption, the potential adopter develop positive or negative attitudes to the innovation, which play important role of modifying the final decision. Perceived attitudes of an innovation as its relative advantage, compatibility and complexity are especially important (Rogers, 1995).

Decision: the decision stage occurs when an individual engages in activities that lead to adoption or rejection of the innovation. In this stage, the adopter starts to actively seek out information about the innovation that assists the decision making.

Implementation: in this stage, mental information processing and decision making come to an end but the behavioral change begins.

Confirmation: after the adoption of innovations, the adopter keeps evaluating results of his/her decision. If the level of satisfaction is significant enough, the use of innovation will continue, however, it is also possible that the rejection occurs after adoption. In the latter case, the reverse of previous decision is called "discontinuance".

2.5. Potentials for IT adoption

2.5.1. Development in ICT

ICTs can be viewed as a collective term for a wide range of software, hardware, telecommunications and information management techniques, applications and devices, and are used to create, produce, analyze, process, package, distribute, receive, retrieve, store and transform information (Porter et al., 1985; Brady et al., 2002).

Nowadays, the widespread uses of ICTs are changing the way people or companies work. It is a feature of the technological advancements of this period in history where there has been immense innovation in information management and communication so that in many countries, information and knowledge are easily conveyed, accessed and used. Thus, the pace of technological change and what is available for use by institutions has revolutionized how they interact and do business.

In the eighties with the question of how to use computing *for* education rather than simply educating *about* computing, the issue of introducing ICT in to schools has been began. Starting from the mid-nineties, the use of ICTs in schools rapidly expanded in developed nations through curriculum support, networking, the professional development of teachers and software improvements (Aston, 2002).

A growing number of researchers and educators began to develop applications that used hypertext, multimedia and networking to build learning environments aimed at improving learning. However, these applications were initially found to be ineffective in attaining better results as compared to learning outcomes achieved through traditional pedagogies and assessed against traditional metrics. This has been because of that there was less development in ICT and shown largely influenced on teachers' and learners' lack of familiarity with ICTs and limitation of the technology flexibility, capacity and characteristic of user friendliness (Ungerleider et al., 2003). In recent years, following the development in ICT, bandwidth has greatly increased and enhancing users' familiarity for example with the Web and ICTs are contributing to adoption technology in education.

On the other hand, the improvements in the costs and capabilities of ICTs are changing the ways in which certain kinds of communications and coordination can occur (McGee et al., 2002). Therefore, it is important to take into account that to adopt IT systems and elements in education, the development in ICT is the first and the most trigger through which the adoption will be realized.

2.5.2. Information Technology Infrastructure

The infrastructure is one of the major activities which are needed to be available, at least on the threshold level. The infrastructure comprise of many assignments and just to list some are the telecommunication infrastructure, the different level of e-Government data centers, the different level of networking, the servers, computers, etc. This activity involves a heavy investment and requires a professional skill which is a scarcity in most of developing nations (Mesfin, 2010; Hare, 2007). In this regard, it is important to take the two major initiatives undertaken by Ethiopian Government, which are the WoredaNet and the SchoolNet.

2.5.2.1. WoredaNet

WoredaNet is one of the public network infrastructure established purely to link administrative components to make the government operations transparent, to make the government accountable, to increase citizen participation in government, etc (Mesfin, 2010). It is under direct management of the Ethiopian ICT Development Agency (EICTDA) with the responsibility to design rules and regulations on how to use it. The network consists of National Data Center in Addis Ababa under EICTDA, 11 regional Data centers at the regional capital cities of each national states and at two City Administrations (Addis Ababa and Dire Dewa) and more than 600 Woreda centers located at the main towns of each woreda (Hare, 2007: WoredaNet - the United Nations: Mesfin, 2010).

According to (Lemma et al., 2011; Hare, 2007; Mesfin, 2010), in order to have the above structure within the network, the connection is through a combination of terrestrial and VSAT type. In the physical connection, more than 4,000 KM is optical fiber cable.

The main objective of this network is to provide ICT services such as video conferencing, directory, messaging, and voice and Internet connectivity at the federal, regional and lowest level of government throughout the country (Mesfin, 2010). Even though, based on the above objective, it provides Web Services through a series of web servers and pages that enable civil servants to access government restricted information, there is also accesses to content available on the internet on education, health agriculture and governance (Lemma et al., 2011; Mesfin, 2010).

With regard to training and distance education, various short term training programs have been conducted using the woredaNet video conference service. In addition to short term trainings, the system has also used for distance education services. For instance, in 2007/08, the ministry of justice uses the video conferencing system to upgrading more than 2000 legal professionals to master level and Bahrdar University has used the system to support its undergraduate distance education program by providing tutorial to its students in 7 central woredas all over the country (WoredaNet - the United Nations and Mesfin, 2010).

According to Mesfin (2010), using the video conferencing, the Instructors at the center provides training for trainees found in different woreda centers spread across the country. This has created an opportunity to train many people at one time and at a reduced cost. Training public servants

using videoconferencing has also helped to reduce service shut downs that may result from moving public servants long distances away from their working area for training (WoredaNet - the United Nations and Mesfin, 2010). According to WoredaNet - the United Nations, the Conference and training services conducted using the WoredaNet's video conferencing services in 2006-8 are summarized in the following table.

Table 2.1: Conference and training services conducted using the WoredaNet's video conferencing services in 2006-08.

	Activity	Number of participants	Number of hours
1	Meeting	8188	320
2	Education and Training	173665	1793
3	Workshop and Seminars	4725	72
	Total	186578	2185

2.5.2.2. SchoolNet

SchoolNet is another big network connecting different schools distributed all over the country. The network is implemented by the Ministry of Education and UNDP jointly is probably the most visible project in the country with schools equipped with networked computers per lab all connected to the Internet (Hare, 2007). According to Mesfin (2010) and Hare (2007), in addition to connecting the schools to the central network, the schoolNet allows to have extranet that will connect the schools.

This network infrastructure is designed to integrate ICTs into Ethiopia's educational system with the aim of providing quality education for all the Ethiopian schools. In addition to improving quality of the education, the system supports the teaching and learning process by giving a similar content to all schools independent of the geographical location: rural and urban (Mesfin, 2010). As indicated the data on the paper by Mesfin (2010), through this network, more than 765 schools are connected which are above 574 of them are high Schools and more than 191 of them are preparatory Schools. Classrooms in those networked schools are equipped with plasma screens and receive lessons via video broadcast for eight hours a day by satellite TV with content from the Educational Media Agency. Furthermore, in those schools there are opportunities to have access for digital library and internet (Mesfin, 2010; Hare, 2007).

Since, the synchronous access of the broadcasted materials is stored on the servers and later accessible based on the need of the individual Schools. The network solves a number of problems associated to the educational processes, like unavailability of qualified teachers in different subjects, the shortage of educational materials, inconsistent content delivery of the same subjects in a different locations, etc (Mesfin, 2010; Hare, 2007).

2.5.3. ICT Policy and Strategy

Policies, standards, guidelines are block stones in realizing concrete results to the citizens. The national ICT policy and the ICT for Development (ICT4D) strategy are the governing component in a successful e-Government activity. The different standards and guidelines are also facilitating the seamless interactions between different e-Government initiatives. The ICT policy and the e-Government strategy are the leading assignment to be handled in this regard and based on the countries demand some other standards and guidelines in localizations, etc (ICT4D, 2006, Mesfin, 2010; Belay, 2015).

Ethiopian national ICT policy and the ICT4D strategy which gives a comprehensive list of concentration areas in ICT and e-Government to support public sectors: like health, education, agriculture, justice, etc (Mesfin, 2010; Hare, 2007). The ICT in Education Implementation Strategy and its corresponding Action Plan are components of a wider Ethiopian national e-education initiative. This initiative forms one of the pillars of the ICT for Development 2010 Plan (ICT4D, 2006; Hare, 2007). The strategy is built on three main streams:

- Ethiopian National SchoolNet Initiative
- The National ICTs in Higher Education Initiative
- The National ICT Education, Training and Awareness Initiative

These three streams form the basis for the implementation of the strategy across the education sector. The National SchoolNet initiative, for instance, is aimed at the deployment and the exploitation of ICTs to facilitate the teaching and learning process within primary, secondary, technical and vocational schools. The ICTs in Higher Education Initiative focuses on deploying ICTs within the universities, colleges, and research institutions. And, finally, the National ICT Education, Training and Awareness initiative promotes ICT awareness and literacy, lifelong and

adult education, and distance and virtual education and learning. The strategy also identifies strategic goals and draws up a program and activities for each initiative.

Both the national ICT4D 2010 Plan and the ICT in Education Implementation Strategy recognize ICT as an enabler for widening access to education for the Ethiopian population, for supporting literacy education, and for facilitating educational delivery and training at all levels (Hare, 2007; Belay, 2015).

2.5.4. The need for Distance Education

As discussed earlier, to adopt information technology in distance education, having ICT infrastructure and proper ICT policy and Strategy are the main potential preconditions. Furthermore, the need (with its degree of interest) for distance education in the society is the one that can be determinant even to have the ICT infrastructure and ICT policy and Strategy. Nowadays, there is a growing deed for distance education in Ethiopia for a variety of reasons (MoE, 1999; EMA, 2001). Some of these reasons related to access, capacity building and educational costs while others are associated with capacity building.

Expanding access to secondary education: Thousands of adults and out-of-school youth are living in the countryside where opportunities for secondary education are not available. Many of these people are concerned to obtain secondary schooling or other types of further education. In order to receive advanced schooling, some people are transferred or migrated to urban centers where opportunities for further education are accessible. Distance education programs greatly reduce the need for out-of-school youth and adults living in rural areas to move to the cities for education.

Improving the flexibility of education with working conditions: There are many reasons why it is difficult or impossible for learners to make use of the available educational opportunities no matter how much they would like to learn or where they are located. For instance, farmers need to care for their fields and cannot attend school regularly. In the evening transport facilities are often unavailable between schools and their homes, and few rural schools have electricity for night classes. Full-time workers have similar problems. Distance education creates opportunities for these individuals to pursue their learning at their convenience wherever they are.

Improving the competence of teachers in primary education: Ministry of Education has recognized that the importance of distance education for upgrading professional competence of school teachers. According to the new policy, the previous 6-2-4 system was changed to an 8-2-2 system. As a result of the change, there was a need to upgrade about 7,738 under-qualified teachers in the first cycle and 21,651 in the second cycle of primary education (EMA, 2000). Following this, the magnitude of the upgrading requirements was beyond the capacity of the teacher education colleges in the country. Also, the usual summer upgrading courses that had been in use for many years were too limited to meet the training needs. Thus, Distance Education was chosen as the best alternative to train this large number of teachers in a short period of time at the desired level of quality.

Reducing educational costs: According to MoE (1999), the national budget allocated to education has increased from 13.7 percent of the total government annual budget in 1995/1996 to 19 percent of the total budget in 1999/2000. The Ministry of Education recognizes that following only conventional methods of education to meet the objectives for expanding the system may not be financially possible for the government. Thus, the Ministry is committed to expanding the role of distance education, as well as encouraging non-formal education and the expansion of private education to help meet the growing needs for education.

Based on the increasing demand for distance education, Ministry of Education has initiated a distance learning initiative using video-conferencing with the Indira Gandhi National Open University in India. The project has started accepting students, mostly teachers, and offering master's degrees in economics, marketing, and business administration. The project is in collaboration with Addis Ababa University, Haromaya University, and St Mary's College (Hare, 2007).

2.5.5. Learners' Attitude

Web-based learning approaches were found to be a promising alternative to conventional education process, especially beneficial to remote students and for lifelong education (Gunasekaran et al, 2002). Parker (2003) argued that the learners who are comfortable with technology and have a positive attitude towards it are more likely to succeed within an e-learning environment. Shashaani (1994) stated "computer experience is positively related to computers

attitudes” and the author pointed out “students’ attitude towards computers is a critical criterion in the evaluation of computer courses and in the development of computer-based curricula”. For students, e-learning offers individual empowerment with greater control over their own learning. It allows improved flexibility over the time, place and mode of study, and makes learning resources more convenient.

As many research studies indicated, organizations, especially educational institutions, are working intensively on adopting information technology into their system and this is with the aim of enhancing organizational competency. However, we need to note that merely adding technology to current instructional methods or attempting to impose a traditional format on a technology supported learning environment is likely to produce inferior learning outcomes. There is need to examine the learners’ attitude in order to the students take more responsibility of the learning process while the lecturer takes the role of the facilitator. Even though attitude can be described in variety of attributes, for this research it is important to see in the following points.

Access to Technology: Students’ level of access to technologies represents an initial factor that would shape their attitudes towards e-learning, and their willingness to use it. This meant that the availability of reliable ICTs and the convenience of accessing these technologies reflect student attitudes toward e-learning. Access to the necessary ICT infrastructure is one of the most important issues that come into focus in the assessment of how developing countries have progressed in e-learning. The traditional means of learning, which are paper-based, are still the most commonly used in contrast to the web-based and online learning methods Gulati (2008).

Tekinarslan (2008) examined computer anxiety and accessibility of personal computers between two groups of Dutch and Turkish students. The results of the study showed that the Dutch students had lower computer anxiety levels and higher levels of technology use than the Turkish students. This was explained by the relatively high levels of computer access and computer usage of the Dutch participants. Thus, in general, accessibility of technology tends to affect student and instructor attitudes and competencies and correlates positively with the level of technology use (Agyei et. al., 2011).

Technology Use and Skills: Over the last few decades there has been increased use of computing devices (information technology) in educational institutions even in developing countries (Deb, 2011; Trucano et. al., 2012). The use of the web, computer, and mobile-based technologies has drawn a lot of interest among students, who use them for educational purposes as well as for social networking. This at least implies a degree of familiarity with these technologies and the skills for using those for education (Trucano et al., 2012). Many research studies identified that positive computer experience, competence and comfort with computers have developed positive attitudes toward the information enabled education specially, e-learning (Papaioannou et al., 2011; Paris, 2004).

Satisfaction with Technology: Student satisfaction with e-learning environments was examined in several studies (Zhu, 2012). Positive learning climate and performance expectations affect student satisfaction, and performance expectations provide the greatest contribution (total effect) to learning satisfaction. Users (students and instructors) will hold positive attitudes towards e-learning if they recognize that it would help them improve their learning and teaching effectiveness and efficiency (Rahamat et. al., 2012). Chen et al. (2012) stated that understanding student attitudes can help expand e-learning system functions and meet student needs, which should further increase the impact of learning and enhance satisfaction with the learning process. Aixia et al. (2011) found that the vast majority of students who were satisfied with an e-learning environment held positive beliefs and attitudes towards it.

2.6. Related Research Works

Distance Education is a mode of delivering education and instruction, often on an individual basis, to students who are not physically present (such as full-time workers, military personnel, and individuals in remote regions) to attend classroom lectures in a traditional setting. Distance Education provides "access to learning when the source of information and the learners are separated by time and distance, or both" (Honeyman et al., 1993).

According Mulatu (2014), even though the provision of an opportunity to learn without being restricted by geographical or time constraints is a major factor behind the growth of Distance Education programs, the media of delivery was mainly has depended on the printed materials for long time: it is regarded as old period of Distance Education.

But nowadays, the area of DE is reaching at its bright age with the support of information technology and the internet: it is regarded as new period of Distance Education. With this transformation, old to new, applying information technology in the Distance Education is a sign of a new period for the area. Education which is based on information technology is characterized by its flexibility, communication, active learning, Collaborative and motivational nature (Farajollahi et al, 2010). Thus, using information technology transforms and changes mental models of distance education, enriches the present educational trends more than before and brings new developments. These trends and developments share the features of education that is based on technology and suggest modern educational and learning approaches in which the learner plays an important role and emphasizes on Self-directed learning, independent, flexibility and communication.

This review of related works has tried to show works done by researchers that are related with benefits and the challenges of implementing IT in distance education.

2.6.1. Benefits of IT Adoption on Distance Education

The adoption of E-learning in education, especially for Distance Education institutions has several benefits, and is giving its several advantages and benefits, e-learning is considered among the best methods of education. Several studies and authors have provided benefits and advantages derived from the adoption of e-learning technologies into schools (Algahtani, 2011; Hameed et al, 2008; Nichols, 2003).

Valentina et al. (2014) have discussed several advantages of adopting Information technology in education as e-learning (in higher education) in their paper by reviewing different literatures. Accordingly, the core idea behind the benefits of adoption of e-learning is its focus on the individual learner's side (even though considering the institutions' and instructors' convenience). The authors have shown this in different dimensions:

- The flexible nature of e-learning with time, space and pace that is as convenient mainly as to the learners.
- It Gives opportunity of accessing huge amount of information by creating ease of access and encourages learners' participation through discussion forums especially for those who fear talking in front of others.

- It reduces learners cost of traveling to schools and institutional cost of having many buildings while enrolling many learners.
- It provides compensation for the limitation of academic and other staff.

This mode of education offers an important alternative way of learning for those who have disabilities without need worrying about the geographical constraints that make learning difficult. According to Tung (2009), integrating e-learning with distance education provides an opportunity to educate military learners who cannot leave their post to attend residential education for a long period of time and to deliver military courses which requires frequent interactivities.

2.6.2. Challenges of IT Adoption on Distance Education

With the many benefits of adopting Information technology on distance education, there are also many challenges with its implementation. Those will be discussed as to organizations (educational institutions) and to individuals (learners).

Organizational Challenges: Implementing Information Technology in education (e-learning) requires academic and other staffs to be skilled in order to carrying out the learning and teaching process. Khan et al. (2012); Ajadi et al. (2008) have discussed that organizations have to train their staffs to have skills of using instructional technology, positive attitudes and beliefs towards the benefits of integrating those technologies in education. According to (Khan et al., 2012), most often in developing countries, many of academic organizations, stakeholders and governments know that investing on Information Technology can enhance the learning and teaching activities using computer but it is not supported with clear vision and developed plan. “Effective implementation of ICT in education is not merely a vision; rather, it needs a proper plan, policies, execution and monitoring. ICT integration is clearly related to actions taken at the school level, such as the development of an ICT plan, ICT support, and ICT training which is a major constraint for most developing countries” (Tondeur et al., 2008). Whenever we think to implement Information Technology in education, it is required that the development of IT infrastructure that is the back bone of the system and it includes supplies of computers with their proper maintenance, proper internet connection and other accessories. According to Gulbahar (2007) and Ajadi et al. (2008), in today’s e-learning environment is suffering from weak or lack of the proper Information Technology infrastructure (due to very high primary cost of

infrastructural development) especially in developing countries like Bangladesh and Nigeria. In addition to the factors mentioned above, there are other factors that directly and indirectly influence the effective implementation of ICT in education like poor administrative support lack of appropriate staff training and quality training for teachers and school principles (Ajadi et al., 2008; Keengwe et al., 2008; Tapan, et al., 2009). Furthermore, it is the fact that Implementing Information technology in distance education is permanently affected by the problem related to the instability and unavailability of required electricity in those developing countries (Ajadi et al., 2008).

Individual Learners' Challenges: The challenges related to individual learners are many as compared with that of to the organizations. According to the literatures reviewed in this paper, these individual challenges are due to low income and are available mainly in developing countries. According to Khan et al., (2012) and Ajadi et al., (2008), the cost of a Personal Computer (PC) and Laptop, internet connection and lack of proper software (with its cost and development complexity) are the problems of most individual learners in those countries and these in turn constrained the implementation of IT in distance education.

The individual learners' skill in using computers, related software and other learning technologies is also among the challenges that learners are facing. According to Valentina et al. (2014): Khan et al., (2012) and Ajadi et al., (2008), learners who are with less skills in using internet to access the delivered learning resources and for online registration, installing software according their application and need are not effective in their learning and it is the fact that it makes implementing effective IT based learning difficult.

Learners' attitude towards the e-learning is affecting the area. As Valentina et al. (2014) and Hatcher & Yen (2005) have stated, most students are reluctant to take responsibility for their own learning instead they are depending on their instructors' pressure and direct instruction (like spoon feeding) and it has its own negative impact implementing effective Information Technology in distance education.

CHAPTER THREE

3. Methodology

This part of the study presents research methodology and it contains study area, study design, target population, sample population, sampling techniques, sample size, data collection method and data collection procedure.

3.1. Study Area

Ethiopian National Defense distance education program was established in 2002 as human resource capacity building and development center under the training main department with about 36 teachers and 4,269 students of grade 5 up to grade 8. Then in 2004, it has been developed with its intake capacity to accept grade 9 up to 10. In the last 3 years (from 2014) as the demand for distance education in the army is increased, the number of students is increased and class levels it comprised are grade 7 up to grade 12.

Distance Education is one of the two educational settings available in the Ethiopian national defense force. This army Distance Education is still with the old educational trend that is the media of delivery mainly based on the printed materials. Therefore, this area is selected for the research because that it is an educational institution, it has also better opportunity to be run with the new technology and accept any technological changes easily. The other reason that army Distance Education is selected for this research is that there is very low learners satisfaction, and therefore, it is very important to examine the current practice and discover the potentials for IT adoption in the system.

3.2. Study Design

The study design is one of the main parts of a research. Therefore, it is important to choose the appropriate research design in order to achieve the study objectives. Researchers can use different types of design depending on the type of problem, the knowledge already available about the problem and the resources available for the study (Yogesh, 2006). Results of a research can be presented in the form of certain quantity (number, graph, table) based on statistical or other measurements which are used to investigate the *what*, *where* and *when* aspects of situation and are not in descriptive manner. Such kinds of results are obtained from

quantitative research (Rajasekar et al., 2013). In the other way, research results can be presented in the form of patterns which are non-numerical, in terms of descriptive words and are used to investigate the *why* and *how* aspects of situation. These types of results are obtained from the qualitative type of research (Rajasekar et al., 2013).

In many cases, results can be presented in both forms quantitative and qualitative. In this case both research types (based on measurements and the form of patterns) in combination are used. Therefore, in this exploratory research, in order to incorporate results based on measurements and the form of patterns: both quantitative and qualitative research designs are applied. For the quantitative method self administered questionnaires are designed whereas for the qualitative data collection methods such as in depth interview, focus group discussion and observation are employed.

Responses from the questionnaires, in depth interview, focus group discussion and observation are analyzed and interpreted in a complementary manner with relation to empirical evidences in the nature of Distance Education and potentials for Information Technology adoption.

3.3. Study and Sample Population

In the army distance education department, there are about 26,000 (from grade 9 to grade 12) students enrolled within 5 centers and about 40 permanent academic staff (teachers and office heads /coordinators). In addition, there are many short term and long term contract teachers (tutors). The population of the study will consist of the permanent academic staff (teachers and office heads /coordinators) and students in order to get detailed and relevant information about the Distance Education process, IT skill, awareness and attitude on IT based Distance Education (of students and staffs), and ICT infrastructure.

The sample population for this study was made of permanent academic staff, office heads and coordinators (from Distance Education department and from the selected center) and grade 9 to grade 12 students from the center of Distance Education found in North Command (contains 4 sub-centers). These sample populations are considered to be selected because it is expected that they will have more experience about the Distance Education system and the relevant information to the research than the lower grades (Grade 7-8) and the contract staffs.

Furthermore, since the army is distributed in almost all parts of the country, the Distance Education system is stretched to address the wide area coverage. But, due to time, budget and other resource constraints to address the entire population of the army Distance Education with this research is very difficult. Hence, the sample population will be taken from one center of Distance Education within the army Distance Education department that covers wider area and contains more than 6000 (grades 9-12) students and it is bigger number than the other centers. In addition, the reason to select one Distance Education center is the similarity of the learning/teaching activities or practice within the army Distance Education.

3.4. Sampling Technique

The traditional sampling methods can be divided in to two categories: probability and non-probability (Saunders et al., 2000). Probability sampling is the most commonly associated with survey based research where researcher needs to make inferences from the sample about the population to answer the research questions or to meet research objectives (Saunders et al., 2000). In probability sampling, sampling units are selected randomly and, if done properly, probability sampling ensures that the sample is representative (Hair et al., 2003).

Non-probability sampling provides a range of alternative techniques based on researcher subjective judgment (Saunders et al., 2000). In non-probability sampling the selection of elements for the sample is not necessarily made with the aim of being statistically representative of the population. Rather the researcher uses the subjective methods such as personal experience, convenience, expert judgment and so on to select the elements in the sample. As a result, the probability of any element of the population being chosen is no known (Saunders et al., 2000).

Based on their suitability for this research, cluster sampling (probability sampling), convenience sampling and purposive sampling (both are non-probability sampling) techniques are be used.

Here, the entire population of the army Distance Education (DE) system is organized in to five centers (DE center 1, DE center 2, DE center 3, DE center 4 and DE center 5). From these five centers one is selected for the study which is the DE center 5 and found in Tigray region. The reason why this center has been chosen is that the cost implication (time, financial and other resources) for the research study and since it contains the larger number of learners (more than

6000 students: grades 9-12) than the other DE centers, data from it would provide rich information for the study.

The learners in this center are further clustered into seven clusters based on geographical locations and three of them are selected based on their convenience for the research time, financial and other resource limits. Finally, the learners in each of the three clusters are sub grouped into four clusters based on class levels (grade 9, grade 10, grade 11 and grade 12) and the number of subjects from each cluster is determined using the proportion method.

Furthermore, in this study, the head of the army distance education system and center/sub-center coordinators who are experienced in the phenomena being researched are eligible (purposely selected by the researcher) for participation in the interview. In addition, using the purposive method, selected teachers are involved in the focused group discussion.

3.5. Sample Size

Since the researcher wanted the study result to generalize to the whole of the army distance education system, the cluster and convenience sampling techniques for the questionnaire were applied whereas purposive sampling techniques for interview and group discussion were used.

For the quantitative study the population size that is the number of learners in the three sub-centers were identified. The population size identification was done by communicating to the head of the army DE and it has been found that a total of 725 population size was identified then using sample size calculator (see appendix VIII for the formula) sample size of 181 has been determined.

Since the population size differs in each class level, the population was organized in a cluster then, percentage of each cluster in regard to population size 181 was calculated and proportional method has been used to calculate sample size for each class level.

$$\text{Size of representatives from each cluster (\%)} = \frac{n}{N} \times 100$$

Where:

n = sample size

N = total population of the final four clusters

The population size was limited on the basis of the number of learners from grade 9 up to grade 12. Table 3.1 shows the number of learners (grade 9 - 12) and sample size.

In addition, using purposive method, a total of 10 participants (teachers from permanent academic staff) were addressed by focus group discussion. Furthermore, 05 heads and coordinators in the distance education system (01 head of the army DE department, 01 head of DE center 5 and 03 coordinators of the sub-centers) have involved in the interview. Finally, a total of 206 participants have participated.

Table 3.1: Sample size of each cluster (class level)

No.	Cluster	Population	Cluster sample sizes
1	Grade 9	232	58
2	Grade 10	185	46
3	Grade 11	200	50
4	Grade 12	108	27
Total		725	181

3.6. Data Collection Instruments and procedures

Researchers who used mixed methods employed a research design that uses both quantitative and qualitative data to answer a particular question or set of questions (Sharlene et al., 2010). According to (Sharlene et al., 2010), a mixed method is a rich field for the combination of data. In this study, multiple approaches, which combined both qualitative and quantitative methods, were adopted in a complementary manner. That means, the intended information for the present study was acquired through questionnaires, interviews, focus group discussion and observation were used to compare with and enrich the data obtained through questionnaire.

3.6.1. Questionnaire

The researcher preferred questionnaire as the main data gathering instrument because it tends to be more reliable; it is anonymous, it encourages greater honesty and it is more economical in terms of time and money (Louis, et al., 2005). Questionnaire was used commonly to gather data for non-descriptive survey. However questionnaires can only produce valid and meaningful results if the questions are clear and precise and if they are asked consistently across all respondents and therefore, careful consideration needs to be given to the design of the questionnaire (Mathers N, et al., 2007).

In order to gather the appropriate information about current practice of the army Distance Education system and access and skill level of using Information Technology, questionnaire was set for students. All of the questions in the questionnaire were written in Amharic, as the researcher believes that respondents could understand the questions easily.

Questionnaire was structured with closed-ended type. Accordingly, most questions were consisted of items prepared four and five points in Likert's scale and the rest are multiple choice items for respondents. The Likert's scale style items, for access level, value ranges from: "Don't know this technology" (1), "No Access" (2), "Limited Access" (3) and "Full Access" (4), and, for skill level, value ranges from: "Don't know this technology" (1), "Very Poor" (2), "Poor" (3), "Good" (4), and "Very Good" (5). These types of scale were important for researcher because it helps to know respondent's feeling. In addition, it helps the respondents to choose one option from the given scales that best aligns with their views.

The questionnaire has three parts. The first part of the questionnaire deals with the personal background of students. The second part is directed to the current practice of army Distance Education system (Course Material Distribution and the Availability and Convenience of Library Service) whereas the third part is directed to access and skill level of using Information Technology.

Before anyone can start on the main stage of distributing, it is crucial that the draft questionnaire is piloted and should never use a questionnaire which has not been piloted, particularly if the questionnaire is designed for self-completion and there will be nobody around to clear up misunderstandings. A pilot stage will enable the researcher to ensure that: all the relevant issues are included, the order is correct, ambiguous or leading questions are identified, and, you have not forgotten or omitted some issue which is really important to the respondent (Maria T. et al., 2005). Therefore, the questionnaires have been pretested on 20 randomly selected distance learners, and necessary modification has been made to improve the quality of the instrument to improve for the final study.

3.6.2. Interview

Interview is a type of survey where questions are delivered in a face-to-face encounter by an interviewer. Interview is like a conversation and has the purpose of obtaining information

relevant to a particular research topic. It is initiated by the researcher and is focused on specific content (Abiy et al, 2009).

In this study, to get further information, interview has been conducted with the administrator of Distance Education system and coordinators of distance education centers who are small in number and their position is important in describing the current status and its implementation of ICT in the Distance Education system. The above participants knew the strength or opportunities and weakness or challenges of the system with regard to status of ICT infrastructure in and around the system.

For this purpose, unstructured interview method was used to collect the necessary data from the respective interviewees. The process of interview was conducted in Amharic language and supported by Audio recorders in order to minimize loses of audio information.

3.6.3. Focus group discussion

Focus group discussions are types of survey where face-to-face discussions are held on designed questions and mediated by the researcher. Focus group discussion is like a meeting and has the purpose of obtaining information relevant to a particular research topic (Freitas, 1998). It is initiated by the researcher and is focused on specific content. Focus groups can reveal a detailed information and deep insight. When well executed, a focus group creates an accepting environment that puts participants at ease allowing them to thoughtfully answer questions in their own words and add meaning to their answers (Maria et al., 2005). Even though surveys are good for collecting information about people's attributes and attitudes but focus group discussion is also important to understand things at a deeper level.

In this study, to get further information, focus group discussion has been conducted with the teachers/tutors of Distance Education. Their experience is important in describing the perception and attitude towards the implementation of ICT in the army Distance Education system. For this purpose, to collect the necessary data from the respective participants, unstructured focus group discussions method was used. In order to help the participants able to forward their idea easily, clearly and in understandable manner, the process of the discussion was conducted in Amharic language. In the discussion, ten permanent tutors have involved and the session was held in

Addis Ababa, at the office of the army DE department found in Bella area and it has taken two and half hours.

3.6.4. Observation

Observation is another useful approach to data collection that relies on the direct observation of the construct of interest. Observation checklist was also employed to observe the overall status (IT Infrastructure, Purpose of the IT infrastructure, Learning materials on the hand of learners, Availability of necessary facilities in tutorial classroom) of the distance education centers.

3.7. Methods of Data Analysis

Before commencing the data analysis, the questionnaires were checked for response accuracy. And it was found that only 02 or 1.1% questionnaires of the student participants were not filled properly as the result they were rejected. Therefore, we can say that almost all students' responses (179 or 98.9%) were good to be included. After the questionnaires were returned from the respondents, the process of encoding was carried out using the Statistical Package for Social Science (SPSS) version 20. The data collected through closed ended questions were organized, coded and presented. Then the data obtained through different methods of data collection were organized, categorized and interpreted. For this purpose statistical tools were used to analyze the data. Those statistical tools were descriptive statistics to show frequency and percentage. Qualitative data were analyzed manually. Some speech marks from the qualitative data that best explain the perception and attitude towards the implementation of ICT in the army Distance Education system and the overall status of IT infrastructure around the army Distance Education centers were identified and presented by the participants own words in parallel with the quantitative information to give more insight for the study.

3.8. Reliability of Instruments

After the preparation of the instruments on variables of the study, tryout was done on the items to get reliability information. The preparation and testing the relevance and consistency of the items were done by consulting pertinent bodies that have knowledge and experience in testing and measurement.

The test has been conducted in DE center 5 (found in Tigray region) and DE center 1(found in Addis Ababa). From DE center 1, 05 tutors for focus group discussion and interview and From

DE center 5, 20 students for questionnaire (excluded from the sample size) were selected as participants. For ascertaining the reliability and consistency of the questionnaires, the software Statistical Package for Social Science (SPSS) version 20 was used. In the process, it was found that the items reliability needs to be improved by making some modification and dropping some items. As the result modification has been made and some items were dropped. Finally, the items for measuring the opinions of students gave the Cronbach reliability level as shown in the following table.

Table 3.2: Cronbach's Alpha of each item in the questionnaire

N _o	Description of items	Number of items	Cronbach's Alpha
1	Items related to learning material distribution	05	0.756
2	Items related to library service	05	0.772
3	Items related to students' level of IT access	08	0.935
4	Items related to students' level of IT skill	14	0.949

CHAPTER FOUR

4. Findings and Discussion

4.1. Overview

This chapter presents the findings of the study on the Potentials for IT Adoption in Distance Education: The Case of Ethiopian National Defense Distance education. The study sought to: examine the current Practice of the Army Distance Education system mainly on the learning Materials Distribution as well as the Availability and Convenience level of Library Service; find out the available IT infrastructure; teachers' IT skill and attitude towards ICT; learners' IT access and skill.

Data were collected through four types of data collection instruments: 1) self administered questionnaire distributed to 181 students in the DE center 5 which is found in the Tigray region; 2) unstructured interview presented to 01 administrator of the army DE and 04 coordinators of in DE center 5; 3) focus group discussion held with 10 teachers of the system, 4) observation secondary and preparatory schools. The quantitative data collected were fed into the Statistical Package for Social Sciences (SPSS) version 20 package and analyzed based on research objectives in chapter one.

4.2. Findings

4.2.1. Findings from Quantitative Data

4.2.1.1. Current Practice of the Army Distance Education system

This part has been designed to obtain data on the learning Material Distribution as well as the Availability and Convenience level of Library Service. The following are details of the findings.

4.2.1.1.1. Learning Material Distribution

In relation to practices of material distribution in the army Distance Education system, questions on media of delivery, ways of distribution, convenience level of distribution methods, problem with Distribution Method and quality of learning materials were presented for the respondents.

❖ *Media of delivering learning materials*

As shown in table 4.1 below, the participants were asked to describe the media of delivering learning materials in the Distance Education system. As the result indicated, most of the respondents (79%) have said that the main media of delivering learning materials are printed texts/modules and there are attempts to incorporate other Medias like audio and video.

The data gained through interview in this regard showed that even though the dominant one is printed texts/modules, all types (including audio and video recorded in CD/DVD) are used and the interviewees provided the following answer:

In addition to the printed texts/modules, contents of modules and plasma lesson are distribute with audio and video recorded in CD/DVD.

Table 4.1: Media of delivering learning materials

Media of delivering	Frequency	Percent
Printed texts/modules	143	79.0
Audio	3	1.7
Video	4	2.2
Audi –video	3	1.7
All type	26	14.3
No response	2	1.1
Total	181	100.0

❖ *Ways of distribution for learning materials*

The participants were asked to describe the ways of distribution for learning materials. Based on the result in table 4.2, most of the respondents (80.1%) indicated that the learners are getting learning materials from the distance education centers and some of them are from their tutors. In addition to the results presented in the table above, the data found through interview indicated that ways of distribution for learning materials are different types and it is based on the location of the army units but mostly learners get learning materials from DE centers in their vicinity.

The interviewees said that they are distributing learning materials via distance education center, via tutors, via courier and even in some areas by using helicopter flight.

Table 4.2: Ways of distribution for learning materials

Ways of distribution	Frequency	Percent
Via distance education center	145	80.1
Via tutors	26	14.4
Via courier	8	4.4
No response	2	1.1
Total	181	100.0

❖ *Convenience level of the media for delivering learning materials*

As shown in table 4.3 below, the respondents were asked to rate the convenience level of media for delivering learning materials. As the result indicated, most of the respondents (78.4%) said that the media for delivering learning materials is convenient. The response from the respondents indicated that they believed the distribution methods of learning materials are convenient. The administrators' answer in the interview with this regard was:

Even if based on the army location and nature of mission is not 100% convenient, it is in a better state of convenience and we are periodically observing and supervising the process.

Table 4.3: Convenience level of distribution methods of learning materials

Convenience level	Frequency	Percent
Strongly convenient	61	33.7
Convenient	81	44.7
Neutral	5	2.8
Inconvenient	19	10.5
strongly inconvenient	13	7.2
No response	2	1.1
Total	181	100.0

❖ *Problem with Distribution Method*

The respondents were asked to show the problems that they faced with regard to learning material distribution methods. Even though the Distribution Methods for learning materials used

by the DE system are described as convenient by the learners, there are also problems that are hindering the effectiveness of the students learning.

As seen from table 4.4 below, the main problems available with the distribution methods are described as shortage or incompleteness of learning materials (36.5%) and taking long time to be received by students (35.4%).

Table 4.4: Problem with Distribution Method

Problem type	Frequency	Percent
Delay of learning materials	64	35.4
Remoteness of distance education centers	35	19.3
Shortage/incomplete of learning materials	66	36.5
Others	14	7.7
No response	2	1.1
Total	181	100.0

❖ *Quality of learning materials*

Quality in any learning material delivery is important and it acts as an indicator of the effectiveness of teaching/learning process. Students were asked about the quality level of learning materials. The study revealed that most of the respondents have described their levels of satisfaction with the quality of the learning materials is low and it is shown in table 4.5 below. As the result indicated 104 or 57.5% of the respondents has described the quality of the learning materials given to them are not even good enough to be used as resources.

Table 4.5: Quality of learning materials

Quality level	Frequency	Percent
very poor	72	39.8
Poor	32	17.7
Good	58	32.0
very good	17	9.4
No response	2	1.1
Total	181	100.0

4.2.1.1.2. Availability and Convenience level of Library Service

In relation to availability and Convenience level of Library Service in the army Distance Education system, participants were requested to provide responses on the issues of availability of library service, problems with related to unavailability of library services, students' time of use of the available library service, opening time of the available libraries and convenience level of opening time of the library.

❖ *Availability of library service*

Respondents were asked forward their idea on whether there is or not library service. Based on the result in table 4.6 below, most of the respondents (117 or 64.6%) said that they do not get library service and almost one third (62 or 34.3%) of the respondents indicated that they have access for library service.

Table 4.6: Availability of library service

Availability	Frequency	Percent
Yes	62	34.3
No	117	64.6
No response	2	1.1
Total	181	100.0

❖ *Problems with related to unavailability of library services*

As the result indicated in the table below, 60.7% of those who do not get access for library service have showed that they encountered problems in their learning and they are 39.2% of the total participants. Among those who are not getting library service, 39.3 % (they are 25.4% of the total respondents) indicated that they do not have any problem with related to unavailability of library services. From the participants, 62 or 34.3% have ignored for the question item because they do have access for the library services. Therefore, most those who do not get access for library service believed that unavailability of library services affects their learning.

Table 4.7: Problems with related to unavailability of library services

Availability of problem	Frequency	Percent
Yes	71	39.2
No	46	25.4
Ignore	62	34.3
No response	2	1.1
Total	181	100.0

❖ Students' time of use of the available library service

Based on the results in table 4.8 below, 79% of respondents, those who have access or 27% of the total participants, have said that they are using the library service ranging from one day per week up to everyday. Those who have ignored the question item are respondents with no library access. A few numbers of respondents (8 or 12.9%) of those who have access for library are using the service accidentally. Therefore, the result indicated that most of the learners with access for library are using the services provided by the available library frequently.

Table 4.8: students' time of use of the available library service

Students' time of use	Frequency	Percent
Everyday	13	7.2
More than one day per week	28	15.5
One day per week	8	4.4
One day per month	5	2.8
Accidentally	8	4.4
Ignore	117	64.6
No response	2	1.1
Total	181	100.0

❖ *Opening time of the available libraries*

As indicated in the table 4.9, among the respondents 58% of those who have library access or 19.9% of the total participants said that the available libraries are providing services everyday and on working days and hours. The response of 26 or 41.9% respondents from those who have library access or 14.4% of the total participants have indicated that the libraries are opened on weekends and during face-to-face tutorial contacts. From the respondents 117 or 64.6 have ignored question item because they do not have the access.

Table 4.9: Opening time of the available libraries

Opening time	Frequency	Percent
Everyday	23	12.7
Weekends	23	12.7
Working days and hours	13	7.2
During face-to-face tutorial contacts	3	1.7
Ignore	117	64.6
No response	2	1.1
Total	181	100.0

❖ *Convenience level of opening time of the library*

With regard to library opening, 87.1% of respondents with the library service indicated that the library opening times are suitable for the learners. From the respondents 117 or 64.6 have ignored the question item because they do not have the access.

Table 4.10: Convenience level of opening time of the library

Convenience level	Frequency	Percent
Strongly convenient	24	13.3
Convenient	30	16.6
Inconvenient	8	4.4
Ignore	117	64.6
No response	2	1.1
Total	181	100.0

4.2.1.2. Students' level of IT Access and skill

4.2.1.2.1. Access to IT

The learners' were asked to show their level of access for 8 technology types presented on the questionnaire and their responses indicated that the learners' access levels for three technology types are found that they are good and for the other 8 are low. Table 4.11 below presents the number of learner respondents (frequency) who have described their level of access for the 8 technology types as good and the result in percent from the total participants.

Table 4.11: level of IT Access

N_o	Type of technology	Frequency	Percent
1	Desktop computer	74	40.9
2	Portable computer	48	26.5
3	Digital camera	53	29.3
4	Mobile phone	169	93.4
5	Memory devices	106	58.6
6	Dial-up internet	56	31.0
7	Broadband internet	48	26.5
8	Wireless internet	87	48.1

Table 4.11 indicates that 169 or 93.4% of the 181 the respondents have the best access for mobile phone. Based on the result, access level of those participants for memory devices and for wireless internet are 58.6% and 48.1% respectively and it shows that it is better as compared to access levels for the other technologies which are in the range of 26.5% to 40.9%.

4.2.1.2.2. Level of IT skill

The survey result indicates that most of the learner respondents are in good level of skill on using information technology. The learners' were asked to show their level of skill on using 14 technology types presented on the questionnaire and the table below shows that most of the respondents ranging from 51.9 % to 98.4% have good skill on using the 9 technology types. The

technology types and the “good” responses of participants for their skill level in percent and frequency are presented in table 4.12 below.

Table 4.12: Students’ skill level of using Information Technology

N_g	Type of technology	Frequency	Percent
1	Using computer to store & edit digital Photos	106	58.6
2	Using computer to create PowerPoint Presentations	75	41.4
3	Using computer to edit audio & video	70	38.7
4	Using computer to play games	94	51.9
5	Using the internet to look up references	88	48.6
6	Using the Internet to send or receive email	110	60.8
7	Using the Internet to access social media	136	75.1
8	Using the Internet to download music/movies	108	59.7
9	Using the Internet to share photographs or other information	120	66.3
10	Using the Internet to make phone calls	90	49.7
11	Using mobile phone to text/SMS people	178	98.3
12	Using mobile phone to access information on the internet	130	71.8
13	Using mobile phone to send/receive email on the Internet	122	67.4
14	Using the internet to play games	77	42.5

As shown in the table 4.12 above 178 or 98.3% of the 181 respondents have described their skill on using mobile phone to send/receive text/SMS with people is good and 136 or 75.2% of the learner responses indicated that they are good on using the Internet to access social media. In addition, it is found that 130 or 71.8% of the learner respondents on using mobile phone to access information or other services on the internet, 122 or 67.4% of students on using mobile phone to send/receive email on the Internet and 120 or 66.3% of the participants on using the Internet to share photographs or other information have better skill. Furthermore, 110 or 60.8% and 108 or 59.7% of those participants are with good level of skill for using the Internet to send or receive email and for using the Internet to download music/movies are respectively. Based on the result shown in the table 4.12, 106 or 58.6% of the participants have better level of skill on

using computer to store & edit digital photos and 94 or 51.9% of the 181 learner participants are in good skill level for using computer to play games.

Even though the results in the table above indicated that the skill levels on using the other 5 technology types are poor as compared to the other 9 types, response of the learner participants on them are in between 38.7% to 49.7%.

4.2.2. Findings from qualitative Data

4.2.2.1. Tutors' attitude towards ICT

As literatures indicated, teachers' attitudes have been found to be major predictors of the use of new technologies in instructional settings. In one or another way, to successfully initiate and implement educational technology in school's program depends strongly on the teachers' support and attitudes. It is believed that if teachers perceived technology programs as neither fulfilling their needs nor their students' needs, it is likely that they will not integrate the technology into their teaching and learning. Among the factors that influence successful integration of ICT into teaching are teachers' attitudes and beliefs towards technology (Hew and Brush, 2007; Keengwe and Onchwari, 2008). If teachers' attitudes are positive toward the use of educational technology then they can easily provide useful insight about the adoption and integration of ICT into teaching and learning processes. (Demirci, 2009) conducted a study on teachers' attitudes towards the use of Geographic Information system (GIS) in Turkey. The study used questionnaire to collect data from 79 geography teachers teaching in 55 different high schools. The study revealed that though barriers such as lack of hardware and software existed, teachers' positive attitudes towards GIS were the important determinants to the successful integration of GIS into geography lessons.

Based on the fact that tutors' attitude on IT is one of the major predictors for adoption and integration of it into teaching and learning processes, assessing the army DE system tutors' attitudes was an important point to meet the objective of the study. Therefore, 10 tutors have participated in the focus group discussion and all of the tutor participants believed that information technology is playing an important role in education in general and specifically in Distance Education. The participants expressed the importance of IT for their day to day activities and for learners support in the teaching/learning process with the points shown below.

IT in education can help teachers and learners to find different alternatives for their teaching/learning activities. It can increase teaching and learning interests of teachers and learners with providing chance of getting updated and prepared in different media. Adopting/implementing IT in Distance Education is used to: prepare updated learning materials with different Medias (like audio and video). It enables tutors and learners uninterrupted communication and teaching/learning support. Having this, can increase tutors' motivation to work and increase their as well as students' performance. This is because of the IT based facilities (like e-library, on line student registration) can increase the quality of teaching/learning process. In addition, learning assessments and different activities that need bi-communication among tutors and learners will be done with speed (on time), quality and reliability.

4.2.2.2. Tutor's level of IT Skill

Many researches that have been conducted on teachers'/tutors' computer self-efficacy showed that it has greater effect on their use of ICT. Self-efficacy is defined as a belief in one's own abilities to perform an action or activity necessary to achieve a goal or task (Bandura, 1997). Therefore, computer self-efficacy is the level of confidence that individual has in his/her ability to use computer.

As Knezek and Christensen (2002) said that teachers' competence with computer technology is a key factor for effective use of ICT in teaching, in this research examining the level of computer skill of the tutors/teachers in the army Distance Education has been considered. Focus group discussion has been conducted on the issue of Tutor's level of IT skill with the army Distance Education tutors/teachers and the participants provide the following answers:

Most of them (7 or 70%) have better skill mainly on the basic computer applications (like word processing and Microsoft excel) and using internet (like searching for references and downloading resources). Those skill developments were gained through short trainings and personal efforts.

Some (3 or 30%) of the tutor participants have said their computer skill is a little bit poor but if they can get basic computer training it will be improved and they are waiting for such training in addition to their personal effort.

As the response given by the interviewees indicated that even if there is a need for additional training, most of the tutors/teachers have good skill level of IT. The interviewee response:

Learning materials are prepared by our tutors using computer (like organizing different texts from different references, editing, printing), recording audio/video resources in CD/DVD, communicating with different DE centers in the system through e-mail (like receiving and sending students data) and organizing students results with computer.

4.2.2.3. Status of IT infrastructure

Effective adoption and integration of ICT into teaching/learning process depends mainly on the availability and accessibility of ICT resources such as hardware, software, etc. Obviously, if teachers and learners cannot access ICT resources, then they will not use them. Access to ICT infrastructure and resources in educational settings is a necessary condition to the integration of ICT in education (Plomp, Anderson, Law, & Quale, 2009). Therefore, access to computers, updated software and hardware are key elements to successful adoption and integration of technology.

The data related to IT infrastructure was collected through interview and observation. As the response of the interviewees indicated that there is communication through email between the DE department and different centers which means there is either wired or wireless internet connection. In addition, according to interview made with the head of the army DE, they are on the verge of designing web site for the DE system.

According to the observation made by the researcher on four secondary and preparatory schools found in Mekelle city, Kuiha twon, Wukro town and Edaga hamus town, there is broadband internet connection, computer center and plasma setup in each school for educational purpose. The schools observed by the researcher are found around (near to) the army location.

4.3. Discussion

As found from the quantitative data, the survey result on the students' level of IT Access has displayed that most of the learners have better access for mobile phone, wireless internet and memory devices. Furthermore, the qualitative data with regard to IT infrastructure showed that there is already established infrastructure mainly for educational purpose. Hennessy S., (2010)

revealed that among the factors that enabling the effective IT adoption in Distance Education are the availability of appropriate IT infrastructure and learners' access to adequate technology and are clearly prerequisites for successful adoption. Access to the Internet is of particular importance for distance learning schools with its ability to providing access to the resources of the web.

If IT is to be used to support teaching and learning activities, then it might be expected that students also require a certain minimum level of IT skill (Khalid A. B., 2009). Based on research studies indication, if learners have a very poor base, it might be expected that teachers would find the burden of supplementing basic skills as barrier to IT application in their subjects. Hence it might be supposed that a basic level of student ICT skills would be a key enabling factor in IT adoption. Similarly, results in this research have shown that most of the learner respondents are in good level of skill on using information technology and can be considered as a basic skill level requirement.

Teachers' attitudes have been found to be major predictors of the use of new technologies in educational settings. According to Hew and Brush (2007) and Keengwe and Onchwari (2008) teachers who have positive attitudes towards IT will be positively disposed towards using it in their educational activities. In other ways, teachers with negative IT attitudes are even less skilled in using it and were therefore less likely to accept and use technology than those with positive attitudes. Therefore, the study result on the army Distance Education administrators' and teachers' attitude to use IT in Education has shown that almost all of the participants believed that information technology is playing an important role in education in general and specifically in Distance Education and it is positive for IT adoption in the system.

As, IT adoption in education related studies revealed, teacher's belief in their competence particularly in computer and IT in general is the greatest predictor of their use of IT in educational activities. In other words, lack of knowledge and skill regarding the use of IT has also limited the use of IT tools in teaching learning situation. According to Bordbar (2010), teachers' basic IT or computer competence is a major (positive) predictor of integrating ICT in teaching.

Therefore, most of the army Distance Education teachers have better skill mainly on the basic computer applications and using internet and it can be taken as a base for integrating IT the Distance Education system.

CHAPTER FIVE

5. Summary, Conclusion and Recommendations

This study aimed at investigating the potentials for Information Technology adoption in Ethiopian National Defense Distance Education system so as to examine operational practices currently used the system and identify the available problems with it, the level of the learners access and skill to use Information Technology, the position of skill and attitude of teachers and administrators to use IT in distance education and the state IT infrastructure in and around the army Distance Education. The final part of this thesis deals with summary of the major findings, conclusions and the recommendations which the researcher assumes to be operational are also forwarded on the basis of the findings.

5.1. Summary

After collection and checking for response accuracy of the data, relevant quantitative and qualitative methods of analysis was used, and this enabled the researcher to reach at some findings that are thought to be the answers to the basic questions of the study.

Findings of the study related to learning materials distribution of the army Distance Education system has shown that even though there are attempts to incorporate other medias (including Audio and Video recorded in CD/DVD) for deliver learning materials, The main and mostly used is printed texts/modules. Based on the survey responses it is found that most of the learners are getting learning materials from the distance education centers in their vicinity. Furthermore, response from the respondents (learners and administrators) indicated that the distribution methods of learning materials are convenient to the students. The students in their survey response said that even though the distribution methods of learning materials are convenient, there is problem with regard to delay and shortage or incompleteness of learning materials. And finally, the learners feel that the learning materials are poor in quality.

The results of the study with regard to availability and convenience level of Library Service have presented that there is no available library service for almost two third (64.6%) of the learners. As mentioned above, most of the learner respondents have no access for library service and it is found that most (60.7%) of them encountered problems in their learning. Many of the learner

respondents those who have library access are using the library service either everyday or one day per week. Most of the available libraries are providing the service everyday or on working days and hours but few are on weekends or during face-to-face contacts and the opening time of the available libraries are suitable for most of the learners.

The survey result on the students' level of IT Access has displayed that most of the learners have better access for mobile phone, wireless internet and memory devices. Furthermore, the learners were asked to show their level of skill on using 14 technology types and most of them have good skill on using the 9 technology types. Therefore, the study result has shown that most of the learner respondents are in good level of skill on using information technology.

The study result on the teachers' attitude to use IT in Education has shown that all of the tutor participants believed that information technology is playing an important role in education in general and specifically in Distance Education. It has indicated that there is good teachers' attitude to use IT in education. Furthermore, most of them (7 or 70%) have better skill mainly on the basic computer applications (like word processing and Microsoft excel) and using internet (like searching for references and downloading resources) but some (3 or 30%) of the tutor participants have said their computer skill is a little bit poor.

As the response of the interviewees related to IT infrastructure indicated that there is communication through email between the DE department and different centers which means there is either wired or wireless internet connection. In addition, according to interview made with the head of the army DE, they are on the verge of designing web site for the DE system. According to the observation made by the researcher with regard to IT infrastructure on four secondary and preparatory schools found in Mekelle city, Kuiha town, Wukro town and Edaga Hamus town, there is broadband internet connection, computer center and plasma setup in each school for educational purpose. The schools observed by the researcher are found around (near to) the army location.

5.2. Conclusion

Distance Education is highly essential to share the goals of conventional education, aims at providing access to those who are constrained (by different reasons) to attend the conventional education program and highly motivated population. With its importance, to provide students' freedom and program flexibility, offer useful learning opportunity to recipients at a time and local environment convenient to them, the delivery media play a crucial role in minimizing the gap between teaching and learning. In order to achieve their intended goals, Distance Education institutions are adopting (integrating) Information Technology into their teaching/learning activities. And to do so, it is the fact that identifying the available potentials with regard to adopting Information Technology on the Distance Education is vital. Based on the study results and summary, the following conclusions were drawn.

- The most common problems related to current practice of the DE system that students encountered are that the main (almost the only one) media for delivering learning materials is printed text/module type and they can find it from distance education centers in their vicinity. Therefore, we can conclude that those limitations on the medium and methods of delivery led to the problems related to dallying, shortage or incompleteness and less quality of learning materials.
- In addition to the above, in the existing DE system about two third of the total learners have no any access for library and hence they can't get any additional resources for reading or references. Therefore, it is possible to say that they are struggling to continue their learning with only the available, incomplete and less quality, printed texts/modules and consequently, their learning is negatively affected.
- The learners' access levels for Information Technology are good on the portable and personal owned devices as well as on the wireless internet. Therefore, we can conclude that with the mobile nature of the army, they are better to be considered as potential for Integrating Information technology (mobile internet based) in to the army Distance Education system.
- Most of the army Distance Education teachers and learners are in good level of skill on using information technology specially related to using computer and mobile phone based internet (like searching for references and information, sending/receiving e-mail

and downloading different resources) as well as sending/receiving text messages (SMS) using mobile phones. Furthermore, most of the teachers have better skill on the basic computer applications (like word processing and Microsoft excel. Therefore, it is an important opportunity found for IT adoption in the army DE system.

- Within and around the army Distance Education there is either wired or wireless internet connection and there is a plan to develop the army Distance Education web site. In addition to the above, there are broadband internet connection, computer centers and plasma set ups in almost all high schools found around (near to) the army locations. Therefore, those available IT infrastructures are huge potentials to adopt Information Technology in the army Distance Education system.
- The teachers of the army Distance Education system believed that information technology is playing an important role in education in general and specifically in Distance Education. Therefore, there is good teachers' attitude to use IT in education and it is an important ground to integrate IT within the system.

5.3. Recommendations

Distance Education is generally based on an indirect teaching relationship, using fundamentally self-teaching methods, with the teacher/tutor acting as a facilitator to activate the skills and situations needed for self-education. All effective Distance Education programs mainly depend upon good learning materials, effective student support, availability of IT infrastructure, teachers' and learners' attitude towards IT use and teachers' and learners' IT access and skill.

The existing army Distance Education system has been established to satisfy the need for educated manpower required by the national defense. But the system still applies the paper based educational delivery and it is not able to meet the high demand for flexible Distance Education.

- Therefore, It is recommended that the administrators of the Distance Education to consider that the system has to be information technology enabled in its educational practices to provide effective learning support services for students that suit their needs, characteristics, accessibility and availability of technology and institutional capacity.
- The study has identified that there are already established different Information Technology infrastructures around the army locations and they are developed for educational purposes

and hence it is recommended that the concerned bodies, specially, the education and training main department of national defense, have to use the available opportunities in order to transform the existing paper based DE system to modern and flexible Information Technology based system.

- The study has investigated that, within the army Distance Education system, there are available potentials with regard to teachers' and learners' IT skill and access, the administrators' and teachers' attitude towards IT use in education. Therefore, it is recommended that the higher leaders of the army have to recognize and convert those potentials in to valuable transformational practices for the IT adoption on the army distance education.

5.4. Directions for Further Research

This study was conducted to investigate the potentials for IT adoption in Distance Education particularly in the Ethiopian National Defense Distance Education. As such, there is still room for further research on the IT adoption in the Army Distance Education and in other institutions working on the field in general.

- First, future studies should be carried out on identifying the appropriate Distance Education model that will be best suited for the army Distance Education learners' needs, characteristics, accessibility and availability of technology and institutional capacity as well as implementation the identified model.
- Second, since this research has focused only on the army Distance Education, similar study should be conducted in other institutions like the private and under minster of education who did not participate in this study.

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APPENDICES

Appendix I: Questionnaire

Part one: Demographics Profile of the Respondent

Please, fill out this part of the questionnaire by putting a tick (√) symbol on one box that best represents your personal information for each item.

1. Gender: male female
2. Age: 18-25 26-33 34-41 42 and older
3. Grade: 9th 10th 11th

Part two: Questions on the Current Practice of the Distance Education system

Section I: Questions Related to Course Material Distribution

Please, fill out this part of the questionnaire by putting a tick (√) symbol on one box that best represents your opinion for each item.

1. Which media does your institution utilize in delivering learning materials?
 - A. Printed texts/modules
 - B. Audio
 - C. Video
 - D. Audio-Video
 - E. All types
2. How or where do you get the learning materials?
 - A. Via DE center
 - B. Via tutors
 - C. Via courier
 - D. Via post office
3. To what extent is the distribution method convenient to you?
 - A. strongly convenient
 - B. Convenient
 - C. Neutral
 - D. Inconvenient
 - E. Strongly inconvenient
4. With learning material distribution, what problems do you encounter?

- A. Delay of learning materials
- B. Remoteness of distance education centers
- C. Shortage/incompleteness of learning materials
- D. Other

5. How do you describe your level of satisfaction with the Quality of the learning materials distributed by the Distance Education system?

- A. Very low
- B. Low
- C. Good
- D. Very good

Section II: Questions Related to the Availability and Convenience of Library Service

Please, fill out this part of the questionnaire by putting a tick (✓) symbol on one box that best represents your opinion for each item.

1. Do you get library service from your institution?

- A. Yes
- B. No

2. If your answer for question 1 is “No”, did you encounter problem in your learning?

- A. Yes
- B. No

3. If your answer for question 1 is “Yes”, how many times do you use the library services?

- A. Everyday
- B. More than One day within a week
- C. One day within a week
- D. One day within a month
- E. Accidentally

4. If your answer for question 1 is “Yes”, when does the library give the service?

- A. Every days
- B. Weekends
- C. Working days and hours
- D. During examination
- E. During face-to-face tutorial contacts

5. If your answer for question 1 is “Yes”, to what extent the opening time for the library is convenient?

- A. Strongly convenient
- B. Convenient
- C. Neutral
- D. Inconvenient
- E. Strongly inconvenient

Part three: Questions for learners on level of Access and skill to Using Information Technology

Section I: Level of Access to Use Information Technology

Please indicate your level of access to different types of technologies (at work place or home).

For each item, circle the number that best represents your opinion, 1 indicates “Very Low”, 2 indicates “Low”, 3 indicates “Good” and 4 indicates “Very Good”.

No	Type of Technology	Access Level			
		Very Low	Low	Good	Very Good
1	Desktop Computer	1	2	3	4
2	Portable Computer (e.g. Laptop)	1	2	3	4
3	Dedicated Digital Camera	1	2	3	4
4	Mobile Phone	1	2	3	4
5	Memory device (e.g. USB Stick, CD/DVD)	1	2	3	4
6	Dial-up Internet Access (Cable)	1	2	3	4
7	Broadband Internet Access (Cable)	1	2	3	4
8	Wireless Internet Access	1	2	3	4

Section II: Level of Skill to Using Information Technology

Please rate your skill level on using the following technologies. For each item, circle the number that best represents your opinion, 1 indicates “Very Poor”, 2 indicates “Poor”, 3 indicates “Good” and 4 indicates “Very Good”.

No	Type of technology	Skill Level			
		Very Poor	Poor	Good	Very Good
9	Using computer to store & edit digital photos	1	2	3	4
10	Using computer to create presentations (e.g. PowerPoint)	1	2	3	4
11	Using computer to edit audio & video	1	2	3	4
12	Using computer to play games	1	2	3	4
13	Using the internet to play games	1	2	3	4
14	Using the internet to look up references	1	2	3	4
15	Using the Internet to send or receive email (e.g. Yahoo)	1	2	3	4
16	Using the Internet to access social media (e.g. Facebook)	1	2	3	4
17	Using the Internet to download music/movies	1	2	3	4
18	Using the Internet to share photographs or other information	1	2	3	4

19	Using the Internet to make phone calls (e.g. using Skype, Viber)	1	2	3	4
20	Using mobile phone to text/SMS people	1	2	3	4
21	Using mobile phone to access information or other services on the internet	1	2	3	4
22	Using mobile phone to send or receive email on the Internet	1	2	3	4

Appendix II: Interview Questions

1. Would you please tell me your roles and responsibilities in implementing the distance education program?
2. How do you describe the effectiveness of the distance education program?
3. Would you please mention that what types of instructional/delivery media are used by the institution?
4. Do you think that all the media of instruction used by the institution are convenient to the teachers and learners?
5. How do you evaluate the effectiveness of the institution's instructional/delivery methods?
6. What are the major factors you think that could affect the quality of learning in your department/center?
7. What strategies do you use to dispatch learning materials?
 - a. How effective are these strategies?
 - b. What problem did you face?
8. Do you have idea/plan to use information technology or the internet to dispatch learning materials? If not why?
9. What way would you normally like to contact your learners (for example telephone, letters, notice board, etc)?
10. Do you think that there is IT infrastructure in or around your center to implement IT based distance education?
11. Do you have any knowledge about the wordaNet and SchoolNet infrastructure in Ethiopia?
12. If you know it, what do you think to integrate the distance education system with those infrastructures in a way that transforming the manual system to IT based system?
13. Do your department/center have website or e-mail account that used to communicate with the distance education department, the staff and learners? If not what methods are you using?
14. Do you have any knowhow about level of skill on IT of your staff and learners? If you know how do you evaluate it?
15. Do you attempt to share experience or learn from other similar institution? What would you think about the situation of the current distance education program will be, if IT is adopted/implemented on it?

Appendix III: Focus Group Discussion questions

1. Would you please explain the level of your satisfaction with the current DE system practices?
What are the factors?
2. Do you believe that IT/the internet is important for education? Mention some points.
3. Would you please explain how IT/the internet can increase the quality of learning/teaching process?
4. Have you ever taken ICT related training on how to support your teaching in distance education?
5. How do you explain the advantage of Adopting IT on your distance education system?
6. What obstacles do you expect which will hindered to implement IT based distance education in this system?
7. What solutions can you suggest for the expected obstacles?
8. Is there anything else we haven't discussed yet that you think it is important for the system?

Appendix IV: The Researcher's Observation Checklists

1. Institution _____
2. IT infrastructure observed _____
3. Location _____

No	Things to be observed		Availability	
			Yes	No
1	IT Infrastructure	Internet connection		
		Computers		
		Internet center		
		Electronic Library		
2	Purpose of the IT infrastructure	Educational		
		Administrative		
		Others		
3	Learning materials on the hand of learners	audio		
		video		
		Text		
4	Availability of necessary facilities in tutorial classroom	Video conference setup		
		Plasma setup		
		Interactive Instructional Television setup		
		Interactive Radio Instruction setup		

Appendix V: Learners' response for the questionnaire on the level of IT Access

Items	Classification	Frequency	Percent
Access level for desktop computer	Very low	30	16.7
	Low	77	42.5
	Good	55	30.4
	Very good	17	9.4
	No response	2	1.1
	Total	181	100.0
Access level for portable computer	very low	30	16.7
	Low	95	52.4
	Good	40	22.1
	very good	14	7.7
	No response	2	1.1
	Total	181	100.0
Access level for digital camera	very low	27	15.0
	Low	98	54.1
	Good	35	19.3
	Very good	19	10.5
	No response	2	1.1
	Total	181	100.0
Access level for mobile phone	very low	1	.6
	Low	8	4.4
	Good	35	19.3
	Very good	135	74.6
	No response	2	1.1
	Total	181	100.0
Access level for memory devices	Very low	19	10.5
	Low	52	28.7
	Good	61	33.7
	Very good	47	26.0
	No response	2	1.1
	Total	181	100.0

Access level for dial-up internet	Very low	33	18.2
	Low	85	47.0
	Good	46	25.4
	Very good	15	8.3
	No response	2	1.1
	Total	181	100.0
Access level for broadband internet	Very low	35	19.3
	Low	95	52.5
	Good	36	19.9
	Very good	13	7.2
	No response	2	1.1
	Total	181	100.0
Access level for wireless internet	Very low	31	17.1
	Low	63	34.8
	Good	59	32.6
	Very good	26	14.4
	No response	2	1.1
	Total	181	100.0

Appendix VI: Learners' response for the questionnaire on the level of IT Skill

Items	Classification	Frequency	Percent
1. Using computer to store & edit digital photos	Very Poor	31	17.1
	Poor	38	21.0
	Good	57	31.5
	Very Good	53	29.3
	No response	2	1.1
	Total	181	100
2. Using computer to create PowerPoint presentations	Very Poor	48	26.5
	Poor	55	30.4
	Good	34	18.8
	Very Good	42	23.2
	No response	2	1.1
	Total	181	100
3. Using computer to edit audio & video	Very Poor	52	28.7
	Poor	56	30.9
	Good	34	18.8
	Very Good	37	20.4
	No response	2	1.1
	Total	181	100
4. Using computer to play games	Very Poor	42	23.2
	Poor	44	24.3
	Good	45	24.9
	Very Good	48	26.5
	No response	2	1.1
	Total	181	100
5. Using the internet to look up references	Very Poor	46	25.4
	Poor	47	26.0
	Good	33	18.2
	Very Good	53	29.3
	No response	2	1.1
	Total	181	100

6. Using the Internet to send or receive email	Very Poor	38	21.0
	Poor	31	17.1
	Good	43	23.8
	Very Good	67	37.0
	No response	2	1.1
	Total	181	100
7. Using the Internet to access social media	Very Poor	24	13.3
	Poor	19	10.5
	Good	22	12.2
	Very Good	114	63.0
	No response	2	1.1
	Total	181	100
8. Using the Internet to download music/movies	Very Poor	30	16.6
	Poor	43	23.8
	Good	19	10.5
	Very Good	87	48.1
	No response	2	1.1
	Total	181	100
9. Using the Internet to share photographs or other information	Very Poor	31	17.1
	Poor	28	15.5
	Good	36	19.9
	Very Good	84	46.4
	No response	2	1.1
	Total	181	100
10. Using the Internet to make phone calls	Very Poor	50	27.6
	Poor	39	21.5
	Good	23	12.7
	Very Good	67	37.0
	No response	2	1.1
	Total	181	100
11. Using mobile phone to text/SMS people	Very Poor	0	0
	Poor	1	.6

	Good	34	18.8
	Very Good	144	79.6
	No response	2	1.1
	Total	181	100
12. Using mobile phone to access information or other services on the internet	Very Poor	25	13.8
	Poor	24	13.3
	Good	25	13.8
	Very Good	105	58.0
	No response	2	1.1
	Total	181	100
13. Using mobile phone to send or receive email on the Internet	Very Poor	30	16.6
	Poor	27	14.9
	Good	31	17.1
	Very Good	91	50.3
	No response	2	1.1
	Total	181	100
14. Using the internet to play games	Very Poor	47	26.0
	Poor	55	30.4
	Good	42	23.2
	Very Good	35	19.3
	No response	2	1.1
	Total	181	100

Appendix VII: Covering Letter Accompanying Questionnaire

Dear Respondent,

I am a post-graduate student in the School of Information Science at Addis Ababa University, currently working on a thesis research on the topic “Potentials for IT Adoption on Distance Education the Case of Ethiopian National Defense Distance Education” in partial fulfillment of the requirements for the Master’s degree.

The purpose of this self-administered questionnaire is to collect data from learners of Ethiopian national defense Distance Education, in order to investigate the current practice of the army Distance Education, the learners’ level of IT access and level of skill on using IT.

Your responses will not be identified with you personally, nor will anyone be able to determine that in which center of the Distance Education you are. All responses that you provide will be treated confidentially.

I would, therefore, like to requests you to fill this questionnaire carefully. The information that you provide me through the questionnaire would be of paramount importance to the research I am undertaking.

Thank you in advance for taking some of your precious time in completing the questionnaire.

Sincerely,

Tsehaye Abreha
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College of natural science
Addis Ababa University,
Addis Ababa, Ethiopia
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Appendix VIII: Sample size calculation

The sample size is determined by the following formula:

$$\text{Initial sample size (No)} = \frac{P * (1-P) * Z^2}{D^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level).

P = percentage picking a choice, expressed as decimal (0.5 is used for the sample size needed).

D = is confidence interval, expressed as decimal, this is the margin of error. (Mostly 0.1(10%) is used as margin of error), but below 0.1(10%) can be used as far as the required initial sample size is determined. So for our case we use 0.09 margin of error, which is 9%.

$$\text{Initial sample size (No)} = \frac{0.5 * (1-0.5) * (1.96)^2}{(0.09)^2}, \text{ this gives approximately 119}$$

Final sample size (N1) = Design effect * initial sample (No).

N1 = 1.5 (default value) * 118 = 1.5 * 119, so this gives us approximately 181 sample size.

The confidence interval (also called margin of error) is the plus-or-minus figure usually reported in newspaper or television opinion poll results. For example, for this study confidence interval of 5.0 is used which means if 50% of the sample picks an answer it can be generalized that if the entire relevant population were asked the question between 41% (50-9) and 59% (50+9) would have picked that answer.

The confidence level tells how sure one can be. It is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the confidence interval. The 95% confidence level means one can be 95% certain; the 99% confidence level means you can be 99% certain. For this study 95% is used since most researchers use the 95% confidence level.

Appendix IX: Declaration

I declare that the thesis is my original work and has not been presented for a degree in any other university.

Tsehay Abreha

Jun 24, 2016

This thesis has been submitted for examination with my approval as university advisor.

Rahel Bekele (PhD)

Jun 24, 2016