# Challenges and Opportunities in Learning through Information Communication Technology in Addis Ababa University: the Case of Students with Visual Impairment

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This is to certify that the thesis prepared by Almaz Abuhay entitled: Challenges and opportunities Learning through Information Communication Technology in Addis Ababa University: the Case of Students with Visual Impairment, submitted in partial fulfillment of the requirements for the degree of Master of Arts (School of Social Work) complies with the regulation of the University and meets the accepted standards with respect to originality and quality.

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## Acronyms

| | |
|---|---|
| ATCB | Adaptive Technology for the Blind |
| ENAB | Ethiopian National Association for the Blind |
| FDRGA | Federal Democratic Republic Government of Ethiopia |
| FGD | Focus Group Discussion |
| FMoH | Federal Ministry of Health |
| ICT | Information and Communication Technology |
| IT | Information Technology |
| JAWS | Job Access with Speech |
| PwD | Person with Disability |
| PwVI | Person with Visual Impairment |
| SNSO | Special Needs Support Office |
| SNSOAAU | Special Needs Support office of Addis Ababa University |
| SwD | Student with Disability |
| SwVI | Student with Visual Impairment |
| UN | United Nations |
| UNESCO | United Nation Educational Scientific and Cultural Organization |

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|---|---|
| USANITA | United Sates of America National Telecommunication and Information Administration |
| WIPO | World Intellectual Property Organization |
| WHO | World Health Organization |

# Abstract

This study focused on examining challenges and opportunities of students with visual impairment in learning through information communication technology at Addis Ababa University. The study deployed qualitative design. To gather information both primary and secondary sources were used. For primary data two key informant interviews with Special Needs Support Office Coordinator and with Ethiopian National Association for the Blind Project Coordinator, ten in-depth interviews, and one focus group discussion with students with visual impairment were held. For secondary information different books, journals, and electronic sources, reports, program guidelines were used.

The findings revealed that information and communication technology helps students with visual impairment to develop self-confidence in their academic life. It also helps them to serve as an interface to communicate with sighted persons. Students with visual impairment prefer Braille when they read during exam and focused reading time. On the other hand the findings revealed that shortage of computer to practice, shortages of Braille books, and inadequate training of the Job Access with Speech (JAwS) software, to utilize the software effectively. Even the existing trainings are given by people who are not professionally trained about the software. To curb the problem, Special Needs Support Office of the University along with other stakeholders needs to find a means. It is felt each student with visual impairment (SwVI) get a laptop as compensation like other sighted peers borrow a book from the book store or adding more computers in the computer laboratory.

# CHAPTER ONE: INTRODUCTION

## 1.1.Background of the Study

As vast literature indicates many people are blind or partially impaired because of manmade and/or natural disasters. Among African countries like Ethiopia, Sudan, Liberia, the Democratic Republic of Congo and Rwanda are countries where large numbers of persons with visual impairment are found (Tamru Ewentu, 2005). Many studies revealed that visual impairment is found everywhere in the world but most persons live in developing countries. A study conducted by the World Health Organization confirmed this reality. Two hundred eighty five million people are visually impaired worldwide: 39 million are blind and 246 million have low vision. About 90% of the world's persons with visual impairment live in developing countries (World Health Organization [WHO], 2012). A National survey on blindness, low vision and trachoma, conducted by (Federal Ministry of Health [FMoH], 2006) pointed out that there are about 1,200,456 blind persons and 2,776,054 individuals with low vision in Ethiopia.

The World Health Organization also pointed out that the main cause of visual impairment is uncorrected refractive errors. Cataracts are the leading cause of blindness in middle and low income countries. Eighty percent of all visual impairment can be avoided or cured (WHO fact sheet, 2012). According to the report of WHO visual impairment has decreased since the early 1990s as a result of global response to prevent blindness that comes from infectious diseases. This is done through concerted public health action which governments establish including national programs to prevent and control visual impairment. To illustrate this action WHO stated that Ghana and Morocco reported elimination of

trachoma in 2007 and 2010, respectively. The World Health Organization has a plan to eliminate blindness that comes from trachoma by the year 2020(WHO, 2012).

In Ethiopia, according to the latest census there are over three hundred thousand totally blind people. According to Special Needs Support Office of Addis Ababa University students with disabilities (SwDs) who are attending higher education at Addis Ababa University in the current academic year are 347; among these 202 are students with visual impairment (SwVI). This number may vary from time to time because of different reasons such as readmission and transfer from one to other university.

These students may or may not use information and communication technology (ICT) in their educational activities. To exactly know how many visually impaired students have access to ICT, additional studies are needed but it is generally believed that using ICT in the teaching learning process has positive impact on the student's academic performance in particular and the country's educational system in general. As Miniwatts Marketing Groups revealed in its website the internet users of the world on June 2012 was 2,405,518,376,among this number countries' using internet are Africa 7.0 percent, Asia 44.8%,Europe 21.5%,Middle East 3.7%North America 11.4%,Latin America/Caribbean 10.6% (Miniwatts Marketing Groups,2013).

A study in the United States of America indicated that visually impaired people used computers more often than non-disabled individual. Sighted individuals used computers for the following tasks: playing games; searching for information on products or services; making online purchases; and gathering information on news, weather and sports. It is also pointed out that people who were visually impaired used computers at nearly the same rate as did sighted people as in e-mail and for obtaining information on health issues and at a slightly

lower rate for finding governmental information (United Sates of America National Telecommunications and Information Administration [USANTIA] (2002).

Developing countries face a number of challenges with respect to their higher education institutions and systems. Some of these changes occur because of external changes that come from globalization (Forest & Altbach, 2006). As we see from day to day information explosion, we understand that scientific and technical knowledge growing more rapidly than any other time in human history. So, students and teachers need to go with the new technology in order to get the opportunity from information and communication technology. New information and communication technologies have the potential to facilitate this process by improving communication among students, teachers and researchers. The technology makes smooth their access to quality educational materials (Forest & Altbach, 2006).

It enhances students in their day to day learning activity by offering information from all over the world that is needed by them through the internet and other digital media. In addition to information published, vast amounts of information are available directly on the internet and other secondary storage media like compact disc (Christensen, 2000). Use of computers by people with visual impairment or blindness was initially a major challenge. However," it was soon discovered that the Microsoft Office Suite provided features that could alter the text size in Microsoft word document via font size (in 1-point increments), zoom (in 1% increments), and/or bold" (Rolyer &Aaron, 2010,P.70).

So, technology in recent times is proved to have positive contribution to the lives of people with visual impairment with regard to information use, education and lifelong learning. Persons with visual impairment also like their peers with the normal vision use

information technology to overcome a major part of the difficulties in daily life. Information and communication technology offers persons with visual impairment independence and autonomy concerning information management and access to communication (Alves, Monteiro, Rabello, Gasparetto and Carvalho, 2009).

Moreover computers can turn text into speech, enlarge print and translate text into Braille, opening the door to books, articles and data that have previously been available only at great expense and difficulty (Armstrong, 2009). As it for the larger population, the internet has created new opportunities for work and education. The Science and Engineering Indicators 2002 report information technology can make working from home more viable for people with limited mobility turn written material into spoken language for visually impaired people. To perform this task there is a variety of adaptive technologies for persons with visual impairments. Examples of the technology include screen reading software, hardware or software speech synthesizers that work with screen readers, Braille displays, Braille embossers, screen magnification software and video devices that magnify print from a book or other document (Petty, 2013). Unless students in general and SwVI in particular go in line with the new technology, they face a difficulty to perform in their teaching learning process effectively.

Thus, to compete with sighted students; students with visual impairment must be familiar with the use of e-learning (that is technology used by instructors to support the teaching learning process) facilities like power point presentations in class and other web based education (Fichten, Asuncion, Barile, Ferraro & Wolforth, 2009). Electronic-learning has the potential to facilitate the needs of visually impaired students in the classroom (Fichten et al., 2009). The experience of higher education students with visual impairment changes

from time to time while they are using information and communication technologies for visually impaired persons. However, literatures reveals that the poor availability and accessibility of information and communication technologies as well as some specific forms of e-learning can raise problems even when students use adaptive technology (Christensen ,2000).

Currently, adaptive technology for the blind is used at Addis Ababa University to help persons with visual impairment. Learning through information technology may have challenges and opportunities for visually impaired student in general and Addis Ababa University SwVI in particular. Therefore, this study tried to identify the existing problems of students with visual impairment using ICT in learning process and the opportunities gained from adaptive technology. As a staff member of Addis Ababa University I had the chance to see many students with visual impairment suffering from challenges of using ICT for their education and on the other hand I have also had the chance to see visually impaired students benefit from using information and communication technology. These reasons inspired me to study the situation and suggest recommendation. The paper has different sections which include: introduction, literature review, research methods, and finding, discussion, conclusion and recommendation as well as social work implications.

**1.2. Statement of the Problem**

Developing countries face a number of challenges with respect to their higher education institutions and systems. Some of these problems arise because of the technology revolution and the process of globalization (Forest & Altbach, 2006). These technology benefits were not present in higher education institution of developing countries like Ethiopia until recent times ((Tamru Ewentu, 2005). It is known that systematic collection, organization

and dissemination of comprehensive and practical information on available opportunities and services are important to all persons in general and students in particular (JU &Gluck, 2011). However, a study conducted by Gardener in 1996 indicated that students who have special needs did not equally get the benefit of ICT like their sighted peers. Gardner further stated that SwVI suffer from limits of information accessibility in single or multiple combinations because their needs differ from normal educational strategy (Gardner, 1996). The targeted study participants of this study were students with special needs and my study tried to give special emphasis to students with visual impairment. His study differs from my study in addressing challenges and opportunities of students with visual impairment through using information and communication technology.

According to Forest & Altbach (2006) ICT has a double benefit for people with visual impairment. On one hand, it helps to access the available information easily and towards independence; on the other hand it helps to plan effectively their intervention, coordinate efforts, avoid duplication of efforts, minimize cost, make the communication easy etc. Although researchers points out the advantage of ICT for visual impairment in their studies, the technology took long time to emerge in Ethiopia. As (United Nations Educational Scientific and Cultural Organization [UNESCO], 2007) revealed adaptive technology for the blind was established in Ethiopia in 2000 to enhance persons with visual impairment. However, after the establishment of the technology, it has not been expanding well in many parts of Ethiopia due to lack of skilled manpower, budget constraints and lack of awareness (Tamru Ewentu, 2005).

Since adaptive technology for the blind is a recent introduction to our country, the researcher of this study was unable to find research output in relation to visual impairment to

information and communication technology in the context of Ethiopia. So, the researcher believes that studying the challenges and opportunities of students with visual impairment in learning through ICT is one of the gaps that need additional studies. Although the researcher did not find studies in relation to ICT with visual impairment, there are studies conducted outside Ethiopia about ICT in relation to visual impairment. However, their aim was different from what this study aimed to study. So, assuming this knowledge, time and context gaps this study attempts to fill the identified gaps.

A study conducted in Denmark about the importance of information technology for visually impaired children and youngsters by Christensen (2000) stated that information technology serves as an interface between people with visual impairment and people with sight. The other study conducted in Brazil related to assistive technology applied to education of students with visual impairment by Alves, et al. (2009) to see the role of information technology in education of the blind and low-vision students from the perceptions of their teachers. This and other studies conducted in developed countries lack specificity and contextually to the teaching learning system in Ethiopia.

Indeed, there are researches conducted on various issues of visual impairment in Ethiopia but their focus area was not information and communication technology. Issues of employment, psychosocial support, attitude of the sighted people towards person with visual impairment (PwVI) in education and marriage were the major concern of their emphases. There are also other researches in relation to inclusive education for instance; the study conducted by Tatek Asmare (2012) and Demitros Mola (2007) about inclusive education of students with visual impairment in schools. Thus, the above mentioned researches are not focused on challenges and opportunities of information and communication technology in the

teaching learning process of SwVI. So, the purpose of this study is to explore the challenge and opportunity of students with visual impairment in learning through ICT at Addis Ababa University. In this vein it tries to answer the following research objectives.

### 1.3. Objectives of the Study

The general objective of this research is to examine the opportunities and challenges of students with visual impairment in learning through information and communication technology at Addis Ababa University. Its specific objectives are:-

1. To examine the experiences of students with visual impairment in information and communication technology
2. To examine how ICT could help SwVI to improve their teaching learning process during their course of studies
3. To assess whether students with visual impairment took any training on how to use information and communication technology in the learning process
4. To assess whether students with visual impairment have got any external or internal ICT support from the University and/or other stakeholders for their learning.

### 1.4. Significance of the Study

According to the Central Statistics Office of Ethiopia (2007) census report among the PwDs visual impairment and blindness take the great share, so addressing the issue of this great proportion of persons has a great significance. This study could serve as base line information for other researchers to conduct similar research regarding the service of ICT for persons with visual impairment. The study also helps policy makers to formulate a new policy in relation to information and communication technology for persons with visual impairment in general and SwVI in particular. The knowledge about PwVI how and when they use

information and communication technology is limited to our country and this essay can fill the existing knowledge gap. Thus, this study can raise awareness in most peoples to tackle information accessibility problem of persons with visual impairment. Moreover, it paves the way for social workers to intervene in justice of information accessibility of persons with disability in general and persons with visual impairment in particular as a policy advocacy document. Finally, it helps to improve the ICT services of the University offered to students with visual impairment.

### 1.5. Limitation of the Study

This research is designed to study the challenges and opportunities of fourth year students with visual impairment attending classes through information and communication technology at Addis Ababa University. In this study, students with visual impairment who were junior ($1^{st}$, $2^{nd}$, $3^{rd}$ year) were not included. So, results obtained from fourth year SwVI were not generalized to other students with similar problems. In addition, research bias, participant bias and methodological constraint were considered as limitation of this research. To avoid the participants bias appropriate time and place were scheduled; to minimize the researcher bias colleagues were invited to comment over the prepared tools and whenever possible different data gathering tools were used for triangulation.

The other limitation was the unavailability of information sources with regard to experiences of ICT to students with visual impairment in higher education in Ethiopia. As a result, the researcher could not see the relevant experiences of adaptive technology of (PwVI) in Ethiopian Higher Education. Next Conceptual definition will be present.

Next conceptual definition will be presented.

### 1.6. Conceptual Definition of Basic Terms and Variables

- **Adaptive Technology** is the technology which assists persons with visual impairment to curb their visual limitation.
- **Braille embosser** is an electronic Braille printer.
- **Braille paper** is a thick paper used for displaying touchable letters known as Braille dots.
- **Information and communication technology** is technology used by visually impaired students for their teaching learning process including technology used in computer and Braille.
- **A JAWS (Job Access with Speech)**is screen reader with voice synthesis.
- **Visual impairment** refers to students with total vision problem because of various reasons.

Next related literature review will be present.

# CHAPTER TWO: RELETED LITERATURE REVIEW

The literature review begins by defining impairment. This is followed by discussions of: Theoretical Models of Disability, Legal Frame Work and Education Access, ICT and Persons with Visual Impairment; Information and Communication Technology, Special Needs Education to SWVI; Adaptive Technology; Adaptive Technology in Ethiopia.

## 2.1. Definition of Impairment

Impairment is:"any loss or abnormality of psychological, physiological or anatomical structure or function that does not work properly, or is missing"(Skelt, 2004, p.45). He defines blindness as the inability to see any light what so ever. He categorized effect of disability in to three as hidden disability (the disability is not noticed very quickly by those around and do not get the response immediately.

Stereotyping "is the term used when certain characteristics of any given group are applied to all individuals within that group" (Skelt, 2004, p.68). He also reveals that stereotype is not always bad; rather it is a psychological phenomenon which helps us to understand things more easily.

The other effect is labeling. According to him labeling is linked to stereotyping, in that one leads to the other when you assign someone to a category, or classify them by, using a label, then we ascribes to them the perceived qualities, faults, or other characteristics of all members of that group. The other impairment definition is given by Tirussew Teferra (2000) “objective and lasting organic loss or deformities in any part of the body"(P.9). World Health Organization defines impairment as “impairment is any loss or abnormality of psychological, physiological or anatomical structure or function.”

## 2.2. Theoretical Models of Disability

Like other disciplines, disability has its own theoretical models such as the moral or religious model, individual or medical model and social or political model. The moral or religious model is the oldest disability model and widespread throughout the world and shared by most culture (Hammell, 2006). The followers of this model believe in sin, witchcraft and evil eye.

On the other hand the individual or medical model deals with person with disability has a limitation of body functioning. The followers of this model say that disability is the direct consequence of physical and mental pathology. The medical model focuses on impairment body (Mclean& Williamson, 2007). However, this concept is not acceptable in social work principles because social work deals with half full of the person to empower and to develop skill. In relation to this particular study, persons with disability have their own skill to use the computer if the education system is very inclusive.

In tandem with the above mentioned models there is a model called social or political model which is directly related to this particular study. The proponents of this model say that disability has nothing to do with body impairment rather it is the attitude of the society (Mclean & Willamson, 2007).

## 2.3. Legal Framework and Education Access to SwVI

There are many legislations and, conventions in the world that concern the right and obligation of persons with disability**.** Persons with disability have the same rights and opportunities, as well as the same obligations, as their sighted counter parts in society. Some of the laws which are directly related to this study are included.

The United Nations convention on the rights of persons with disabilities 2006in Article 21 includes section on, freedom of expression and opinion, and access to information."Providing information intended for the general public to persons with disabilities in accessible formats and technologies appropriate to different kinds of disabilities in a timely manner and without additional cost." The United Nation (UN) Convention (2006) on the rights of persons with disabilities indicates that web accessibility is a basic human right. Although the convention says this, most of the information from web is not accessible for persons with visual impairment because the web is primarily designed for visual consumption (Wanniarachchi, & Withanage, 2012).

A law formulated by (World Intellectual Property Organization [WIPO], 2012) which is about the accessibility of information for visual impairment, in its preamble states "Desiring to provide full and equal access to information and communication for the visually impaired." And in its article (1) an element of the purpose of the treaty is:

> Recognizing the opportunities and challenges for the visually impaired/persons with a print disability presented by the development of new information and communication technologies, including technological publishing and communication platforms that are transnational in nature aware that national copyright legislation is territorial in nature, and where activity is undertaken across jurisdictions, uncertainty regarding the legality of activity undermines the development and use of new technologies and services that can potentially improve the lives of the visually impaired/persons with print disabilities, recognizing also the need to maintain a balance between the rights of authors and the larger public interest, particularly education, research and access to information, and

that such a balance must facilitate effective and timely access to works for the benefit of visually impaired persons/persons with a print disability (WIPO,2012, p.2).

The Government of Ethiopia has ratified laws from international conventions and formulated many laws, policies, and standards concerning people with disabilities. The main ones are: Constitution of the Federal Democratic Republic of Ethiopia, adopted in 1995.Article 41(5) of the Constitution sets out that the State's responsibility in the provision of necessary rights and obligations. The Constitution also points out the State's responsibility for the provision of necessary rehabilitation and support services for people with disabilities (art. 41 and 91).

Federal Democratic Republic Government of Ethiopia [FDRGE] Education and training Policy, in its objective reveals that the necessary of

"Education policy is to enable both the handicapped and the gifted to learn in accordance with their potential and needs, to make education a supportive tool for developing traditional technology, and for utilizing modern technology" (FDRGE, 1994, P.9).

To implement the policy different educational sector programs, guidelines were formulated in tandem with the national strategic plan. Educational sector program IV is the latest program, the ultimate goal of the strategy is to ensure access and quality education for marginalized children particularly for children with special needs education. Special needs/ inclusive education strategy, implementation guideline is also another helpful document for the development of education in Ethiopia (Federal Ministry of Education [FMoE], 2012).

The guide lines contain of detailed implementation points of special needs education starting from the lower class to the higher education and duties and responsibilities of various hierarchies in the education system. It also reveals the duties and responsibilities of school

management in detail. One of the responsibilities of the school management is to avail budget to purchase materials such as Braille paper, slate, styluses, white cane, sign language dictionary, etc. The *Woreda* Education Office has a responsibility to allocate budget to equip resource centers with assistive devices (wheelchair, cane , hearing aid, crutches) and computer, Job Access with Speech (JAWS) software as well as other relevant educational materials (slate, styluses, Braille paper, sign language dictionary).

### 2.4. Information and Communication Technology and PwVI

It is known that information and communication technology makes our life easy in terms of accessibility of information with a minimum cost, time, and storage. In general information technology is one of the basic necessities of our life. According to Armstrong, (2009) extensive use of ICT and the internet holds huge numbers of users and seeking and retrieving information on and of the virtual world. Access to the internet has paramount importance in the lives of people with visual impairment, improving educational and employment opportunities, enhancing social networks and online groups, and facilitating independence learning (Gerber, 2003).

In higher education institutions accessing the internet and the web are very important to access learning materials with the growing number of vision impaired students (Armstrong, 2009). It is more or less impossible to get a job after higher education graduation without computer literacy (Christensen, 2000). Even though Christensen said this, it is not practical in developing countries like Ethiopia

Christensen further states that among the well-known problems of persons with visual impairment is unemployment. Although information technology (IT) may not be the only solution to mitigate the prevalence of unemployment for persons with visual impairment, it can

play a main role to alleviate the condition. For a society, to be considered developed, or to be called information society computer literacy is a necessary condition. There are many ways and channels for learning in today's world. Christensen further argued that learning opportunity of students through many channels to follow more information becomes directly available to the public through a wide range of channels. Students can acquire information not only through the traditional, printed sources, but also sources in various formats through the internet or other electronic Medias (Christensen, 2000; Armstrong, 2009). Although many studies show the importance of ICT for all persons and PwVI in particular, accessibility of ICT for all persons in developing countries like Ethiopia is at a minimum prevalence stage.

Information technology has enhanced the coordination of dispersed innovation activities and knowledge workers; students have gained access to a much wider range of knowledge bases (Petty, 2013). Many researchers and writers of the profession of information technology argue that ICT makes the teaching learning process easier in terms of cost, time and communication. Information technology can support effective learning in all areas of the curriculum and also word processing allow the students to produce clear writing and to amend, print, review, and revise works as a result they communicate easily with a minimum cost and time (Skelt, 2004).

Although many studies indicated the importance of ICT for students with visual impairment, unless the necessary facility and equipment are provided, the beneficiaries cannot benefit. Alves and his colleagues (2009) in their study pointed out that the main requirements for the use of information technology in schools and universities are enough computers for all students, advisers to help teachers, and pedagogical support. It is true that the initial cost to facilitate ICT in higher education is a predicament for higher institutions. Not only the initial

cost but also the maintenance cost is another challenge for higher education to assist their education system with information and communication technology.

Information and communication technology's offers individuals the ability to compensate for physical or functional limitations, to access knowledge by adapting digital media to the nature of their disabilities, and to enhance their social and economic integration in communities by enlarging the scope of activities available to them (Petty, 2013). Education is also going through revolutionary changes driven by technology. Using ICT can overcome many of the potential barriers of learning by supporting students with visual impairment (Chin, 2004).

Information and communication technology improves access to information and information sources for students with disability in general and students with visual impairment in particular (Chin, 2004). Technology for many students with special educational needs can provide an excellent means of enhancing competence; self-esteem and presenting of works (Skelt, 2004). These facts help visually impaired students to participate in a new way of learning and working environment at the level of efficiency to overcome their limitations. By using the internet people can get education without physical presence at the place of learning. So, internet opens and broadens educational opportunities to persons with visual impairment (Christensen, 2000). However, PwVI and low vision students face difficulty in the teaching learning process because much web- based content is not designed for supporting assistive technology and as a result students are frustrated to use assistive technology (Armstrong, 2009). Armstrong further explained that commonly used assistive technologies such as Braille display device, screen enlargement software (such as Magic and Zoom text) and JAWS

software that convert screen reading into audio have limited or no ability to translate graphic image.

Learning theories of different educators state that to assimilate new knowledge and to strengthen learning in many cases vision centric learning is replacing previous experimental learning (Skelt, 2004). He further added that students with visual impairment need to practice how to use these assistive technologies and need to use their memory to a greater extent than their sighted peers to concrete on their learning.

### 2.5. Information and Communication Technology, Special Needs Education to SwVI

The Federal Ministry of Education in its special needs/ inclusive education strategy implementation guidelines defines special needs education as:

" Special education typically refers to educational arrangements in which learners with disabilities, impairments or social-emotional difficulties are educated in special classes, special units or special schools that are specifically designed to suit their special needs" (FMoE, 2012, p.7)

We learn from this definition that students with special needs are treated in accordance with their special needs that suite their education. The guidelines also states that in such special class teachers receive specialized training and students accesses various psychosocial support.

In the document, duties and responsibilities of various hierarchies in the education system, the role of other stakeholders, and how they work in integrated manner towards the implementation of special needs education at all levels are included. As revealed in the document, the guidelines serve as working document for the realization of the strategy of special needs education in Ethiopia. Since we are living in the age of information technology,

we need to use the facilities of information technology to achieve the goal of special needs education.

Gardener (1996) in his study reveals the role of information technology in special needs education by categorizing it into three parts. The first two roles are mentioned in most countries national policies and the third refers to all special needs education contexts as follows:

- Students should develop information technology capability that they should become confident and competent with common information technology applications and that they should be familiar with and have experience of the ways in which new technologies can serve both the individual and society;
- Where appropriate, information technologies should extend and enrich the learning of students in all aspects of their schooling.
- Where information technologies can bridge gaps in students' access to and grasp of learning, they should be implemented**.**

In the era of digital information explosion, information literacy is a very important issue for students. Whatever their discipline, wherever they attend their education, students are deprived of knowledge unless they have the knowledge of ICT tools and relevant information communication literacy skills (Schiff, 2009).

Even though many studies in the world indicate the necessity of information technology for special needs education, the reality in Ethiopia still shows that special needs education materials in traditional formats like Braille are a challenge for students with special needs. The same situation was revealed in the study of Demitros Molla (2007) aimed at challenges of teaching usually impaired students in the inclusive classroom. The study assessed the various

challenges faced by SwVI teachers and the schools. Among the challenges shortage of special learning materials is one of the difficulties mentioned in the study.

A study conducted by Tatek Asmare(2012) was about the practice of inclusive education of students with visual impairment in Addis Ababa. The finding of the study showed that the schools faced shortage of adequate trained teachers in special needs education, teachers heavy work load and shortage of special learning materials were major problems.

**2.6. Use of Adaptive Technology to SwVI**

Like sighted students, students with visual impairment also need to support their education with information and communication technology. The technology which assists persons with visual impairment to mitigate their sight limitation is called adaptive technology. Adaptive technology helps visually impaired and blind people to read, print, communicate via e-mail and other facilities of the technology and serves as an interface to communicate with sighted people (Alves et al. 2009).

"Adaptive Technology is an interdisciplinary field of knowledge comprising products, resources, methodologies, strategies, practices, and services that aim to promote functionality for people with visual impairment regard to autonomy, independence, quality of life, and social inclusion" (Alves,et al.2009, p. 148).

By definition, “assistive technologies” include both hardware and software that enable blind and visually impaired persons to read and print, use a computer, taking notes, and communicate via paper and email (Schiff, 2009). Technology can assist persons with visual impairment in many ways and help them to become active participants in their community like sighted peers (Alves et al., 2009). Alves and his colleagues further added that the use of assistive technology enables students with visual impairment to better adjust to their condition

to regular learning processes and academic domains. It gives these students access to the same information source as their peers use. Although Alves and his colleagues pointed out that SwVI can access information like sighted peers, Armstrong (2009) argued that JAWS software has a limitation to translate graphic image into audio. So, SwVI cannot able to access graphic images like sighted peers.

On the other hand SwVI are also able to communicate with other databases of the University library by using computers. New work opportunities can be considered, and the internet, as well as its multiple possibilities, can be explored by using specific programs for students with visual impairment (Petty, 2013). It is generally believed that computers save time and cost to produce writing materials. To illustrate this Petty (2013) further stated that, producing Braille by computerized embossers saves both time and energy. Embossers are equipped with graphic programs, enabling the Braille readers visualize objects and thereby form clear mental images of the real world under their fingertips, something that wasn't possible earlier (Chin, 2009). In addition, he said that, to write on the Braille with traditional ways takes long time and too much space for storage.

Although there are other computer software packages such as Windows-eyes and Zoom text to assist students with visual impairment, this study is confined to the JAWS (Job Access with Speech). Currently, this software is deployed in Addis Ababa University for students with visual impairment. Job Access with Speech (JAWS) is a screen reader with voice synthesis which is compatible with Microsoft windows applications (Schiff, 2009). Although many writers said that JAWS enables persons with visual impairment to interact with the computer in the same way a sighted individual would, they also stated the limitation of the software in

reading graphic documents. Furthermore, in order to master the program continuous practice and intensive training are necessary (Schiff, 2009).

### 2.7. Adaptive Technology in Ethiopia

Like technologies for sighted people which came to Ethiopia lately compared to other developed countries, adaptive technologies for people with visual impairment also did not come to Ethiopian at the same time comparing with the technology that came to Ethiopia for sighted people. As a result, people with visual impairment in Ethiopia until recent times used only traditional ways to access information such as using materials like Braille, listening to tape recorder, listening when sighted persons read or speak to them in the learning process. Adaptive Technology for the Blind (ATCB) was established in June 2000 to introduce the technology and make accessible information to blind and visually impaired people in Ethiopia (UNESCO, 2007).

It is aimed at ICT training with adaptive technology for the blind and computerized Braille printing projects (Ethiopian Adaptive technology for the blind brochure, n. d).

Adaptive technology center has been selected by UNESCO not only as an institution with a vision for the blind and visually impaired in Ethiopia, but also as a model for blind-focus initiatives in Africa (UNESCO, 2007).

As mentioned, although adaptive technology came to Ethiopia 13 years ago, the prevalence of the technology is at a preliminary stage. Researchers mention that universally applicable technology and technology for special needs are not introduced or innovated equally. It is also important to note that modifications are always reactive, meaning that students with visual impairment experience a delay in obtaining information that is readily available to their peers with sight (Rolyer &Aaron, 2010). Rolyer and Aaron further stated that

universal design seeks to alter after this paradigm by providing a new way of thinking about access that is proactive rather than reactive.

Next research methods of the study will be present.

# CHAPTER THREE: RESEARCH METHOD

This section of the study describes the research design that has been employed, study participants, selection process and eligibility criteria, tools of the study and procedure of data collection. Moreover, data analysis, quality assurance and ethical considerations are explained clearly.

## 3.1. Research Design

The study deployed qualitative design to deal with the experiences of visually impaired students using information and communication technology service during the teaching learning process. The study is a descriptive case study. The reason descriptive case study is used, is because according to Yin (2003) this type of approach helps to describe the phenomenon and the real-life context in which it occurred.

This research design is suitable for this study because the study is about a specific case of Addis Ababa University students with visual impairment. For the purpose of this particular study the researcher used case studies that generate knowledge about the participants and their condition. To support this idea Grinnell (2001) says that this type of research design is helpful in presenting the participants' perspective, their experience towards a certain area and their situations.

## 3.2. Study Area

The study was conducted at Addis Ababa University because, most students with visual impairment are found in the University (Special Needs Support Office of Addis Ababa University Key informant interview, 2013). When they choose a university for further education, most of students with visual impairment select Addis Ababa University. Moreover, the adaptive technology which came to Ethiopia first was implemented at Addis Ababa

University (Tameru Ewentu, 2005).Due to the implementation of adaptive technology at the University, students with visual impairment use computers for their teaching learning process. Thus, the area was selected purposively because, the researcher knows the community in close proximity and, hoped that relevant information could be collected sufficiently.

### 3.3. Source of Data

The researcher used both primary and secondary information sources. Primary sources of data were collected from in-depth interview, key informant interview, focus group discussion and personal observation. Secondary data were collected from different books, journals, reports, electronic information sources and other related sources which are important for this particular study.

### 3.4. Study Participants

Participants of the study were fourth year students with visual impairment. The researcher believed that these students have access to ICT because they use computers and other related electronic materials to work on their assignment, thesis, senior essay and other day to day educational activities more than other junior students with the same problem. The other target groups were key informants from the Ethiopian National Association for the Blind who have the knowledge and experience about students' with visual impairment. They were used because the researcher believes that, knowing the association's effort to promote adaptive technology for students with visual impairment in their teaching learning process in higher education is necessary. In addition, getting information regarding network of the ENAB and Addis Ababa University's help to understand the challenges from the grassroots level and enhance the opportunities of students learning through information communication technology. The other key informant was from Addis Ababa University Special Needs

Support Office which is a place where ICT services are provided for students with disability. The center enables the students to get information of how it facilitates ICT service for students with visual impairment by discussing their challenges and opportunities with the concerned body and the students themselves.

### 3.5. Selection Process of Participants

In this study ten respondents were selected purposively from Addis Ababa University fourth year undergraduate students from departments of Law, Social Work, Sociology, Foreign Language, Political Science, History, Amharic, Afan Oromo and Special Needs. Departments having large number of blind students were represented by two students. The other key informants were officials selected from ENAB, as the association has better information about some SwVI because they were members and still are. In addition, another key informant was selected from Addis Ababa University Special Needs Support Office. She/he is expected to have information about the establishment of the center and what main services are offered in the center and to know what efforts are still made to improve the existing service at the center.

### 3.6. Research Instruments

The researcher used in-depth interviews, key informant interviews, focus group discussions and personal observation as means of research instrument. In order to get adequate information and not to limit the interviewee idea within the prepared interview guide, semi structured interview was used.

### 3.6.1. In-depth Interview

In-depth interviews were held with the selected ten students to get their experience of information and communication technology while they are staying at the University. The researcher assumed that they knew the challenges and opportunities of adaptive technology more than other persons. Thus, the ten students were taken because assuming that, their number was large enough to give adequate information and data saturation were achieved as it has been expected.

### 3.6.2. Key Informant Interview

Key informant interview was held with the selected informants with Officials of ENAB Projector Coordinator and, Special Needs Support Office of Addis Ababa University Coordinator. The researcher believed that these officials have detailed knowledge of ICT services provided to SwVI by their offices.

### 3.6.3. Focus Group Discussion (FGD)

Focus group discussion was held with students with visual impairment who did not participate in the depth-interview. This FGD helped to triangulate information from the interview and to get more insight about the research topic. The FGD participants were five students with visual impairment. Initially six SWVI were assumed to participate in the FGD but did not come to participate for unknown reason. The reason why the researcher chose six members for FGD is according to Bedford & Burgress (2001) the FGD should be designed for small group of people, with a number of between four and eight. So, the researcher preferred to take the average of six as FGD respondent.

All the FGD participants were male students to ensure that as various scholars say FGD participants are homogeneous. The reason, to have all male participants was because they were

greater in number than female students and using ICT better than the female students at computer center of Kennedy Library. This is approved during my personal observation. In addition, before I started actual data collection, I visited the computer laboratory of students with visual impairment repeatedly; the majority who used the service was male students. So, to avoid this confusion and domination of male visually participation in the discussion the participants were male students.

#### 3.6.4. Observation

Personal observation was made by the researcher, to check the availability of sufficient equipment, and how the SwVI uses ICT service. The observations were held 3 times in a day one in the morning session from 9am to 11am, one in the afternoon session from 2pm to 4pm, and one in the evening session from 6pm to 8pm.These observations were important to check how at different times the SwVI use the service, to identify the challenges and opportunity while they were using the ICT services and the availability of equipments. Another observation took place while the in-depth interview was in progress. In general, four different tools were prepared and used: in-depth interview, key informant, and FGD and observation check list guiding items.

### 3.7. Data Collection Procedures

In order to collect data the necessary co-operation letter from the School of Social Work was presented, especially for persons who participated as key informants. Once the letters were given to all concerned centers the researcher got the approval from centers to conduct the actual data collection. To make the data collection procedure smooth the researcher established rapport with respondents. The established rapport helped the participants to disclose the information freely. The key informant interview took place in their office because they

preferred their office for the interview. The in-depth-interview and FGD were held in the Kennedy Library visually impaired conference room because the participants preferred the place for the interviews and discussions. To collect the data a tape recorder was used with the consultation of the participants. Before the interview and FGD took place the consent form was read to the participants and the objectives of the study articulated well. Each key informant interview took forty to sixty minutes and in-depth interviews were held from one and fifteen to one and half hours. The FGD discussion was also held for about one and one half hours.

**3.8. Data Analysis**

The data which were collected from interview and FGD were analyzed first by organizing the data into categories on the basis of themes, concepts and similar features. As Kreuger and Newman (2003) pointed out the central idea of data analysis in qualitative research is examining, sorting, categorizing, evaluating, comparing, synthesizing and contemplating. Finally, the data transcribed till the intended meaning was produced. Following this, by highlighting similar experiences, explanations and quotes of participants and according to their initial meaning from transcription pre coding was made. The pre coded data was developed into basic code and initially 100 codes were produced.

In coding the basic experiences, meaning arrangement of concepts, ideas and constructs were made. So, the experience of each participant would be organized if they had exceptional experience. Following the development of code, meaningful categorization was made and the initial hundred codes were reduced in to twenty major categories and these twenty categories were reduced into five big themes. Data obtained from both primary and secondary sources had been analyzed thematically in a qualitative way in line with identified themes and concepts.

### 3.9. Data Quality Assurance

To ensure the trust worthiness of the data, before the FGD and interview started, the research objective was clearly discussed. Their answers were well articulated and informed how their clear and genuine participation is needed for this particular study. Before I started the actual data collection, I created good relationship with the respondents, in order to make them feel free. Furthermore, if they had any threat that might make them constrained to tell the truth, they had the right not to disclose the information. Moreover, to triangulate the data which were acquired from the primary source, the researcher used different type of data collection techniques. The interview and FGD items issue of trustworthiness was assured by avoiding double barreled, long and complex questions. Efforts were also made to avoid leading questions and false premises. In tandem with this, six peers were invited to comment and debrief on the prepared questions (Peer debriefing). Triangulation by method and data source was held to keep the trustworthiness of the data. In other words, different methods were used to collect the qualitative data.

### 3.10. Ethical Consideration

As a researcher before I started the data collection, I obtained an official letter from the School of Social Work. In the process of information gathering ethical issues were considered in advance. To assure confidentiality of the information, that participants were provided with issue of anonymity. Their names and address would be kept confidentially and present on the consent form. In order to help them make informed decision, the researcher informed the purpose of the research objectives. Respondents became aware of their rights and what they were getting from the research. They were also communicated the risks like they may felt nervous during discussion time and they can leave the discussion for some times. It is obvious

that, the target participants of this study were students with visual impairment. So, the researcher read the consent form for the respondents in order to get their full agreement. Finally, with the permission of the respondent, tape recorder was used and the time and place of interview were conducted as per the preference of each participant.

Next findings of the study will be present.

# CHAPTER FOUR: FINDINGS

This part of the study deals with presentation of data obtained from participants of the study. Based on the findings, five thematic areas were categorized as, services given to students with visual impairment, experience of ICT, training and strategic plan, and challenges of students with visual impairment while using technological materials in teaching learning process, and opportunities of students with visual impairment will be discussed.

## 4.1. Back ground of the participants

| **Variables** | | **Number of participants** |
|---|---|---|
| Age | <20yrs | 0 |
| | 21-25yrs | 14 |
| | 26-30 | 1 |
| | >30yrs | 2 (ENAB and SNSOAAU officials) |
| Total | | 17 |
| Sex | Female | 4 |
| | Male | 13 |
| Total | | 17 |
| Education background | Degree | 1(ENAB official) |
| | Masters | 1(SNSOAAU official) |
| | 4th year | 15 (SwVI) |
| Work experience | 5 years | 1 (ENAB official) |
| | 4 years | 1(SNSOAAU official) |

In the above table, a Participant from Ethiopian National Association for the Blind was Project Co-coordinator of the association. He has been working in the association for five years in that capacity. One of the projects under his coordination is ICT training and other ICT services for the members. He has a certificate in basic adaptive technology skill and has a BA degree in History.

The participant from Addis Ababa University Special Needs Support office was the Co-coordinator of the office. In tandem with the coordinator's responsibility, he has been working

in the office for four years as assistant of ICT computer laboratory. He has a certificate in basic adaptive technology skill and has an MA degree in multicultural education.

Respondents of the in-depth interview were ten in number, among them the two were visually impaired/blind from Law Faculty, one from Sociology, one from social work, one from foreign language, one from Political science, one from History, one from Amharic department, one from Afar Oromo, one from Special needs. Regarding their sex four were female and the rest were male. Concerning their age they were between 23 and 25 years. All had started their higher education at Addis Ababa University in 2003 Ethiopian calendar.

The participants of FGD were five students with visual impairment. The departments were Social Work, Political science, Afan Oromo, Amharic, and Law. All were attending 4th year classes. Concerning their age they are between 21and 29.

**4.2. Services given to students with visual impairment**

Regarding the service given to SwVI by Special Needs Support Office of Addis Ababa University (SNSOAAU) and ENAB key informant (1) and (2) were interviewed. Key informant (1) replied: most of the services offered by the unit differ based on the type of disabilities that students have. Students with visual impairment get services like Braille papers, stylus, slate, white canes, tape recorders, cassettes, access to computers having software called JAWS(Job Access with speech) which converts text information into an audio and access to internet services and an audio scanner called Embosser. Those who have a partial vision get a magnifier support. According to the informant the unit has already completed its preparation to open an audio book center for such students but it is not functional due to the absence of a professional in the area. The office also hires on temporary basis exam readers and voluntary recorders; the center pays 15 birr per hour for exam readers. Moreover, students who have

more than one disability (multiple disabilities) are assisted by the office and get shelter and person to assist them.

Key informant (2) replied about the service given by ENAB. He says once the blind person becomes a member of the association, the compound of the association serve as the recreation center, exchange of ideas among members, can enable him/her to get the service of the association cafeteria for a minimum price, and cooperation request letters are written by the association if they request whenever they want to do something.

To give the above mentioned services, both the office and the association, have their own selection criteria for their members. Regarding this issue, according the finding from ENAB, key informant (2), pointed out that a person, who is blind, can bring evidence from health centers that assure that he/she is blind and is able to pay the association 24 birr per year can be registered as a member of the association. On the other side, according key informant (1), the criteria required by the office to use its service are being University student and having disability. The committee which is established by the office identifies students whether they are students with disability or not.

**4.3. Experience of ICT Materials**

When students with visual impairment were interviewed, they stated that the experience of using technology materials for their teaching learning process starting from their high school, except for one student all of them used Braille and its accessories, and listening when friends read books or other reading materials. The one who did not use the Braille said that," although I took the Braille training for one year with my friends, I did not practice it after the training". So, he could not read and write using Braille. He revealed, he was unable to write and read using Braille, as there was no Braille paper and other Braille accessories in his

previous school. He further explained that, he completed his high school education only by listening during lecture time and his friends reading the reading materials like books. Except for one student who was using his mobile and tape recorder for his teaching learning process almost all did not use tape recorder for their teaching learning process before they joined the University. Most of them said that the reason why they did not use tape recorder was the inaccessibility of the material. Only one said that there was no culture of use of the tape recorder for teaching learning process.

Among the interviewee two participants' from two different departments took ICT training before they joined the University. As the interviewee (1), said though he has got certificate, he forgot what he learned because he did not have the opportunity to practice until he joined the University. As interviewee (6) mentioned, he had a good opportunity being the only blind student in his high school to take the ICT training. In addition his friends helped him by installing the JAWS software in the school's computer as a result he had a good knowledge.

The rest of the participants took the ICT training for three months after they joined the University. The training helped them to write and read from the computer but still they have the challenge to use the ICT facility effectively. On the other hand, except one female student, the rest female students did not come to use ICT services. The reason why they did not use the service is, they have a fear and do not have adequate knowledge and skill to use the computer. As they mentioned that “When we use the computer, it switched to the unnecessary program" (interviewee, 3, 5, 7). This frustrated them. All participants agreed that the training was not adequate to use ICT efficiently. They said the training which they took helped them only to write and read from the computer. Except for interviewee 1 and 6, the rest revealed that still

they have a problem to browse information from the internet. This was also confirmed by FGD participants.

According to both in-depth- interviewees and FGD participants, comparing female participants with the male participants the male participant are more confident to use ICT. Even if, some of the male participants do not have adequate skill to use the accessibility of ICT service, they have motivation to go to the computer center to practice to develop their skill because, the experience they got from friends with better skill of the technology helped them to practice more. This finding was also confirmed during personal observation by the researcher.

Furthermore, the FGD participants pointed out that, there is a computer center in the Law Faculty of the University for students with visual impairment. This opens an opportunity for more practice for law SwVI unlike other Faculty and Departments of the University. Information and communication technology course also is given as one course in the Law Faculty. Thus, the participants believed that, the students from Law Faculty have a better skill than other students. This finding was also approved by personal observation of the researcher.

In addition, interviewee (1) and (6) said that the training which is given by Special Needs Support Office of Addis Ababa University is not given by identifying the skill level of the students. As a result, students with a better skill than the beginners but do not have adequate knowledge, drop out from the training.

As interviewee (2) and (8) described for those students who came from far and rural parts of Ethiopia do not have a skill to write and read with Braille. So, Braille training is necessary for those students. Because still students prefer Braille to study for exam and if they need more concentration reading (touching gives more concentration than listening). For doing assignment and to communicate with other persons they prefer computer. In general, as an

FGD participant mentioned, even for some of the students who do not use the ICT service, the training opens the way for new learning.

### 4.4. ICT Training and Strategic Plan

When key informant (2) was asked whether ENAB facilitates ICT service to all its members in general and for students of Addis Ababa University with visual impairment in particular before they start their higher education in order to streamline the learning process**,** he replied that, blind students who are members of the association did not get any training in ICT before they joined University by Ethiopian National Association for Blind. Previously, the training was facilitated by the association after they joined the University inconsistently but now that trend has stopped because of budget constraint. Currently, after they got the opportunity to join the University, the University facilitates the training.

However, The Ethiopian National Association for the Blind has a strategic plan which covers from 2010 to 2014 and it is updated from 2013 to 2015. The plan embraces ICT training for employees, awareness creation, establishing computer centers for its members to access the internet. The fund which will serve for this service is obtained from African Union for the Blind, the house rent income of the association, and income from sales of the special needs materials. In addition to this, the association has a plan to formulate a project to increase the income of the association, in order to expand ICT services. They have a plan to buy computers and distribute them to all branch offices. Then, giving ICT training to their members in order to minimize their limitation, especially for SwVI who will join higher educations .As a result, students with visual impairment will get training and knowledge about ICT before they join University.

In tandem with this, when the researcher asked the key informant (1), whether the SNSOAAU gives or facilitates ICT training for students with visual impairment when they join the University before they start their formal education, he replied that:

> We give ICT training to all SwVI by giving priority to those who have less ICT skill. Furthermore, Braille training was given for SwVI especially those who would not come from the boarding school. Since we do have a budget constraint, we are not able to give the training to all SwVI at the same time. Moreover, we do have awareness raising program for those students who have better skill of JAWS software to help other students who have less skill of the software (Key Informant( 1), 2013).

On the other hand the key- informant (1) asked by the researcher about the future plan of SNSOAAU, he replied that:

> The office wishes to see students with disabilities like students who have no disability be equal in accessibility of services for teaching learning process. To accomplish the service, the office is making a broad study to know the overall situation of services offered to the beneficiaries (Key Informant (1), 2013).

Finally, he revealed that, after the completion of the study the office can identify the challenges and can be able to improve the service by using the opportunities it acquires from the study. He further added that,

> Generally, there are no experts that have adequate knowledge about adaptive technologies for the blind at Addis Ababa University. As a solution, the office is studying the experience of other universities from abroad regarding what the accessibility of information technology looks like. Then, the office believes that the experiences that it gets from abroad help the office to curb the problem. The technology

transfer can be by sending persons abroad or by bringing experts from abroad to teach people or by video conferencing. After the result of the study, the office will decide which method suits its purpose (Key informant (1), 2013).

Although key informant(1) stated about the training facilitated by SNSOAAU to SwVI, the interviewee (10) said that, after they took the training the manual was not given in the convenient format, such as in Braille and audio cassette, to remember the skill acquired from the training. All interviewees and FGD participants said that, the training which they had got through the University or from other means were not adequate. When the researcher asked, whether they need additional training or not, all agreed that, additional training is necessary to upgrade their skill and to use the technology effectively; most of them pointed out that they have difficulty to use the internet.

They further elaborated that, the training which was given to SwVI, was not given in regular program but it might be given in the summer vacation. Hence, most of the students were unable to attend the training because most of them went to their family for summer vacation. In addition, the training, which was given /facilitated by Special Needs Support Office of the University, is not adequate to access information using JAWS software. As a result, most of the students after taking the training are unable to use the ICT service or do not have confidence to use the service. In most cases the training was given by those who did not have adequate skill of the technology. As interviewee (10), pointed out that, although the training program was arranged for three months, the time was not used efficiently. Due to shortage of the training time the whole topic of the training was not covered by the trainer. This assertion was also supported by FGD participants.

On the other hand, the key informant (1) confirmed the inadequacy of the training. But the way he described the inadequacy of the training was, from the perspective of obsoleteness of the JAWS software in particular and the technology in general.

The other question raised to the key informant (1) was what kind of relationship there is between the office and teachers to solve ICT related problems of students with visual impairment. He said , they have a good relation with the teachers of students with visual impairment.

As far as possible, the office tried to give many awareness training workshops to the teachers. The training was not given only to teachers but also to all community of Addis Ababa University including the President (Key informant (1)). Furthermore, he explained that:

> The office does not approach an individual teacher for an individual student's case .In this University there are around 347 students with disability among whom around 202 are students with visual impairment. It is difficult to address one individual case to correspond with one teacher. Instead the office gave depth training to the concerned body. Of course, there was a time to approach teachers individually, if the student faced a special problem at individual level. The office facilitates training in collaboration with the Special Needs Department of the University for the instructors, how they would give training to students with disability depending on the disability type. In addition to the training, if necessary the office sends memorandum (how the teachers should give the exam to students with visual impairment). Whenever necessary the office meets the teachers physically and advertises on the notice board (key informant (1), 2013).

The researcher asked the key informant (2), regarding the relation of ENAB and Ethiopian Adaptive Technology for the Blind, he replied:

> We had an agreement with Ethiopian Adaptive Technology for the Blind considering that, it would give training to members of the association free of charge, and unfortunately the organization has become purely a business organization. It charges highest money for training that is beyond the capacity of most of persons with visual impairment. He further explained that, the money required by Ethiopian Adaptive Technology for the Blind for the training has become an obstacle to get knowledge of ICT for most persons with visual impairment (Key informant(2), 2013).

On the other hand key informant (1) said that, the SNSOAAU arrange training for SwVI in summer with the cooperation of the Ethiopian Adaptive Technology for the Blind.

**4.5. Opportunity using ICT in the teaching learning process**

When the researcher asked what kind of opportunities they get through using ICT: most of the interviewees said that, they can write, save and retrieve information from the computer without the help of sighted people. The training helps them to be independent learners and develop confidence in their academic performance. If they do have a soft copy, they use without the help of sighted people. However, most of SwVI still use Braille technology. These issues are also confirmed by FGD participants.

According to interviewee 1 and 8, although students with visual impairment education is lectured based, CT helps to do assignments using computers without the help of sighted persons by writing and listening from the computer with the assistance of JAWS software. On the other hand the findings from FGD revealed that, books written in Braille found in the University library are outdated. This finding also is supported by most interviewees. According

to interviewee (2) and (6) information and communication technology helps them to use the available recent books in soft copy. Moreover, it expands their communication skill. After they have got the skill of ICT, they can communicate with sighted persons equally by sharing softcopy with their friends. So, ICT serves as an interface between persons with visual impairment and sighted person. Interviewee (2) and (10) mentioned that ICT helps them to write in ink and they are able to share information like sighted people with soft copy.

In addition interviewee (9) pointed out that, Information and communication technology helps to develop communication skills locally and internationally through social websites and e-mail. As a result SwVI develop confidence to share their problem with many other people locally and internationally to get a solution, to share, and to develop knowledge. It also helps them to keep secret of individuals. Although they do not use Braille embosser because of the unavailability and the cost, they have an opportunity to convert the soft copy to hard copy using Braille embosser (interviewee, 3, 5, 7, 2013).

On the other hand interviewee (9) describes that, unlike the previous time when they had to ask sighted people to read the book or other materials to do thesis, now, they have an opportunity to do their thesis independently by using the soft copy. However, most of interviewee and FGD participants identified that, they do not have adequate knowledge of internet browsing. They further elaborated; those who have the skill can retrieve information for their education, recreation or for other personal need. Even some SwVI who do not have the skill also use internet with the help of friends who have the skill. There is also an opportunity if one student with visual impairment is not able to use the ICT service after taking the 3 months training, the training increases confidence to ask friends who have the skill to use the ICT service. In tandem with this (interviewee (1)) said that:

> Sighted persons consider persons without sight as unable persons; people without sight also tell themselves they are unable. But after we use the technology, we develop self-confidence and we are be able to show to others and to ourselves our ability. The technology also helps us to read and write in ink like sighted peers. Even if it is expensive to print the soft copy into Braille, the technology has the facility to change the soft copy into Braille. It keeps our privacy. If we want, we can communicate with other persons by e-mail or by writing without the help of sighted persons. We can also use the technology facility for educational purpose, for recreation purposes and other information which we want to know. We are also able to communicate with other persons, locally and internationally through community websites like face book. The communication which we create locally and internationally helps us to share our problems and be able to share others experience to solve problems we faced (Interviewee (1), 2013).

This is also supported by participant number six and says it saves our time and helps us to use our time effectively.

### 4.6. Challenges of students with visual impairment in learning through ICT

According to the findings from both interviewees and FGD participants explained the training which was facilitated by Special Needs Support of the University was not adequate to do teaching learning process efficiently. Even after they have taken the training, they could not practice what they learned because there is a shortage of computer at the computer center. Thus, they did not feel confident about their skill to do their work. Moreover, they spend their time simply without doing anything until the computer becomes free. These points are also corroborated during personal observation.

On the other hand, almost all participants of this study revealed that, Braille books which are found in Kennedy library are very few and outdated. Most of the books which are necessary for their education are not available either in Braille or soft copy. These make them still dependent on sighted people. In addition, as interviewee(1) mentioned, most of the teachers are not willing to give the lectures in soft copy; even those teachers who want to give the lecture with soft copy wait until students ask them to do so. In addition to this, interviewee 2, 4,6,10 explained that:

> The JAWS software still has a limitation to read all formats of soft copy like PDF format documents, tables, figures and documents written in Ethiopian language. On the other side, some of the SwVI have a problem of handling the software because some times when they use the key board to select what they want ,the program shifts to other programs which are not in their interest(Interviewee(2), 2013).

On the other hand, (interviewee (7)) said that, some of the SwVI disliked the voice which comes from the software. So, some of them are unable to listen and understand properly when the JAWS reads the information.

In addition, interviewee (5) reflected his feeling as:

> The sighted people discriminate against us because they do not experience like us how blindness looks like in the real experience. All technology facilities which are necessary for students with visual impairment are in the hands of sighted people, so they do not give priority to us or see equally like sighted peers. They do not allocate budget to the blind students to facilitate technological equipment needed by us. They always consider equipment that is needed by students with visual impairment as aid stuff (Interviewee (5), 2013).

Most participants revealed that the computer software currently available at Addis Ababa University is called Job Access with Speech (JAWS). Beside this software, FGD participants mentioned that, sighted people, who made the computer did not consider the special needs of SWVI, for example as the mouse is used to access the computer information and replace information access with key board but after the innovation of mouse still they access the computer using the key board. They stated that this is a challenge to them because all information available in the computer is not accessible using the key board; some of them need mouse.

The other discrimination is when one sighted person buys a computer all the necessary application software is pre-installed, so the only thing expected from a sighted person is buy the computer and use without further installation of other software. Therefore, if they need to install the computer software, installation of the software with key board is impossible; they need assistance from other sighted persons. Since JAWS is not preloaded software, it can be removed easily when someone wants to delete it. The interviewees also believed that, it should be preloaded like other application software which is used by sighted persons. Moreover, according to interviewee 9, JAWS software cannot read documents which are written in Ethiopian languages like Amharic, although it tries to read the Oromiffa, it does not pronounce properly. As a result, SwVI who are attending their education in Ethiopian languages are not getting the opportunity from the technology for their teaching learning process like other peers.

Next discussion of the study will be present.

# CHAPTER FIVE: DISCUSSION

In this section of the study, the research findings are presented in relation to relevant findings of previous researches in the area specifically related to the challenges and opportunities of learning through information and communication technology of SwVI and the role of ICT in learning process are discussed. Moreover, major findings of this study are presented in the previous chapter. Here, the findings are analyzed and discussed against the local and international literature in accordance with the sub-topics in the literature and finding part of the study.

## 5.1. Opportunities of ICT for SwVI

As indicated by Gerber (2003) ICT plays a fundamental role in the task of promoting students 'with visual impairment in creating paramount conditions for teaching learning process. This is also corroborated by findings of the study. Access to assistive technology provides independence in academic life to students with visual impairment by enhancing their communication, mobility, and environment control. In many cases, technology is the best way for people in general and PwVI in particular to connect to the external world. Armstrong (2009) says extensive use of ICT and the internet holds huge numbers of users and seeking and retrieving information on and of the virtual world.

In this study, the findings show that students with visual impairment are aware of the importance of using assistive technology in educational activities. However, the training which they have got is not enough to know the whole skill that is expected from the training due to shortage of time; the training was given by a person who has no adequate skill. According to Schiff (2009) it is necessary to be familiar, practice with and know how to use the technology in order to master the JAWS software. However, there is critical shortage of computers in the

computer center of students with visual impairment to practice. Most of SwVI do not have laptop to practice. In order to master the JAWS program continuous practice and training are necessary.

In the findings students with visual impairment indicated that having information technology can promote the teaching learning process, facilitating teaching learning tasks and social interaction in the university environment and outside the University internationally through internet. In the era of digital information explosion, information literacy is very important for students. According to Schiff (2009) whatever their discipline, where ever they attend their education, students are deprived of knowledge unless they have the knowledge of information and communication technology tools and relevant information communication literacy skills.

Moreover, the use of information technology enables students with visual impairment to better adjust to regular learning processes and academic environment. It gives SwVI access to the same information source like their peers use. With a computer, a SwVI is able to communicate with other universities using databases, libraries, etc. New work opportunities can be considered, and the internet, as well as its multiple possibilities, can be explored by using specific programs like JAWS for students with visual impairment. According to Christensen (2000) internet opens and broadens educational opportunity to persons with visual impairment.

**5.2. Challenges of learning through ICT**

Despite all these aforementioned opportunities, SwVI in the University may not use ICT services. As the findings revealed, the computer center, which gives service to SwVI is not organized well with adequate computers, and even the available computers do not work properly and most of them need immediate maintenance. As Alves and his colleagues (2009) in

their study pointed out the main requirements for the use of information technology in schools and universities is enough computers for all students, advisers to help teachers, and pedagogical support. So the computer center for SwVI does not full fill the requirements and equipment. Moreover, the training which was facilitated by Special Needs Support Office of the University was not adequate and was not given by an appropriate person and in the correct time. Thus, most of the students had difficulty to master the JAWS software since JAWS software needs daily practice. In addition, inadequate allocation of time for training led to not to cover the whole part of the training topic. Thus, most of the trainees are not able to use the internet completely or use insufficient ways. So, most of the students who took ICT training, still need additional training, about the internet and other facilities of the computer. On the other hand, unavailability of books in soft copy, and unavailability of adequate and current Braille books are some of the challenges faced by students with visual impairment. As the finding indicated, there is poor allocation of budget for special needs materials. Moreover, the technology which is designed for persons with visual impairment has limitations. The software, JAWS cannot read properly documents written in Ethiopian languages and documents in graphic format; as a result SwVIs who are attending their education in Ethiopian languages are unable to use the software for their learning process. To support this idea Armstrong (2009) stated that SwVIs face difficulty in teaching learning process because the majority of web-based content is not designed for supporting assistive technology, which is frustrating relevant students to use assistive technology. Beside this the software has limitation in reading graphic documents.

When SwVI of other departments are compared to SwVI of Law Faculty, students who were attending in the Law Faculty had better knowledge of ICT and were confident to tell about ICT, because they take ICT as a course and there is a computer center in the Law faculty

for students with visual impairment to practice. This was also observed during the interview time with students with visual impairment. This idea also approved during data gathering. For example, SwVI who practiced more are able to perform better in terms of handling the software. Law students who had an opportunity to practice in the law faculty computer center of SwVI had more skill than other students who did not do practice more frequently.

The process of introducing adaptive technology for persons with visual impairment in universities requires the participation of all stakeholders, so their educational activities can benefit from technology tools like equipment shortage and material supplies do not become obstacles. To achieve a common goal collaborative effort is necessary. Studies have shown the necessity of collaborative effort, the result of the finding showed that the collaboration among the stakeholders is in its infancy stage. To overcome the shortage of computers at the university in general and computer center for students with visual impairment in particular, the cooperative effort of students, teachers, the concerned body of Addis Ababa University staffs, and other stakeholders are necessary.

The stakeholders are: students with visual impairment with the real knowledge of challenge and opportunities of the ICT service, University teachers who have communication with their students in the teaching and learning process, Special Needs Support Office which is responsible for facilitating training and similar events which is needed by students with visual impairment, concerned staffs of the University who allocate budget to buy equipment or to find a solution if there is an obstacle in teaching learning process, other stakeholders who give training to students or fund raiser etc. On the other hand the inclusive education guidance plan for the implementation of inclusive education, which was designed by the Ministry of Education, has a great role to start at grassroots level and to decrease the ICT burden of SwVI

when they will arrive at university level. If the policies which were formulated by the Ministry of Education are implemented soon, SwVI can start learning ICT before they join University and they become familiar with the technology.

Therefore, ICT contributes to the limitation of visual function. It is an important tool in the inclusion process. It allows students with visual impairment to promote knowledge sharing and quality of life. To enhance functional limitation of SwVI, assistive technology was applied to education of students with visual impairment at Addis Ababa University. However, as findings showed, need for intensive training, adequate computers in computer laboratory for practice and inclusion of ICT as one course are important to increase the knowledge of ICT in the teaching learning process.

Even if most of the students believe that ICT or adaptive technology for the blind makes them independent learners, there are conditions in which they prefer Braille to reading using computer. When they want to read for exam they prefer Braille to computer because when they read with Braille they are reading using touch so reading by touching is more sensible and the reader confines with the reading and get more concentration. Even if the Braille technology seems obsolete, it is necessary for students with visual impairment. Braille technology is also available with JAWS software. According to Petty (2013) Embossers are equipped with graphic programs, enabling the Braille readers to visualize objects and thereby form clear mental images of the real world under their fingertips, something that wasn't possible earlier. Although the technology has the facility to convert soft copy of the document into Braille, SwVI did not get the opportunity due to the unavailability of the device in the University. Even if the embosser is found outside the University, the price is unaffordable. Students, who have the money, are also unable to get the service due to the distance of the organization from Addis

Ababa University. From the findings we have learned that there are some students who did not like the voice of JAWS or disturbed by JAWS voice. However, some of the students who are disturbed by the voice of JAWS can avoid it through practice. For these types of students until they associate themselves with the software one of the main source of information is books written in Braille or listening to the recorded documents. Moreover, if the inclusive education strategy implementation guide lines are implemented soon, students start ICT training at lower class and adapt the technology when they join higher education.

In addition, the information gathered from ENAB indicated that the association did not facilitate ICT training before members join university. However, the association has a strategic plan to establish a computer center for its members and to distribute computers to branch offices to mitigate the prevalence of computer illiteracy of its members. If the association acts in accordance with the plan, it may help to introduce ICT to its members before they go to higher education institutions and contribute a lot to overcome the limitation of students with visual impairment.

The other paramount importance of ICT is unlimited boundary in which people help each other when they face problem and to share knowledge among them. There are many websites that help SwVI to choose strategies for promoting information accessibility and social and personal problems. Many advocacy groups and organizations are available now on line, and network is emerging as a reliable way to take action. Current news items about empowerment are available within seconds on the internet. Of course, we need to know how to find this on the web to advocate for issues. Findings also showed that students with visual impairment use different websites for different purposes such as to get knowledge and for other general purposes, by using social websites to share their ideas and experiences, to solve

their problems, to win friends locally and internationally, to receive and send e-mail messages so on. In general ICT helps SwVI by decreasing their functional limitation by using the facility of the computer or by communicate through internet locally and internationally.

Next conclusions, recommendations, social work implications of the study will be present.

# CHAPTER SIX: CONCLUSIONS, RECOMMENDATIONS, SOCIAL WORK IMPLICATIONS

## 6.1. Conclusions

Visual impairment is found everywhere in the world but mostly in developing countries. The main cause of visual impairment is uncorrected refractive errors. Eighty percent of all visual impairment can be avoided or cured. Among the persons with disability group persons with visual impairment have the greatest number. In Addis Ababa University there are 347 students with this disability, among this 202 are students with visual impairment.

The study deployed qualitative approach and as data gathering tool, key informant interview, FGD and personal observation were used. According to the finding, inadequate training and even the given trainings of ICT was given by persons who are not professionally trained. As a result, SwVI could not get the expected knowledge. Although the training is not enough to master the JAWS software, SwVI can write and read using computer and ICT increases their confidence to become independent learners. This all in turn decreases the functional limitation of students with visual impairment. Information and communication technology also broadens communication skills of SwVI through e-mail and social web sites like Face book. Even SwVI could read and write like their sighted peers in ink.

On the other hand, most of the students were unable to browse from the internet due to inadequate training and shortage of training time. Moreover, especially, female students had frustration to use the ICT service because they believe that they do not have adequate knowledge and training about how to use information and communication technology. To master and appropriately use the software needs intensive training practice. Students with

visual impairment are unable to do the practice adequately because of shortage of computer in the computer center of Kennedy library. Comparing students with visual impairment of Law Faculty with other department's students with visual impairment, the Law Faculty students had more confidence and knowledge to talk about information and communication technology. Hence, because they take ICT as one course and there is a computer center in the Law Faculty for practice. So, they are more comfortable with the computer. In addition, there is a great shortage of Braille books in the library even if students need books written in Braille when they are reading for exam and reading that need concentration. Based on the findings the following recommending remarks will be present.

## 6.2. Recommendations

Skills contribute to greater independence and self-determination. They are important for success in education. The ability to travel independently and to utilize Braille and/or technology is necessary for successful education for students with visual impairment. Training should encourage SwVI to develop those skills and to emphasize education as a goal. Training should also emphasize the importance of ICT skills.

It is important to create opportunities that maximize the students 'potential especially students with special needs. The effort which is made individually should be changed to institutional in order to make the effort feasible. The training should be started at the lower classes in order to decrease the burden when SwVI join higher education. The education sector program IV and special needs education guide which are formulated to implement the education policy should be implemented soon in order to mitigate the problem of students with special needs. For the successful achievement of this programs and plans all stakeholders, and the University concerned body should strive their best.

The training should be planned and arranged properly in consultation with concerned stakeholders who give the training and who may cover the cost of the training or the higher officials of the University who allocate the budget for the training and students with visual impairment. When the training starts, the manual should be given to the trainees in suitable Braille or audio cassettes. Moreover, the training should not only be basic training, it should be beyond that and should be given as one of the main courses of each department because it is the main thing that decreases the limitation of students with visual impairment. The training should be given at appropriate times and by right person.

In order to make the teaching learning process smooth each student need to get a laptop computer per head by designing different means of fund raising like formulating projects and present to donor organizations, stakeholders and the authorities who allocate budget to buy books to sighted students should allocate budget to buy technology equipment for students with visual impairment. To make accessible the computers for SwVI either the computer center need to add more computers which are equivalent to the number SwVI or need to find a means every student to have a laptop much like sighted people could loan a book from the book center.

In addition, the university needs to allocate budget to buy embosser to change the soft copy to Braille at a reasonable cost. To decrease the burden of the computer laboratory of students with visual impairment, the Special Needs Support Office along with the university library should strive for the establishment of computer centers at each faculty where students with visual impairment may be found.

A student with visual impairment from the Law Faculty has more opportunity to practice the technology because they take ICT as one course and the faculty has a computer laboratory and as a result they have confidence to use the ICT. This practice should expand to other faculties and departments to increase the opportunities for SwVI to practice and to make them familiar with the technology. For the implementation of this, the Special Needs Support Office of the University and SwVI and other stakeholders and social workers of the university should strive until the effort bears fruit.

Comparing male SwVI to female SwVI, females have less frequency to use ICT for their teaching learning process because they think that they do not have adequate skill of ICT and adequate training. So, the University Special Needs Support Office in cooperation with other stakeholders like the Gender Office of the university should create an opportunity for

female SwVI to gain more training and ICT practice in order to familiarize them with ICT and develop confidence to use information communication technology.

The soft copy which is given to the students from the instructors should be offered without any precondition. And the university policy must enforce such rights.

## 6.3. SOCIAL WORK IMPLICATIONS

Previously conducted research showed that there is a shortage of special needs education schools in the country. Even, the departments of special needs education have a huge scarcity of special needs education materials and are not organized well. This implies that social workers need to advocate for equitable allocation of budget to students who have special needs.

When we see higher education institutions specifically Addis Ababa University, there is a huge scarcity of educational materials. The findings of this study indicated that computers and Braille books are some of the educational materials which are needed by students with visual impairment. In order to curb the aforementioned problems awareness raising program and advocacy are needed for equal opportunity of information. To start at the grass root level ,the documents prepared by the Ministry of Education for the implementation of Education Policy of Ethiopia such as programs (Education Sector Program IV) and guides (Special Needs Education guide) are a good start but it needs intervention for its immediate implementation.

Social workers have a responsibility to activate the concerned body and facilitate awareness raising /advocacy program for the implementation of the programs or if necessary for the formulation of new ICT/Information policy, for equal accessibility of information communication technology for each disability type.

Social workers also need to participate in research conducting in the accessibility of information and communication technology for special needs students and need to empower special needs students using different mechanisms. Current news items and empowerment are available within seconds in the internet. Of course, we need to know how to find this on the web to advocate the issues. Social Workers need to intervene in with these areas in order to enable students with special needs participate in different social websites to share knowledge, to get solution for their problems and to counseling.

Specifically Addis Ababa University social workers need to intervene soon in order to assist students with special needs. Specially SwVI need technological materials like computer and Braille book and Braille embosser. Unless intervention is made soon, SwVI will not get educational materials which will help the teaching learning process. This has a diverse effect on the educational process and especially SwVI who cannot compete with sighted peers. Since technology becomes obsolete in the fast SwVI cannot reach sighted peers and the gap will increase from time to time.

# References

Alves,CCF, Monteiro, GBM, Rabello, S, Gasparetto, MERF, Carvalho, KM. (2009). Assistive technology applied to education of students with visual impairment. *Rev Panam Salud Publica*. 26(2):148–52.

Armstrong, H. L. (2009). Advanced IT Education for the Vision Impaired via e-Learning. *Journal of Information Technology Education*. Volume 8.Australia: School of Information Systems, Curtin University of Technology.

Bedford,T., & Burgress, J. (2001). The focus group experience: Focus Groups: A practical guide for applied research, Issues and Debates, pp.121-135.Arnpld: London

Central Statistics of Ethiopia. (2007). Statistical report on person with disability.

Chin, P. (2004).Using C &IT to support teaching. London: Rout ledgeFalmer.

Christensen, L. B. (2000).The Importance of Information Technology for Visually Impaired Children and Youngsters and the Expectations for Future Development. Retrieved from http://www.sensus.dk

Demitros Mola. (2007). *The Challenges of Inclusive Education of the Blind: The Case of Two Inclusive Schools in Gondar and Bahirdar, and Addis Ababa*. (unpublished master's thesis) Addis Ababa University, Addis Ababa.

Ethiopian Adaptive Technology for the Blind Brochure.

Federal Democratic Republic Government of Ethiopia. (1994). Education and Training Policy. Addis Ababa Ethiopia.

Federal Democratic Republic of Ethiopia, [1995]. Federal Negarit Gazeta, Proc. No. 1/1995, Constitution of the Federal Democratic Republic of Ethiopia. Addis Ababa: Berhanenaselam Printing Enterprise.

The Federal Democratic Republic of Ethiopia Ministry of Education. (2012). Education Sector Program IV. Addis Ababa.

The Federal Democratic Republic of Ethiopia Ministry of Education. (2012). Special needs/ inclusive education strategy implementation guide line. Addis Ababa.

Federal Ministry of Health [FMoH]. ( 2006). National survey on blindness, low vision and trachoma.

Fichten, C. S., Asuncion, J. V., Barile, M,Ferraro ,V., & Wolforth, J. (2009). Accessibility of e-Learning and computer and information technologies for students with visual impairments n postsecondary education. *Journal of Visual Impairment & Blindness, September.*

Forest, J.F., & Altbach, P. G.(2006). International handbook of higher education part two. Netherlands: Springer.

Gardner, J. (1996). Information technology in special education. In P.C. Clarkson and R. Toomey Gerber, Elaine. (2003). computing across the secondary curriculum: A Review of Research Melbourne: Deakin University.

Gerber, J. (2003). The Benefits of and Barriers to Computer Use for Individuals Who Are Visually Impaired. *Journal of Visual Impairment & Blindness; Sep2003, Vol. 97 Issue 9, p536-550,* 15p

Grinnell, R. M. (2001).Social work research and evaluation: Quantitative and qualitative approaches.6th ed. USA: F. E. Peacock Publishers.

Hammell, W. (2006).Perspectives on Disability and Rehabilitation: Contesting assumptions; Challenging practice. Canada: Elesvie

Internet Usage Statistics. Retrieved from www.internetworldstats.com

JU, B. , & Gluck, M.(2011). Calibrating information users' views on relevance: A social representation approach. *Journal of Information Science.*Vol37, NO.269.

Kreuger, L. W., & Newman .L. (2003).Social work research methods: Qualitative and quantitative applications with research navigator. Boston: Pearson.

Mclean, S. A.M., &Williamson, L. (2007). Impairment and disability: Law and ethics at the beginning and end of life. New York: Rutledge-Cavendish.

Miniwatts Markting Groups. (2013). Internet world statistics. Retrieved from www.internetworldstats.com.

Petty, R.E. (2013). Technology Access in the Workplace and Higher Education for Persons with Visual Impairments: An examination of barriers and discussion of solutions. Independent Living Research Utilization at TIRR. Houston, Texas. Retrieved from http://www.ilru.org

Rolyer, D. & Aaron J. (2010). Special educational need, inclusion, and diversity. London: Pitman.

Schiff, R. A. (2009). Information Literacy and Blind and Visually Impaired Students. The Science and Engineering Indicators 2002 report.

Skelt, A. (2004). Caring for people with disabilities. London: Pitman.

Tamru Ewnetu. (2005). African perspective on visual impairment ICT's and policies: A personal experience, a variety of perspectives and technological solutions: A paper presented to UNESCO. Tunisia.

Tatek Asmare. (2012). *The practice of inclusive education of students with visual impairment in Addis Ababa regular schools: The case of Menelik II primary school.* (Unpublished master's thesis). Addis Ababa: Addis Ababa University.

Tirussew Teferra, (2000). Human disabilities developmental, educational and psychosocial implications. Addis Ababa: Department of Educational Psychology, Addis Ababa University.

United Nations. (2006, December). Convention on the rights of persons with disabilities. [Online].http://www.un.org/disabilities/default.asp?navid=12&pid=150

United Nations Educational, Scientific and Cultural Organization [UNESCO] (2007). Adaptive technology retrieved from http://www.unsco.org.

United States of America National Telecommunications and Information Administration [UNANTIA]. (2002). Chapter 7: Computer and internet use among people with disabilities. In a nation online: How Americans are expanding their use of the Internet [Online]. Retrieved from www.ntia.doc.gov/ntiahome/dn/html.

Wanniarachchi, H. , & Withanage, D. K. (2012). A Frame work for building accessible websites for visually impaired. *International Journal of Emerging and Advanced Engineering, Volume 2, Issue 10.*

World Health organization [WHO]. (2012). Visual impairment and blindness Fact Sheet N°282 June 2012.Retrivied from http://www.who.int/mediacentre/factsheets/fs282/en/

World Intellectual Property Organization [WIPO]. (2012).Revised Working Document on an International Instrument on Limitations and Exceptions for Visually Impaired Persons/Persons with Print Disabilities. Geneva: Standing Committee on Copyright and Related Rights.

Yin, R. K. (2003). Case study research design and methods. London: Sage publications.

# Appendices

## Appendix A

### Consent form

Verbal Consent Form for Participants of the Study

Introduction

My name is Almaz Abuhay. I am from graduate school of social work at AAU. I am currently collecting data concerning the challenges and opportunities of students with visual impairment through learning information communication technology the case of Addis Ababa University. For the purpose of this research, I like to request your consent to take part in answering the research questions. The information that I get from you is significant for the progress of my study. Answering the questions is not mandatory; if you do not want to answer you can stop the dialoguer at any time. I would like to ask your consent, the interview will take from 45 minutes to 1 hour. When the findings are publicized your personal information is kept confidential. Thank you for your being part of my research.

Signature of interviewee_____

(Respondents have given certifying that informed consent verbally)

**Appendix B**

**Section one: In-depth Interview Guide for Students with Visual Impairment**.

i. General Information

1. Sex
2. Age
3. Type of Visual Impairment
4. Department

ii. Main question

1. When did you join the University?
2. What type of visual aid instrument you used when you had been in your high school?
3. Have you heard or used information communication technology or adaptive technology before you joined the University?
4. Have you had any challenges in using ICT, \if so, in what way?
5. Did you get any training before using ICT? If, so which center gave you the training?
6. What are the opportunities from such training?
7. What are the challenges from the training?
8. Do you think that the training is helpful to use ICT service effectively and to explore the necessary information that you need?
9. Do you need additional training? Pro: If so, what kind of training do you need?
10. What is your additional advice for future training in ICT?

11. Do you think that ICT helps you to make your learning teaching process easy? Pro: If yes, could you tell me comparing with the traditional information seeking, and after you use the ICT?
12. Have you ever faced any challenge while you are learning through ICT to acquire significant information?

**Appendix C**

**Section II: Key informants Interview Guide for AAU Special needs Support Office Coordinator**

i. Background information

1. Sex
2. Age
3. Work experience
4. Education background

ii. Main questions

1. What type of service does the center provide to persons with visual impairment?
2. Do you have any criteria that the beneficiaries need to full fill to use the service offered by the center?
3. Does your center facilitate the use of Adaptive Technology for members?
4. Do you facilitate to your members use of ICT training before they start their higher education in order to make the teaching learning process easy/to reduce their challenge?
5. Do you have enough equipment to give ICT service?
6. Do you have well trained persons to give training for students with visual impairment?
7. Does the center use of network/stakeholders to upgrade the ICT service for SwVIs?
8. What type of support did you get from inside or outside?

9. To what extent does the center work with instructors to help students with visual impairment to use the service?
10. What type of challenge do you experience to provide service to students with visual impairment?
11. What are the future plans to expand the service?

**Appendix D**

**Section III: Key informants Interview guide for Ethiopian National Association for the Blind Project Coordinator**

i. General background information

1. Sex
2. Age
3. Work experience
4. Education background

ii. Main questions

1. What type of service does your organization provide to persons with visual impairment?
2. What are the selection criteria to be a member of ENAB?
3. What type of service do you provide to your members?
4. Is your organization's work facilitated by using ICT?
5. Do you have adequate ICT equipment?
6. Is your organization facilitating the use of Adaptive Technology for members?
7. Do you facilitate to your members to use ICT before they start their higher education in order to make the teaching learning process ease challenge?
8. What type relationship does ENAB have with Ethiopian Adaptive Technology for the blind or other similar National or International Organization?
9. What is your future plan to expand the service?

## Appendix E

### Section IV: Focus group Discussion students with visual impairment

1. What Challenges are/were encountered when students with Visual Impairment use ICT?

2. What benefits do students with visual impairment gain during using ICT services?

3. What kind of support is needed from stakeholders to strength your learning through ICT?

## Appendix F

## Section V Observation Check List

Availability of adequate equipments such as computer, ear phone.

Working independently without assistance.

Assisting software availability/JAWS

Declaration

I declared that this thesis is my original work and all sources of material used for this thesis have been duly acknowledged.

Name of Students: Almaz Abuhay Signature_____

Date_____