Information Communication Technology

To support and include Blind students in a school for all

An Empirical study of teachers' and students' experiences With inclusion and ICT support to blind students

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Abstract

The hyposthesis of this Qualitative study is how blind students and teachers experiences Information Communication Technology as a tool to support and include blind students in a school for all. The study investigates how Information and Communication Technologies (ICT) enables blind students to adjust into non-special schools. The research method used to collect data is interview. The goal is to get insight to teachers and students' experiences with inclusion and ICT as a tool to support blind students in the regular school. The selected sample is teachers of blind students and blind students in Bangladesh. Three blind students and three teachers of blind students are the informants in this study. The experiences of ICT by blind students are compared with teacher`s experiences. The findings form the shows that blind students use ICT as support in their learning process and it helps them to be included in regular school, if their teachers provide adequate ICT materials as support in their teaching practice. The teacher's experiences shows that they need proper training in matters of using ICT in their teaching practice. The findings from study help to understand the use of ICT for learning and teaching in school for all in Bangladesh. The conclusion of the study is the need for blind students and teachers to get access to ICT and ICT resources. They need also to get access training of how to use ICT as their learning and teaching support.

Acknowledgement

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1 - Chapter 1

Introduction

The advances in technology of the past few years have rapidly affected communities across the world. Educational institutions all over have definitely done their best to adapt. However, if your school does not have the sufficient funds, access, or influence, you may very well be stranded in an ocean of advancements and find yourself on an island stuck in time. Despite the external limitations such schools have, it remains the duty of education professionals to do all that is in their power to advance learning for their pupils, and help them adapt to the new waves of understanding and learning. The antiquated model of teacher-student relationships in which one speaks and the other listens should be a thing of the past, and students should be empowered to do "learning to learn" and be enabled in their hunger for knowledge. As educators, it is our duty to promote the acquisition of skills that make learning possible over their lifetimes. As such skills, ICT usage is one that we wish to enable in the years to come all around the world, especially in places such as Bangladesh. Since this was my main target and from which all interviewees were selected from.

Information and Communication Technology (ICT) means getting information and other facilities from the modern and advanced scientific discoveries and technologies. Consequently, it eases human endeavors and saves time and productivity to a great extent. Information and Communication Technology in Education means teaching and learning using ICT. ICT plays a dynamic role in teaching in the classroom by making the class very effective and comprehensible. In standard school, Power Point presentation by using multimedia is very popular. Moreover, students can get involved in the class enjoying relevant web pages, videos and movies displayed by teachers using multimedia. On the other hand, adapting to these technologies is an added challenge in the classroom, especially for visually impaired (VI) learners. These learners have both the difficulties of facing classrooms that aren't suited to them, and now the adapting to new technologies that don't always take accessibility into account. It can be one of the principal roles of ICT; visually challenged students need Information and Communication Technologies to bridge the gaps from the classroom to the rest of their worlds.

They can use ICT tools like recorder, talking keyboards, Job Access With Speech, Talkback soft copies of text book, and internet in the classroom.

These tools not only assist them in their classroom activities, but also assist in preparing lessons, making assignments and enriching their exam notes. Moreover, they can contact their teacher by using e-mail and phone calls. They can record the class lecture by using recorder, take notes using talking keyboard, read soft copies of available texts, collect abundance of information from resourceful websites like Google and Wikipedia. Thus ICT is enabling visually impaired students to learn quite comfortably by making their learning process easier and learning tools accessible to them. ICT has brought a blazing ray of hope and optimism of complete education in the life of visually impaired (VI) students. In this study I will try to contribute to the limited set of knowledge that we have on the practical effects of ICT usage in classroom in the inclusion of visually challenged students. Both from their own perspectives, as well as how teachers perceive this progress.

Education for all has been an international goal for several decades. The UNESCO Salamanca Statement on Special Needs Education and Inclusion (1994) clarified the intended consequence for children with special educational needs by introducing the principle of inclusion. The purpose was to change and extend the standard school system in order to give meaningful and tailor-made education to the multitude of children with different educational needs.

1.1   Statement of the Problem and Objectives

Through some significant research, human civilization got some radical inventions and ideas which enabled visually challenged people to become as competent as their peers, or more so. Since the time of Ancient Egypt, there has been an effort to make the lives of visually impaired people more meaningful. We have seen the invention of Braille system which brought a revolution in the literary genre of the visually impaired people. Researchers and scientist put their best effort to develop Braille and make it more accessible for them. Later on, Information

and Communication Technology (ICT) arrived and accelerated the development of Braille. Audio recordings, books, talking software, etc. were introduced. Still, now, many new technologies are coming on the market and new research are being done every day in order to gear up the process of visually challenged education. Several national and international organizations are working together hand in hand. So Information and Communication Technology (ICT) can be a tool to include visually challenged learners in education for all classrooms.

The goal of the study is as follows:

- o   To determine how user-friendly are the teaching aids used in the classroom environment at standard school in Bangladesh.
- o   To find out how the secondary level students with visual impairment in Bangladesh will be benefited by availing themselves of the use of smart devices through inclusive education systems.
- o   To assess the positive possibility of inclusive education systems through the use of ITC devices for the students with visual impairment for learning purposes.

1.2   Research Question

How does blind students experiences ICT support as a tool to learn and to be included in a school for all, and how does teacher experiences using ICT to support and include blind student in their teaching practice?

The main research questions are dividing into following four sub-questions:

1. How does ICT support inclusion of blind students?
2. What are the experiences of teachers using ICT as a tool to teach and include blind students?
3. What are the experiences of blind students using ICT as a tool to be included and support in their learning process?
4. How does ICT support visually impaired students??

5. How is the process implementing ICT for blind students in a school for all?

1.3 Context of the Study

There is approximately 8-10% of the population in Bangladesh who are disabled. Although there is no exact estimation of the disabled people to the government, according to berdo-bd.org (accessed 30 April 2017), an estimated 8.5 million people have physical disability; 1.3 million have problem with speech and hearing; almost 2 million are partially or totally visually impaired; and approximately 1.5 million people are intellectually or mentally impaired.

Ministry of Social Affairs of the People's Republic of Bangladesh deals with the disability issues within Bangladesh. With a view to protecting the rights of disabled people, especially the visually impaired, Bangladesh government has enacted two laws: Disability Protection Act (2013) and Children Act (2013). Through these laws, all governmental and non-governmental activities for challenged and impaired people are conducted here in Bangladesh. The first proper education policy of the People's Republic of Bangladesh was published in 2010 by the Ministry of Education. Challenged students' education, especially visually impaired education, was mostly focused in Section 18a. of this policy. It begins with a definition of the challenged people was given. Later on, the section talked about the goal and strategy of challenged people's Education. Combined education for these students was first started in 1974 in Bangladesh (http://www.dss.gov.bd). The Department of Social Welfare has been running 64 centers in order to give schooling to visually impaired students since 1974. Out of these 64, 28 centers provide accommodation and 36 do not. Students of these centers have proved their talents upon higher secondary level. In terms of secondary education, visually challenged students have no other ways other than attending standard school. Thus coming into secondary education, most students face the highest difficulty in coping with the educational environments. They have to confront many problems; Ranging from the inadequacy of materials, to classroom activities and exam systems. Research on the visually impaired is not a new phenomenon in the history.

This investigation of Bangladeshi classrooms adapting to visually impaired students attempts to determine out how user-friendly the teaching aids used in the classroom environment at standard schools are. In addition to assess out how the secondary level students with visual impairment will be benefited availing smart devices through inclusive education system. All considering the positive possibility of inclusive education system through the use of ICT devices for the students with visual impairment in their learning purposes.

As well as the theoretical objectives presented, this paper also came into being with the hope that, as researchers and teachers, we call attention to an issue of insurmountable importance: Inclusion in education and the small strides done so far. I aim to call to action both international and local authorities, so they can allocate resources and knowledge where it is direly needed, with the young people (and perhaps not so young) who wish to learn but whose current conditions do not allow them to. Being a visually impaired person myself, I wish to know that the efforts I put into practice enables others like me, in the future, and give them access to all they need to feel equal and comfortable in their lives.

Prior to ICT, visually impaired students were separated inside a small bubble of connections and communication, only being able to connect truly with those who read and wrote in Braille. Education has become incredibly diversified in the last couple of years, especially due to technological advances such as ICT. From our Braille days we were already in a blur of disparity with the rest of learners across the world. ICT has bridged that gap of knowledge for us, yet there are still strides to be made so that all knowledge online and elsewhere can be truly accessible for us. ICT is what allows me at this very moment the opportunity to write this particular paper, so it goes without saying that it is a vital part of my everyday life and learning. The aim of this study is to investigate how the secondary level students with visual impairment will benefit from the use of Information and Communication Technology through inclusive education system, and how ICT influence to teaching strategies of a teacher in a standard school. This study is not only for the visually impaired students, but also for the sighted students to inspire them in their respective possibility of life in fact. Required socio-cultural education system of a country is a pre-requisite for development. Inclusive education lessens the social disparity and economical stratification. In fact it's a worldwide concept today. So for the developmental issue and lessening disparity this study will play a very significant role. Students and teachers alike are

asked questions in regards to their everyday at school and how do they employ ICTs, these answers are later compared and used to determine the relevance of ICT in this environment.

1.4 Thesis outline

The following thesis is comprised of seven chapters. This first chapter introduces the topic at hand, the Contex of the study where this research was conducted), and establish objectives of the research and research questions. In chapter 2 the conceptual framework and theoretical backgrounds are stated. Chapter 3 establishes the literature review. Chapter 4 is where this thesis consolidates the research design. Chapter 5 connects the data analysis and results. in chapter 6 there is over all discussion and finally executive summary, conclusion and recommendations has been presented in chapter seven.

2 Chapter 2 - Background and Conceptual Framework

2.1 Visual impairments

Definitions

The legal definition of blindness sets a physical standard of sight less than 20/2000, meaning that one cannot see after correction at 20 feet what the typical person sees at 200 feet. A person with low vision would have, after correction, 20/70 to 20/200 vision (Kirk, 2012, 327).

WHO has released that there are 4 levels of visual function, according to the International Classification of Diseases -10 (Update and Revision 2006): Normal vision; Moderate visual impairment; severe visual impairment; Blindness.

Moderate visual impairment, combined with severe visual impairment, is grouped under the term *"low vision"*: Low vision taken together with blindness represents all visual impairment. The term "visual impairment" refers to children who are classed as visually impaired or as having low vision (Davis, P. 2003). There are various definitions, but the World Health Organization (WHO) definitions of terms, based on visual acuity scores, are now the most widely accepted. These scores are based on the sight perception of people with "perfect" vision and are written as a fraction. According to this conception:

A person scoring between 6/6 and 6/18 is classed as having normal vision;

A person scoring between 6/18 and 3/60 is classed as having low vision;

A person scoring less than 3/60 is classed being visually impaired.

Importantly, the vast majority of people who are classed as visually impaired have some sight. Usually, the term visually impaired does not mean unable to see anything at all. Sometimes a person with no sight facility is referred to as being *totally visually impaired.* (Davis, P. 2003: 3)

The World Health Organization (WHO) has released the following key facts regarding Blindness and visual impairment.

• About 285 million people are visually impaired worldwide; 39 million of them are blind.

• Throughout the world, most people with visual impairment are age 50 or older.

• About 90% of the world's visually impaired live in developing countries.

• The number of people blinded by infectious diseases has been greatly reduced by recent public health efforts, but age-related impairment is increasing.

• Cataracts remain the leading cause of blindness globally, except in the most developed countries.

• Correction of refractive errors could give normal vision to more than 12 million children ages 5 to 15.

• Globally about 80% of all visual impairment is avoidable.

Source: WHO Fact Sheet #282.

The Human Eye

Vision, or visual interpretation, is a function of the brain, experience, and adequacy of the sense organ that receives stimuli from the outside world: the eye. The process of visual interpretation is as follows: Light enters the eye, focuses on the retina, and transmitted along the optic nerve to the brain, where visual information is interpreted. Two people with well-functioning sense organs can interpret a visual experience differently, depending on their training and experience (Kirk, 2012).

 Causes of visual impairments

A wide variety of conditions can cause serious visual impairments in children from birth to age 5. The potential causes include hereditary conditions, infectious diseases, cancer, injuries, premature birth and various environmental conditions (Kirk, 2012:330).

Genetic causes of blindness are relatively rare. Vision impairment is often associated with albinism, the absence or lack of pigmentation resulting from and inheritance of recessive genes, in approximately 1 in 20000 individuals (Wikipedia, 2010 in Kirk, 2012).

2.1.1   Characteristics of children with visual impairment

Children with visual impairments tend to develop at slower pace than children without disabilities. There is a wide variation in the patterns of development of children with visual impairments, and with a rich physical environment and encouragement to take reasonable risks parents can increase the adaptive skills of their children (Kirk, 2012).

Even though, children with moderate visual impairments are able to communicate through language they still have limitations in understanding the three-dimensional world in which we live (Kirk, 2012).

The emotional context of children with visual impairments is that they can fall into a state of learned helplessness and be unable to read the emotional context of others, which they need to be able do to interact with others effectively. This interaction impacts their ability to make decisions and choices and use the executive function to its fullest (Kirk, 2012).

In the 1940s and 1950s, educators believed that the intelligence of children with visual impairments was not seriously affected by their condition, except for their ability to use certain visual concepts. This thinking then was that intelligence unfolds on a genetically determined schedule and is affected by only the most severe environmental trauma. Nowadays, we recognize that we measure as intelligence in school-age children has been notably affected by their cumulative experiences in the early years of development. Lack of vision, then, is both a primary impairment and a condition that can hamper cognitive development because it limits the integrating experiences of association and classification and the understanding of those experiences, which the visual sense brings naturally to sighted children. These limitations are especially notable if the children do not receive early intervention in the preschool years (Kirk, 2012).

Sighted children acquire language by listening, reading, and watching movements and facial experiences. They express themselves first through babbling and later imitating their parents and

siblings. Even though, children with visual impairments acquire language in much the same way, but their language are not helped by visual input. The language is may be similar to that of their sighted peers. However, the children with visual impairments had less understanding of words as vehicles of, or as standing for, concrete experiences. They may talk about a baseball for example, but they talk about it without a full understanding of the concept (Kirk, 2012).

Vision provides a continuous source of information. People without sight have to rely on other senses for information and for all the other tasks that vision performs. The false doctrine of sensory compensation holds that if one sense, such as vision, is deficient, other senses are automatically strengthened, in part because of their greater use. Although this may be true in certain cases, research does not show that the hearing or touch sensitivity of children with visual impairments is superior to that of sighted children (Huebner, 2000 in Kirk, 2012, 335).

The restricted mobility and consequent limited experiences of children who are visually impaired appear to cause, in some children, a state of passivity and dependency. Studies showed that students with visual impairments spent more time on the telephone, engaged in more sedentary activities, spent more time alone, and were bound to their homes by their inability to travel independently (Sacks, Wolfe, & Tierney, 1998 in Kirk, 2012).

This study seems to indicate is a need for continued implementation of programs desired to prepare students with visual impairments for adult life (Kirk, 2012). That would mean curricula that focus on career development and social skill competencies. The study also underscores the importance of mobility training as a key component to social contact for these students (Kirk, 2012).

Self-esteem appears to be the by-product of good performance on tasks deemed socially valuable (for example, effective mobility around the class and school). Good academic and social behavior will result in good self-esteem, rather than the other way around (Kirk, 2012).

2.1.2   History of educational development visual impairments

Blindness and education were first talked of in the ancient Egypt. History shows that period of time as the start for visually impaired education. "Institut National des Jeunes Aveugles" was established as the first modern institution for the visually impaired in 1784, in Paris by Valentin

Haüy. A boy named Louis Braille got admitted at this institution in 1819. He started to think about the gap between the sighted and the visually impaired students regarding reading and writing. Later on, he got in touch with a soldier, who told him about a reading system used on the battlefield by the soldiers. This idea crossed his mind, and he developed the revolutionary system of reading and writing for visually impaired students called the Braille system. Yorkshire School for the Visually Impaired in England, established in 1835, was the first institution rendering proper education for the visually impaired: Formal efforts in the United States to educate children with visual impairment began in Boston in 1829, with the establishment of the residential school now called the Perkins School for the Visually Impaired. In 1834, Louis Braille perfected his literary raised dots code of reading, but it was not until 1900 that the first public school class for children who were visually impaired organized in Chicago (Kirk, 2012).

During the past few decades, a rapid growth in public school services for children with visual impairment has been stimulated by the Education for All Handicapped Children Act (PL 94-142) (IDEA, 2004 in Kirk, 2012). Currently, there are teacher preparation programs and orientation and mobility (O&M) programs based in universities that prepare professionals to work with children with visual impairment (Goodrich & Sowell, 1996 in Kirk, 2012).

Before the implementation of the individuals with Disabilities Education Act (IDEA), children with multiple handicaps that included visual disabilities were often refused education in schools for the visually impaired and were placed in settings that focused on their other disabilities while often ignoring the visual problems. As Hatlen (1998) pointed out, it is no longer possible for educators of students with visual impairments to ignore students with multiple impairments (kirk, 2012).

2.1.3   Teaching students with visual impairments

Most children with severe and profound visual impairments are identified by parents and physicians a long before they enter school. Early identification allows us to broaden those experiences for the child with visual impairment through maximum correction and preschool programs (Kirk, 2012).

The term assessment describes a process that must occur before a student with suspected disability receives special educational services. Four specific steps are taken in assessments: screening, eligibility, instructional planning, and progress evaluation (Lewis & Russo, 1998 in Kirk, 2012:340).

The successful inclusion of the exceptional child requires a well-thought-out plan and capable people; otherwise, there is a good possibility for social isolation of the child. An additional complicating factor is cultural differences between the child with visual difficulties and the school. For example, a child who is a visually impaired and from a Hispanic background has numerous challenges to overcome as well as, possibly, a language barrier and a set of family values that may differ from values taught at school (Kirk, 2012).

In the general education classroom children with visual impairments will need additional help. A specialist trained in visual impairment instruction needs to supervise, if not directly be a part of, the intervention. The following additions are important:

- Technology to aid students' visual acuity in reading and using computer programs
- The regular use of the extended core curriculum for those students who need it
- A teacher of the visually impaired who can give help to the regular classroom.

Bishop (2004) proves a variety of ways in which to improve the regular classroom's learning environment for children with visual impairments:

- Allow preferential seating or "roaming privileges" for best use of available vision;
- Allow enough time for the student's best work – and expect it. Don't "give" grades. Expect the student to earn them.
- Monitor lighting conditions; especially watch for glare (Do not stand with your back to windows when lecturing, as this forces the visually impaired student to look into the light source).
- Verbalize whatever you write on the board.
- Remind visually impaired students in particular to face the speaker (orienting both face and body in that direction). Some students with low vision may need to be similarly

reminded. Reminders should be as unobtrusive as possible, so as not to embarrass the student in front of his or her peers (Beshop, 2004 in Kirk, 2012:346).

Lowenfeld (1973 in Kirk, 2012), a pioneer in educating children with visual impairments, proposed three general principles that are still important for adapting instruction to the educational needs of children who have visual impairments:

1. Concrete experiences – through tactile observation of real objects in natural settings, students with visual handicaps come to understand shape, size, weigh, hardness, texture and temperature.
2. Unifying Experiences – visual experiences tend to unify knowledge. The teacher of student with visual impairment must bring the "whole" into perspective while teaching the student, not only by giving students concrete experiences, but also by explaining relationships.
3. Learning by doing – to learn about the environment, these children have to be motivated to explore that environment. Teacher should stimulate the child to reach and make contact by introducing motivating toys or games (for example, object with interesting textures).

Hatlen (2000 in Kirk, 2012) points out that there needs to be an expanded core curriculum that includes those skills needed especially by the child with visual impairments. One of these is orientation and mobility, which enables a child master spatial concepts and physical environments. The goal is to make children with visual impairment as independent as possible.

The universal design for learning (UDL) framework helps us to see that inflexible curricular materials and methods are barriers to diverse learners, just as inflexible buildings with stairs as the only entry option are barriers to people with physical disabilities. Universally designed curricula include a range of options for accessing, using, and engaging with learning materials – recognizing that no single options will work for all students (Hitchcock, Meyer, Rose & Jackson, 2002 in Kirk, 2012).

Individual Educational Plans (IEP) for children with visual impairments should include a variety of goals- some focusing on the effective use of the learning environment, some on instructional

content, and some on skills that the student will need to perform effectively in the inclusive classroom. It will likely take a team of professionals to implement the goals.

As Sack (1998) points out, one of the consequences of the diversity of children with visual and other disabilities is that the teacher becomes a team member rather that teaching in isolation (In kirk, 2012, :358).

2.1.4   Inclusion of visually impaired children in schools for all:

Nowadays, including children with visual impairment in mainstream school is the main goal for the world. In order to ensure that the educational and sight needs of a child are met, it is crucial that guidance to teachers is of the highest standard. This requires the translation of a full medical diagnosis into guidance on the educational needs of a child. Mainstream teachers and support staff need to receive accurate and ongoing advice. Providing this kind of advice to the teachers and to the school in general, is crucial. Farrell et al. (1999) state that 'for teaching assistants who are likely to work with specified group of pupils with identified disabilities, e.g. pupils with visual disabilities, some proven expertise in this area may be a necessary condition of the appointment. If it is not, then appropriate training should be provided immediately the post has been filled. (Davis, P. 2003:7)

The social development of the child is an essential part of the ongoing development of their participation and learning in school.

For many children with visual impairment, changing the physical environment is disorienting, so the teacher is advised to minimize rearrangements to class disorienting, so the teacher is advised to minimize rearrangements to class seating. (Davis, P. 2003:15)

For some children with visual impairment the inability to take part fully in school life as it causes significant emotional stress or physical fatigue. Many of these children and young people will require some of the following (DfEE, 2000: 65 in Davis, P. 2003:15):

- o   Flexible teaching arrangements
- o   Adaptations to the physical environment
- o   Adaptations to school policies and procedures

- Access to alternative or augmented forms of communication
- Access in all areas of the curriculum through specialist aids, equipment or furniture
- Regular and frequent access to specialist support

Providing opportunities for children with visual impairment to participate fully in the life of the school is very important. Every attempt should be made to ensure that the child is afforded the chance to participate in school trips, the playground and after school-activities.

The additional curriculum is defined as the skills, knowledge and behavior needed to facilitate the child's access to the main curriculum and to promote social inclusion among peers, and more widely in society, e.g. mobility, tactile awareness and life skills (Davis, P. 2003:18).

Much can be done to enable a child with visual impairment to fully participate in the school and classroom. While there is an important and necessary role of specialist teachers skilled in supporting children with visual impairment, there are many opportunities for the class teacher to take ownership of the learning and teaching of children with visual impairment and enable them to become fully participating members of the class. (Davis, P. 2003: 23)

Inclusion should be preparing for lifelong learning. If inclusion is only just in the school environment… then it is not going to work… we have to change the culture within schools and we have to change the society.

We consider inclusion as a means of increasing the child's participation socially and educationally in the classroom, the school and more generally in society. We therefore view the inclusion of the child in school not only in terms of their participation in the lesson but also in terms of their opportunity to participate and in terms of opportunities for developing the skills needed to live independently. (Davis, P. 2003: 13)

Teaching students with special needs requires from regular teachers to respond to the individual needs of each student within the diversity of learners in their class. Obviously, general educators need special support to achieve the abovementioned goals. Here, special needs education is supposed to be the mediation between a learner with special needs and the general education, as "special needs education incorporates the proven principles of sound pedagogy from which all children may benefit" (UNESCO, 1994).

The Salamanca Statement and Framework for Action and the UN Convention on the Rights of Persons with Disabilities have significantly changed the attitude to the education of persons with special needs (UNESCO, 1994; UN, 2006). Salamanca Statement became the baseline for the worldwide acknowledgment of the Inclusive education model. According to this model, every individual, despite the abilities and limitations is entitled to get education together with their peers.

Preparation of teachers who teaches visually challenged students:

- Face the class when speaking. Speak clearly in a normal voice, not loudly, slowly or with exaggeration. Keep your hands away from your mouth when speaking. If in doubt ask the student if the pace is right.

- Identify yourself by name in case the student does not recognize your voice.

- Indicate verbally when you are entering or leaving the person's presence.

- Convey orally whatever you have written on the board or shown on overheads

- The visually impaired person should be seated to the best possible advantage. They will know where best to sit. This will usually be a seat near the front, or slightly to one side of the projector or board display.

- If you are speaking to a visually impaired person in a group, try to ensure that only one person at a time speaks so that they can easily follow the thread of the conversation.

- Questions and contributions from elsewhere in the room, should identify the speaker verbally, as the visually impaired student may not recognize the voice.

- Try to stay in the same place and not move around while you are talking.

- Students, who have visual difficulties that affect their ability to access text, may be excluded when there is reading to do in the tutorial. They may also experience difficulties with face-to-face communication, if they are unable to read facial expressions or body

language. It can take time for students to get used to the voices of other students in their class, and it may be helpful for speakers to say their name prior to speaking. It is helpful to provide any textual material, in an accessible format, in advance of the tutorial, even if this is not the tutor's usual practice. Concerns are sometimes expressed about how other students might react to visual impairment. Usually over time this is not a problem. If difficulties occur, it might be useful to discuss with the student how they would like situations to be handled.

- Give directions in words not gestures.

- Do not single out students with a visual impairment or discuss their requirements in front of a group.

- Ensure students are aware of emergency and evacuation procedures for the buildings they are using

- Doors should be kept closed or open, not partly open.

- Wherever possible objects should not be moved from their usual place without letting the person know.

- Choose a room with good lighting where light will be concentrated on the speaker's face.

- Adjust lighting for individuals. Generally good lighting is helpful, but for some students too much light can be a hindrance, and glare from shiny surfaces can be very distracting. Many students who are partially sighted are photophobic - they cannot tolerate bright light.

2.2 ICT in Education:

2.2.1   Historical Development of ICT in Education

Information and Communication Technology (ICT) is now a commonplace concept in all aspects of life. During the past twenty years, the use of ICT has fundamentally changed the practices and procedures of nearly all forms of life. Education is no exception. Education is a very socially oriented practice and quality. Education has traditionally been affiliated with strong teachers having high degrees of personal contact with their students. The use of ICT in education contributes itself to more student-centered learning settings. But with the world changing rapidly into digital media and information, the role of ICT in education is becoming more and more efficient, and this importance will continue to acquire and develop in the 21st century.

Daniels (2002) holds that ICT have become, within a very short time, one of the basic building blocks of modern society. Many countries now consider understanding ICT, and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing, and mathematical literacy. However, there seems to be a misconception that ICT generally refers to 'computers and computing related activities'. This is fortunately not the case in complete sense, although computers and their application play an efficient role in modern information management, other technologies and/or systems also comprise of the phenomenon that is commonly defined as ICTs. Pelgrum and Law (2003) state that around the end of the 1980s, the term 'computers' was replaced by 'IT', commonly known as Information Technology, signifying a shift of focus from computing technology, to the ability to store, retrieve and manipulate information. This was followed by the introduction of the term 'ICT' near 1992, when e-mail started to become available to the general public (Pelgrum, W.J., Law, N., 2003). According to a United Nations report (1999), ICT cover internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other related information and communication activities. ,Various kinds of ICT products have relevance to education; such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counseling, interactive voice

response system, audiocassettes and CD-ROMs etc. all being used in education for different purposes (Sharma, 2003; Sanyal, 2001; Bhattacharya and Sharma, 2007)..

2.2.2   ICT in Education:

ICT means getting information and other facilities from the modern and advanced scientific discoveries and technologies. It eases human endeavors, and saves time and increases productivity to a great extent. ICT plays a dynamic role in teaching in the classroom by making the class very effective and comprehensible. Teachers can use multimedia classroom for getting the best benefits of ICT. Power Point presentations can make the lesson plan easier for the teacher. A teacher can show interesting and informative things in their presentation. Students will be more curious seeing all the visual presentations. Also, relevant videos of the lessons can be displayed in the large screen. By this, students can connect to it easily. Similarly, audio can be played for this purpose. Moreover, teachers can get electronic copies of various helpful reference books of their topic from internet. They may easily give the copies to their students. Also, students and teachers can use email for contacting each other. They can send each other important materials for their studies. ICT also gives them opportunity to make groups in social networking websites like Facebook and Google Plus for discussing and interacting with each other. Moreover, they can have both video and audio chat for having discussions on the relevant topics.

If there is an ICT lab in the institute, and access to computer and internet, students can easily collect their study materials from there. By using internet, they can serve their study purpose without any problem. Moreover, these skills of ICT usage will benefit them in their future professional life. In this regard, a senior research officer (Rudd, 2000) of School Improvement Research Centre, National Foundation for Educational Research, UK, gives suggestion in a paper:

"What comes out very strongly from a reading of the literature on ICT and classroom activity - and this is probably the key to how ICT and school improvement research can be brought together - is a stress on the need for human interaction and structured teaching and learning to

accompany the use of new technologies in educational settings. Learning involving ICT applications must be carefully planned, clearly set out and well sequenced (and in this respect the requirements for a successful lesson using ICT are no different from those of a good lesson generally)."

2.2.3   Teacher's skills in ICT:

ICT skills of teachers is a very significant criterion for the development of quality education systems. For example, the Department of Education and Training, of the Government of Australia, assesses ICT skills of all government school teachers. They analyze several ICT skills, and make comparative studies so that they can improve the conditions for and quality of the teachers, by giving proper training and emphasis. As the education system of Australia maintains a high standard and is acknowledged throughout the world for its quality, it bears significant relevance to focus on the ICT skills of the teachers. In that ICT report, some analyzed and highlighted skills of teachers are,

- Word Processing
- File Navigation
- E-mail
- Presentation Packages
- Spreadsheets
- Curriculum Manager

Similarly, UNESCO made a framework for teachers ICT skills called 'UNESCO ICT Competency Framework for Teachers'. There it talks about various necessary skills of the teachers:

'Teachers need to be able to help the students become collaborative, problem-solving, creative learners through using ICT so they will be effective citizens and members of the workforce. The Framework therefore addresses all aspects of a teacher's work:

- Understanding ICT in education
- Curriculum and assessment
- Pedagogy
- ICT
- Organization and administration
- Teacher professional learning.'

For facilitating all ICT support, teachers need to have high skills. For this purpose, they need to have proper training, as well as be motivated and enthusiastic. The Faculty of Education and Social Work, of The University of Sidney, refers to browsing as a very significant skill as it helps to find out all the tutorials from internet. It also gives a list of things which can be helped by browsing like

- Lesson preparation,
- Compiling a mark book,
- Conducting a lesson using interactive whiteboards,
- Conducting a presentation to stakeholders,
- Conducting a presentation in class,
- Conducting an online class or discussion,
- Creating a quiz on PowerPoint using buttons and hyperlinks,
- Creating a school newsletter or newspaper,
- Creating a school publication,
- Creating a talking book,
- Creating a Web Quest,
- Creating a worksheet,
- Inserting a video into a PowerPoint presentation,
- Inserting pictures into an existing document,
- Lesson notes,
- Teaching and learning,
- Mail merge to create certificates,
- Mail merge to create letters to parents,

- Teaching students to write a report.'

In this age of ICT, conducting an ICT class can be a very effective skill for teachers. It's a very modern application. Teachers are often busy, and may need to travel home and abroad both for personal and professional purposes. In this scenario, a teacher can easily take a class by using video calling software like Skype or Imo for making a video conference to be projected in the white board. So a teacher would be able to conduct the class, and students would not be deprived of classes. Also, creating an audiobook can be another significant skill of the teacher. This technology will benefit the visually impaired students greatly. As they cannot read printed books, audiobooks would ease the work for visually impaired students. Similarly, teachers should also know to make tables and charts. They can make their work more organized and easier. Teachers can easily do this by using Microsoft word.

About twenty years ago, a classroom setting could hardly be thought of without the presence of blackboard, chalk and duster. In this modern time, blackboard and chalk have been replaced by white board, multimedia projector and laser light. It has only been possible because of the dynamic and revolutionary changes and inventions in the field of ICT. In this circumstance, teachers are required to be smart enough to adapt to the new mode of technologically equipped classroom. So teachers should have some basic skills for conducting a classroom effectively. Laura Turner, a famous researcher, discussed about some basic skills of a teacher in an article. (2005). The skills are,

1. Spreadsheets Skills
2. Electronic Presentation Skills
3. Web Navigation Skills
4. Web Site Design Skills
5. E-Mail Management Skills
6. Computer Network Knowledge Applicable in School System
7. File Management & Windows Explorer Skills
8. Downloading Software From the Web (Knowledge including eBooks)
9. Installing Computer Software onto a Computer System
10. WebCT or Blackboard Teaching Skills

11. Video Conferencing skills
12. Computer Related Storage Devices (Knowledge: Disks, CDs, USB drives, Zip Disks, DVDs, etc.)
13. Scanner Knowledge
14. Educational Copyright Knowledge

2.2.4   ICT as tools to teach visually impaired students:

ICT plays a significant role in teaching visually impaired students in the classroom. For this purpose, teachers need to have some ICT skills. The importance of the skills of concerned teachers is found in a study conducted by Institute for Information Technologies in Education (IITE) of UNESCO (2006),

"Modern technological devices applied in special needs education to improve the learning outcomes require the specialists' experience and qualification to be enriched continually, a wider access to more expert knowledge, guidance, and professional advice to provide for individual-based education. Special programs to train and retrain ICT specialists involved in education of people with SEN are of paramount importance to keep the staff informed on progressive inventions and abreast with the world developments."

ICT makes teachers' interaction with the visually impaired students easier. They can get to know concepts easily from the projector. It gives teachers a great benefit to display things using talking software based projectors. They can give their point of views to the students by using sound based Power Point presentations. With the help of ICT support, they can assess their knowledge, facilitate them into classroom. They can make them involved in class activities. During presentation sessions, teachers may involve visually impaired students into the discussions, ask them relevant questions and similarly, the students can ask their queries back. This is how; ICT helps them to connect themselves into the discussions. Teachers can give them soft copies of class lectures. They can easily take it to their home by pen drive and utilize it whenever they wish to do. For this purpose, teachers need to be very adept in browsing and searching internet as finding out required data, books and information. Not a very easy task in the maze of thousand

pages of internet. Moreover, teachers need to know how to use software like Power Point, MS Word for creating essential files for their visually impaired student. E-mail is another helpful tool for communicating visually impaired students. Teachers can easily send the soft copies of lecture, e books, and audio files to the students for their advantages. Moreover, using social media websites can be highly advantageous for the teachers. Facebook groups can be created where study materials like soft copies, website links can be uploaded. Students can easily get access to these things. They can discuss among themselves where teacher can also give his expert opinion for modification and corrections. For these reasons, teachers need to have these ICT skills for facilitating the whole learning process.

Teachers have a great role in teaching visually impaired students. They can enable and help them, not only in the classroom, but also outside the classroom by the effective use of ICT. For this purpose, they need to have some very essential ICT skills. In this regard, John Hegarty, a famous researcher, mentions the significance of ICT skills of the teachers for teaching visually impaired students in an essay,

"The need for support has always been recognized by UK governmental initiatives in ICT. The British Educational Communications and Technology Agency (Becta), like its predecessor organization, the National Council for Educational Technology, has an important role for teachers using technologies. Much of its early work was to do with the dissemination of information about the available technology and software, and ways in which it could be used for different groups of learners (including those with special needs)." (2004)

Moreover, they need to be very sensitive to the visually impaired students and take care of their inconveniences. In this regard, in a research conducted by Institute for Information Technologies in Education of UNESCO (2006), finds the requirement of special aptitude and attention of the teachers like this,

"As there are very many people with SEN, Inclusive Society is heterogeneous. In the first instance, the diversity of individual learning needs is affected: it requires the educators' ability to teach based on a variety of academic and behavioral features. Therefore, the staff involved in special needs education, have to master different vocational knowledge and skills to analyze carefully every learning situation, choice of objectives, applications of educational means and

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methods, monitoring and evaluation of learning progress, and personal or collective reflection of the process."

Teacher may dictate while writing on the board and then the student may record it using smart phone. Teachers should be very liberal to allow visually impaired students to record their necessary lectures. Also, teachers can read out loudly whatever he writes on the board so that visually impaired students can listen to it and understand their lessons by using their highly active auditory sense. Or the student can adapt to use Notebook to type the lecture of the teacher. So if they have ICT, they can participate easily. So the teacher won't have any objections.

Visually impaired students should be given more support in the standard school. It is a major duty of the concerned teachers to take care of the disadvantaged students. They should always keep the visually impaired students in head while lecturing or preparing lessons that they can easily understand the lessons. They should also encourage them to participate more in the classroom as they may feel demotivated in the classroom because of their disability. Also, they should take care of lecture speed as visually impaired students very often find it difficult to keep pace with the high pace and to understand and take notes of the lessons. Teachers are also to ensure whether visually impaired students are well equipped with the necessary ICT tools. Their responsibilities should not only be confined in confirming the adequate tools but also they should take care of the successful, effective and maximum use of these tools. As responsible teachers, they may also provide them available soft copies of books and essential notes. For this, he needs to be very expert in browsing internet and find out the necessary documents. Visually impaired students can also be given chances to consult with the respective teachers after the class if they have any problem. It may not be possible all the times due to other business of teachers. For this inconvenience, students may contact them via email. So teachers should also be very adept in communicating via email. If these supports are given and ensured, visually impaired students will find the learning environment more helpful. Teachers can give their point of view to the students by using Power Point presentations. With the help of ICT support, they can assess their knowledge, facilitate them into classroom. They can make them involved in class activities. During presentation sessions, teachers can involve their visually impaired students into the discussions. They may ask students relevant questions and similarly, students can ask them their queries. This is how ICT helps them to connect themselves into the discussions.

ICT as a teaching tool for teachers of visually impaired students: Actually after getting ICT, teachers can cover lesson plan within a shorter span in comparison to earlier. It helps them to cut short the duration of their classes. They can conduct classes more effectively and include visually impaired students as well through the help of it. ICT can achieve teaching goals if proper ICT environment can be provided in the classroom. Teachers can use multimedia classroom for getting the best privileges of ICT. Power Point presentations can make the lesson plan easier for the teacher. They can present interesting and informative things in their presentation. By this, students can connect to it easily. Similarly, many audio can be played for this purpose. Moreover, teachers can get electronic copies of various helpful and reference books of the topic from internet. They may easily give the copies to students. Also, students and teachers can use email for contacting each other. They can send each other important materials for their study. ICT also gives them opportunity to make groups in social networking websites like Facebook and Google plus for discussing and facilitating each other. So teachers should also be adept in social networking for their professional purposes. Moreover, they can have both video and audio chat for having discussions on the concerning topic. If there is an ICT lab in the institute and access to computer and internet, visually impaired students can easily collect their study materials from there. By using internet, they can serve their study purpose without any complications. Teachers need to ensure ICT labs in their educational institutions. Also, they should never stop working for enriching the labs with adequate resources.

2.2.5 The present scenario of using ICT in teaching practice:

It is a matter of great regret that the overall condition of the teachers' skill in using assistive technology to teach the visually impaired students is not satisfactory. Though some developed countries are a bit progressed in the teachers' skills, developing and poor countries show a different scenario. In an article, some researchers point out it clearly,

'A recurring theme of the four studies of the assistive-technology knowledge of teachers of students with visual impairments that have been conducted since 1990 (Abner & Lahm, 2002; Candela, 2003; Edwards & Lewis, 1998; Kapperman, Sticken, & Heinze, 2002) has been that teachers of students with visual impairments are not prepared to use assistive technology and to teach students how to use it (Smith & Kelley, 2007).' (Sismek, Altun, Ates, 2010).

So necessary steps should be taken to improve the training of teachers ICT skills. ICT has initiated profound changes in the whole learning process of modern time. Students find it very easier and comfortable to collect study materials, prepare lessons, understanding better by the help of ICT. . It eases human endeavors and saves time and productivity to a great extent. ICT plays a dynamic role in teaching in the classroom by making the class very effective and comprehensible. In a research conducted by Institute for Information Technologies in Education of UNESCO (2006), it describes the condition of ICT in the present education system like this,

"The technologies available today and those, which are about to emerge, having the potential to transform the educational system. Today we can see a lot of new ICT-based methods and forms of education. For many years educational institutions have been elaborating the educational content, structure, and methods to meet the demands of Industrial Age. The vision of education has now shifted to address the needs of the Information Age. New approaches to teaching and learning are called for with a corresponding change in the roles of all parties to the educational process."

In this regard, a senior research officer (Rudd, 2000) of School Improvement Research Centre, National Foundation for Educational Research, UK gives suggestion in a paper,

"What comes out very strongly from a reading of the literature on ICT and classroom activity - and this is probably the key to how ICT and school improvement research can be brought together - is a stress on the need for human interaction and structured teaching and learning to accompany the use of new technologies in educational settings. Learning involving ICT applications must be carefully planned, clearly set out and well sequenced (and in this respect the requirements for a successful lesson using ICT are no different from those of a good lesson generally)."

3 Chapter 3 Literature Review

3.1 ICT as a technical resource:

Yusuf (2005) holds that the field of education has been affected by ICTs, which have undoubtedly affected teaching, learning, and research. According to Al-Ansari (2006), a great deal of research has proven the benefits to the quality of education. ICT have the potential to innovate, accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis and Tearle, 1999; Lemke and Coughlin, 1998; cited by Yusuf, 2005). As Jhurree (2005) states, much have been said and reported about the impact of technology, especially computers, in education. Initially, computers were used to teach computer programming but the development of the microprocessor in the early 1970s saw the introduction of accessible microcomputers into schools at a rapid rate. Computers and applications of technology was becoming more pervasive in society, which led to questions about the need for computing skills in everyday life. Hepp, Hinostroza, Laval and Rehbein (2004) claim in their paper "Technology in Schools: Education, ICT and the Knowledge Society" that ICT have been utilised in education ever since their inception, but they have not always been astronomically present. Although at that time computers have not been fully integrated into the learning of traditional subject matter, the commonly accepted rhetoric that education systems would need to prepare citizens for lifelong learning in an information society boosted interest in ICT (Pelgrum, W.J., Law, N., 2003). The 1990s was the decade of information communications computer and access, particularly with the popularity and accessibility of internet-based services such as electronic mail and the World Wide Web (WWW). At the same time, the CD-ROM considered standard for distributing packaged software (replacing the floppy disk). As a result, educators became more resourceful on the use of the technology to improve student learning as a rationale for investment. Any discussion about the use of computer systems in schools is built upon an understanding of the link between schools, learning and information communication technology. When the potential use of computers in schools was first mooted, the predominant conception was that students would be 'taught' by computers (Mevarech & Light, 1992). In a sense, it was regarded that the computer would 'take

over' the teacher's job in much the same way as a robot computer may take over a welder's job. Collis (1989) terms this as "a rather grim image" where "a small child sits alone with a computer".

3.2 ICT as a teaching and learning tool:

The use of information and communication technologies in the educative process can be classified into two broad categories: 1. ICT as a technical resource and, 2. ICT as a teaching and learning tool. ICT for education focuses the development of information and communications technology specifically for teaching/learning purposes, while the ICT in education indicates the adoption of general components of information and communication technology as a teaching and learning tool. The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning, and research (Yusuf, 2005). ICT have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis and Tearle, 1999; Lemke and Coughlin, 1998; cited by Yusuf, 2005).

Conventional teaching has accentuated content. For many years the course has been written almost as textbooks. Teachers have taught through lectures and presentations interspersed with tutorials and learning activities designed to solidify and practice the content. Contemporary settings now prefer curricula that promote competency and performance. Curricula are starting to focus capabilities and to be concerned more with how the information will be utilized than with what the information is. Contemporary ICT are able to provide strong support for all these requirements and there are now many outstanding examples of world class settings for competency and performance-based curricula that make sound use of the affordances of these technologies (Oliver, 2000). The Inclusion of information and communication technologies can help revitalize teachers and students. This can support to improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, teachers need to be involved in collaborative projects and development of arbitration change strategies, which would include teaching partnerships with ICT as a tool. Zhao and Cziko (2001) remark that three conditions are necessary for teachers to introduce ICT into their classrooms:

a. Teachers should believe in the effectiveness of technology.

b. Teachers should believe that the use of technology will not cause any disturbances.

c. Teachers should believe that they have control over technology.

However, research studies find that most teachers do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly (Smeets, 2005). Harris (2002) conducted case studies in three primary and three secondary schools, which focused on innovative pedagogical practices implicating ICT. Harris (2002) suggests that the benefits of ICT will be achieved "…when confident teachers are willing to explore new opportunities for changing their classroom practices by using ICT. As a consequence, the use of ICT will not only enhance learning environments but also prepare next generation for future lives and careers as Wheeler (2001) states, The changed pool of teachers will bring changed responsibilities and skill sets for future teaching involving high levels of ICT and the need for more facilitative than didactic teaching roles (Littlejohn et al., 2002). According to Cabero (2001), "the flexibilization time-space accounted for by the integration of ICT into teaching and learning processes contribute to increasing the interaction and reception of information. Such possibilities show changes in the communication models and the teaching and learning methods used by teachers, giving way to new scenarios which favor both individual and collaborative learning".

The use of ICT in educational fields, by itself, acts as a catalyst for change in this domain. ICT by its very nature are tools that encourage and provide independent learning. Students using ICT for learning purposes become immersed in the process of learning and as more and more students use computers as information sources and cognitive tools (Reeves & Jonassen, 1996). In the past, the conventional technique of teaching has revolved around teachers planning and leading students through a series of instructional sequences to achieve the desired learning outcome. Typically these forms of teaching have rearranged around the planned transmission of a body of knowledge followed by some forms of interaction with the content as a means to consolidate the knowledge acquisition. Contemporary learning theory is based on the notion that learning is an active process of constructing knowledge rather than acquiring knowledge and that instruction is the process by which this knowledge construction is supported rather than a process

of knowledge transmission (Duffy & Cunningham, 1996). In this domain, learning is viewed as the construction of meaning rather than as the memorization of facts (Lebow, 1993; Jonassen & Reeves, 1996). Learning approaches using contemporary ICT provide many opportunities for constructivist learning through their provision and support for resource-based, student-centered settings and by enabling learning to be related to context and to practice (Berge, 1998; Barron, 1998). Moreover, use of ICT in learning settings can serve to support various aspects of knowledge construction and as more and more students employ ICT in their learning practices, the more pronounced the impact of this will become teachers generate efficient and engaging learning experiences for their students, strategically using ICT to enhance learning. Students enjoy learning, and the independent inquiry which can foster the innovative and proper use of ICT.

3.2.1 Researchers' ideas on ICT in instruction

Some educationists consider ICT to be the only way to go if not a substitute for conventional teaching and learning resources (Broekman et al, 2002). ICT's interactive testing and review mechanism, together with "a -let-go-back and look-at-that-again-loop" was believed to offer the best of all worlds of learning (ICT in learning, 2000). Studies have shown that ICT can contribute to an innovative student-centered learning environment where teachers act as coaches while remaining in firm control of the learning environment (Smeets and Mooij, 2001). Broekman (2002) found that ICT programs are said to promise power for students to control over their own learning, that networking replaces hierarchies and promises to give voice to learners. According to Sibiya (2003), there was evidence that ICT provided motivation and variety, generates enthusiasm, interest, and involvement, maintains attention and enjoyment, enhances thinking and problem-solving skills. Gay & Lantini(1995) and Fuks (2000) mentions **AulaNet** as a current technology in E-learning which provides a groupware for creation, participation, and maintenance of Web-based courses emphasizing group learning where individuals share ideas online. These features have been described as a way to move from elite to mass education through digital media where more students get access to education for both campus and distance.

The study indicated that ICT is primarily used to support existing teaching structures and traditional ways of tuition. It seemed to Hellios (2006) that most European universities are still at

a stage where the use of ICT "consists of treating the computer as a sophisticated typewriter and as a means of facilitating communication via traditional pedagogy and didactics in the actual teaching situation" and only a minority take advantage of the potential of ICT to redesign curricula and the content of programs. The OECD has also investigated student performance at the secondary School, providing evidence of the impact of ICT on concrete school achievements.

Based on the OECD's PISA 2003 assessment of educational performance by 15-year old students, it can be stated that regular computer users perform better in key school subjects compared to those with limited experience with computers or to those that lack confidence in their capability to perform basic computer functions. In this perspective, it can be said that ICT generally has a positive impact on teaching and learning but the expectations that ICT could in some ways revolutionize processes at school have not been realized. Teachers, trainers, and other learning facilitators have to be trained up, examples and time to "adopt" ICT in their daily practice. Empowering teachers and trainers are, therefore, fundamental (Hellios, 2006). Information and Communication Technology (ICT) includes computers, the internet, and electronic delivery systems such as radios, televisions, and projectors among others, and is widely used in today's educational setting. School is an important environment in which students participate in wide range of computer activities, while the home serves as a complementary site for regular engagement in a narrower set of computer activities (Kent and Facer, 2004). Increasingly, ICT is being applied successfully in teaching, learning, and assessment.

3.2.2   ICT as a support to collect information:

In this century, ICT has become a powerful informative addition for educational change and reformation. A number of previous studies have shown that an appropriate use of ICT can raise educational quality and connect learning to real-life situations (Lowther, et al. 2008; Weert and Tatnall, 2005). As Weert and Tatnall (2005) have claimed, learning is an ongoing lifelong activity where learners change their expectations by seeking knowledge, which departs from traditional approaches. As time goes by, they will have to expect and be willing to find out new sources of knowledge. Skills in using ICT will be an unavoidable prerequisite for these learners. These days ICT inclines to expand access to education. Through ICT, learning can come anytime and anywhere. Online course materials, for example, can be accessible with in short time or no

inconvenience. Teleconferencing classrooms support both learner and teacher to interact simultaneously with ease and convenience. By using ICT, learning and teaching no longer depend exclusively on printed materials. Multiple resources are bounteous on the internet, and knowledge can be acquired through video clips, audio sounds and visual presentation and so on. Castro Sánchez and Alemán (2011) point out that, current research has indicated that ICT assists in transforming a teaching environment into a learner-centered one. Since learners are actively involved in the learning processes in ICT classrooms, they are authorized by the teacher to make decisions, plans, and so forth (Lu, Hou and Huang 2010).

ICT, therefore, provides both learners and teachers with more educational affordances and possibilities. Students are now more frequently engaged in the meaningful use of computers (Castro Sánchez & Alemán, 2011). They build new knowledge through accessing, selecting, organizing, and interpreting information communication and technology. Based on learning through ICT, students are more capable of using information and data from various sources, and critically assessing the quality of the learning materials. ICT develops students' new understanding in their areas of learning (Chai, Koh and Tsai 2010). ICT provides more creative solutions to different types of learning inquiries. For example, in reading class, e-books are commonly used in reading aloud activities. Learners can access all types of texts from beginning to advanced levels with ease through computers, laptops, internet personal digital assistants (PDAs), or iPads. Therefore, ICT involves purpose designed applications that offer innovative ways to meet a variety of learning needs.

3.3 ICT as a support of learning development through communication

Koc (2005) holds that using ICT enables students to communicate, share, and work collaboratively anywhere, anytime. For instance, a teleconferencing classroom is enable to invite students around the world to gather together simultaneously for a topic discussion. They may have the possibility to analyze problems and explore ideas as well as to develop concepts. They can further evaluate ICT learning solutions. Students not only acquire knowledge together but also share diverse learning experiences from one another in order to express themselves and

reflect on their learning activities. McMahon's study (2009) figured out that there were statistically significant correlations between studying with ICT and the acquisition of critical thinking skills. A longer exposure in the ICT environment can foster students' higher critical thinking skills. Thus, schools are strongly advised to include technology across all of the learning areas and among all learning levels. Where this is done, students are capable to apply technology to the attainment of higher levels of cognition within specific learning contexts. There are three important characteristics are needed to develop good quality teaching and learning with ICT: autonomy, capability, and creativity (Lowther et al, 2008).

Autonomy means that students take control of their learning activities through use of ICT. In this way, they will become more capable of working by themselves and with others. Teachers may also authorize students to complete certain tasks with peers or in groups. Through collaborative learning with ICT, the students have more opportunity to gain new knowledge onto their background knowledge and become more confident to take risks and learn from their mistakes. Moreover, Serhan (2009) argued that ICT helps to foster autonomy by allowing educators to create their own material, thus providing more control over course content than is possible in a traditional classroom environment. With regard to capability, once students are more confident in learning processes, they can develop their capability to apply and transfer knowledge while using new technology with effectiveness.

To cite an example, in a regular class room, visually impaired student may be asked to practice their study using online learning resources. They are required not only to listen to the learning material from the internet, but also to learn the usefulness of ICT like sighted student. They then can make a recording of their own studies and maintain class activities. Before completing this task, they have to know which browser to use in order to search a suitable online audio or readable text book. They will have to browse several online resources and select the one that best meets their learning needs. In addition, finding talking software to access their learning material is another prerequisite for these learners. Therefore, the whole learning process enriches students' learning skills and broadens their knowledge beyond what they already know. Considering ICT, students' creativity can be optimized. They may bring out new multimedia

tools and create materials in the styles readily available to them. Through games Gee 2007, ICT may improve both teaching and learning quality.

3.4 ICT supporting teachers:

Watts-Taffe et al. (2003) concluded that teachers can act as catalysts for the inclusion of technology through ICT. If the encouragement, equipment, and necessary technological support are available from institutes for the teachers, developing an ICT class will be comfortable them. The main responsibilities of these teachers will be changing their course format, creating and explaining the new class activities, and setting the computer lab through their technology learning specialists or assistants. The use of ICT also changes the teacher learner relationship. Based on the findings of Reid's study, teachers claimed that the relationship between teacher and learner is sometimes reversed with regards to information technology. This relationship boosts student's' confidence when they are able to cooperate teachers with technical issues in the classroom. Therefore, ICT reconstructs the traditional teacher-centered approach and requires teachers to be more creative in customizing and adapting their own material. On the other hand, some limitations to effective technology integration from a teacher perspective can include:

a. Low teacher expectations and a lack of clear goals for ICT use in schools (Al-Bataineh et al. 2008);

b. A lack of teacher collaboration and pedagogical support, as well as a lack of experience among cooperating teachers (Ertmer and Otternbreit-Leftwich 2010);

c. Insufficient time to master new software or integrate ICT during class period (Almekhlafi and Almeqdadi, 2010);

d. Insufficient skills for managing teaching materials (Frederick, Schweizer and Lowe, 2006);

e. Low software competence and habitual ways of conceptualizing what and how students should learn (Goktas, Yildirim and Yildirim 2009);

f. Limited knowledge and experience of ICT in teaching contexts (Honan 2008);

g. A lack of specific knowledge about technology and how to combine it with the existing pedagogical content knowledge to support student learning (Hutchison and Reinking 2011);

h. Excessive focus on teaching technical or operational skills rather than course content (Lim 2007);

i. Pressure to improve scores on national examinations (Liu and Szabo 2009);

j. A lack of recognition and encouragement of the timely and effective use of ICT (Tezci 2011a);

k. A lack of in-service training on the use of ICT (Yildirim 2007);

l. Technical problems in the classroom (Yildirim 2007);

m. Classroom management with large class sizes (Tezci 2011a);

n. Uncertainty about the possible benefits of using ICT in the classroom (Yildirim 2007); and

o. Lack of specific and definite ideas about how integrating technology into instruction will improve student learning (Al-Bataineh et al. 2008).

But several strategies for reducing with these challenges have been suggested:

a. Provide professional development activities related to technology to update teachers' skills and knowledge, and offer technical support when needed (Al-Bataineh et al. 2008)

b. Support partnerships that help teachers share effective technology practices and experiences (Ertmer and Otternbreit-Leftwich 2010);

c. Provide workshops that allow teachers to reflect upon effective strategies for technology integration into instruction and unveil issues that are central to understanding the process of technology integration into instruction (Almekhlafi and Almeqdadi 2010);

d. Offer opportunities to virtually observe teachers who use technology (Frederick, Schweizer and Lowe 2006);

e. Adjustment curricula with technology-enhanced materials (Goktas, Yildirim and Yildirim 2009);

f. Provide enough freedom for teachers in selecting and covering curriculum materials (Honan 2008);

g. Provide effective, timely, and continuous training to improve ICT skills and manage technology-rich classroom (Hutchison and Reinking 2011);

h. Encourage positive attitudes about the significance of integrating ICT into instruction Lim, 2007); and

i. Provide adequate technical support (Liu and Szabo 2009; Tezci 2011a; Yildirim 2007).

Tezci (2011a) holds that technology should be used for more than just support of traditional teaching methods According to him (2011a), teachers should learn not only how to use technology to enhance traditional teaching or increase productivity, but also should learn from a student-centered perspective how ICT can be integrated into classroom activities in order to promote student learning. This means that teachers need to use ICT in more creative and productive ways in order to create more engaging and rewarding learning activities and more effective lessons (Birch and Irvine 2009; Honan 2008). Hence, Castro Sánchez and Alemán (2011) suggested that teachers need to keep an open mind about ICT inclusion in the classroom. It is imperative that teachers learn new teaching techniques to adapt to the new instruments when teaching with technology.

Ertmer and Otternbreit-Leftwich (2010) reviewed the related literature on the necessary elements to enable pre-service and in-service teachers to apply ICT as a fruitful pedagogical tool. They suggested that schools provide teachers with solid evidence supporting the positive impact of technology-based and student-centered instruction on student learning and achievement on standardized tests. For an example, schools can offer opportunities for pre-service teachers to observe a variety of examples and models, which they can apply with real learners. Schools need to support pre-service teachers understand difficulties they may face when they begin to use ICT in their classrooms, and present effective techniques for addressing them. School authorities should ensure that teachers understand that the ultimate objective of technology integration is to advance the teaching and learning process, not replace it.

Keengwe and Onchwarei (2009) recommend that developing a pedagogical model deserves a strong link between theory and application with a view to helping teachers overcome the obstacles faced in technology integration. Thus, Staples, Pugach and Himes (2005) said that good planning for technology integration requires a special understanding of specific hardware

and software related to the curriculum. Staff development and teacher training are also unavoidable to supporting the curriculum with technology integration.

According to Sang et al (2011), several internal factors also have influence over technology inclusion outcomes. Internal factors related to teachers include: understanding of ICT use, attitudes toward technology integration; perceptions, including intention or encouragement to use ICT; self-confidence and knowledge; technology skills; readiness to use ICT; and technology self-efficacy (Al-Ruz and Khasawneh 2011; Chen 2008; Lin, Wang and Lin 2012; Sang et al 2011; Tezci 2011a). Chen (2008) explained two common issues associated with internal factors. Firstly, teachers may apply policies based on limited or improper theoretical interpretations and comprehension of ICT use. Secondly, teachers may be under pressure to address all content and be unwilling or hesitant to let students spend more time exploring content on their own with technology due to their other conflicting beliefs. These issues indicate that teachers' beliefs may not continue in their practices. A school culture emphasizing competition and a high-stakes assessment system can discourage teachers from including technology into their classrooms. Therefore, Chen (2008) says that teachers' beliefs influence ICT use in the classroom.

In terms of (UNESCO, 2002), Innovative use of Information and Communication Technology has the potential to solve this problem. Internet usage in home and workplace has grown exponentially (McGorry, 2002). ICT can potentially decrease the barriers that are causing the problems of the low rate of education in any country. It can be used as a tool to overcome the issues of cost, less number of teachers, and poor quality of education as well as to overcome time and distance barriers (McGorry, 2002).

3.5 ICT supporting learners:

ICT offers an entirely new learning environment for students, thus requiring a different skill set to be successful. Critical thinking, research, and evaluation skills are creating in importance as students have increasing volumes of information from a variety of sources to sort through (New Media Consortium, 2007). ICT is playing role in changing techniques of teaching and learning by adding elements of vitality to learning environments including virtual environments for the

purpose. ICT is a powerful tool even full of potentially for offering educational opportunities. It is difficult and maybe impossible to imagine future learning environments that are not affirmed, in one way or another, by Information and Communication Technologies (ICT). When looking at the current widespread diffusion and use of ICT in modern societies, especially by the young the so-called digital generation then it can be measure that ICT will affect the complete learning process today and in the future. Collins (1996) focused mostly on the authenticity which should be addressed in the design and development of learning environments. Learning environments need to reflect the potential uses of knowledge that pupils are expected to master, in order to prevent the acquired knowledge from becoming inert (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Duffy & Knuth, 1990). In addition, teachers should encourage pupils to engage in active knowledge construction. This calls for open-ended learning environments instead of learning environments which focus on a mere transmission of facts (Collins, 1996; Hannafin, Hall, Land, & Hill, 1994; Jonassen, Peck, & Wilson, 1999). ICT may contribute to creating effective learning environments in numerous ways.

3.6 ICT as a learning tool for visually impaired learners:

The Charter of Fundamental Rights of the European Union (2000) declares that: "Any discrimination based on any ground such as sex, race, color, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited". In the field of education, the basic concept of "Non – discrimination" entails the ability of all people to have "equal opportunity in education, regardless of their social class, ethnicity, background or physical disabilities" (Klironomos et al., 2005). So, students with visual impairment have the right to expect the equal educational opportunities as their schoolmates and, in this view, they also have the right to access mainstream educational tools, including ICT-based ones, which are generally concerned to as "Learning tools". Hitchcock et al (2003) named such tools as 'powerful tools' to foster learning. According to Viisola, M (1999), data from the World Health Organization seem to confirm that sight impaired students are a relevant percentage of the

overall population of the students with disabilities. Such students could be highly benefited by using ICT for educational purposes but they actually face a number of accessibility problems (Burzagli et al., 2004). In the Article, 'ICT-based learning tools and its impact on students with visual impairment', (*IRACST - International Journal of Computer Science and Information Technology & Security (IJCSITS), ISSN: 2249-9555 Vol, 5, No6, December 2015), Vidhya P stated that, "*Intelligence of an individual is not connected with the visual impairment and it is reported that the visually impaired people have the same range of intelligence and abilities of sighted people. However, it is found that the significant number of visually impaired people needs additional support in reading and writing and concept development. This is because visually impaired pupils may not have access to the consequent learning through vision.

World Health Organization delineated the assistive technology as any product or technology supported services which enable the disabled to lead an independent life. In recent years, technology acts a vital role in the development of teaching-learning process due to ease in the usage of computers and its supporting tools. Therefore, researchers are being motivated towards developing tools for automation of an existing classical system. In the book, 'Assistive Technology for Students Who Are Visually Impaired or Blind' Ike Presley and Frances Mary say that, all students may find themselves challenged in today's fast-moving and globally competitive environment, but students who are visually impaired or blind have additional challenges. They must learn the same higher levels of information-processing and handling capabilities as their classmates, and they must have access to the advanced technologies such as hardware and software that make these "21st-century literacies" possible. This access has been made available to individuals with disabilities through a wide range of special devices and software, defined as assistive technology, which allows them to access information and the general curriculum, as well as through innovative technological tools. Visually impaired students, thus, must develop expertise in using assistive technology, and they must develop skills in performing other complex tasks. Much has also been said in the literature about the benefits of using ICT for the students with special needs.

A report of ACE Centre Advisory Trust (1999) reads that students with special educational needs are able to accomplish tasks working at their own pace. The best-benefited group through ICT

was the visually impaired students. Waddell (2000) suggests that visually impaired students using the internet can access information alongside their sighted peers. Nowadays communication disorder has little to hinder their communication with their sighted peers. Detheridge (1997) holds that students with profound and multiple learning difficulties can communicate more easily. There are many visually impaired students who are now no more dependent on the help of others for their study and much more. Voice communication aids have brought a radical change in their way of communication. Worth (2001) indicated that students using voice communication aids gain confidence and social credibility at school and in their communities. Visually impaired students are not only using ICT for their necessary tasks, they are using it as a tool of amusement as well. Waddell (2000) claims that increased ICT confidence amongst students motivates them to use the internet at home for schoolwork and leisure interests. A research launched by UNESCO in 2006 found out some general benefits of using ICT for Special learners:

    a. Enables greater learner autonomy

    b. Unlocks hidden potential for those with communication difficulties;

    c. Enables students to demonstrate achievement in ways which might not be possible with traditional methods

    d. Enables tasks to be tailored to suit individual skills and abilities

In addition, there are more benefits:

    a. ICT is useful in improving a person's quality of life by enhancing effectiveness of teaching, developing life skills; complementing learning in special needs education, and exploring other related issues

    b. ICT enables disabled students to gain access to the curriculum and supported learning and provides a platform for disabled trainers to promote their skills.

    c. ICT can be compared to a magic stick and will help disabled students to get ahead through capacity building and empowerment, subsequently combating poverty among the disabled within their communities, if utilized in a coordinated, planned and appropriate manner.

    d. ICT is heralded as enabling PWD (Public Works Department) to participate fully, and to enhance the social and economic life of their communities. Combined with proper

methodologies, it can offer individuals the capacity to compensate for physical or functional limitations

e. ICT is a significant force in terms of choice and opportunity for disabled students, and a significant means of bridging this gap

f. ICT offers the old and young alike an opportunity to overcome social barriers to interaction and communication that can be caused by the lack of provision for impairments or lifelong limiting illness.

g. ICT has also been identified as playing a significant role in offering severely disabled people an increased degree of independence in their everyday lives.

h. ICT provides disabled persons with an improved quality of life and offers the possibility of accessing knowledge by adapting digital media to the nature of their disabilities.

3.7 Benefits and Challenges teaching visually impaired students using ICT

To be more specific, now, ICT is being used to teach the visually impaired students more than ever before. David Dawson (2002) holds that ICT will play the most vital role in the teaching of visually impaired students. As Helene LidstrÖm & Helena Hemmingsson (2012) stated that the literature appears to support the use of ICT as an assistive technology device (ATD), specifically designed to assist and enable an individual's participation, particularly in education and communication. Learning and teaching process of the visually impaired students have highly been benefited through ICT. It has become a boon for them. Leslie Casely-Hayford and Paul Lynch (2003) think that the vision-impaired are one of the most successful disability groups in adapting assistive technology and gaining access to information using ICT. Despite all the potential that this technology possesses, researchers also find that most teachers don't make appropriate use of ICT or don't use it to its full quality of benefits, leaving students shorthanded. Parker et al, (1990) stated that teachers of students with visual impairments and deafness-had poor or nonexistent knowledge of specific areas of assistive technology, and a study by Mack et al (1990) on computer training of students with visual impairments concluded that teacher

education programs have a duty to train teachers in the necessary knowledge, skills, and motivation to provide a bridge between students and technology (Smith & Kelley, 2007).

A recurring theme of the four studies of the assistive technology knowledge of teachers of students with visual impairments that have been conducted since 1990 (Abner & Lahm, 2002; Candela, 2003; Edwards & Lewis, 1998; Kapperman, Sticken, & Heinze, 2002) has been found that teachers of students with visual impairments are not prepared to use assistive technology and to teach students how to use it (Smith & Kelley, 2007). It was also observed that trainers did not have time to get to grips with the technology in terms of ICT (Gerber, 2003). Corn and Wall (2002) in their survey of the use of technology and multimedia presentations by teachers of students with visual impairments indicated that the teachers were more at ease with general technology rather than the assistive technology (Sales et al., 2006). In order to bridge the gap in lack of teacher knowledge, Abner and Lahn (2002) found in their survey in Kentucky of teachers of learners with visual impairments that the teachers did not, in general, feel competent to teach assistive technology. 93% of the teachers surveyed used the internet and 88% used email, but the level of telecommunications use was not being transferred to the students, given that only 8% of the students used the internet (Sales et al., 2006). Consequently, the problems that visually impaired learners (VIL) encounter during developing information and communication technologies (ICT) skills need to be explored both experimentally and in point of their views and their trainers' views.

The complicated journey of adapting to the use of ICT has its ups and downs; however, teachers all over the world are slowly making strides towards a better tomorrow. Nowadays, there are many recent organizations working for the visually impaired education. The Canadian National Institute for the Blind (CNIB) is working for the Canadian visually impaired students. This organization is providing a great service through its various programs including research and library for the visually impaired s. The DAISY (Digital Accessible Information System) consortium and Open eBook Forum (OeBF) are providing a lot of opportunities to access the various branches of knowledge regardless of disabilities. Africa Braille Centre (ABC) Nairobi, Kenya, an NGO, is dealing with the gigantic task of producing braille reading and writing materials. ABC is one of the biggest organizations in Africa making braille and computer

products. It has a great influence over the visually impaired education in Africa. Celia Library for the Vision Impaired and Tactile Books has been providing its services in Finland for the visually impaired students. The Swedish Library of Talking Books and Braille (TPB) is an initiative in association with other libraries for the visually impaired s in Sweden. The NLB (Norwegian Library for the Blind) provides free books in audio or braille format for all visually impaired students of Norway.

Along with these organizations, there are some other factors which can be counted on this issue of teaching visually challenged learner:

a. Universal Connectivity and Access.
b. International Broadband Network(IBN)
c. Low-cost Equipment
d. Low-cost Connectivity
e. Inter-Connection
f. Regional Infrastructure
g. Open-Source software/Free software (OSS/FS)
h. Government Policies
i. The combination and Central Control.

The literature on ICT usage in visually impaired education is so wide and gigantic. It is not possible to discuss all of them in this paper as the scope of this study will not permit it. Obviously, more research on this field is needed, and hopefully as time goes by more people in academia will dedicate themselves to it. ICT is now being used as a teaching-learning tool, a guide, and assistance for visually impaired people. Visually impaired people are no more dependent on their fellows to reading out their materials. They have books in braille version. In the case of unavailability, audio books are there too. ICT is also present in the form of reading software. Although visually impaired learners are having newer facilities every day, shortcomings are there. Works are being conducted all the time to give good news for visually impaired people. Special schools have been introduced throughout the world since the eighteenth century. As time passed, visually impaired education has been formulated into new shapes with the support of ICTs. Nowadays it has become a pressing need for visually

impaired people to engage themselves in the regular classroom. It is quite possible to provide them with education without keeping them segregated. ICT fills that gap every day.

4 Chapter 4 Research Methods

Research means systematic investigative process to increase or revise current knowledge by discovering new facts. It is divided into two general categories: (1) Basic research is inquiry aimed at increasing scientific knowledge, and (2) Applied research is effort aimed at using basic research for solving problems or developing new processes, products, or techniques. This applied research will reveal the limitation and strength of visually impaired students in standard school regarding ICT based support.

4.1   Research design

The research design will utilize the phenomenological research of qualitative research design.

There is some common agreement today about the core characteristics that define Qualitative research: Natural setting, Research as key instrument, Multiple sources of data, Inductive and deductive data analysis, Participants' meanings, Emergent design, Reflexivity, Holistic account (Cresswell, 2014).

Qualitative approach is situated within the constructivism paradigm that considers social reality as constructed by the individuals personally experiencing this reality (Gall, Gall, & Borg, 2007: 21). Respectively, qualitative research focuses on the meanings people assign to the social phenomena experienced by them (Savin-Baden & Major, 2013: 11). It is notable that qualitative researcher admits the fact that all qualitative research is inherently subjective (Savin-Baden, & Major, 2013: 12).

In qualitative research investigator represents an instrument of investigation (Maxwell 2013: 88) and through personal involvement influences its flow and outcomes. Maxwell (2013) claims that in qualitative research it is impossible to fully eliminate researcher's influence on the study and the goal is not elimination, but the understanding of own influence for its effective use (Maxwell, 2013: 125). Therefore, qualitative researcher should be conscious and reflexive about own effects and personal biases (Creswell, 2014: 187).

There are several reasons for conducting qualitative research: One of the main reasons is the nature of the research problem and the other is the personal choice of the researcher itself.

The research design utilizes the phenomenological research of qualitative research design. There is some common agreement today about the core characteristics that define Qualitative research: Natural setting, Research as key instrument, Multiple sources of data, Inductive and deductive data analysis, Participants' meanings, Emergent design, Reflexivity, Holistic account (Creswell, 2014). As the research gap was addressed previously, the issue requires and involvement of rather large amount of factors to be examined within environment. These would include perceptions of student on ICT, current situation in schools with the ICT tools and much more. Thereafter the researcher aims to incorporate and initially examine quite a broad range of these factors to a shallow depth. Yet, it should be possible to identify which of these factors stem as important if one intends to implement ICT tools for visually impaired students, which in turn can be later used to lay a ground for further research.

The researcher is dealing with a rather unexplored phenomenon. The use of ICT has been well researched; however the implementation to standard schools as a study tool that will help visually impaired students is a rather underdeveloped area. Due to that, the qualitative characteristic of this research has to be supported with exploratory nature. This research has hence intended to find out and described "what" is happening in the field, not drawing descriptive connections or exploratory conclusions. This author kindly hopes that the latter two might be built on this paper.

Moreover, the author aims to incorporate an iterative characteristic into the research due to the lack of previous exploration into the phenomena. This iteration has been implemented during data collection process, where the author selected pilot respondents and based on their answers a final set of questions that had been asked actual respondents has been formed. The pilot respondents have not been included in a data analysis as these were facing different sets of questions. This practice is done so that the final set of questions can be better focused on the most significant of the field factors influencing implementation of ICT for visually impaired students.

As for the research strategy used, the author wondered between two alternatives. Firstly, it should be possible to use a case study, whereas one school that is attended by visually impaired

students is being treated as a single case, while the author would examine this entity in a holistic manner. Secondly, it can be possible to treat these phenomena as an issue that has been occurring in the past years - namely implementation of ICT into schools with visually impaired students. Thereafter stories had been collected about this issue through a narrative inquiry approach. Due to rather exploratory nature alongside of its qualitative character, the latter has been selected so that a triangulation of data analysis can be used. As for triangulation, the researcher aims to bring three inputs into data analysis from which findings and conclusions should be drawn. Firstly, the literature review and opinions of academics are understood as one input into data analysis. Secondly, students who had been respondents to questions had provided their perceptions mainly on what kinds of ICT helped them during their studies. Thirdly and finally, teachers has provided with their view on what might limit their motivations with the implementation of ICT for visually impaired students.

4.2 Drawing a Sample

If one intends to examine how students with visual impairment use ICT as a study aid, it is possible to set a research environment in twofold way. Firstly, it is possible to aim for schools that are entirely focused on impaired students and do not involve students who are not in a need of such due to their health condition. Secondly, it is possible to set as an environment schools that are attended by both of previously mentioned groups of students. The latter option has been selected by a researcher due to various reasons. This setting, as a school that combines both groups of students appears to be more promising for the future of education. Moreover, if researcher aims to identify possible barriers, which halt the implementation of ICT for visually impaired student, one can presume that these barriers will be more obvious in this setting, compared to the other mentioned.

As for the sampling, it is not possible to use probabilistic methods due to very small population of interest. Only a small margin of students at school of this paper interest are visually impaired. Moreover, as it might be hard to get in touch with these a combination of purposive sampling has been used. Through personal contacts of researcher the very first respondents has been found and through them, the further possible respondents has been identified. This type of sampling is

essentially to do with selection of units (which may be people, organizations, documents, and so on), which direct reference to the research questions being asked (Bryman, 2012).

For this study following group of people has been selected:

→ 3 Secondary level students with visual impairments in standard school in Bangladesh;

→ 3 Teachers of students with visual impairments in standard school of Bangladesh.

An integrated school has been selected where visually challenged students enrolled under the inclusion policy of Bangladesh education system. In this integration program, every integrated school allows 10 students in the regular classroom and regular teachers teach them with cited student. From this type of integrated school 3 teachers and 3 students has been selected to take interview by permission formalities of Ministry of Education of Bangladesh. The questionnaire of this study mentioned below has been phenomenologically oriented and open-ended as mentioned above in research question. Group of visually impaired student will give opinion of using possibility of information and technology for inclusion in their classroom. Group of teacher will clarify the important, positivity, advantages and disadvantages of information and technology for inclusion.

4.3 Data Collection

For this study the stage was set for discussion of issues involved in collecting data. The data collection steps include setting the boundaries for the study, collecting information through unstructured (or semi-structured) observations and interviews, documents, both audio and visual materials, as well as establishing the protocol for recording information (Cresswell, 2010).

The purpose of the research interview is to explore the views, experiences, beliefs and/or motivations of individuals on a specific matter (Gall et al., 2007). The main task in interviewing is to understand the meaning of what the interviewees say. Qualitative methods, such as interviews, are believed to provide a 'deeper' understanding of exclusion as a phenomenon. The purpose of study is to determine the nature of the interview (e.g. structure, types of questions) (Gall, Gall and Borg, 2007). Because of these reasons, the nature of my research question, the interview is the natural method for obtaining the data needed to answer this question.

Interviews consist of oral questions and oral responses between researcher and the informant, typically one informant at a time. The researcher (interviewer) is largely in control over the response situation, scheduling the time of the interview and controlling the pace and sequence to fit the circumstances of the situation (Gall, Gall and Borg, 2007). According to them, most significant advantage of the interview is the adaptability, in which the researcher builds trust with the informant, therefore making possible learning the information that could not be obtained by other methods. However, there are some disadvantages of the interview, first being difficult to standardize the interview situation so the researcher does not affect the answers (Gall, Gall and Borg, 2007).

Here this study continues through collecting information where significance is emphasized on participants' and their way of spontaneous approach. So to make this context easier the data collection procedure is launched through open-ended questions for two reasons from my two groups of participants as follows:

♦ To find out the participants' real attitude and thoughts about the students with visual impairment accept the principal target group for whom this is of.

♦ My limitation make me avoid note-taking approach from the interview of my participants as I myself is a student with visual impairment. That's why I focus on audio recording approach of data collection. In this case collected data (recorded file) will be helpful for further analysis in times.

4.4 Instrument to collect data

For this study the stage will be set for discussion of issues involved in collecting data. The data collection steps include setting the boundaries for the study, collecting information through unstructured or semi-structured) observations and interviews, documents, both audio and visual materials, as well as establishing the protocol for recording information (Cresswell, 2014).

4.4.1   Interview

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4.4.2   Sampling and Participants of the study

In qualitative research discussion of sampling tend to revolve around notion of purposive sampling. This type of sampling is essentially to do with selection of units (which may be

people, organizations, documents, and so on), which direct reference to the research questions being asked (Bryman, 2012).

For this study one non special school and following group of people will be selected:

→ 3 Secondary level students with visual impairments at schoolfor all in Bangladesh;

→ 3 Teachers of students with visual impairments at School for all of Bangladesh.

Acquiring the permission formalities of Ministry of Education of Bangladesh a standard school can be selected where visually challenged students enrolled and using ICT under the standard school policy of Bangladeshi education system. The questionnaire of this study mentioned below will be phenomenological oriented and open-ended as mentioned above in research question. Group of visually impaired student will give opinion of using possibility of information and technology for inclusion in their classroom. Group of teacher will clarify the important, positivity, advantages and disadvantages of information and technology for inclusion.

4.5 Ethical Considerations: Validity and Reliability

Validity and reliability are important quality measures of every research. The main question regarding qualitative study is how to make sure that the conclusions made by the researcher are valid and trustworthy (Przeworski and Salomon, 1988 in Maxwell, 2013: 121-122). In interviews, inferences about validity are made too often on the basis of face validity (Cannell and Kahn 1968), that is, whether the questions asked look as if they are measuring what they claim to measure (Cohen et al., 2007: 150).

To increase trustworthiness of the results Maxwell suggests making specific solutions useful for minimizing validity threats within the context of a particular study (Maxwell, 2013: 124).To ensure the accuracy of participants' accounts and not to miss essential details, the interviews will be recorded. Together with audio records, written notes will be made by my assistant to maintain those aspects of the interviews, which could not be recalled only by the audio records. Furthermore, the transcripts will be checked several times. An accurate understanding of participants' perspectives is central to the qualitative research. Hitchcock and Hughes (1989) argue that because interviews are interpersonal, humans interacting with humans, it is inevitable that the researcher will have some influence on the interviewee and, thereby, on the data (Cohen

et al., 2007: 150). Interpretive studies are never fully free from the researcher's perspective. To minimize threats to the interpretive validity, during the interviews I will check whether the participants' statements and opinions are properly understood. One way of controlling for reliability is to have a highly structured interview, with the same format and sequence of words and questions for each respondent (Silverman, 1993). However, controlling the wording is no guarantee of controlling the interview (Cohen et al., 2007: 150).

The issues of reliability do not reside only in the preparations for and conduct of the interview; they extend to the ways in which interviews are analyzed. (Cohen et al., 2007). To increase dependability in qualitative research, Yin suggests to make steps operational as much as possible by precisely documenting the undertaken procedures (Yin, 2014: 49). With this concern, I will try to carefully document the fieldwork details in the study report.

According to Yin, *"specific ethical considerations arise for all research involving human subjects"* (2014: 77). As research in social sciences, particularly in education, always relates to humans, ethical considerations become vital. By emphasizing and addressing ethical concerns, educational researcher show respect for research participants, protects them from possible harm and honors their contribution (Gall, 2007: 69). During the study is very important to anticipate any cultural, religious, gender, or other differences in the participants (NESH, 2006).

This study will maintain the obligation to respect the attitudes, choice, rights, needs, economical context, and desires of the informant (visual impaired students) to an extent, phenomenological research is always obtrusive. Participant observation invades the life of the information (Spradley, 1980) and sensitive information is frequently revealed. This is of particular concern in this study where the informant's position and institution are highly visible. The following safeguards will be employed to protect the informant's rights:

- ♦ The research objectives will be articulated verbally and in recording so that they are clearly understood by the informant (including a description of how data will be used).
- ♦ Written permission to proceed with the study as articulated will be received from the institute (School).
- ♦ A research exemption form will be filed with the institutional review board.

- The informant will be capable of friendly all data collection devices and activities.

- Verbal and recorded interpretations and audio-visual file (as a documentary report) will be made available to the informant.

- The information's rights, interests and wishes will be considered first when choices are made regarding reporting the data, and the final decision regarding informant anonymity will rest with the informant. (Cresswell, 2014)

As the study represents a thesis work of the master program belonging to the University of Oslo, the approval for the study will be required from the Norwegian Social Science Data Services (NSD), which provides assistance to the researchers and students during their investigations.

NSD's main responsibilities are to evaluate research and student projects relative to the provisions in the Personal Data Act and Personal Health Data Filing System Act with appurtenant regulations, to provide information and guidance to the institutions and the individual researcher and student on research and the protection of privacy, to help respondents protect their rights and to keep a systematic, public list of all treatments (NESH, 2006). It is a fundamental responsibility of every researcher to do all in his or her power to ensure that participants in a research study are protected from physical or psychological harm, discomfort, or danger that may arise due to research procedures (Freankel et al., 2012). The most obvious way in which the participants can be harmed in qualitative research is if the confidentiality of responses is not honored. Thus, it is very important to protect each participant's confidentiality.

In this study all the data of the informant will be preserved safely only for the proof of research validity and reliability. If there is created any suspicious situation to prove the validity and integrity of that research only then the data will be used to ensure the specific source. Apart from these no other will get any access to violate the source of data. Here the researcher will be liable for any kind of disclosure or harmful effect of the informants/participants of whom provided data and information have been analyzed.

5 Chapter 5 Results and Analyses

This is qualitative data from interview with 3 blind students and 3 teachers of blinds students. The data show their experiences using ICT as tool to learning and teaching for inclusion. The main research question is as earlier mention: How does blind students experiences ICT support as a tool to learn and to be included in a school for all, and how does teacher experiences using ICT to support and include blind student in their teaching practice? The main research questions are dividing into following four sub-questions and the results will be presented with the connection to these sub-question :

1. How does ICT support learning of blind students?
2. What are the experiences of teachers using ICT as a tool to teach and include blind students?
3. What are the experiences of blind students using ICT as a tool to be included and support in their learning process?
4. How does ICT support visually impaired student?
5. How is the process of implementing ICT for blind students in a school for all ?

Every answer by both the students and teachers interviewed were analyzed to come to an understanding of their experiences about factors that influences ICT in their learning and teaching in a regular school. Not only did the sub-questions help understand what was asked of the interviewees, but they also painted a more holistic picture than expected on the topic of inclusion of not only blind students but generally all special needs students using ICT in teaching and learning.

5.1 How does ICT support inclusion of visually impaired students?

Teachers' perspectives:

Results ICT and inclusion

Informant 1:

"There is not sufficient number of braille books in standard school so I see that they are managing their classes by ICT support."

The student can adapt to use notebook to type the lecture of the teacher. So if they may have ICT they can participate easily. So the teacher won't have any objections. »

Mainly they can use digital recorders so that information won't be missing. They can also use soft version of text books. By using it, they will take part in reading test like sighted students does."

"Teachers should also be more responsible and helpful to ascertain some privileges to use ICT tools effectively to the visually impaired students"

 Informant 2:

"Yes, undoubtedly ICT help them to continue my classes."

 Informant 3:

 "Yes, ICT helps them to continue my classes. They can read, write, take notes, and prepare their lessons with ICT, except some tricky subjects like mathematics and drawing. they need to be more familiar with ICT. They can use some of the tools successfully, but they have to take the help of others to operate these tools. Moreover, they often run the tools slowly which leaves them behind. So they needed to be trained to operate these properly to maximize their advantages. It would make their learning much easier and they will be more competitive to the sighted students."

Teachers feel that there is no sufficient number of braille books in standard school so they see that their visually impaired students are managing their classes by ICT support. ICT has become a great alternative helpful tool in their learning process. They added that though little bit slow, by using Assistive technological support, visually impaired students are taking part in the class rooms. They suggested some ideas which visually impaired students can follow to take part into classroom. For example, Teacher may dictate while writing on the board and then the student may record it using a smart phone. The student can adapt to use Notebook to type the lecture of the teacher. So if they may have ICT they can participate easily. Mainly they can use digital recorders so that any information won't be missing. By using it, they will take part in reading Test like sighted students does. One teacher mentions that he gives them soft copy of teacher's class lecture maximum time. Even they are using smartphones to record the teacher's lecture. Sometimes teachers find that they are a little bit slow but the visually impaired students who have practiced a lot are faster in typing than sighted students. They should use talking software

based devices to take class notes but they have to be careful to make sound that their sighted friend don't face problem by the sound of talking software. Teachers think that their visually impaired students needed to be trained to operate ICT properly to maximize their advantages. It would make their learning much easier and they will be more competitive to the sighted students. Teachers consider that ICT can make them confident, help them to write and read. Their visually impaired students can share their thoughts with sighted friends by communicative Technology. Moreover, they can exchange their knowledge with each other. ICT helps the visually impaired students to become more competent. They assume that visually impaired students can be included into standard school because they can admit a very few meritorious visually impaired students for insufficient student capacity of the schools. There are ICT labs almost in every school. So the schools need not do anything extra for accommodating the visually impaired students. They just need to manage nothing but some headphones and some software.

They also added that since study materials are not available and sufficient; they can convert their text books into their accessible version by ICT tools like scanners, Talking Book, Book Reader. By this, they will get a chance to read the same books like the sighted students and compete with them with the same materials. Teachers expect that since ICT is working well with visually impaired students and they can use ICT like other students, so in standard school, ICT can help the visually impaired students to be included with sighted students. ICT is supportive to the visually impaired learners, at least they can read and write like sighted students by the various tools developed by it. Since they are arranging that their standard school system using ICT not only for visually impaired students but also for their administrative purposes, it gives them reasonable support. Their visually impaired students are greatly benefited by it.

Students' perspectives

Results ICT and inclusion

Informant 4:

"I use talking computer, class lecture and internet information for making my class notes. Talking Computer helps me to read out the information. Class lectures gives me an overall view of all the topics included in the syllabus. Internet sources help me to polish and maximize the bulk and quality of my notes"

Informant 5:

"Sometime I can type in my laptop like other students."

 Informant 6:

"I can manage most of the class activities with the support of ICT."

"Today ICT saves both my time and cost. ICT can give me reach to more and more information. I can easily apply those according to my need. »

Summary

All the visually impaired students claim that ICT helps them to overcome classroom difficulties. Apart from the visual part, they can manage most of the class activities with the support of ICT, nevertheless, they expect their teachers to be more attentive while they are using ICT and their class room setting should be more ICT user friendly, so that they can use it properly. They think that it is making them independent. Moreover, it brought good speed and accuracy in their work. Today ICT saves both their time and cost. ICT can give them access to more and more information. They can easily apply this according to their need. It's better now that they can learn faster than ever before. They give some examples of ICT tools which are of help to them to manage their studies. They use talking key pad for writing their notes. Audio recording devices are needed to record the class lectures and instructions of their classmates for preparing notes. They also need the class lecture's soft copy for this purpose. They use talking computers, class lecture and internet information for making their class notes. Talking Computer helps them to read out the information. Class lectures gives them an overall view of all the topics included in the syllabus. Internet resources help them to polish and maximize the bulk and quality of their notes they use recording text book, talking computer and scanner. By using scanner, they can scan the documents and make those readable for them.

5.2 What are the experiences of Teachers to use ICT as a tool to teach blind students?

Teachers' perspectives:

ICT as teaching tools

Informant 1:

"ICT makes my interaction easier with the visually impaired students. They can make sense of my thoughts easily from the projector. It gives me a great privilege to present things using projectors. "

"ICT saves time. I can give my point of view to the student by using Power Point presentations. "

 Informant 2:

"Actually after getting ICT, I can cover my lesson plan within 50 minutes class duration. I can conduct my classes more effectively and include visually impaired students as well through the help of it. ICT can achieve our teaching goal if we can provide proper ICT environment in the classroom. So they can participate better in my class. "

 Informant 3:

"I help them to record my lessons. I suggest them some essential books which they can scan with the help of talking software later. It is a very effective way of learning to them."

Summary

All three teachers think that ICT makes their interaction easier with the visually impaired students. They can make sense of the teacher's thoughts easily from the audio version of projector. It gives them a great privilege to present things using talking software based projectors. They think that ICT saves their time. They can give their point of view to the students by using talking Power Point presentations. With the help of ICT support, they can facilitate them into the classroom. They can make them involved in class activities. During their presentation sessions, they involve their visually impaired students into the discussions. This is how; ICT helps them to connect themselves into the class activities. Actually after getting ICT,

they think that they can cover their lesson plans within the class duration. They can make their classes more effective and include visually impaired students as well with the help of it. They express that ICT can achieve their teaching goal, if they can have proper ICT environments in the classroom. So they can participate better in the class room. One teacher says that he likes to give them soft copies of his class lectures. They can easily take it home by using pen drive, and use it whenever they wish to do. Most of the time, they use voice recorders in his class. He helps them to record his lessons. He suggests some essential books which they can scan with the help of talking software later. It is a very effective way of learning for them.

All teachers say that they permit them to record their lecture. Two teachers use e-mail to provide them class tasks.

Students' perspectives

ICT as a teaching tool

Informant 4:

"My teachers generally use projector, soft copies, audio system, e-mail etc. Soft copies of various books, newspapers, articles are used to better understand the material."

Informant 5:

"My teachers use multimedia presentation as a learning tool in the classroom. They present their topics in an organized way, and present it by multimedia presentation. Personally I find this tool very helpful for teaching visually impaired students."

Summary

All visually impaired students also mention that their teacher uses projector, soft copies, audio system, e-mail etc. They think that audio system plays a very vital role for the visually impaired students when class teachers use it in the class room.

5.3 What are the experiences of blind students using ICT as a tool to be included and to get support in their learning process?

Teachers' perspectives:

Results ICT as a learning tool

 Informant 1:

 Informant 2:

"I know they can read documents or material in MS Word, so I try to give them soft copy that they can read by their talking software."

"I try to make my Power Point presentation with fewer animations and input descriptive information. It becomes easier for them then to make sense properly."

 Informant 3:

"I send my suggested study materials through e-mail. Over the phone, they can contact me in fixed time slots."

Summary

All teachers like to tell that their visually impaired student can continue their class with the help of ICT. They say that they know their visually impaired students can read documents or material in MS Word, so they try to give them soft copy of the class lecture that they can read by their talking software. They try to make their Power Point presentation with fewer animations and input descriptive information. It becomes easier for them then to make sense properly. They try to give clear description when they deliver their lecture from their Power Point. They speak slowly so that they can take notes. One teacher mentions that she sends her suggestive study materials through e-mail. Over the phone, so they can contact her in some fixed time slots.

Students' perspectives:

Results ICT as a learning tool

Informant 4:

"I use mp3 for recording and playing audio. Smartphones can also be used as a useful tool in the classroom. I use several apps for helping my classroom activities. Moreover, smart phones can be used as a tool for recording lectures."

Informant 5:

"Yes, ICT helps me because I use Talking Book Reader. It reads out my book which is synonymous of reading books to me."

Informant 6:

"Yes, I scan my text books and then I convert them into Word format. After that, I use talking Software JAWS. It helps me to read those converted text properly. I try to understand the content at the same time I record this read text. I also ask my teachers if I have any confusion."

"I use talking computer, class lecture and internet information for making my class notes."

"Text book reading helped me to become a successful learner. For this purpose, I have used ICT tools like scanners with Open Book software, Daisy book and computer. Scanners with Open Book software helped me to scan any text and then it made my target text accessible. Likely, Daisy books can be talking books or books printed as Braille books on paper or books having Braille display or screen reading display. It helped me largely. Computer also helped to me browse internet and storing my necessary documents."

Summary

All visually impaired students consider ICT as their learning tool an alternative of braille. They argue that they use MS Word which takes their input and give back their desired output. They use smartphone recorder, mp3 for this purpose also. They mention that smartphones can also be used as a useful tool in the classroom. They use several apps for helping their classroom activities. More or less they use mobile recorder, mp3, notebook and laptop for help themselves in the classroom.

For reading text book they use Talking Book Reader, scanners with Open Book software, Daisy book and computer. It reads out their class book which is synonymous of reading books to them. They also scan their text books and then they can convert them into Word format. After that, they use talking software JAWS. It helps them to read those converted text properly.

They say that Braille book is not available for them in the book shops. So they have to record text books for some cases. For making class notes they use talking computer, class lecture and internet information, and Talking Computer helps them to read out the information. Class lectures gives them an overall view of all the topics included in the syllabus. For writing purpose they use talking keypad.

5.4 How does ICT support visually impaired students?

Teachers' perspectives:

Results Support of ICT

 Informant 1:

"They can use talking keypad if they want. It enables them to type what exactly they want to type.

So they needed to be trained to operate these properly to maximize their advantages. It would make their learning much easier and they will be more competitive to the sighted students.

Informant 2:

"Yes, ICT helps them to continue my classes. They can read, write, take notes, and prepare their lessons with ICT except some tricky subjects like mathematics and drawing.

Informant 3:

"ICT can make them confident, help them to write and read. They can share their thoughts with sighted friends by communicative Technology. Moreover, they can exchange their knowledge with each other.

So the schools need not do anything extra for accommodating the visually impaired students. They just need to manage nothing but some headphones and some software.

Summary

All 3 teachers suggests to their visually impaired students the use of ICT to compensate for the unavailability of study material. They undoubtedly feel ICT helps them to continue their classes, which are greatly designed by the help of this system which has proved to be very helpful for their visually impaired students. Nevertheless, they need to be more familiar with ICT. They can use some of the tools successfully but they have to take the help of others to operate these tools. Moreover, they often run the tools slowly which leaves them back in class. So they need to be trained to operate these properly to maximize their advantages. It would make their learning much easier and they will be more competitive to the sighted students. It helps them to continue their classes. They can read, write, take notes, and prepare their lessons with ICT except some tricky subjects like mathematics and drawing. Teachers suggests that visually impaired students can read e-books and use smart phones. But still there is no good Bangla reading software. Scanning technology can also help on that issue. They can use Daisy Book, scanners, Screen Reader, Braille tablet. Braille tablet enables them to read the Braille versions of books in a tablet. But it costs a lot and it is not available in Bangladesh. Most of the people of this country cannot afford it for their high prices. Moreover, mainly they can use scanners to have any kind of text book. By scanning the book, they can easily read the book using Open Book Reader software. They may find some books in soft copy mode. To reduce writing difficulties, teachers suggest the use of talking Key pads. Also, they can use MS Word for taking notes which is very convenient. Teachers say that they normally use Braille writing frame but it takes too much time and it's not totally friendly in regular class rooms.

Students' perspectives:

Results Implement ICT

"Informant 4:

I normally record the class lecture of my teacher by using my smartphone. Moreover, I collect soft copies of various books and notes from the internet. I can also collect my necessary data from internet. Thus, ICT help me to compete with my sighted friends.

"Informant 6:

Yes, ICT can help me to have the same things like my sighted friends. I can read, I can write. I can collect study material by searching internet like my sighted friends.

Admission, registration, text books, class lesson are changing into online Version. Our School is organizing their own website. Very soon we shall be able to access everything by our own way

To implement ICT in the class room all 3 visually impaired students also mentions some technologies which they use in the class room. They use Acrobat Reader for English books. And for Bengali books, they use NVD, Kothok, Bijoy Bayanno, DAISY book software. They use soft copies of books which are available in various websites. Also they read books from the internet. They also like to download books from the internet which are easily accessible. For Writing they mention using MS Word and Braille writing form. They also use mobile phones, Talking touch pad for writing purposes. They claim that ICT helps them to compete with their sighted friends. They are hopeful regarding their studies with the support of ICT because the government has taken a planned Admission, registration, text books, and class lesson which are changing into online Versions. They say that "Very soon we shall be able to access everything by our own way"

5.5 How is The process of implementing ICT for blind students in a school for all ?

Teacher' perspectives Implement ICT to support blind students

Results Implement ICT

Informant 1:

"They are fine in Schools for all. On the other hand, sighted student also need to learn how to become equal social being by attending classes and spending time with their visually impaired friends. They can feel their limitations and appreciate their courage and hard work to get educated and independent in life.

I think it is not needed to implement special needs university as both visually impaired and sighted students will walk side by side in the journey of education and life.

"Informant 2:

They should talk to our School Authority so that they can take some steps for making their learning and other things easier by providing them their demands and solving their problems. They should follow my class directions properly. They can prepare and collect their text book before the class. If they give a glance to the topic which is going to be discussed in the next class and take a brief idea of it, it will be easier for them to understand their lessons. They may try to do everything by their own. They can take training on how to manage class activities

. Informant 3:

"ICT has brought a drastic change. It has given them independence to use various dynamic tools like Talking Keypad, recorder, MS Word etc.

Using ICT time is being consumed. They are being independent learner. Their knowledge is being advanced.

Summary teachers implementing ICT supporting blind students

Due to lack of Braille book, their learning material was limited. They had to depend on converting Braille books. Now they are being independent learners. They can get updated information like sighted students. All 3 teachers comments on the advantages in learning that ICT provide in regards to communications, in regards to Writing, reading and performing School and life tasks. They are observing that their visually impaired students doing well in standard school. They take part in activities like other students. Regular students also have no complain against them. They are fine in standard school. On the other hand, sighted student also need to learn how to become equal social being by attending classes and spending time with their visually impaired friends. They can feel their limitations and appreciate their courage and hard work to get educated and independent in life. They should give them proper facilities. They should be included into standard school. Otherwise they can't survive in university level as in the university level; they have to take part with sighted student because they don't have special needs university. They think it is not needed to implement special needs university as both visually impaired and sighted students will walk side by side in the journey of education and life. Teachers are argues that Before ICT, they used to read in Braille which is a very slow process.

They also couldn't take notes properly. But ICT has brought a drastic change. It has given them independence to use various dynamic tools like Talking Keypad, recorder, MS Word etc. Using ICT time is being consumed. They are being independent learners. Their knowledge is being advanced. They can get updated information like sighted students. They can give presentation like others.

Student's perspectives Implement ICT to support blind students

Results Implement ICT

"Informant 4:

 I can record my lectures and also I have access to internet. Also, I can take notes during the class. I use talking software for calling my friends for discussing our study related topics. ICT helps me largely in reading, writing and listening which makes my learning process easier and compete with my sighted friends

Informant 5:

"We are a bit late to collect information comparing our sighted friends. For their visual privilege, they can look at the writing of teachers on the board. Moreover, they can follow the expression, gesture and movements of the teacher from where they can learn and infer something more.

Summary student's perspectives implementing ICT to support blind learner in School for all

Like teachers all 3 visually impaired students also satisfied in the standard school with ICT. ICT helps them to be independent in many learning aspects. By the help of ICT, they can themselves type class lectures, prepare notes for exams as well as they can record any necessary things. They are hopeful that they can be better learner because the educational system is developing day by day. They are getting more facilities by ICT. Various fruitful initiatives have been taken for facilitating the education of visually impaired students.

Presentation of data

ICT mentions	Number of Teachers	Number of Students
Internet	1	3
Recording devices	3	3
Talking Notebook	3	3
Soft copy (textbook and lectures)	3	3
Talking projector (audio based)	3	3
scanners	2	2
Book Reader	3	2
Daisy Book	1	3
Braille tablet	1	0
Braille display	1	2
Mobile (smart) Phones	2	2
E-mail	2	2
Facebook	2	3
Bangla Talking software	0	1

The results of this small table reflect that visually impaired students put a lot more effort into independent research after classes. Whether this is an immediate result of the teachers' efforts remains to be seen. Obviously the experiences of the teachers and students can differ to certain degree. The students would find certain ICT more useful than the ones the teachers would. Of course the teachers would not share all the student's experiences and needs for ICT and therefore their training would render them sometimes unable to make the best use of ICT for their students.

5.6 General data analyses

As it appears, every person examined agrees on mixing visually impaired students with sighted peers within classrooms. This process appears to be beneficial especially because it teaches both parties to work with each other. Firstly, it teaches sighted students to cooperate with their impaired peers. Secondly, it teaches visually impaired students to work within the environment that is operating mainly for their sighted peers. However having a learning process designed for both parties, certain barriers might occur. The learning rate can differ as visually impaired students are in need of recording the lectures and then re-hearing them at home. Ultimately, coming to the next day's lecture, they will be equally well prepared as their sighted peers, however on the original lecture they would not be able to interact equally to their sighted peers. When such barriers occur ICT can help to serve overcoming these.

Many derivations of ICT (e.g. recorder, typewriter, media player and scanner) helps students to perform class activities in normal schools in an enhanced manner. So it is obvious that with the utilization of ICT comes the mainstream bound flow of students. To fill the gaps regarding the usage of ICT, proper and regular training programs should be organized for both students and their teachers by expert trainers. Only then can we ensure better utilization of ICT on this regard.

If students along with their teachers can be provided with full phase training programs on the usage of ICT then successful learning outcomes can be assured. But for that we need expert trainers and such organizations first. If visually impaired students can properly utilize the ICT products provided to them, they can do much better than the sighted students; and it's a proven truth! So it can be concluded that ICT not only provide equal knowledge but may also provide enhanced knowledge.

Since more and more students are starting to use ICT in their learning process, the total learning pattern should be reformed. And also the teachers should be trained up for improved teaching methodology concerning ICT. In the light of recent events, it is a verified truth that ICT can help any human to surpass any type of barrier. So it can be said that if anybody can be provided with required ICT facilities, education won't be intangible to that person.

Students often need support from other people. But ICT can be a substitute on that issue. Thus ICT can create an alternative way of deserving support. As we can see, ICT helps students to

cope up in standard schools. So we can undoubtedly conclude that ICT is a barrier removing factor.

To clarify

Disabilities and the efforts to impede disabilities from interrupting people's lives and learning do not exist in a vacuum. While working on these interviews we learn to understand that the everyday lives of students who are visually impaired are also affected by the environment they live in. As stated before, Bangladesh is a developing country, making strides to better the lives of all of their inhabitants. Yet it remains a huge struggle to obtain the resources to provide Braille teaching tools for visually impaired learners. However, as one gets to learn of the testimonies of people such as these interviewees, the disparities of wealth country-wise become less of a hindrance to education with the help of ICT and the efforts of all of those who keep developing such technologies

5.7 Analytical Summary

This final chapter of this study deals with the concluding remarks and processes what have been learnt from the comparison of data, findings, theory and attempts to clarify practical issues which have been found from the interviews and the overall process. It will assess the current situation in Bangladesh with visually impaired students and their use of ICT; how teachers use ICT currently and what are the benefits we concluded and agreed with from other scholars, additionally this chapter will include some recommendations that hopefully will be taken into account as time follows. Specifically it will show how ICT can be implemented so students with visual impairments are included successfully in classrooms for all.

6 Chapter 6 Discussion, Inclusion and ICT Support to Blind Students

School for all should be considered for the better education of the visually impaired (V I) students. Stacey Nimmo (2008) opines in a research paper,

"*Inclusion of all students has become a highly desired educational model, allowing for all students to learn together, despite any disabilities* (American Foundation for the Visually impaired, 2005a; British Columbia Ministry of Education, 2006; UNESCO, 1994)." (P.60)

A visually impaired (VI) student should be sent to standard school class room from their childhood. This helps them to grow their mentality properly. They will find an interactive environment there. They will deal with not only their homogenous students but also with other sighted students. They will be mentored in such an environment where students of all diverse merit, background and orientation will be exposed. Through participatory works and assignments, they would feel more comfortable and fluent. Moreover, they will also find an opportunity to form a circle of fellow visually impaired students if they feels it necessary. It will offer them to discuss probable ways of understanding and capturing study materials. This is how; they can come up with easiest ways to prepare their lessons. Also, they will feel interconnectedness in this process. Moreover, they will have to deal with a practical environment of diversified kinds of personalities. In their professional life, they are to deal with interactive and challenging situations. They will become more competent for handling this kind of situations with skill as they will have previous experiences. So schooling for all will offer them some practical as well as professional skills. They will feel more confident going to standard school in comparison to special needs school. Special needs school may provoke a feeling of inferiority and irregularity that they are isolated from the mainstream students while they get almost equal opportunity to develop the individual. Education 2030 Framework of UNESCO (4 November 2015) also announced that The Education for All (EFA) movement is a global commitment to provide quality based education.

6.1 ICT as a tool for Inclusion:

Inclusion of visually impaired students in standard school is not at all an easy task. A visually impaired student has to overcome various challenges. ICT greatly helps them for the successful inclusion in the classroom. World Health Organization specified the assistive technology as any product or technology supported services which enable the disabled to lead a normal life. The outputs from ICT like recorder, talking software based devices, media player and scanner helps visually impaired students to cope up with their class works even in any kind of schools. By the successful use of ICT, they can learn and communicate effectively. This is how, they feel motivated. Thus ICT helps to develop the platform for their inclusion in the standard school classroom. Some researchers showed the opinion of teachers in a paper of them basing on a survey,

"The survey results show that the majority of teachers (75%) acknowledge that ICT tools and resources may have a great potential to foster and actualize inclusive practices in schools." (Benigno, Bocconi & Ott, 2007).

6.2 Supporting equal opportunities by using ICT:

ICT can easily provide the visually impaired students with equal opportunities with their sighted friends. To study without having eyesight is a very difficult thing to do. It becomes harder if they are required to compete with the friends having eyesight. In this circumstance, one of their significant sensory organs is inactive. They finds hurdles in almost each and every level of learning. For example, teacher is drawing a picture in the white board or displaying something there. They will be unable to visualize it in spite of having intense desire to see it. Also, teachers make thousands of gestures and indications at the time of teaching. Similarly, they fail to get at these things which would have made their learning quite easier. For this reason, they have to depend mainly on their auditory and tactile senses for supplementing the learning process. Due to the tremendous advancement of science and technology, it has become easier to make their learning easier by the successful use of these ICT tools. They can overcome the naturally got deficiency through the use of these helpful aids. Sighted students are naturally benefited in

comparison to the visually impaired students. ICT can play a very defining role to equalize the opportunities for learning. European Agency, an agency which works for the education of the visually impaired and students with other disabilities ran a project aiming to collect information for inclusion of ICT. The project framework had five propositions and among those, the first proposition was,

"ICT should be considered as a key tool for promoting equity in educational opportunities" (Agency, 2012, 2013).

But the actual scenario in Bangladesh is that most often these opportunities are not attained. Various factors work behind it. Financial problem is a major reason for this. Also, more government and non-government initiatives are required to ensure to equip the visually impaired students with necessary ICT tools for providing them an equal competitive field.

6.3 ICT as facilitation to visually impaired Learner

ICT can facilitate a visually impaired learner immensely by supporting with various tools. In the abstract of a research paper, the probable influence of ICT in visually impaired students' life and its actual present scenario is very transparent from this commentary,

 "Nowadays, visually impaired students can take advantage of a large number of effective assistive technologies but, while using electronic material for learning purposes, they often encounter a number of accessibility and usability problems." (Bocconi, Dini, Farlino, Martinoli & Ott, 2007)

They can be privileged not only in the classroom but also outside the classroom during making their lesson preparing activities. They can type any lecture in MS Word. As taking notes in exercise books is not a matter of convenience, they finds it very flexible to take my notes via MS Word. Typing makes their work easier as they can edit and save the file effortlessly. Talking keyboard is a very handy tool for this purpose. Also, they can record the lecture of the concerned teacher instantly by just turning their cellphone recorder on. They can use it while they prepares their lessons at home by playing it. They feels the freedom to pause it wherever they likes and replays it as many time as they wish. In addition, soft copies of books are very helpful as they are

readable to them by using appropriate book readers for them. Moreover, they can use websites like Google and Wikipedia for collecting information which are required for them. Also, they can access to the lectures of renowned professors uploaded in the YouTube. By using these, they becomes more confident and participates in the several activities. According to Moore and Taylor (2000); Waddell (2000), computers can improve independent access for students to education.

6.4 Enrichment of School facilities by ICT

ICT can enrich school facilities significantly. It can make the learning process more effective, interesting and impressive. In this respect, a famous researcher (Kaka, 2008) pointed out the importance of ICT in a paper,

"The influence of ICT, especially internet (open source tool) cannot be ignored in our student's lives. So, the learning activities should be reoriented and reformulated, from the manual source centered to the open source ones. In this case the widely use of internet access has been an unavoidable policy that should be anticipated by schools authorities."

Teachers can use multimedia classroom for getting the best privileges of ICT. Power Point presentations can make the lesson plan easier for the teacher. Teachers can show interesting and informative things in their presentation. Students will be more curious seeing all the visual presentations. Also, relevant videos of the lessons can be displayed in the large screen. By this, students can connect to it easily. Similarly, many audio can be played for this purpose. Moreover, teachers can get electronic copies of various helpful and reference books of their topic from internet. They may easily give the copies to their students if they wish. Also, students and teachers can use email for contacting each other. They can send each other important materials for their study. ICT also gives them opportunity to make groups in social networking websites like Facebook and Google plus for discussing and facilitating each other. Moreover, they can have both video and audio chat for having discussions on the concerning topic. If there is an ICT lab in the institute and access to computer and internet, students can easily collect their study materials from there. By using internet, they can serve their study purpose without any delicacy.

Moreover, these skills of ICT usage will privilege them in their future professional life. In this regard, a senior research officer (Rudd, 2000) of School Improvement Research Centre, National Foundation for Educational Research, UK gives suggestion in a paper,

"What comes out very strongly from a reading of the literature on ICT and classroom activity - and this is probably the key to how ICT and school improvement research can be brought together - is a stress on the need for human interaction and structured teaching and learning to accompany the use of new technologies in educational settings. Learning involving ICT applications must be carefully planned, clearly set out and well sequenced (and in this respect the requirements for a successful lesson using ICT are no different from those of a good lesson generally)."

On the other hand, visually impaired students can get advantages from standard school classroom by using several ICT tools like recorder, type writer, media player, scanner etc. These facilities can enrich the resources of the institute especially for the visually impaired students though these facilities are typically rare in most of the educational institutions of Bangladesh.

6.4.1   Giving necessary support including visually impaired student in standard school classroom

Visually impaired students should be given more support in the standard school classroom. It is a major duty of the concerned teachers to take care of the disadvantaged students. A teacher should always keep the visually impaired students in head while lecturing or preparing lessons that they can easily understand the lessons. Teacher should also encourage them to participate more in the classroom as they may feel demotivated in the classroom because of their disability. Also, they should take care of their lecture speed as visually challenged students very often find it difficult to keep pace with the high pace and to understand and take notes of the lessons. They are also to ensure whether their visually impaired students are well equipped with the necessary ICT tools. Their responsibilities should not only be confined in confirming the adequate tools but also they should take care of the successful, effective and maximum use of these tools. As a responsible

teacher, they may also provide available soft copies of books, notes and essential notes. Visually impaired students can also be given chances to consult with the respective teachers after the class if they have any problems. It may not be possible all the times due to teacher's other business. For this inconvenience, students may contact them via email. If these supports are given and ensured, visually impaired students will find the learning environment more helpful.

6.4.2   Adaptation of visually impaired learner with sighted Student by ICT

If a visually impaired student is included into a standard school classroom, they finds various difficulties to adapt them self in the classroom environment. But ICT can help them to adapt in the classroom easily. UNESCO in 2006 figured out that ICT help visually impaired learners to participate fully and to enhance the social and economic life of their communities. They can use several ICT tools like recorder, talking keyboard, scanner, soft copies of various books for adapting themselves there. In this issue, the sighted friends can help their visually impaired friends in operating their ICT tools successfully. Different type of Communicative tools like email, Viver, Imo, Skype, Messenger, Facebook can build up an equal educational society between visually impaired learners with their classmates. In this fashion, visually impaired students will find a very co-operative environment to learn and they will move forward more confidently.

6.4.3   Redefining learning process by considering ICT

The learning process can be redefined considering ICT with traditional learning system. Both of the processes will present a complete different scenario where traditional system has thousands of drawbacks, on the opposite, ICT based learning process accelerates learning by showing a spectacular display of optimism and positivity in the horizon by making the education of visually impaired students possible and more comfortable. Instead of giving lectures by reading lessons from the books manually, now teachers can show visuals, videos and other relevant things by Power Point presentations which are making students more curious and interested to their lessons. Also, visually impaired students can have the access to the lecture of the teacher by

getting soft copy or recording it and playing it as many times as they wish. Eventually, various book readers are available which enable them to read soft copies of necessary books. Also, both sighted and physically challenged students can easily take the advantage of using internet according to their conveniences for finding out relevant study materials. Thus the whole learning process can be redefined considering the presence of ICT in it.

6.4.4   ICT can be an alternative way of deserving support

Visually impaired students often need support from others for performing works properly. In this regard, ICT can work as an alternative way of deserving support in their life. In this aspect, a researcher (Eid) finds out the possibility of ICT in building the dependency of visually impaired students like this,

"ICT is heralded as enabling PWDs to fully participate and enhance the social and economic life of their communities, combined with proper methodologies can offer individuals the ability to compensate for physical or functional limitations."

 If a visually impaired student needs to take some notes in the classroom, they will not be able to write it properly in the exercise books proper and read it later in traditional fashion. They must need the help of another person in this regard. But ICT provides them software like MS Word and another useful tool like talking keyboard. They can write effortlessly in MS Word using the keyboard which would make sound on pressing the respective buttons. On the other hand, if the teacher delivers lecture quickly, there is possibility of missing parts of it. Then they would require one of their classmates or the respective teacher to make them understand the lesson. This dependency can easily be avoided by simply turning the recorder of their smartphone on. Later, they would easily listen and use it according to their need and store it. Likely, a visually impaired student cannot read traditional books. So they will need an assistant to read for them the books. But this problem can easily be solved by the use of an ICT tool called Book Readers. A visually impaired student can read soft copies of any books by using convenient book readers. Moreover, they can use internet as a supportive tool for information and making notes. For making presentations and assignments, they need not to rely on other people. Thus, ICT can be used as a substitute for deserving support.

6.4.5 Filling gaps using advantages of ICT and assuring successful learning out come from it

All kinds of gaps in using ICT should be filled for getting the maximum output from these tools. One can get the highest level of output from a device or technology only if the proper usage of it is ensured. For this purpose, not only the teachers should be concerned but also the target student group should know it thoroughly. Ministry should attract the trainers showing various possibilities and influence them to open training agencies on their own. This public private initiative can enrich the ICT sector with quality trainers which would definitely develop the tech as well as the education sector of the country. It will especially benefit the students with various disabilities including visual impairment. For this purpose, very efficient ICT trainers should be employed. It is a matter of great regret that in Bangladesh, there are no sufficient expert ICT trainer. Moreover, most of them are not ready to work outside metropolis. ICT ministry should take initiatives to encourage more people to come into this profession. For this purpose, their salary and other advantages should be attractive. Primarily, they will train up the teachers. Then teachers can train the students. Authorities should arrange regular training programs. They can also arrange feedback sessions where visually impaired students will ask about their incompetence. All of them should try to get the maximum outcome from the process.

6.5 Executive summary

In order to engage the visually impaired learners into schools for all, several challenges have to be met with. The most crucial of them all is to cope with the classroom environment with the fellow sighted peers. Thusly, understanding their difficulties in the use of standard teaching tools and the fact that most of these items are oriented towards visual learning is of great importance. They also have to deal with the class lecture and the teacher. However, as little has been done in the study of classroom techniques which are able to lead the visually impaired learners toward an effective environment, this paper focuses on those untouched points. More precisely, we focus on the voices and experiences of actual visually impaired students and how they actively handle their classroom activities to be up to par with their peers.

This paper intended to find out some effective usage of ICT which can give the visually impaired students a fruitful environment in the classroom. In secondary schools, ICT usage will enable the visually impaired students to act in a more swift way.

The methodology followed by this research was rather unique. I made a field visit to a Bangladeshi secondary school where both able and visually impaired students studied together and took interviews of three teachers and three visually impaired students working there. All of the attendees of my research were the real life users of ICT in the classroom for all. Information was collected from both the teachers and students so that a cross-perspective may be analyzed. They made some suggestions which should be given utmost importance to have a user-friendly classroom. Instances of mentions of the diverse devices and ICT were recorded as well to draw context into what sort of tools both teachers and students found relevant for their work and learning. The rest of the data was assessed in a qualitative manner by means of analyzing their responses and attitudes towards both the issue of inclusion and adaptation to classrooms for all and how the ICT used supported this process and how big of a role they take on these students' lives.

In terms of Bangladesh, no other such researches have been made previously focusing the classroom activities of the visually impaired learners in schools for all, especially in regards to the use of ICTs. The findings of the research are verily going to enrich the teaching-learning process for the visually impaired students in Bangladesh. I am certain that this small contribution to the pile of research made so far will encourage other researchers and perhaps other visually impaired students like me, to continue on this path to knowledge.

It is thanks to ICT such as talking software (for example, JAWS), mobile recorders, soft copies and e-books with research materials that I was able to execute my vision of this particular thesis. I selected visually impaired students like me alongside their teachers to collect their accounts on practical issues regarding ICT use and how it contributed to the students' inclusion in the classroom. Thusly, I wished to make as accurate as possible of a report on those experiences that mirrored mine so closely. I hope that with this material that I have provided through the channels sighted people use nowadays such as word and PFD documents will see how everyday life and studying is for people like me and these students.

7 Chapter 7 – CONCLUSION and recommendations

This study intended to search for some effective usage of ICT which can give the blind students a fruitful environment in the classroom for all. The methodology followed by this research was interview, and I made a field visit to a Bangladeshi secondary school where i took interview where blind students studied together with sighted student and teachers of blind students. All of the attendees of my research were the real life users of ICT in the classroom for all. Information was collected from both the teachers and students so that a cross-perspective may be analyzed. They made some suggestions which should be given utmost importance to have a user-friendly classroom. Instances of mentions of the diverse devices and ICTs were recorded as well to draw context into what sort of tools both teachers and students found relevant for their work and learning. The rest of the data was assessed in a qualitative manner by means of analyzing their responses and attitudes towards both the issue of inclusion and adaptation to classrooms for all and how the ICTs used supported this process of the role ICT have in the blind students' school lives. In terms of Bangladesh, no other researches have been made previously focusing the classroom activities of the blind learners in schools for all, especially in regards to the use of ICTs. The findings of the research are verily going to enrich the teaching-learning process for the blind students in Bangladesh. I am certain that this small contribution to the pile of research made so far will encourage other researchers and perhaps other blind students like me, to continue on this path to knowledge. It is thanks to ICTs such as talking software (for example, JAWS), mobile recorders, soft copies and e-books with research materials that I was able to execute my vision of this particular thesis. I selected blind students like me alongside their teachers to collect their accounts on practical issues regarding ICT use and how it contributed to the students' inclusion in the classroom. Thusly, I wished to make as accurate as possible of a report on those experiences that mirrored mine so closely. I hope that with this material that I have provided through the channels sighted people use nowadays such as word and PFD documents will see how everyday life and studying is for people like me and these students.

In order to engage the blind learners into schools for all, several challenges have to be met with. The most crucial of them all is to cope with the classroom environment with the fellow sighted

peers. Thusly, understanding their difficulties in the use of standard teaching tools and the fact that most of these items are oriented towards visual learning is of great importance. They also have to deal with the class lecture and the teacher. However, as little has been done in the Study of classroom techniques which are able to lead the blind learners toward an effective environment, this study focuses on those untouched points. More precisely, I focus on the voices and experiences of actual blind students and how they actively handle their classroom activities to be up to par with their peers with the support and proper use of ICT

7.1 How does ICT support inclusion of blind students?

Teachers are argues that Before ICT, they used to read in Braille which is a very slow process. They also couldn't take notes properly. But ICT has brought a drastic change. It has given them independence to use various dynamic tools like talking keypad, recorder, MS word etc. The blind student are being independent learner, and their knowledge is being advanced. They can get updated information like sighted students, and give presentation like others. The students says that ICT helps them to be independent in many learning aspects. By the help of ICT, they can themselves type class lectures, prepare notes for exams as well as they can record any necessary things. They are hopeful that they can be better learner because the Educational system is developing day by day. They are getting more facilities by ICT.

7.2 How does ICT support learning of blind students?

Teachers expect that since ICT is working well with blind students and they can use ICT like other students, so in Regular School, ICT can help the blind students to be included with sighted students. ICT is supportive to the blind learners, at least they can read and write like sighted students by the various tools developed by it. Since they are arranging that their regular school system using ICT not only for blind students but also for their administrative purposes, it gives them reasonable support. Their blind students are greatly benefited by it. All the blind students claim that ICT helps them to overcome classroom difficulties. Apart from visual part, they can manage most of the class activities with the support of ICT, nevertheless, they expect their

teachers to be more attentive while they are using ICT and their class room setting should be more ICT user friendly so that they can use it properly. They think that it is making them independent.

7.3 What are the experiences of teachers using ICT as a tool to teach and include blind students?

All three teachers think that ICT makes their interaction easier with the blind Students. They can make sense of the teacher's thoughts easily from the audio version of Projector. It gives them a great privilege to present things using talking software based projectors. They think that ICT saves their time. They can give their point of view to the students by using talking Power Point Presentations. With the help of ICT support, they can facilitate them into the classroom. They can make them involved in class activities. During their presentation sessions, they involve their blind students into the discussions. All blind students also mention that their teacher uses Projector, soft copies, audio system, E-mail etc. they think that Audio system plays a very vital role for the blind students when class teachers use it in the class room.

7.4 What are the experiences of blind students using ICT as a tool to be included and support in their learning process?

All teachers like to tell that their blind student can continue their class with the help of ICT. They say that they know their blind students can read documents or material in MS word, so they try to give them soft copy of the class lecture that they can read by their Talking software. They try to make their power point presentation with fewer animations and input descriptive information. It becomes easier for them then to make sense properly. They try to give clear description when they deliver their lecture from their Power point. They speak slowly so that they can take notes. One teacher mentions that she sends her suggestive study materials through E-mail. Over the phone, so they can contact her in some fixed time slots. All blind students consider ICT as their learning tool an alternative of braille. They argue that they use MS word which takes their input and give back their desired output. They use smartphone recorder, mp3 for this purpose also.

They mention that Smart phones can also be used as a useful tool in the classroom. They use several apps for helping their classroom activities. More or less they use mobile recorder, mp3, notebook and laptop for help themselves in the classroom. For reading text book they use Talking book Reader, Scanner with open book Software, Daisy book and Computer. It reads out their class book which is synonymous of reading books to them. For making class notes they use Talking Computer, Class lecture and Internet Information Talking computer helps them to read out the information. Class lectures gives them an overall view of all the topics included in the syllabus. For writing purpose they use Talking Keypad.

7.5 How is the process implementing ICT for blind students in a school for all?

The teachers suggests to use of ICT to compensate for the unavailability of study material, and they undoubtedly feel ICT is very helpful for their blind students. Nevertheless, they need to be more familiar with ICT. They can use some of the tools successfully but they have to take the help of others to operate these tools. Moreover, they often run the tools slowly which leaves them back in class. So they need to be trained to operate these properly to maximize their advantages. They can read, write, take notes, and prepare their lessons with ICT except some tricky subjects like mathematics and drawing. Teachers suggests that blind students can read e-books and use smart phones. To implement ICT in the class room the blind students mentions some technologies which they use in the class room. They use soft copies of books which are available in various websites. Also they read books from the internet. They also like to download books from the internet which are easily accessible. They are hopeful regarding their studies with the support of ICT because the government has taken a planned Admission, registration, text books, and class lesson which are changing into online Versions. They say that "Very soon we shall be able to access everything by our own way"

7.6 Recommendations

This final section of my thesis will be divided into two sub sections, firstly I will address suggestions to students and how they use or understand the support ICT provides them, finally I will address the teachers and sighted people who provide both infrastructure and/or research to visually impaired students.

7.6.1   Students needs and own work

ICT surely is beneficial for us, this paper is for you and hopefully through ICT you can also access this source in broadening your own understanding of ICT to this date. Now it is up to you to continue further research and voice your own needs as they come in regards to technology and accessibility. ICT is only the beginning of our search for a place in this sighted world. I urge you to contribute to researchers and people who develop software every day. Download open source software and communicate with those who develop it. The more you voice your needs the better they can help and further improve such tools for your benefit. Lastly, educate yourselves, the more knowledge you possess, and the better for everyone.

7.6.2   Teachers and sighted people, how can you assist?

With the help of these students and teachers' testimonies I have now proven the relevance of ICT in learning processes. I urge you to continue enforcing policies, programs and actions that continue to include ICT in standard curricula for classes since it not only helps visually impaired and visually impaired students but also students who do not learn visually anyway. The more diverse the better when it comes to sources of understanding and knowledge.

As for teachers, think of how you can implement ICT in the classroom but also receive proper training so you can provide better ways for ICT usage for your students. Learning does not end once you finish university studies or teacher training, we learn constantly alongside our students. They always have something new to teach us every day.

Finally for future researchers, implementation and policies regarding ICT usage is essential. Due to the limitations of this thesis study, I could not do surveys and have a broader scope of data;

thusly I hope that you can add to this research field by providing more data to analyze. Not only visually impaired students and teachers but we must confer with policy makers, school authorities, and software developers and ICT experts. Comparative studies are key to understanding this topic in its entirety since ICT usage is very different from country to country. Take for example Norway, where I write this paper, here there are no special needs schools and all students are included in the same institutes. However back in Bangladesh, my home country, there is an immense divide between special needs schools and standard schools in which a conflict of interest exists and resources are extremely limited. Please consider this in your own research. From my practical experience I can say, we must have equal education so our society as a whole can progress properly. From the visually impaired people who are like me, I can say, ICT can be our third eye if we learn how to use it and achieve accessibility for all of us.

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Appendices

1.Inteview Guide

Interview Guide for Student with visual impairment

Opening the Interview: You are a secondary level student; I would like to talk with you about the learning process and your learning experience.

1. How does ICT support you in regular school?a. which system you feel better regular school or special school? b. what type of support you get from your School? c. what do you mean by ICT? d. share your ideas about ICT in Regular School. how does ICT help you in your class room?

2. What kind of ICT do you use in general? In school? a. how do you interect with your Class teacher? b. how can you manage your class lecture? c. which ICT tools you use to manage class lecture? d. which tools your Teacher use while giving Lecture? e. which ICT support you take to read your Text books? f. what type of ICT you use regarding writing? g. telll me some ICT tool's name which are help you to prepare your class assignments.

3. How does ICT help you in learning process? a. how do you prepare your class lesson? b. ICT help you to read your text book? c. from where you collect your text book? d. do you use internet for collecting study materials? e. do you know what is E-book? f. which ICT tools you use to make notes?

4. What do you think are the outcomes of your learning process? a. do you think you can't learn that much than your sighted friends? b. could ICT help you to become more advance from them? c.which tools help you to make you success Learner?

5. If there is then does ICT help you in that? a. could you find same study material like your sighted friends? b. if not, can ICT help you to have same things?

6. Do you have access to every kind of ICT you need in school? a. do you attend to all activities in your School? b. do you use your School library? c. do you find accessable these areas? d. in this case ICT can help you? e. what type of ICT tools you use during

exam time? f. do you participate in all event like other students in your School? g. do you think that it can be more accessable if you get proper ICT support?

7. What are the main communication difficulties in school (if any) and what support your communication with teachers, with other students? a. do you think that your class activities not suitable for you? b. do you find difficulties to communicate with your Teacher? c. is it helpfull to you if your Teacher like to use ICT to give you Lesson? D. if not it can easy for you if your teacher use ICT tools? e. can ICT help you to overcome this difficulties? F. how do you interact with your classmates. can you use facebook, e-mail, phone, to communicate to them?

8. What type of difficulties did you have during the learning (if any)? a. what type problem you faced when didn't you have ICT support? b. is ICT makes easyer than before? can compare your learning before using ICT tools and after getting ICT support?

9. What else do you want to add or ask?

Closing the Interview: Thank you for giving time and sharing your experience and thoughts with me.

Interview Guide for Teachers of students with visual impairments

Opening the interview: You already have experience to teach student with visual impairment; I would like to talk with you about the teaching - learning process and your personal experiences during this process.

1. What does inclusion of blind student in regular school mean for you? Could you bring your personal definition? a. what is your opinion to include blind student into Regular School? b. is there any problem while they attend to class with Sighted Friend? c. how does ICT help them to include into Regular School? d. basically which type of ICT tools can be supportive to include them into regular School?

2. What is your main objective of teaching blind students, what do you intend to achieve? a. to teach blind student difficult than sighted Student? b. do you think ICT can help to achieve your teaching goal?

3. How do you communicate with your blind students? a. do you think that blind students are less interective than sighted student in your class? b. can they response like other students? c. can they follow your lecture like other>? d. if not what you do in these case? e. can you take ICT support to interect with them to conduct your Class? f. can ICT help them to continue your class?

4. What are the main challenges (if any) of your communication with the blind students? a. what are the major problems a blind student can face into regular school? b. is it problem that they attending class into regular School? c. how does ICT support serve to solve these issues?

5. What type of adaptations do your students necessitate during the learning? a. what type of ICT support you suggest to your blind student regarding to read text books? b. which ICT tools they can use for writing purposes? c. how do they maintain their class activities? d. do you find less outcome from them than sighted student? e. is that ICT gives them proper support to learn better like other?

6. What factors do influence your choice of teaching strategies for your blind student? a. which ICT support you take to teach your blind student? b. is that ICT help you to make easyer your teaching strategies?

7. What do you think, how does ICT support blind students in regular school?

8. What are your skills in ICT?

9. What are your skills supporting blind students to use ICT?

10. Based on your experience which teaching strategies are the most beneficial for the blind students' teaching and learning process? a. would blind students find dificulties with ICT support into regular School? b. which way is beneficial, learning with ICT support or with out ICT support? c. what kind of changes has been found for their learning process by ICT support?

11. What else do you want to add or ask?

Closing the Interview: Thank you for giving time and sharing your experience and thoughts with me.

Request for participation in research project

"ICT Supporting Blind Students in Regular Classroom"
An interview study of teachers and students' experiences with ICT support

Background and Purpose

This research is a Master's project at the University of Oslo. Its purpose is to investigate how the secondary level students with visual impairment will be benefited availing Information Communication Technology through inclusive education system, and how ICT influence to teaching strategies of a teacher in the regular school.

The sample is selected purposefully, so that the participants have knowledge about phenomenon under study and are able to inform about it. Therefore For this study one regular school and following group of people will be selected:

→ 3 Secondary level students with visual impairments in regular school in Bangladesh;

→ 3 Teachers of students with visual impairments in regular school of Bangladesh.

What does participation in the project imply?

The data will be collected only through one-to-one interviews with teachers of students with visual impairment and students with visual impairment. The interviews will last about an hour each. The questions will concern teachers' and students' experiences and skills in ICT and how ICT helps students in learning process.

What will happen to the information about you?

All personal data will be treated confidentially. Only the Master's student and the supervisor (if requested) will have access to the data. Moreover, to ensure confidentiality list of names will be stored separately from other data. In publications the participants will not be identifiable.
The project will be completed by June 2017. By project completion the data will be made anonymous.

Voluntary participation

It is voluntary to participate in the project, and you can at any time choose to withdraw your consent without stating any reason. If you decide to withdraw, all your personal data will be made anonymous.

If you would like to participate or if you have any questions concerning the project, please contact: The student - **Mahbubur Rahman Rony**: tel. +8801674864598;

Email: mahbubronydu@gmail.com

Or the supervisor – Jorun Buli-Holmberg: tel: +4722858069;

Email: jorun.buli-holmberg@isp.uio.no

The study has been notified to the Data Protection Official for Research, Norwegian Social Science Data Services.

Consent for participation in the study

I have received information about the project and am willing to participate

_____

(Signed by participant, date)

Jorunn Buli-Holmberg
Institutt for spesialpedagogikk Universitetet i Oslo
Postboks 1140 Blindern
0318 OSLO

Vår dato: 17.06.2016   Vår ref: 48774 / 3 / AMS   Deres dato: Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 27.05.2016. Meldingen gjelder prosjektet:

48774	ICT Supporting Blind Students in Regular Classroom (An interview study of teachers and students' experiences with ICT support)
Behandlingsansvarlig	Universitetet i Oslo, ved institusjonens øverste leder
Daglig ansvarlig	Jorunn Buli-Holmberg
Student	Mahbubur Rahman Rony

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/meldeplikt/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, http://pvo.nsd.no/prosjekt.

Personvernombudet vil ved prosjektets avslutning, 30.06.2017, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Kjersti Haugstvedt

Anne-Mette Somby

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

Kontaktperson: Anne-Mette Somby tlf: 55 58 24 10
Vedlegg: Prosjektvurdering
Kopi: Mahbubur Rahman Rony mahbubronydu@gmail.com

Personvernombudet for forskning

Prosjektvurdering - Kommentar

PURPOSE
This study aims to investigate how the secondary level students with visual impairment will be benefited availing Information Communication Technology through inclusive education system, and how ICT influence to teaching strategies of a teacher in the regular school.

INFORMATION AND CONSENT
The sample will receive written and oral information about the project, and give their consent to participate. The letter of information is well formulated.

SENSITIVE DATA
There will be registered sensitive information relating to health (blindness).

DATA SECURITY
The Data Protection Official presupposes that the researcher follows internal routines of Universitetet i Oslo regarding data security. If personal data is to be stored on a private computer, the information should be adequately encrypted.

ANONYMIZATION
Estimated end date of the project is 30.06.2017. According to the notification form all collected data will be made anonymous by this date.

Making the data anonymous entails processing it in such a way that no individuals can be recognised. This is done by:

- deleting/rewriting indirectly identifiable data (i.e. an identifying combination of background variables, such as residence/work place, age and gender)
- deleting digital audio files