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Utilization of ICT by Students with Visual Impairment

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Abstract

Children with disabilities are given equal rights for information accessibility as mentioned in the "Convention on the Rights of Person with Disability". The study aimed to explore the actual role of information communication technologies in imparting information to students with visual impairment. For this the data was collected from 41 male and female students with visual impairment using android mobiles, computer/laptop or using internet facilities at libraries of their academic institutions. It involves quantitative data gathering techniques following snowball sampling procedure. Findings indicates that: (a) mobile has been identified as the best source to access information to enhance literacy among students (females) with visual impairment followed by Laptop/Desktop Computer and web browsing respectively (b) girls are using information communication technologies more effectively for their digital literacy as compared to male students with visual impairment and c) girls are facing more constraints in accessing information as compared to male students with visual impairment. The effort made by this study is helpful to develop awareness among the stakeholders of the field and particularly to sensitize the heads of teaching institutions and government to enhance the provision of more computer labs with internet browsing services to enhance digital literacy among students with visual impairment.

Keywords: Information, accessibility, Information Communication Technology, visual impairment

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Introduction

It is the fundamental right of every member of the society to access information apart from ethnic background, creed, religion and physical condition. Mendel (2003) emphasized the same by coding the notes of U.N. special report:

> "*Everyone has the right to seek, receive and impart information and that this imposes a positive obligation on States to ensure access to information (p.2)*".

Person with disabilities being the part of regular community posses the same right but requires some fundamental adaptations in accessing their required information. Moreover less awareness about adaptation also restricts the students with special needs to access smoothly in their social group of community. The same is also reported by various other researchers in their studies with reference to seek library information and concludes the social environment as a constraint for person with disabilities (Hosking 2006; Newton, Ormerod & Thomas, 2007).

As per the census of 1998 the persons with disabilities has been reported as 2.45% of total population in Pakistan. However as per the projected formula applied by The Helping Hand for Relief & Development, an INGO (2012) more than 5 million persons with disabilities have been reported in Pakistan by Helping Hands for Relief and Development (HHRD), 2012 and majority of them are placed in Punjab. The large number of disability requires serious efforts by the government of Pakistan. Government has established 264 special education schools/centers in Punjab and trying to provide good learning facilities to students with disabilities. At present to encourage the education for persons with disabilities in Pakistan, the government is providing them with free education, monthly stipend, free uniform, free pick and drop services in the special schools and centers. Computer labs are established in schools, but unfortunately still students are not getting full benefit to access all types of information.

Being the signatory country of Convention on the Right of Person with Disabilities (CRPD) the right to "provide information accessibility to the PWDs" is an obligation of the state. CRPD in its article 9 says about the rights of persons with disabilities in specific areas of activity which include the terms "accessible" or "accessibility" including all products relevant to information communication technology based

applications and services, a far reaching implication for industry, governments and civil society. According to the article 09, CRP:

> "*To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems...* »

This article completely revealed that persons with disabilities have a legal right to access all types of information and each state is responsible to provide the same accordingly. Free appropriate public education is fundamental right for children/person with disabilities and the same is for a child/person with visual impairment. Visual Impairment is a condition that precludes a person to process his/her daily life successfully. According to World Health Organization (WHO), 285 million people are estimated to be visually impaired worldwide: 39 million are blind and 246 have low vision. It is also reported by WHO (2003) that about 90% of the world's visually impaired persons live in low-income settings. In Pakistan reality is observed in the same lines. Majority of persons with disabilities or with visual impairment belong to those families who have low income and face difficulties to meet the needs of special children. The limitations in visual acuity or efficiency require the use of Information Communication Technology (ICT) for those students who face the visual limitations. These limitations are increased when these students are not provided with assistive technology.

During last decade, common practice in terms of use of information communication technology remained the use of internet as a tool to develop knowledge, information and build social interaction within community. Generally the students with visual impairment are not privileged in Pakistan to have these technologies which result in deprivation of the right to access available information too (NTIA, 2002-2004, Kubichk, 2004). It is also observed that use of computer technology and internet has enhanced the independence of people with disabilities. The Charter of Fundamental Rights of the European Union (2007) states 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"

Klironomos et al., 2005 as per reported by Bocconi, Dini, Ferlino & Martinoli (2007) states that 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". So many documents states that it is the equal right of students with disabilities like their class/schoolmates to access and use educational tools including the ICT mostly known as "e-learning tools".

Davis (2005) has pointed out different legislations which talk about the equality of opportunities for the persons with special needs in various countries such as; Disability Discrimination ACT, 1995: the Special Education Needs and Disability Act 2001 (both in UK).

For disabled people with logistic difficulties or communication problems related to their disabilities, ICT skills have become an important tool to participate in society (Puffelen, et. al. 2008). Computer technology was used in the production of Braille for the visually impaired from 1960 to onward mostly for their vocational use. After 1980, ICT was applied in the education with visual impairment in U.K in the form of microcomputers. Since then, these developments have been made in very diverse form. It has been used as educational technology and access technology, specialist tools and management tools (Douglas, 2001). Olukotun (2004) stated that technology has positive impact on the lives of persons with visual impairment with reference to use of information, education and lifelong learning. This will also help the visually impaired to be great equalizers.

Many countries believed that with the use of ICT and its implementation the persons with visual impairment will be able to access their rights. Whereas, Braizer (2007) pointed out that main websites do not meet the standards for accessibility to persons with visual impairment and they are lagging behind to access computers. Person with visual impairment needs access to information like the sighted persons.

The access to ICT has given a great opportunity to the visually impaired to be more included in the society. Visually impaired persons are getting the benefit of Braille books, talking books and particularly from computers by which they have enhanced their reading ability. Rapid progress in the ICT devices and technologies such as Glare protected screens on computers, Special software to present large prints on normal and or large monitors with different color contrast, mouse trails, computer based keyboards, screen magnifiers, refreshable Braille displays, Braille translation Software, CCTV, portable note takers, Braille embosser, augmentative communicative devices etc. have

strengthened the access and information of visually impaired persons (Adetro, 2009 ; Zia & Mahmood,2010).

New innovations in assistive technology such as Digital Talking Books (DTBs) specially among the Digital Accessible Information System (DAISY), Opera, with upgrade Accessible Rich Internet Applications (ARIA) with JAWS, Windows Eyes, Dolphin Pen has given the facility of magnified screen reading for the visually impaired persons at their personal settings.

In spite of these facilities and opportunities persons with disabilities are facing different problems of limited economic resources, low degree of literacy, limited ICT assimilation and low level of understanding (Adetro, 2009). The case is not much different for the persons with visual impairment, particularly in accessing ICT. The persons with visual impairment have no benefit from mouse, as well as face problems of non-described tables, and poor contrast in colors. Carven (2001) describes, "Blind face the biggest problem of navigation in digital libraries when frames are being used. The fact is that accessed technologies support only linear navigation within one frame at a time, which consequently often requires the user to backtrack a long way in order to reach the desired point" (p3).

In Pakistan the students with special needs are using information communication technologies but the situation is not much favorable with reference to latest technology. Ashraf & Manzoor (2008) reported that majority of the students with visual impairment are not provided with talking books at schools and no training so far have been given to these children to use these talking books. Zia & Mahmood (2010) pointed out that the students with visual impairment are not comfortable with the use of ICT as they were exposed to these devices very late. They also reported that these students are not provided with specific training with reference to informational communicational technology.

In Pakistan the level of awareness is still very poor about issues of person with disabilities. Mostly the general population perceives the disability as results of sin or a challenge given to people by the God. The charity model is in practice in rural areas, however, the awareness level is higher in urban community and a better base approach is seen to be followed for persons with disabilities. The scenario is changing though the persons with disabilities are facing inequality issues in all walks of life. They face discrimination in accessing information and most of the time general community peers are the source for the provision of information. The Government of Punjab has established more than two hundred sixty four special education institutions including the primary

and elementary grade schools. These special schools, centers and colleges in Punjab are providing free education along with free books, fresh milk and 700 hundred rupees scholarship to each child. The purpose of these efforts is to sustain these children in educational setting rather to become a burden or the source of charity for their parents. Although the Government is seriously working to educate Persons with Disabilities (PWDs) but still they are not being provided enough facilities for accessing information as compared to facilities and provisions available to a normal child. Provided educational facilities comprises trained teachers, use of Braille and tactile approach, pegs and slates in the classes. However, the students with visual impairment are still lagging behind in getting the latest information due to their visual limitations despite the availability of various information communication tools. The objectives of the study were to: (i) identify the most used information communication device among mobile phone, computer/ laptop, or internet to access information by students with visual impairment; (ii) explore the constraints faced by students with visual impairment in accessing information by information communication technology; and (iii) compare the use of ICT among visually impaired boys and girls to assess their progress by seeking information by these tools.

Methodology

The study was based on descriptive method of research. The purpose of the study was to explore more popular information communication technology used by the students with visual impairment to access the information. A survey was conducted. The population constituted the visually impaired students studying in Special Education Schools, and Colleges. Questionnaire was the tool of research, distributed to the students with visual impairment (male and female). Moreover, while collecting the data the teachers were also questioned to verify the usage of telecommunication technology by the students.

In general, the visual impairment assumed as “totally blind” or having no ability to see anything”. The population was visually impaired students studying at school and college level. Snowball sampling technique was employed to select 41 participants out of which 35 were totally blind and 6 were facing low vision. The sample comprised 23 girls and 18 boys with visual impairment. The participants were between

the age ranges of 17 years to 24 years. The majority of the respondents were enrolled in special colleges and few were about to matriculate.

Questionnaire was developed on Likert scale to collect the data from the students. The questionnaire was validated. Reliability of the tool was 0.76 on Cronbach's Alpha. After carrying out validation and reliability studies, the data was collected in the form of interviews. While taking the responses, the researcher read the questions and wrote the answers on the sheet on behalf of the respondents. All responses were verbally taken and recorded as well.

Each interview took about 30 to 45 minutes to record the responses of the participants. The respondents were briefed about the purpose and the questions. They were asked to choose one option from the given five (1=0%, 2=25%, 3=50%, 4=75%, 5=100%). In first step the researcher spoke the sentence and the respondent was asked to give verbal answer by selecting one option. Sometimes options were repeated again and again to acquire the response. This was just due to visual limitation of the students. The respondents with low vision could observe the data sheet by themselves on their laptop by extending the zoom.

The researchers used the following descriptive analysis, comparison of mean by using independent sample t-test to find out the results of collected responses.

Results

To meet the first objective following analysis has reflected the true picture on nature of device to access information by students with visual impairment.

Table 1
Types of ICT Equipment used by VI Students

	Mobiles	
Gender	Mean	SD
Male	31.83	4.85
Female	34.65	4.45
	Computers/Laptop	
Male	17.17	5.23
Female	18.04	3.50
	Internet Services/Internet Browsing	
Male	16.33	4.524
Female	18.65	3.761

(*N=41, M=18, F=23*)

The mean score of three above mentioned ICT tools clearly indicate that mobiles were found as best and easy technology to seek information for the purpose of digital literacy among the students with visual impairment. It is further concluded that in each component the female were getting more benefits from these technologies to enhance their literacy as compared to male.

Table 2
Effective Use of ICT on the Basis of Gender

Variable	N	Mean	SD	t	df	Sig.(2-tailed)
Male	18	65.33	8.67	-2.122	39	.040
Female	23	71.35	9.257			

The independent sample t-test was run to differentiate the effective use of ICT to access information among male and female students with visual impairment. The significant difference was found among the both genders. The mean score of females (M=71.35, t.-2.12, p = .040) clearly showed that they were using ICT more effectively to access information as compared to male students with visual impairment.

Constraints for Using ICT

Constraints faced by Visually Impaired students for accessing technology were:

- Economic constraint was one of the major reasons for VI students to purchase, access or use ICT.
- Unawareness about the sale points of the relevant software and accessories was there even if they had the purchasing power.
- Students reported lack of their skill and non-availability of trainings to use the available/ required assistive technology.
- Girls are not given equal importance or encouragement to use the ICT equipments.
- In rural areas, the problem of availability, accessibility and use of ICT was graver.

Table 3
Constraints in Using ICT on the Basis of Gender

Variable	N	Mean	SD	t	df	Sig.(2-tailed)
Male	18	85.06	14.58	-4.58	39	.000
Female	23	109.04	18.10			

The independent sample t-test was run to differentiate faced constraints in using ICT among male and female students with visual impairment in seeking information. The mean score of female students (M=109.04, t.-4.58, p= .000) clearly showed that they were facing more constraints to accessed information for seeking and improving information as compared to male students with visual impairment.

Conclusion

It was concluded that mobile phones were the most used and easily assessed technology to seek information by the students with visual impairment. Navigation and screen reading are the main constraints while using internet.

Discussion

People with disabilities face special barriers in using the Internet, aside from those related to material access and computer-related training. Dobransky and Hargittai (2006) used data of a large national survey in the United States and discovered that technical accessibility barriers could be one of these extra barriers for people with disabilities. In an accessibility test conducted by Bayer and Pappas (2006) with blind Internet users, navigation and screen reading were identified as the main problems. The same has been identified by the researcher in present research.

The audio recorded data on given questionnaire in interview setting was transferred on spread sheet. To meet the authenticity of data spread sheet was shown to a sighted person nominated by students with visual impairment. The audio recording of the responses were collected after taking the written consent of participants. Following the research ethics these recordings and names of the respondents were kept confidential. A prior permission to conduct the study was obtained from the Head of Institution in which the students were enrolled.

References

Adetro, N. D. (2009). Information and communication technology (ICT) as an Access equalizer of information: opportunities and challenges for Nigeria's persons with visual impairment. *Information Technologist*, 6 (1).

Ashraf, S. & Manzoor, A. (2008). *Identification and the use of talking books for the children with visual impairment*. An Un-published Master Thesis, Department of Special Education, University of the Punjab, Lahore.

Barizer, H. (2007). The role and activities of the IFLA Libraries for the Blind section. *Library Trends*, 55(4), 864-878.

Bayers, N. L., & Pappas, L. (2006). Accessibility testing: Case history of blind testers of enterprise software. *Technical Communications*, (53)1, 32-35.

Bocconi, S., Dini, S., Ferlino, L., Martinoli, C. (2007). ICT educational tools and visually impaired students: different answers to different accessibility needs. Retrieved from: http://www.itd.cnr.it/ download/e_inclusion.pdf

Carven, J. (2001). Understanding the searching process for visually impaired users of the Web. CERLIM at Manchester Metropolitan University. Retrieved from: http://www.ariadne.ac.uk/issue26/craven

Charter of Fundamental Rights of the European Union. (2007). *Non-discrimination, Article 21-1* Retrieved from http://fra.europa.eu/en/charterpedia/article/21-non-discrimination.

Convention on Rights of the Persons with Disabilities. A*rticle 9- Accessibility*. *R*etrieved from https://www.un.org/development/desa/ disabilities/convention-on-the-rights-of-persons-with disabilities/article-9- accessibility.html

Davis, J.E. (2005). An overview of International Research in to the library and information needs of visually impaired people. *Library Trends*, 55(4). 785-795.

Dobransky, K., & Hargittai, E. (2006). The disability divides in internal access and use. *Information, Communication and Society*, (9)3.

Douglas, G. (2001). ICT, education and visual impairment. *British Journal of Educational Technology,3* (32), 353-364.

Helping Hand for Relief and Development. (2012). *Persons with disabilities (PWDs) statistics in Pakistan 2012*. Islamabad, Pakistan. Available at http://hhrd.pk/crp/wpcontent/uploads/2013/02/PWDs-Statistics-in-Pakistan-2012-2.pdf.

Hosking, D. L. (2006). Great expectations: Protection from discrimination because of disability in Community law. *European Law Review,* 5. 667-689.

Klironomos, I., Antona, M., Basdekis, I., Stephanidis, C. (2006) White Paper: Promoting design for all and e-accessibility in Europe. European Design for All e-Accessibility network. Retrieved from: http://www.academia.edu/download/43943890/White_Paper_promoting_Design_for_All_and20160321-5879-3if32e.pdf

Kubicek, H., (2004). Fighting a moving target: Hard lessons from Germany's digital divide programs. *In IT & Society,* 1(6), 1-19.

Mendel, T. (2003). Freedom of information as an internationally protected human right. *Comparative Media Law Journal*, - article19.org Retrieved from https://www.article19.org/pdfs/publications/foi-as-an-international-right.pdf

Newton, R., Ormerod, M., & Thomas, P. (2007). Disabled people's experiences in the workplace environment in England. *Equal Opportunities International,* 26(6), 610-623.

NTIA, (2002). A nation on line: how Americans expanding their use of the Internet. US Department of Commerce, Economics and Statistics Administration, Washington, DC, USA.

NTIA, (2004). *A nation on line: entering the broadband age*. US Department of Commerce, Economics and Statistic Administration, Washington, DC, USA.

Olukotun, J. O. (2004). The need for expanded core curriculum for visually impaired learner in Nigerian schools. *Journals of Association of Libraries for the Visually Impaired*, 3(1). 43-53.

Puffelen, C., Geest, T., & Meij, H. (2008). The use of digital skills by visually disabled people to participate in society. IADIS International Conference ICT, Society and Human Beings 2008

World Health Organization. (2003). Media centre: Access to rehabilitation for the 600 million people living with disabilities. Retrieved from: http://www.who.int/mediacentre/news/notes/2003/np24/en/.

Zia, S., & Mahmood, T. (2010). *A study of the utilization of computer technology by students with visual impairment.* Unpublished master level thesis, University of the Punjab, Lahore.

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