

Analytical Study To Explore The Facts Of The Significant Teaching Pedagogy Of The Visually Impaired Using ICT

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ABSTRACT: With the augmentation of the internet, ICT has seen exponential growth in the coming years and will continue to do so. Over the years, the numbers of universities and colleges offering online courses have been dramatically increasing. ICT comprises all forms of electronically supported learning and teaching. The interactive tools for communication in ICT give the sighted learners as well as visually impaired learners' flexibility in terms of easy accessibility to learning, learning at their own pace, anytime anywhere learning environment. In view of the issues, the paper focuses about the study of the methods and practices of teaching the visually challenged people and how ICT (Information and Communication Technology) can be used to provide higher education for the visually challenged learners. It reveals information about the available software tools and resources that let learners with sight and without sight to team up to see, hear – and now also feel – what is on the computer screen. It also emphasizes on scenarios which demonstrate the effective use of ICT for the visually impaired learners. The use of technology can help them in activities like newspaper reading, creative writing, making resumes, presentations, participating in select college events thereby highlighting each one's abilities. Also, the study points out how the visually impaired learners could be groomed to take mock interviews and making them corporate ready. It reveals information about the available software tools and resources that let learners with sight and without sight to team up to see, hear – and now also feel – what is on the computer screen. The visually challenged learners do have aspirations. There is a huge talent pool of PWDs which is untapped yet. However, even in this digital era, there has been little done for learners with low vision or no vision. The visually impaired learners too require the same learning opportunities as the sighted learners because they too live and have to work and earn within the same environment. So there is a need to boost and encourage learning for the visually impaired learners so that these learners can lead an independent life. A minute supportive change to this neglected section of a society could make a lot of difference and improve their standard of living. The day when companies fully support this community, there will be increased productivity. The use of ICT aims at making a better future for the visually challenged learners. The study presently states the pedagogy of the visually impaired learners of any age.

Keywords : ICT (Information and Communication Technology), visually impaired learners.

1 INTRODUCTION

IN the United States, the terms "low vision", "legally blind" and "totally blind" are used by schools, colleges, and other educational institutions to describe students with visual impairments (Blindness/Visual impairment, 2012, para. 1). They are defined as follows:

1. Low vision generally refers to a severe visual impairment. It means low vision applies to all individuals with sight who are unable to read the newspaper at a normal viewing distance, even with the aid of eyeglasses or contact lenses. They use a combination of vision and other senses to learn, although they may require adaptations in lighting or the size of print, and, sometimes, Braille.
2. Myopic - unable to see distant objects clearly, commonly called near-sighted or short-sighted
3. Hyperopic - unable to see close objects clearly, commonly called far-sighted or long-sighted
4. Legally blind indicates that a person has less than 5% vision and
5. Totally blind students learn via Braille or other non-visual media.

In 2000, the Charter of Fundamental Rights of the European Union included in Article 21(1) states that 'any discrimination based on any ground, such as sex, race, colour, 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' is prohibited (Discrimination, September 2011,

para. 1). In education, people with physical disabilities should be given an equal opportunity to learn. Students who are physically challenged have equal rights as normal students to have access to traditional mode of education including education using ICT based. Most people with sight problems have some useful vision, and read online text in exactly the same way as fully sighted people with their eyes. However, the needs of people with poor sight vary, depending on how their eye condition affects their vision. Some people require large text, while others can only read smaller letters. Many people with sight problems need a highly contrasting color scheme, while some can only read yellow text on a black background. To cater for everyone, web sites should be flexible in design, enabling the individual to adjust the text and color settings to suit their needs and circumstances. In contrast, people with very little or no vision read web pages with the help of access technology installed on their computer. Synthesized speech software reads the content of web pages aloud through a speaker, while Braille software outputs to a retractable display, so that the web site can be read by touch (Howell).

1.1 Users with low vision

Users with low vision rely on increasing the text size to read web pages easily. Most websites use a multicolumn format of three or more columns. Though the majority of modern web browsers such as Internet Explorer (IE), Firefox, Opera and Safari allow the user to increase text size; many page designs do not scale well and are often hard to read clearly. Also, people who rely on screen magnification software to

read web pages often miss information when the layout is complex, particularly when information spans across more than one column such as multi-column online forms. Offering alternative page layouts using style sheets is an effective solution to these problems. Many people with low vision find the following web page options helpful:

- I. Single column layout
- II. Fluid layout
- III. Navigation presented horizontally
- IV. Light text on a dark background
- V. Large text
- VI. Bold text (Moonan)

In recent years, the World Health Organization [2004] has emphasized that "childhood blindness remains a significant problem. With an estimated 1.4 million blind children below age 15", the problem appears even more relevant if we consider the students with visual impairments other than blindness (the incidence of low vision being generally estimated three times greater than blindness). In the same report, in fact, it was found that, in 2002, there were 161 million (about 2.6% of the world population) visually impaired people in the world, of whom 124 million (about 2%) had low vision and 37 million (about 0.6%) were blind. The visually impaired students, in principle, could highly benefit from using ICT for educational purposes but they actually, despite the availability of a growing number of technology-enhanced and sophisticated assistive devices, face a number of accessibility problems (Bocconi, Dini, Ferlino, Martinoli, & Ott). Blind and low vision students encounter different types of obstacles: in order to fully to access the contents. The legally blind and totally blind students need to rely on screen readers or Braille, while the low vision or the visually impaired students may access a much wider variety of software applications, including, often, those with graphic interface. Lack of writers is particular painful for blind students studying for an advanced degrees in universities.

2 OBJECTIVES

Keeping these views, an attempt was made with the following objectives: Below are the objectives of this research.

- I. To list out the teaching pedagogy that may affect for the visually impaired learners.
- II. To determine how ICT can provide assistance for the visually challenged learners.
- III. To unveil the available software tools and resources that blind learners can use for enhancing their learning techniques.

3 RESEARCH METHODOLOGY

The analysis of secondary data helped in understanding the prior work on the subject. This study is also based on the data collected from research studies, reports and websites.

3.1 Listing the teaching pedagogy that may affect the visually impaired learners:

There are many learners having low vision or partial sight in comparison to those with total absence of vision. Therefore, the type of assistance required will vary according to the degree and nature of their impairment.

I. Reading:

Low vision learners can access information in using Braille or may be able to read large-prints. However, Braille readers cannot skim read and would usually take more time to read than other learners to read a text. Therefore, many blind students prefer material in an electronic format and use a screen reader such as JAWS.

II. Writing:

Finding a responsible person to do the writing for the blind students in the examination hall is a difficult task for the conductors of examination. Even if the writer is arranged to write the exam on behalf of the blind student, there is nagging fear that the writer may not honor his commitment.

III. Lectures:

Visually impaired learners take longer to write down lecture notes and they may be unable to see PowerPoint slides or board work. Diagrams can be difficult to understand unless an oral description or additional clarification is given. TV and videos/DVDs are generally less problematic than might be expected. Some students who are sensitive to light or screen glare may struggle with TV & video conference. Recording lectures can also be useful.

IV. Practicals, Lab and Studio Work:

A variety of different situations can arise in practical sessions for the visually impaired learners. Auditory displays of visual information (such as talking thermometers), illuminated magnifiers and simulated environments can be useful during such sessions. Microscopes and interfacing with the lab equipments can be an issue and they can be linked to a computer screen to display sufficiently large prints. These equipments can also be connected to voice synthesizers. Laboratory practicals, experiments or field trips can be explained through audio taping commentaries.

3.2 Assistance for the visually challenged learners:

The normal websites usually have small texts, images linked to other web pages, menus, multi-columnar forms, small icons. These components render it difficult for the visually impaired/blind students to have access to the website. Some of the aids/assistance which could be provided when designing these websites are as follows:-

I. Flexibility to change color schemes of web sites when designing websites:

Many learners with sight problems need a highly contrasting color scheme. For instance, a yellow text on a black background. To cater for everyone, websites should be flexible in design, enabling the individual to adjust the text and color settings to suit their needs and circumstances. This way the websites can engage sighted learners as well as learners with poor sight.

II. Using synthesized speech softwares:

Speech synthesis is the artificial production of human speech. A computer system used for this purpose is called a speech synthesizer, and can be implemented in software or hardware. A text-to-speech (TTS) system converts normal language text into speech. Speech synthesis has long been a vital assistive technology tool for people with visual impairment. Synthesized speech software reads the content

of web pages aloud through a speaker or headphone (Speech synthesis).

III. Braille software:

The Braille system is a method that is widely used by blind people to read and write, and was the first digital form of writing. Braille software create highly accurate Braille documents for school books and teaching materials, office memos, bus schedules, personal letters or signs (Braille).

IV. Screen magnification software:

Users with low vision rely on increasing the text size to read web pages easily .A screen magnifier is software that interfaces with a computer's graphical output to present enlarged screen content. It is a type of assistive technology suitable for visually impaired people with some functional vision; visually impaired people with little or no functional vision usually use a screen reader (Screen magnifier).

V. Provide alternative text for images and graphics on the webpage :

Speech softwares can't read images or graphics. The solution is to provide alternative text when the learner hovers the mouse over the images and hovering text could have a large font.

VI. Using synchronous and asynchronous mode of communicating during the online and offline sessions:

i. Synchronous conferencing:

Web conferencing, text chatting can be done for online interaction, and communication and clarification.

ii. Asynchronous conferencing:

Online discussion forums, e-mails, etc can be initiated for developing reflective skills, in-depth dialogue and critical thinking.

3.3 Available software tools and resources that provide assistance and direction to the blind learners:

Sr. No.	Assistance provided in designing websites	List of softwares used	description
1.	Flexibility to change color schemes of web sites when designing websites	Screen tinter lite software	Changes the foreground and background color of IE or any applications Source: http://www.bltt.org/software/screentinterlite/index.htm
2	Using synthesized speech softwares:	Adobe acrobat reader software	Used for reading pdf files. In that, the read out loud feature exists exists.
		NaturalReader	NaturalReader is a Text to Speech software with natural sounding voices. This easy to use software can convert any written text such as MS Word, Webpage, PDF files, and Emails into spoken words. NaturalReader can also convert any written text into audio files such as MP3 or WAV for your CD player or iPod. Source: http://www.naturalreaders.com/index.htm

	Using synthesized speech softwares(Cont...)	JAWS	Screen reader for the visually impaired and the blind. Also supports other features like text to braille conversion, multilingual support
3.	Braille software	Duxbury Braille Translator (DBT)	Duxbury Braille Translator (DBT) provides translation and formatting facilities to automate the process of conversion from regular print to braille (and vice versa) (Refer to Figure 1)
4	Screen magnification software	Virtual Magnifying Glass	free, open source, cross-platform screen magnification tool. It is simple, customizable, and easy-to-use. (Refer to figure 2)
5	Other technologies that can be used	gtalk, adobe connect for web conferencing, emails, mobiles for instant messaging	

4 CONCLUSION AND FUTURE RESEARCH

The software development team must ensure that when designing the web pages, for people with low vision, the following web page options would be helpful: Single column layout, Fluid layout (Layouts defined in percents instead of pixels and will be resized as the browser window is resized), Navigation presented horizontally, light color text on a dark background, large text, bold text. Website designers should make provisions for selecting predefined templates that suits the needs of various categories of learners. There are challenges to be anticipated when offering courses through ICT for the non-sighted learners but that should motivate us to re-think and expand our educational approaches in this area. Although, there are general aspects similar in every course, more emphasis should be given to visual aspects and accessibility. These approaches raise questions on how to approach this teaching accordingly. It is a good idea to teach them the same contents as much as possible. These students like to be treated the same way as other students and to become familiar with same knowledge even if they have to experience information in different ways. They should have adequate support from the software development team and in particular from the facilitators. The facilitators should attempt to encourage their reflective, collaborative, constructivist skills and sharing their different experiences and perspectives. When designing these courses, technical-oriented aspects of user interfaces requires better supporting materials. An effective use of ICT and careful designing of web sites can provide blind learners with the same opportunities for learning and empower them to be proactive citizens as that for the sighted population. However, students with disabilities may face relevant difficulties both in accessing and in using ICT tools depending on the type of visual impairment. Considerable planning needs to be carried out before offering such online courses for these target audience. It becomes important to enhance awareness amongst the facilitators about visually impaired and blind learners and train the facilitators about how to help these non-sighted learners to learn better. The working of policies and practices of corporate are very different and since there is a huge talent pool available in the visually impaired stakeholders that is almost untapped, therefore companies have to change in adopting the ICT effectively and in a uniform way. Future research is necessary to determine if the discussions of this study are replicable for this course. In addition, the studies in fully online environments can improvise and incorporate various learning styles. To strengthen the conclusions of future studies, the researchers have to determine which course delivery, methods and levels are ideal to design these instructional methods to improve the effectiveness of online course for the disadvantaged non-sight learners.

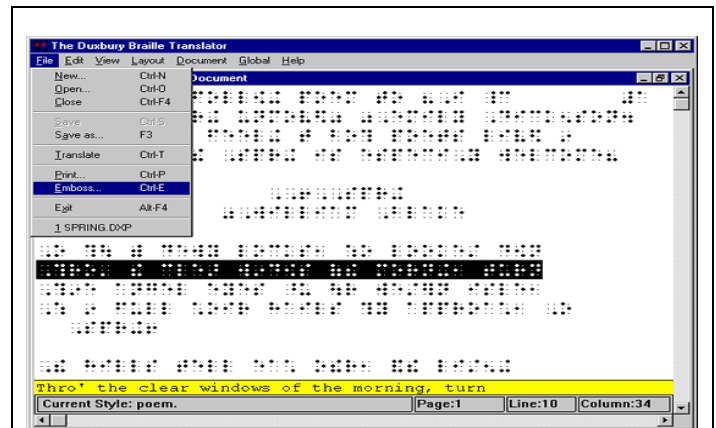


Figure 1: A DBT translator-converting text to Braille and vice-versa. Source: <http://www.ulva.com/Online-Store/Braille-Translation/dbt.htm>

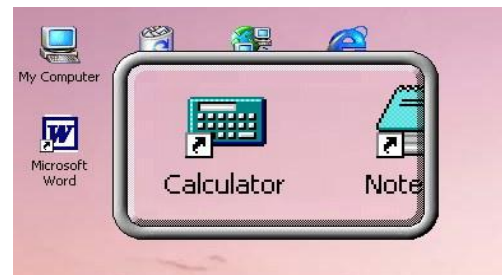


Figure 2: screen magnifying software Source: <http://magnifier.sourceforge.net/>

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