Assistive Technology for Students with Visual Impairments: A Path Revisited

DR RANJITA DAWN*

ABSTRACT

The paper aims to look at the significance of assistive technologies for the education of persons with visual impairments. In this context, it makes an attempt to analyse some of the benefits of assistive technologies and their usage for providing a quality education to such people. It also provides a critical review of the limitations of such technologies that needs to be addressed to facilitate their better instruction and integration.

"New information and communications technologies can improve the quality of life for people with disabilities, but only if such technologies are designed from the beginning so that everyone can use them...." - Bill Clinton

In the age of incessant technological advancement there is tremendous demand for incorporation of new and modern programmes and methods in order to ensure greater adaptability with the pace of rapid competition. The same holds true for people with disabilities all over the world. Visualisation which is regarded an inevitable medium for people to adapt to complex information as well as to navigate around structured information, the visually challenged are placed at a vulnerable position by nature. However, the situation seems to be undergoing rapid and more positive changes with the ushering in of new technological interventions.

The opportunity to access and interact with text, both printed and electronic, continues to be fundamental to education in the information age. Appropriate assistive technology has enabled students who are visually impaired to access information and to complete tasks efficiently enabling them to achieve the highest level of independence possible. Emerging research suggests that technology promotes acquisition of literacy, provides more equal access to information required for employment, and for access

* *Assistant Professor*, Department of Education, Loreto College, Kolkata

to information, in general, and facilitates social and community networks (Kelly and Smith, 2011). In recent years, assistive technology has enabled people with visual impairment to overcome stereotypes and to function efficiently in diverse professions of life.

The most important advancement since blind assistive technology began to appear in the 1970s is the screen reading software, which simulates the human voice reading the text on computer screen or renders hard-copy output into Braille. Screen reading software such as JAWS, Job access with Speech, by Freedom Scientific, Window-Eyes by GW Micro, and Serotek are being used widely by the visually impaired students to read the text appearing on the screen. Their ease in operation by keyboard commands and the options of Braille display and a synthetic voice facilitates better instruction. Given the current state of technologies for displaying refreshable braille or magnified text, paired with speech driven by screen reader technology, students can now access information available in text through multiple modalities. The optical character recognition which scans and reads the text aloud has enabled students with visual impairments to access all types of print materials by using this scanning technology. Portable reading devices are now being used to download books and read them out loud in a synthesised voice such as the Victor Reader Stream and the BookSense.

The apparent benefits of Audio Supported Reading (ASR) suggest that rather than teaching the skills essential for braille reading, print reading, and listening in isolation as separate pedagogies, a more robust and integrated approach for teaching and acquiring literacy skills will be more advantageous. In today's era of general curriculum access and high stakes testing, it is imperative that new practices and pedagogies be examined with a view to improving results for these students, many of whom lag far behind their typically seeing counterparts. In addition to computers and other devices, talking clocks and thermometers, specialised bar code scanners, and palm pilots all make daily life, education and employment more accessible for people with vision impairment. The GPS system including BrailleNote GPS, Street Talk™, Trekker, and Mobile GEO have also taken a lead in facilitating mobility of people with visual impairment.

Lowenfeld (1973) determined that there were three primary issues facing individuals with visual impairments: access to information, independent travel and lack of meaningful experiences. Assistive technology is used by individuals with visual impairments to compensate for these limitations, achieve educational success,

gain competitive employment by providing tools for increased independent access to information and for effective communication. The current challenge is to provide appropriate access to and instruction on blindness and low vision specific assistive technology through individualised assessment of assistive technology needs, appropriate instruction in the use of assistive technology as tools and equitable distribution of assistive technology.

Issues and Challenges

Although the need for and benefit of assistive technology has been well-documented throughout literature, there are various complex issues that often restricts the use of assistive technology devices and software. One such problem centers on the fact that most of the provision of assistive technology are not based on the particular needs of individual but upon disability. There is frequent ignorance of the fact that even students with the same visual loss may require instruction in different types of assistive technology based upon their unique needs. Besides this it is also imperative to take into account that determination of access mode(s) i.e. speech access, braille access, print access, tactile communication systems, etc. and must be guided by skilled specialists in the education of students with visual impairments who have comprehensive expertise in blindness and low vision specific assistive technology and who can also access individual learning characteristics.

There is also the need to diagnose the specific needs of students with visual impairments followed by proper planning, implementation, and continuous monitoring instruction in the use of appropriate technology. Students with visual impairments will not be included unless their unique educational needs for access are addressed by specially trained personnel in appropriate environments and unless these students are provided with equal access to core and specialised curricula through appropriate specialised books, materials and equipments. Hence, it is imperative that efforts must be directed towards appropriate instruction including designing a plan of individualised assistive technology instruction and teaching a specialised hierarchy of skills that is based upon diagnostic evaluations. Instruction in the use of appropriate assistive technology devices such as speech, large print, Braille must take place concurrently with instruction in keyboarding, word processing, and use of the Internet. Appropriate instruction also needs to be provided concerning introduction to or mastery

of other blindness and low vision specific assistive technology devices such as electronic note takers, scanners, optical character recognition (OCR) systems, braille translation software, braille and print embossers, screen magnification software, etc.

Access to and instruction with assistive technology must be driven by individual needs, not by logistical constraints such as availability of equipments, location or model of service delivery, or funding restraints. Currently, some students with visual impairments have access to a wide range of blindness and low vision specific assistive technology devices while others have none at all (Kelly, 2008). In inclusive classrooms, students with disabilities do not always have access to the same learning tools as their classmates. For instance while the students with visual impairments have to rely on alternative-format books, such as large print or Braille as compared to their sighted counterparts who access written text, the former are dependent on their teachers and peers to describe the matter to them and also in certain cases visual materials may never be adapted. Moreover, though use of Educational Software has become an important tool and their use is continuously being emphasised on in classrooms it poses certain challenges for the students with disabilities. For instance while a sighted student can learn a biology lesson based on interactive simulation, a student with low vision may have to depend on assistive interactive software for experimental. Though the accessible software can contribute positively towards filling in some of the gaps resulting from lack of exposure to a wide range of activities the issue of proper accessibility and training becomes important.

Instruction by qualified educational professionals is often hindered by lack of pre-service and in-service training in assistive technologies. It is evident from research that some students with visual impairments have access to teachers who are well-prepared to deliver special instruction in blindness and low vision specific assistive technology, while others do not and Edwards and Lewis, 1998; Kapperman, Sticken, and Heinze, 2002; Murphy, Hatton, and Erickson, 2008; Parker et al., 1990; Sahfi, Zhou, Smith, Kelley, 2009; Smith, Kelley, Maushak, Griffin-Shirley, and Lan, 2009). Hence, there is the urge to eliminate this inequity. Opportunities must be provided for professional development through partnerships among school, universities, organisations as well as assistive technology vendors to ensure that professionals keep abreast of emerging technologies.

Factors such as location, cost, and personnel often hinder the availability of assistive technologies for individuals with visual impairments. The main problems are not only associated with designing the electronic circuitry for a satisfactory electronic mobility aid but in identifying the optimum information needed for independent traveling, displaying this information to the blind persons in a non-visual format i.e. auditory or vibratory signals, manufacturing the device at a reasonable price and finally training of the blind persons in the use of these devices. Referring to issue of structural adaptations for effective orientation and mobility of the visually challenged as well as other forms of disabilities most of the schools in India do not possess many of the prescribed infrastructural standards as specified by the 1995 Disability Act. There is still lack of basic requirements such as ramps, adequate Braille books etc. Morever though embossed maps can be used in familiarising a visually challenged person with the layout of the environment they are not easy to produce or interpret since just embossing a sighted map may not ensure an intelligible embossed map.

Limited awareness among non-specialist sighted users about the difficulties encountered by the visually impaired users in adapting to the new technology such as investing a great deal of time in learning the command structure and operation of the speech, Braille, or text display system can further hinder in providing assistance. Hence, attempt should be made towards providing structured training so as to bring positive benefits to those who need to use technology for a specific range of tasks.

Suggestions

It is important that schools must ensure that all students have equitable access to assistive technology devices and instruction as documented by the individualised education programme. School and university programmes must address the lack of blindness and low vision specific assistive technology knowledge among the future teachers of students with visual impairments. Opportunities for professional development needs to be provided through partnerships among school districts, universities, organisations as well as assistive technology vendors to ensure that professionals keep abreast of emerging technologies and have the opportunity to become proficient in the use of the assistive technology. There is also the need to bring separate pedagogies together in a unified

instructional design. Learning to read with Braille or print, learning to listen, and learning to use technology must all come together to create authentic classroom activities.

Conclusion

A significant challenge in education for both visually-impaired and deaf is that they are a minority population and often have less guided practice in communication. As a result, they have limited interaction with the larger community, which would normally reinforce their literacy and communication skills. Although inadequate teacher training, lack of awareness, infrastructural deficiency and high cost are some of the major problems in the use of technology but willingness, appropriate effort and positive outlook can play significant role reducing some of these shortcomings. This perfectly relates to the words of James Baldwin "Not everything that is faced can be changed, but nothing can be changed until it is faced."

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