



## **Assistive Technology Competencies: Need, Outlook, and Prospects (with Reference to Special Educators for Children with Visual Impairment)**

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### **Abstract:**

*Technology can increase our productivity and independence by facilitating the performance, simplifying tasks, allowing greater speed and less physical energy. It can also enhance our knowledge, understanding and participation by expanding our access to information, places and people. Assistive technologies are used by individuals with disabilities in order to perform functions that might otherwise be difficult or impossible. It improves the quality of life in them. Therefore, it is imperative that the training of assistive technology should be integrated with education of children with visual impairment for better adaptability and greater independence in the society. These training needs create an obvious call for competency in special educators for children with visual impairment towards knowledge and skills in assistive technologies.*

**Key words:** Competency of assistive technology, Special educator's competency, Special educators for children with visual impairment, Assistive technologies for children with visual impairment.

Almost everyone has benefited in some way from the development of both simple and very complex or sophisticated technology. Many people have found their lives made easier through the use of technology, whereas others have found that

they could accomplish much more because of technology. Directly and indirectly, technology is playing a continuously greater role in people's lives. It can increase our productivity and independence by facilitating the performance of routine tasks, simplifying more complex tasks, and allowing us to carry out activities with greater speed and less physical energy. It can also enhance our knowledge, understanding and participation by expanding our access to information, places and people. Technology has many important applications in teacher education in general or special education. The integration of new technologies and multimedia materials in teacher education programs at the pre-service and in-service levels can improve the quality of training and increase competency in best practices (Ludlow 2001).

Assistive technology enables and empowers persons with disabilities as it reduces or eliminates barriers and holds the promise of greater participation in meaningful developmental, educational, social, recreational and vocational experiences (Massachusetts Department of Elementary and Secondary Education, 2012). Assistive technology is a broad and inclusive term that includes both assistive technology devices and assistive technology services (Connecticut State Department of Education 1999). An assistive technology device is any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of children with disabilities. Again, an assistive technology service means any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device. The term includes the evaluation of the needs, selecting, designing, fitting, customizing, adapting, applying, retaining, repairing, and technical assistance for a child with a disability, family members or, professionals.

## **Assistive Technology Competencies: The Need**

Technology which is used by individuals with disabilities in order to perform functions that might otherwise be difficult or impossible is grouped under assistive technology (University of Washington 2013). Children with visual impairment are particularly challenged in obtaining, manipulating, and producing many types of information, such as text, graphics, facial expressions, and gestural cues. They are also challenged in understanding and moving about in physical space (Blasch, Wiener & Welch 1997). Achieving self-esteem becomes difficult for these children since self-awareness in the social context may be affected by such factors as social isolation, low expectations, and over-protection (Tuttle & Tuttle 2004). Such barriers must be carefully examined and skillfully addressed by teachers and special educators in order to provide them genuine and valid access to the general curriculum.

Individuals with visual impairment have for centuries relied upon assistive technology to access information, travel independently, and participate in a variety of experiences (Smith 2008). They have a long history of the successful use of assistive technology dating back to ancient civilizations that used types of the long cane for independent travel (Smith & Kelley, 2007). The history of blindness shows how specifically embodied, individual practices and the relation with objects and technologies play a central role in articulating socialness and humanity (Schillmeier 2008). Assistive technology can support wider group of students with visual impairment (including students who are blind or have low vision) in all academic areas as well as in expanded core curriculum (Wiazowski 2009). It is generally accepted that assistive technology positively impacts the lives of individuals with visual impairment (Cooper & Nichols 2007; Kapperman, Sticken, & Heinze 2003; Strobel, Fossa, Arthanat, & Brace 2006).

As the journey of assistive technology for visually impaired is so long, a large array of technologies have been developed to aid individuals with visual impairment with their ability to access information, travel independently, and take part in meaningful experiences. Since most jobs held by people with visual impairment today require them to use some kind of assistive technologies, hence, the inadequate and untimely training on assistive technology contribute to the persistence of social and employment inequities (American Foundation for the Blind 2013). Almost everyone who suffers from blindness or other visual disabilities can benefit from vision rehabilitation based on technology that can help make the adjustment process more transitional for the individual. Therefore, training in assistive technology should be one of the key components of compulsory extended core curriculum for children with visual impairment (Alberta Education 2006).

Due to the usefulness of assistive technologies for individuals with visual impairment, it is imperative that the special educators who worked for the rehabilitation and education of visually impaired must be competent in using and practicing assistive technologies. Again, it is an obvious responsibility of University training programs or other programmes in special education to prepare teachers for children with visual impairment incorporate assistive technology training into their programs (Smith, 2008). The programs must instill in teacher candidates the knowledge, skill, and confidence to effectively conduct assistive technology assessment and implement individualized assistive technology plans as part of an inclusive educational program (Bargerhuff n.d.). Within the assistive technologies for visually impaired there is a wider range of assistive technologies dedicated to two broader groups - blindness and low-vision. When special educators are not adequately prepared with assistive technology competencies as part of pre-service training, they may not feel empowered to deal with children with visual

impairment. They may proceed in attempting to implement in inappropriate and non-productive ways (Michaels & McDermott 2003).

Therefore competencies in assistive technology are an important concern along with other components of extended core curriculum for children with visual impairment. Special educators' competency on assistive technology is much desirable to cater the needs of children with visual impairment. Technology should be thoroughly integrated into the teacher education program and infused throughout courses and field experiences (Edybum & Gardner 1999).

### **Assistive Technology Competencies: The Outlook**

Assistive technologies for individuals with visual impairment can be divided into three major categories: no-tech, low-tech, and high-tech (Smith 2008). No-tech or, no-technology refers to any assistive device that does not consist of any electronic device within it. No-tech items includes Braille slate, Taylor-Frame, abacus, reading stand, bold-lined paper, long cane etc. Again, Low-tech or, low technology devices may be electronic but do not include highly sophisticated advanced components. This category includes electronic voice-recorder, audio player, a talking calculator, Braille, etc. High-tech or high technology devices utilize complex, multifunction technology and usually include a computer and associated software. Some no-tech assistive technology became part and parcel of the individual with visual impairment. But, in order to make coordination with existing curriculum and learner proficiency in use of low-tech and high-tech, assistive technologies are indispensable. While all technologies have impacted the lives of individuals with visual impairment, the high-tech devices have had the greatest impact on success in education and employment (Gamble, Dowler & Hirsch 2003). The wide range of assistive technologies for people with visual

impairment provides plenty of choice for users at all stages of sight loss. There are several categorization made by premier institution in the field as per nature of task to be performed, nature of technologies or, place of use. RNIB (2013) has suggested some important assistive technologies for individuals with visual impairment as follows:

- Screen readers- A screen reader is a specialized type of software that converts electronic text to speech.
- Screen magnifiers- A screen magnifier is a software that presents enlarged screen content.
- Speech recognition software- Speech recognition software allows input of data using voice rather than a mouse or a keyboard.
- Text-to-speech (TTS) software- Text-to-speech software converts written text into audio files that can be played on a wide range of devices.
- Optical character recognition (OCR) software- OCR software takes scanned text and converts the scanned image into to an electronic text file.
- Large monitors- Large monitors make on-screen reading easier by providing more space on-screen and are helpful for persons with low vision.
- Closed circuit television (CCTV)- CCTV refers to standalone devices that use cameras to magnify large format printed materials and objects.
- Magnifiers- Magnifiers are smaller optical devices and are placed on objects to magnify smaller items or text and are available with or without light sources.
- Dictation devices and transcription- Dictation devices allow people to record meetings or take notes that can be transcribed from the recording made.
- Scanners- Scanners convert images from printed material to a computer file. This is used to access information by mingling with other assistive technology devices.

- Standalone reading machine- An integrated machine with a scanner, OCR, and speech software, which functions without the need for a computer.
- Refreshable Braille displays- Refreshable Braille is an output device which displays Braille reading interface by connecting to computers from what is on-screen.
- Braille embossers- Braille embossers are specialized printers that produce braille embossed documents.
- Braille writers- Braille writers can be either manual or electronic devices that are used for braille input. Manual Braille writers produce Braille onto paper and electronic Braille writers input Braille directly into a computer.
- Braille translation software- Braille translation software is used in conjunction with a Braille embosser. It converts print text file into embossers ready Braille Electronic file.
- Alternative keyboards- A standard keyboard may not be suitable for people who have low vision. Many people who have low vision use either large print keyboards with high contrast colours.
- Audio players- There are devices available for people using a variety of formats, but the main formats that are being promoted are the DAISY format and the mp3 format.
- Digital books- Digital books are available via handheld devices or tablets and use a variety of formats, many of which are specific to the device being used.

## **Assistive Technology Competencies: The Prospect**

In India, information and communication technology revolution impacts almost every segment and level of education. The significant role of ICT in school education has been highlighted in the National Curriculum Framework 2005 (NCERT 2005). Education is inspired by the tremendous potential of ICT for enhancing outreach and improving quality of education (Govt. of India 2012). With the convergence of

technologies in the school education it has become imperative to take a comprehensive look at all possible information and communication technologies for improving quality of education and rehabilitation of children with visual impairment at school. Use of ICT for quality improvement also figures in Government of India's flagship programme on education, Sarva Shiksha Abhiyan (SSA). Again, ICT has figured comprehensively in the norm of schooling recommended by the Central Advisory Board of Education (CABE), in its report on Universal Secondary Education, in 2005.

National Policy on Information and Communication Technology (ICT) in School Education, 2012 clearly promotes the use of ICT to achieve the goals of inclusive education in schools (Government of India 2012). The policy emphasizes that the different technologies including software and tools to facilitate access to persons with visual impairment, like screen-readers, Braille embossers to be the part of infrastructure in all schools. It also speaks about capacity building programmes to be introduced for ICT enabled inclusive education.

The Indian legislation also promotes research, development and proper use of assistive technologies. Section 28 of the Persons with Disabilities Act, 1995 stresses over research by official and non-governmental agencies for the purpose of designing and developing new assistive devices, teaching aids, special teaching materials or such other items as are necessary to give a child with disability, equal opportunities in education. Again, Section 48 of the Act also makes a provision to influence Governments and local authorities to make desirable arrangements to promote research on psychosocial aspects of assistive devices (Government of India 1996). However, in India we do not have much more documented resources on competencies, ethics, roles and responsibilities (Council for Exceptional Children 2003). Presence of legal and policy documents on these issues develops accountability in special educators towards their duties.

## **Conclusion**

Individuals with disabilities use assistive technologies in order to perform functions that might otherwise be difficult or impossible. Dependence and relied upon assistive technology to access information and travel independently by individuals with visual impairment shows an obvious connection between success or independence and better understanding of assistive technology. Assistive technologies also improve the quality of life in persons with disabilities (Scherer 1996; Agree & Freedman 2011).

If we want to see changes in children with visual impairment towards a better level of independence we should make use of assistive technologies more and more. Then we have to inculcate a technology based approach in the individuals with visual impairment from a very early stage of education and training. Hence, it demands the proper and compulsory training in relevant and modern assistive technologies among children with visual impairment.

For proper training in children with visual impairment it is necessary to make assistive technologies a compulsory component of extended core curriculum for children with visual impairment. To facilitate effective training in assistive technologies in children with visual impairment, it is very crucial that special educators at schools should be equipped with knowledge and skills related to assistive technology. As the special educators' competency in assistive technologies has a significant role, it builds an obvious need of skill proficiency in knowledge and skill related to assistive technology among special educators. As a consequence, it has been emphasized the training of assistive technologies as a vital section in pre-service as well as in-service training of special educators. It becomes important that the training centers that are engaged in preparing teachers for children with visual impairment must be infused with training programs with instructions and

practical exposure in assistive technologies. Recent policy documents also reflect the sensitization towards need of assistive technologies in schools.

Competency in assistive technologies in special educators has several challenges. The first challenge is that the nature of assistive technologies is much dynamic and shifting. One technology replaces another too abruptly and sometimes entirely. It demands the regular capacity development of special educators towards new technologies. The second challenge is the very wide extent and range of assistive technologies. It makes it complex to shortlist important assistive technologies either by their usability, portability, cost-effectively, place where they can be used, branding, support services, brand name etc. Another major challenge related to the competencies of special educators in assistive technologies is teachers' resistance towards use of technologies (Woodward & Rieth 1997). Teachers should temper their resistance to technology applications in teacher education until they have thought through their potential applications to the preparation of professional personnel.

## **BIBLIOGRAPHY:**

Agree, E. M. & V.A. Freedman. 2011. "A Quality-of-Life Scale for Assistive Technology: Results of a Pilot Study of Aging and Technology." *Journal of American Physical Therapy Association: Physical Therapy*. 91(12): 1780–1788.

Alberta Education. 2006. "Essential components of educational programming for students who are blind or visually impaired." Retrieved from [https://education.alberta.ca/media/511690/ecep\\_blind\\_or\\_visually\\_impaired.pdf](https://education.alberta.ca/media/511690/ecep_blind_or_visually_impaired.pdf)

American Foundation for the Blind. 2013. "Assistive technology specialists." Retrieved on March 13, 2013, from <http://www.afb.org/Section.asp?SectionID=44&TopicID=239>

Bargerhuff, M.E., H. Turner, & K. Myers. n.d. "Assistive Technology in the Teacher Education Program at Wright State University." Wright State University

Blasch, W., R. Wiener, & R.L. Welsh. Eds. *Foundations of orientation and mobility*. 2nd ed. 231-259.

Connecticut State Department of Education. 1999. *Guidelines for Assistive Technology*. Developed by the Connecticut State Department of Education and The Connecticut Birth to Three System.

Cooper, H.L., & S.K. Nichols. 2007. "Technology and early Braille literacy: Using the Mountbatten Pro Braille in primary-grade classrooms." *Journal of Visual Impairment & Blindness* 101(1): 22-31.

Council for Exceptional Children. 2003. *What every special educator must know: Ethics, standards, and guidelines for special educators*. Arlington, VA: Author.

Edyburn, D. L., & J. E. Gardner. 1999. "Integrating technology into special education teacher preparation programs: Creating shared visions." *Journal of Special Education Technology* 124: 3-17.

Gamble, M. J., D. L. Dowler, & A. E. Hirsch. 2003. "Informed decision making on assistive technology workplace accommodations for people with visual impairments." *Work* 22: 123-130.

Government of India. 1996. "Persons with Disabilities Act, 1995. Ministry of Law, Justice and Company affairs. New Delhi.

Government of India. 2012. "National Policy on Information and Communication Technology (ICT) in School Education." Department of School Education and Literacy, Ministry of Human Resource Development. New Delhi.

Kapperman, G., J. Sticken, & T. Heinze. 2002. "Survey of the use of assistive technology by Illinois students who are visually impaired." *Journal of Visual Impairment & Blindness* 96(2): 106-108.

Ludlow, B.L. 2001. "Technology and teacher education in special education: Disaster or deliverance?" *Teacher Education and Special Education* 24(2): 143-163.

Massachusetts Department of Elementary and Secondary Education. 2012. Access to Learning- Assistive Technology and Accessible Instructional Materials.

Michaels, C.A., & J. McDermott. 2003. "Assistive technology integration in special education teacher preparation: Program coordinators' perceptions of current attainment and importance." *Journal of Special Education Technology* 18(3): 29- 41.

NCERT. 2005. "National Curriculum Framework." National Council of Educational Research and Training, New Delhi.

RNIB. 2013. "Action for the Blind People." Retrieved from <https://www.actionforblindpeople.org.uk/resources/practical-advice/assistive-technology-resources/types-of-assistive-technology/assistive-technology-visual-impairment/>

Scherer, M.J. 1996. "Outcomes of assistive technology use on quality of life." *Disability Rehabilitation* 18(9): 439-48.

Schillmeier, M. 2008. (Visual) "Disability- from exclusive perspectives to inclusive differences." *Disability & Society* 23(6): 611-623.

Smith, D.W., & P.A. Kelley. 2007. "A survey of the integration of assistive technology knowledge into teacher preparation programs for individuals with visual impairment." *Journal of Visual Impairment & Blindness* 101(7): 429-433.

Smith, D.W. 2008. *Assistive Technology Competencies for Teachers of Students with Visual Impairment: A Delphi Study*. Doctor of Education Dissertation. Texas Tech University.

Strobel, W., J. Fossa, S. Arthanat, J.Brace. 2006. "Technology for access to text and graphics for people with visual impairment and blindness in vocational settings." *Journal of Vocational Rehabilitation* 24: 87-95.

Tuttle, D. W., & N. R. Tuttle. 2004. *Self-esteem and adjusting with blindness*. 3rd ed. Springfield, IL: Charles C Thomas.

University of Washington. 2013. "What is Assistive Technology? AccessIT: The National Center on Accessible Information Technology in Education." Retrieved from <https://www.washington.edu/accessit/articles?109>

Wiazowski, J. 2009. "Assessing Students' Needs for Assistive Technology." WATI.

Woodward, J., & H. Rieth. 1997. "A historical review of technology research in special education." *Review of Educational Research* 67(4): 503-536.