

EVALUATION OF EYE TRACKING ICT TOOLS TO IMPROVE THE LEARNING PROCESS OF VISUALLY IMPAIRED CHILDREN

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Abstract: *The United Nations has estimated that there are significant quantity of visually impaired in the world and India has 40 lakh impaired people. A few students with visual impairments have basic learning experiences because they do not able to observe other objects and visuals. Also the need of the visually impaired students may vary from person to person. Assistive Technology is the boon to students with visual impairments and it can support in inclusive learning. The educational institutions have been slow to ensure accessibility of learning materials and environments for those with a variety of disabilities, and the vision impaired are particularly disadvantaged by the vision-driven online education approach. The visually impaired students have a lot of educational problems and it should be solved. It is observed that the unique educational needs of all students with visual impairments cannot be met in a single environment. The ICTs offer a great potential to support lifelong learning for visual impaired students. Therefore, government agencies, NGOs and industrialists should join hands to work out modalities that will be beneficial in solving the educational needs of the visually impaired across the globe. The application of ICTs in teaching and learning process must enhance independence, integration and equal opportunities. This paper discusses various types of ICT based tools available for visual impaired students and evaluates its importance with respect to teaching and learning process.*

Keywords: *Analysis, Assistive Technology, ICT Tools, Learning, Visually Impaired*

1. INTRODUCTION

The visual impairment is a significant reduction in vision which cannot be corrected by lenses and reduces a person's ability to carryout his or her activities. However, the nature of the visual impairment may vary significantly depends upon the person. The visual impairment is generally classified into blindness and low vision. As per the literature, the legal blindness ranges from a visual acuity of 20/200 in the better eye after correction. The blind student may have some usable vision. A blind person generally uses braille as a reading and writing medium. In low vision, the vision is reduced central acuity of 20/70 or less in the better eye after correction. In literature, it is reported that, most students with visual impairments have low vision and needs support as well as encouragement to use their residual vision.

As per the estimation of United Nations, there are 42 million visually impaired in the world. The total population of the visually Impaired in India is 40 lakh and the population of the visually impaired according to urban & rural distribution is 6.70 lakh and 33.35 lakh respectively. It is reported that, between the two sexes, prevalence as well as incidence are reported to be marginally higher among females than among the males. . *Demographic details of the visually impaired* (2016, Sep 17) retrieved from <http://www.bpaindia.org/> reports that among the States, highest Prevalence Rate in the rural sector was reported by Orissa followed by Andhra Pradesh and Himachal Pradesh. As per a report, India accounts for 20 per cent (7.8 million) of global blind population. It is also reported that 62 per cent are on account of cataract, 19.7 per cent refractive error, 5.8 per cent glaucoma and one per cent corneal blindness. It was also disclosed that a total of 285 million visually impaired were also present in the country, who had some form of impairment. The experts said among the causes of blindness, many were curable if proper detection was done in time and added that while cataract was the most

common cause. *India accounts for 20 per cent of global blind population* (2016, Sep 27) retrieved from <http://www.deccanherald.com> estimated that prevalence of Childhood blindness in India is 3 lakh in India.

In India, corneal blindness is one of the most common causes of blindness. At present approximately 35,000 corneas are collected in the country every year, whereas 150,000 are required annually to combat corneal blindness. This causes the patient line-up and wait to get a corneal transplant keeps getting longer with each passing day. *Blindness in India Statistics of Blind India*. (2016,.Sep 17) retrieved from <http://www.netradaan.com> insist that it is necessary to create awareness and encourage the people to pledge their eyes for donation.

The development of a student with a visual impairment is affected by type and severity of the visual impairment, availability of equipment and resources, onset of the visual impairment, nature and degree of intervention, use of residual vision, other disabilities and cultural attitudes to visual impairment. The visual impairments students have fewer natural learning experiences because they do not able to observe objects and interactions. The areas of learning which are particularly affected are concept development, interpersonal communication skills, orientation and mobility skills and academic development.

2. VISUAL AIDS AND ADAPTATIONS

The adaptations of optical and non-optical aids suggested by the ophthalmologist may help the students with low vision. The visual aids such as binoculars and other adaptations are used to increase the visual experience. Appropriate lighting and environmental adaptations shall be maintained to avoid glare, provide high contrast and adjust the optimal vision. The student has to spent additional time in the classroom when using a visual aid. The student with low vision may be included in the regular classes with the following considerations in reading, listening and writing assignments. Also print materials should be provided in appropriate size depends on his/her visual assessment. Most storybooks for young children are in large print. The reading requires the efficient use of visual skills such as tracking, scanning, fixating and shifting gaze. Low vision impairment students need more energy and effort to read fluently and continue reading over a longer period of time and adaptations and requirements may vary at different age levels.

The perception level and technological advancements can be enhanced by medical treatments and preventive methods. These technological aids consist of variety of learning aids and tools, can be classified as assistive technology and general technology. The general technology tools are GPS devices, smartphones and computers. The assistive technology tools are screen readers, telescopes, hand magnifiers, stand magnifiers, braille printers, speech synthesizers, etc.

2.1 Assistive technology for students with visual impairments

The various types of assistive technology for students with visual impairments are discussed below.

- i. Assistive technology tools for a blind or partially sighted in your classroom are
 - a) Magnifying glass
 - b) Software added to a computer enabling a student to type and write
 - c) Magnifying device that could help students read a book or text in the classroom
 - d) CCTV
 - e) Braille device to read, write, and learn literacy skills
 - f) Mobile device
 - g) Large print text/books
 - h) Anti-glare paper
 - i) Contrasting text and background colours
 - j) Thick lined paper
 - k) Highlighters
 - l) Felt tip markers with various thicknesses
 - m) Slant board and

- n) colour filters
- ii. Mid Assistive Tech for Individuals With visual Impairments
 - It includes large key keyboards, keyboards with high contrast, MP3 players to record lectures, audio books, large calculator and portable word processing device.
- iii. High Assistive Tech For Individuals with visual Impairments
 - It includes screen readers, screen magnification, reading machines, video magnifiers, refreshable braille displays and braille translation software

3. VISUALLY IMPAIRED IN HIGHER EDUCATION

An individual's qualities and decision making skills is greatly affected by his or her education. The level of education provided by colleges, universities and other collegiate level institutions are called as higher education institutions. The higher education can minimize the effect of disability in visually impaired students. It also helps them to develop their powers and potentials adequately. From the literature it is observed that the inclusion of students with disabilities has not been taken seriously in recent years in many countries. Also the assistive tools are available for the visually impaired students have drawbacks. The visually impaired students have problems such as accessing resources, navigation and information centres. It is the university's responsibility to ensure that the visually impaired are assisted in anyway and every way possible. Also the technological progress has to contribute to this state of affairs, with highly inaccessible computerization of many online educational courses. It is reported in the literature that the few educational institutions have been slow to ensure accessibility of learning materials and environments for those with the visually impaired students.

Chikukwa, H., & Chimbwanda, F. (2013, May) evaluated the challenges faced by visually impaired students in open and distance learning (ODL) institutions of higher learning and carried out in the Zimbabwe Open University. Their results indicated that the visually impaired students face continuous challenges in their effort to become successful college students. This is due to lack of qualified lectures, inadequate equipment and services.

Omede, A. A. (2015) work focused on the challenges in educating the visually impaired students and modalities for ensuring quality assurance in Nigeria. Their work discuss about the global challenges in the higher educational system. The paper found out that the educational needs of the visually impaired include computer application, Braille writing materials and optical aids to support the issues of mobility, funding, library resources, personnel availability and physical infrastructural facilities.

4. RESULTS AND DISCUSSION

Students who disclose that have a visual impairment includes blind and people with partial visually impairment. In this those who have a total absence of vision are a minority and maximum numbers of students have low vision or partial sight. The requirements of visually impaired students may vary from person to person depends upon the severity of visual impairment. Hence the type of assistance required will also vary according to the degree and nature of their impairment. It is necessary that a teacher should discuss directly with the student and find his/her individual requirements in a discreet manner. Few students have gradually lost their vision over a number of years or blind since birth. Most people who advise that they are blind have some vision and may be light-sensitive. They may have blurred or distorted vision. In some cases they may have a restricted field of vision having less side vision, central vision or may see only half the field of view. With some visual impairment, sight fluctuates and light tolerance is much better than others. Some students may have difficulty in identifying detail or reading print but it will not affect their mobility around campus. However, when the peripheral vision is affected it can reduce the visual field making mobility difficult.

Omede, A. A. (2015) carried out a study in Turkey, to reveal problems that visually impaired learners (VIL) encounter during developing information and ICT skills and to suggest solutions for these

problems. The actions of VIL while using computer were captured by screen capture software and reviewed with regard to the skills. Their results showed that there is a necessity of regulations for VIL to develop their ICT skills. Carrière, V. (2012) study is about the relationship between students with visual disabilities and their peers and between students with visual disabilities and their teachers during training assisted by educative informatics. He suggests that the ICT will not always be sufficient without the cooperation of the teachers and the peers. They reported that the student with visual disabilities himself knows his own needs and the adaptation required consequently it places him at the heart of the interactional process.

Osiceanu, M., & Popa, I. (2015) highlighted the importance of access technologies, for studying the ICT for students with visual impairments. The research has shown that students with visual impairments are selected and preferred new technologies and even though at first they have not proven confidence in the benefits of studying this subject. However towards the end of the school year the situation changed and most students were delighted to study this subject and also in the benefits that their acquisitions have upon their personal and interpersonal development. Yurtay, N., Yurtay, Y., & Adak, M. F. (2015) developed a distance education portal for his study and used database in MySQL and PHP. They used JAWS as the screen reading software and the HTML pages are coded using CSS3 and HTML5 technologies and are designed to be compatible with JAWS. They obtained successful results with the help of JAWS screen reading software and suggest that it can provide the visually impaired with many dynamic and interactive educational opportunities. They concluded that for any type of special or vocational education, it is reasonable to use this technology.

5. CONCLUSION

Students with visual impairments need an educational system which meets the individual needs of these type of students and it can be measured by the success of each individual. It is observed that the visually impaired students are most likely to succeed in educational systems where appropriate instruction and services provided. However these unique educational needs of visually impaired students cannot be met in a single environment. The ICTs offer a great potential for the teaching and learning processes and also to support lifelong learning. Also the application of ICTs must enhance integration, independence and equal opportunities to the visually impaired students and should facilitate their inclusion in society as valued and contributing members. However there are few problems while using ICT tools, which are lack of basic ICT skills, lack of training etc. It is crucial to develop ICT skills of visually impaired students to provide a chance to improve their professional qualifications, to provide equal opportunities and to integrate with the society. Finally visually impaired students educational problems cannot be solved without the help of governments and industry support.

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