
e-Learning: The Vision in the Dark

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Abstract

The paper attempts to provide a descriptive framework of e-learning in specific context of visually challenged. The paper reviews contemporary trends and scenario of visually challenged people. As an integral component of the framework for visually challenged people, legal provisions have been recognized as significant component. The paper also reviews legal environment for visually challenged people in the context of The Person with Disabilities (Equal Opportunity Protection of Rights & full Participation) Act, 1995. The paper attempts to identify the barriers to normal functionality for visually challenged people. The paper argues that e-Learning has a significant role to play in overcoming the problems of visually challenged people. It identifies preconditions in enabling e-Learning as well as problems in e-Learning for these people. At the end, the paper attempts to provide strategies for optimizing for effective e-Learning for the visually challenged people. The paper reviews contemporary emerging dimensions of e-Learning for visually challenged. The paper assumes that e-learning is inevitable for maximising the effectiveness of all strategies of e-Learning for the visually challenged people.

1. Meaning of E-Learning

The delivery of formal and informal learning and training activities, processes, communities and events via the use of all electronic media like Internet, Intranet, Extranet, CD-ROM, Video tape, DVD, TV, cell phones, personal organizer etcetera.

2. Definition

2.1 Disability

Persons with disability are person who: have a significant and persistent mobility, sensory, learning or other physical or mental health impairment which may be permanent or temporary in nature;

experience functional restrictions or limitations of their ability to perform the range of life's activities; and may experience attitudinal and/or environmental barriers which hamper their full and self directed participation.

2.2 Blind

According to NAB (National Association for Blind), India Legal blindness is defined as visual acuity of not greater than 20/200 in the better eye with best correction or a visual field of less than 20 degrees. Legal blindness can mean tunnel vision, no central vision, cloudy or extremely blurred vision, seeing just shadows, or no vision at all. What does 20/200 means?

A person with normal visual acuity can see an object clearly, at 200 feet; a legally blind person must be 20 feet or closer to see the same object.

3. Facts and Figures

There are 13 million blind people in India, two million of who are children only 5% children get education. In fact, one out of every three blind people in the world lives in India.

Table 1 Blind in India

Area	Male	Female	Out of 1,00,000 population
Rural	22	28	
Urban	15	25	

According to Census of India 2001 total disabled population in Gujarat was 10,45,465 which is about 2.06% of total population of Gujarat

In the year 2003, approximate total population of Bhavnagar district (Gujarat) was 7,94,000 out of which 492 were visually impaired.

4. Disabilities Act 1995

The person with Disabilities (Equal Opportunity Protection of Rights & full Participation) Act, 1995 is a significant step in the direction of ensuring equal opportunities for people with disabilities and their full participation in the nation building.

Some of the provision related to education and employment of disability act 1995 are as follows

4.1 Right to free Education

Every child with disability shall have the rights to free education till the age of 18 years in integrated schools or special schools.

Appropriate transportation, removal of architectural barriers and restructuring of curriculum and modifications in the examination system shall be ensured for the benefit of children with disabilities.

Children with disabilities shall have the right to free books, scholarships, uniforms and other learning aids such as for visually disabled children-Braille books, talking books, mathematics kits, science kits, sensory training kits, text-to speech software and computer hardware having Braille key Board etc.

Special School for children with disabilities shall be equipped with vocational training facilities.

Non-formal education shall be promoted for children with disabilities.

Teacher's Training Institutions shall be established to develop requisite manpower.

Parents may move to appropriate fora for the redressal of grievances regarding the placement of their children with disabilities.

4.2. Employment

3% of vacancies in government employment shall be reserved for people with disabilities, 1% each for persons suffering from Blindness or Low vision, Hearing Impairment Disability & Cerebral Palsy.

Suitable schemes shall be formulated for the training and welfare of persons with disabilities, the relaxation of upper age limit, Regulating the employment, Health and safety measures and creation of a non-handicapping environment in places where persons with disabilities are employed.

Government Educational Institutes and other Educational Institutes receiving grant from Government shall reserve at least 3% seats for people with disabilities.

All poverty alleviation schemes shall reserve at least 3% for the benefit of people with disabilities.

No employee can be sacked or demoted if they become disabled during service, although they can be moved to another post with the same pay and condition. No promotion can be denied because of impairment

5. Barriers to normal functionality for visually challenged

The blind person cannot learn in way the normal person can learn.

Blind persons may not convenient with software and hardware use for normal person.

Blind persons may have difficulty in receiving and interpreting output from the computer; giving commands or entering data into the computer; and comprehending the information as presented to write and read Braille textbook is time consuming.

6. Role of e-Learning for blind

It opens the door of further education and higher education for visually challenged.

They can keep in touch with institution, libraries etc working on-line for visually challenged.

E-learning provides good exposure to carrier of blind person.

It enables an institution, working for blind, to provide education to more number of students.

E-learning provide more convenient way of learning for visually challenged as compare to Class based training.

E-learning make it possible that visually challenged can do part time jobs with further

and higher learning as the law has provision for free education till age of 18 to disabled.

E-learning plays an important role in encouraging learning of disabled.

7. Preconditions for e-Learning for visually challenged

They should have computer knowledge, computer with assistive technology and Internet connection.

All the content should be provide in language/format which they can access easily. Screen reading software should be available in the mother tongue.

For Further learning and Higher learning, existence of e-University or institutions which provide online or distance learning to disabled is required.

Need to have specialized training center. The resource must be developed in web-formats which are accessible to students who use adaptive technology.

8. Problems in e-Learning with visually challenged

When we are thinking to implement e-Learning, access to the information is major concern area. But for visually impaired it is not accessible as accessible to sighted person.

Visually challenged in remote area are still not computer literate.

Graphics are not accessible from the site. ADOB PDF and MS Power Point format are not easily accessible for visually challenged. Difficulty in reading table and charts.

Screen reading softwares in mother-tongue are not available. Most of the computer centers for the visually impaired uses the JAWS. Graphic and charts are not accessible to the visually impaired in JAWS. As JAWS does not work in Indian Languages.

Web-sites are not easily accessible by visually challenged person. As the screen

reading software follows the pattern of reading from left to right. Use of frames, complicated tables and graphics will pose difficulties to screen reading.

9. Strategies for effective e-Learning for visually challenged

Creation of accessible end user product
Development of computer training center, cyber cafe for visually challenged.

To create accessible web pages, development of the accessibility standard and guidelines with respect to Indian environment. To create friendly web page W3C guideline should also be followed. Some of the W3C guidelines are as follows:

- Provide equivalent alternatives to auditory and visual content.
- Don't rely on colour alone.
- Use markup and style sheets and do so properly.
- Clarify natural language usage .
- Create tables that transform gracefully .
- Ensure that pages featuring new technologies transform gracefully.
- Ensure user control of time-sensitive content changes.
- Ensure direct accessibility of embedded user interfaces.
- Design for device-independence. Use interim solutions
- Use W3C technologies and guidelines.
- Provide context and orientation information.
- Provide clear navigation mechanisms.
- Ensure that documents are clear and simple.

Options to be incorporated while preparing CD-Rom for the person having partial sight loss user may change text size. Audio volume may be adjusted. Keyboard equivalents provided for all the mouse action. Contrast between background and text should be at least 80%. And for the person of complete sight loss all elements are narrated .keyboard equivalent should be provided for mouse actions. Volume setting may be adjusted by the visually challenged.

Creation of VLE for further and higher education so that one tutor can train more number of students.

Development of e-libraries and online courses for visually challenged student of India.

Development of technology is not the only solution, to raise awareness of the issue of access for people with visually challenged to learning opportunities and e-learning in particular.

SWOT analysis to know feasibility for implementing e-learning in Shri Krushnakumarsinhji School for blind of Bhavnagar, Gujarat. This school for blind admits around 100 students every year. It has computer training centre. It has 10 seats out of which 5 seats for visually impaired and 5 for the disabled other than visually impaired.

9.1 Strength

In Existing Infrastructure school for the blind has computer centre equipped with 5 systems JAWS 4.5 and Duxbury 7.0 software are installed in all the system. Braille press has also one computer and Braille embosser. All this existing facility may be use to provide online learning to the student.

As the normal students obtain computer literacy from primary this school for the blind may also utilize this computer centre to provide computer knowledge from primary. They are also going to launch EDUSAT programme with the help of ISSRO and BPA – Ahmedabad. EDUSAT is the satellite which is exclusively used for the purpose of education. As per the scheme there will be 20 receiving centers and four uplink centre. The educational programs will be broadcast from any of the uplink centres and will be attended by all students at the receiving ends. The students will be able to ask questions through telephone there and then. Bhavnagar will be one of the uplink centers. This might be their first step towards e-Learning.

Another important matter for development of any new project is availability of funds. They might get fund from donors, NGOs and other

institution etc. Law has the provision that amount donated to the institution is 50% tax free under 80G and 100% tax free under section 35 A.C.

Government provides free education to visually impaired till the age of 18. Also provides the aid and appliances free of charge.

This School for the blind provides education from standard 1st to 10th. So to train the student for further education through e-learning is possible. School may also provide education through this new technologies starting from primary school. This will surely raise the interest of the student for learning.

Development of indigenous technology in India is rapidly growing. The numbers of institutions are growing which work for development of assistive technology in India. Thus technology which developed in India can be prepared with reasonable cost. As for example Blind People's Association, Ahmedabad has set up Braille language laboratory in 2002 at the cost of only 1.5 lakhs. If it is imported it would cost up to 15 lakhs.

9.2 Weakness

Very few visually challenged get computer knowledge in Bhavnagar district. Total 492 visually impaired are in Bhavnagar district; around 100 students are admitted to the school every year. Out of approximately 10 students get computer knowledge.

Low bandwidth is the major problem in this region.

The School under utilizes its existing resources. Approximately 10 students get computer knowledge every year. If it planned properly then school might provide computer knowledge to more number of students.

Skilled professional do not take much interest in training of disabled. Disabled Students and teachers are not aware of e-Learning and e-Learning technologies.

Teachers are satisfied of what they taught. Teachers of this region, except few, do not take much interest to raise awareness about higher education or developing new methods of teaching to disabled.

9.3 Opportunity

Foreign aid may be utilized for the implementation of new learning methodology. This type of institution might get assistance from foreign donors and institutions. Sister concern of this blind school runs technology Park for the disabled have recently established an outsourcing centre with help of foreign aid. This centre teaches computer courses and prepares the student so that they can get jobs. Thus, if school tries to launch some new project like cyber café for the blind, school might get foreign aid.

With establishment of cyber café or providing internet access in the school the students may have advantage of visit e-libraries. Visually challenged students may go for online further and higher education.

Through e-Learning, learning process can be extended to the remote area.

9.4 Threats

Re-designing of courses of blind suitable to new technology is difficult.

Enhance the attitude of the student towards learning.

Challenges like collection of funds, training of the student and teacher might be faced.

Thus, EDUSAT is one of the best efforts of the school towards e-Learning still school may try to provide computer education to more number of students. And the school has to take steps to enhance awareness towards learning and e-Learning.

10. Emerging dimensions of e-learning for visually challenged

10.1 Notetakers and Writers

Notetakers and Writers are used to review the document. They support synthesizer. Specialist electronic note-takers support for Braille or QWERTY keyboard input, and speech and/or Braille output

10.2 Braille Translation Software

It converts the standard ASCII into Grade 2 Braille and also translate printed document in Braille.

10.3 Text enlargement Software

It enlarges text and image on screen. It allows varying magnification. Some examples are ZTWin TM, Zoomtext TM for windows, INLarge TM, Close View TM for Machintosh.

10.4 Optical Character Reader

It converts printed text on book, magazine and news paper into speech or digitized format. Used to get virtual access of printed material.

10.5 CCTV

It enlarges text information of document and Book onto a computer or TV Screen.

10.6 Voice Recognition Software

It enables the learner to speak to a computer and have words appear on screen. Interpret words spoken at normal pace. For e.g. DragonNaturallySpeaking TM.

10.7 Membrane keyboard

Larger typeface keys are available on such keyboard. Vision impaired person can use it.

10.8 Teletypewriter

Facilitate communication to the persons who are both deaf and blind.

10.9 Screen reader

Reads text on screen and identify graphic. A person can hear from a speech synthesizer of the computer's sound card. It allows controlling the computer using the keyboard rather than the mouse.

JAWS (Job Access with Speech for Window) is screen reading software being marketed in India by Krishama Enterprises.

10.10 Electronic, Refreshable Braille display

It is not like a computer screen, it places near or under keyboard and screen reader sends information on screen to Braille display. A person who is both blind and deaf can use it.

10.11 Electronic reading aid

Scan and translate printed text into a computer readable file. Integrated unit with OCR and speech software.

10.12 Screen Magnification software

This software works by increasing the size of the image displayed on the screen. It is useful for visual impaired people.

10.13 List of some software

ZoomText 8.0 an screen enlarging software, Kurzweil 3000 7.0 , Kurzweil 3000 version 9 reads the web, read the text within the frames and new window, supports the Firefox Browser. Two Voice Texts – one male and one female – offers natural sounding voices. Kurzweil 3000 scan/read system is a reading tool provides auditory and visual presentation and helps those who learn English as a second language.

Rapid Caption for Windows 1.5, Duxbury Braille Translator 10.4, Scientific Notebook., Digital Video Creator, InFocus 4.1.2, A-Prompt 1.0.5, Bobby 3.2, a web-based service that scans any HTML document and produces a report outlining its access problems, Omni Page Pro 12, textHELP TM, WYNN TM, Co Write TM TTS, Text-only, Voice-enabled browsers etc are some software useful for visually challenged.

Other alternate medium are like e-text, Large Print, Braille, Close captioning, tactile graphics and Audio reader are also available.

Although India has not developed e-Classrooms or e-Library as compared to foreign countries but its efforts towards e-

Learning are growing. As some institutions, Government bodies etcetera have taken steps towards imparting computer knowledge to visually challenge and development of indigenous assistive technologies.

As a cyber cafe for visually impaired in Mumbai is setup by **NAB** (National Association for Blind). NAB participated in project with **BARC** (Bhabha Atomic Research Centre) Speech system. This allowed inputs into a computer using a special six-key keyboard which enable blind persons to type Braille codes. It has speech output with word processing a part of this package. **I.I.Sc** (Indian Institute of Science) - Bangalore, has developed system uses external speech synthesizer and screen reading software. This system provides speech output to general purpose application program.

A computerized Braille transcription and embossing system has been developed under **Jai Vigyan National S&T Mission** which can operate in English and all major Indian languages. The equipment enables a school for blind children to easily generate reading material, class notes, questions papers, training material, etc., for the blind students. The software and hardware have been developed for transcription of text to Braille and printing of Braille material on the indigenously developed Braille embosser. The equipment also enables the blind to communicate with the sighted using a specially developed Braille Key Board and the Braille to text software. The systems have already been installed and commissioned in 30 blind schools in different parts of the country.

Ahmedabad has set up country's first Braille Laboratory by **BPA (Blind Peoples' Association)** in 2002. In this Braille language laboratory teacher spells out a word or letter through computerized master panel, electronically via voice message. The letters are simultaneously received by 10-15 students through sensing pads. This system of Braille can be used to teach students right from KG level to graduate level. This system is also installed in blind school of Surat, Gujarat. It becomes easy to train teachers of

Visual Impaired as well as to Visual impaired students using this system.

BPA and ISSRO have jointly launched **EDUSAT** a satellite providing online education to 20 receiving centre simultaneously. Initially they will be able to broadcast only audio material gradually they telecast audio - visual material. Next phase

may be to increase 50-60 receiving centers and to hold teleconferencing through EDUSAT in near future.

C-DAC and Webel Mediatronics have developed a computerized Braille Transcription System. It has developed Braille to Text and Text to Braille software in 13 Indian Languages.

IIT Madras has been involved with a project on Multilingual Computing for the underprivileged and the disabled in India. The Software developed has gained wide acceptance in the country on account of its unique features as well as its flexibility to work with all Indian languages in a transparent manner. Software effectively produces text books in Braille.

Computer Vision and Pattern Recognition (**CVPR**) unit of the **Indian Statistical Institute (ISI)** in Kolkata has developed software that enable the blind to access computer technology that helps in writing and reading independent without human assistance.

The Media Lab Asia, a joint collaboration between the Department of Information Technology and the Massachusetts Institute of Technology, USA, has been an important initiative to address the challenge of Digital Divide in India and other developing countries. It would pursue high-end research in four areas germane to the needs of rural India: 'World Computer' (low-cost computing devices); 'Bits for All' (bringing low-cost connectivity to the doorstep of rural masses; 'Tools for Tomorrow' (creation of low-cost learning tools to bring out the spirit of innovation among the rural youth); and 'Digital Village' (where the above three research programmes would be demonstrated for palpable impact).

Department of Information Technology has taken the initiative of promoting e-Learning as a potential methodology, to compliment the Government efforts to generate high quality, high-end manpower in the area of Information Technology. The software Virtual Vision developed in the office of **Mr. A. P .J. Abdul Kalam** which

provides a speech interface for visually challenged persons.

11. Conclusion

All these technologies have enhanced the scope of learning and create new job opportunities for visually challenged.

e-learning will meet the need of learners with disability and likely to benefit all learners. And we believe e-learning will continue to expand its market-share and higher education. We think it opens the new way and vision till the horizon because in this techno age there is a slim line between magic and reality, magic - but strictly in technological sense.

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