

USAGE OF COMPUTERS AND INTERNET BY THE VISUALLY CHALLENGED

ISSUES AND CHALLENGES IN THE INDIAN CONTEXT

Findings of a study conducted by Enabling Dimensions
January 2002, New Delhi



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Summary of Findings

The impact of computers and Internet on the lives of the disabled in general, and the visually-challenged in specific, has not received the attention of the mainstream society and its media. The premise that these modern tools of work lend themselves favorably to the disabled audience hasn't been tested especially in the Indian context.

Research conducted by Enabling Dimensions, in early 2002, reveals the motivations of this audience in using computers and Internet; the impediments they have to face, the show-stoppers, and their latent needs. Here are some of the significant findings from our study:

- ❖ Most visually challenged use JAWS screen reading software to access electronic text and Kurzweil scanning (OCR) software to access printed text.
- ❖ Foreign accent of speech - American or British – were the main problem with using JAWS. Only 3 out of 10 visually challenged users are able to overcome the difficulty of accent.
- ❖ Awareness of accessible web content and related issues was low amongst the respondents.
- ❖ Respondents reported accessing web content “frustratingly difficult”, implying the need for availability of more accessible and usable web content with alternate text equivalent for the visual elements, which the screen readers can read.
- ❖ Internet is used most often for sending emails, followed by looking for specific information like information for doing research assignments in college or about new features of a software, and some used it for accessing news sites.
- ❖ Internet is seldom used for general browsing or for entertainment purpose, even though there is latent demand for accessible online games, quizzes etc.
- ❖ e-Learning as a complementary or supplementary mode of education was identified as an unexploited latent need.
- ❖ Audio-Only e-learning holds great promise. However, major challenge is in describing visual elements like photographs, graphics and especially diagrams and charts. Audio books provided on cassettes by RFBD (Recording for the Blind and Dyslexic, New Jersey, USA), could serve as benchmarks.
- ❖ Haptic technology (‘forced-feedback’ mouse) was well-received by the more experienced blind users of the Internet. The relatively new users were not used to a mouse at all and were not able to use the haptic mouse effectively.
- ❖ Resignation to fate, rather than volition, is the chief factor in major decisions of life such as education and jobs. More often than not, the choices are humanities and teaching. There is a need to change mindset at the policy making level to establish that visually challenged can pursue streams other than social sciences.
- ❖ We identified a strong felt-need for community interaction. Learning from others, problem solving, information exchange were the main drivers for such a demand.

1. Background

The implications of the increasing usage of computers and Internet in the modern world are manifold. These are still early days to study and fully comprehend the impact of this revolution on our lives. However, we have witnessed a raging debate on the issue of digital divide. At this juncture, the attention of this debate is primarily focused on the under-privileged. Unfortunately, even now, the term 'under-privileged' is narrowly defined as the poor and destitute sections of the society. At Enabling Dimensions, we believe that this definition should be broadened to include the disabled and even the elderly, thereby viewing it in terms of available options rather than available resources (the latter being a function of the options available to an individual).

There are two sides to this situation – capability and availability. Capability being controlled by factors such as education and monetary resources, while availability being controlled by factors such as reach, reliability, ease of use. The latter being the focus of Enabling Dimensions, we wanted to learn the steps that needed to be taken to facilitate this portion of the equation. Our premise is the same as that of any technology product. The early adopters of new technology are always more adventurous, more affluent members of the target audience. However, it gains wider acceptance only if it is reliable, easily available, solves a real problem and of course is affordable. We wanted to study, not only, *how* technology (specifically web technology) can make a positive difference in the lives of the disabled, but what *more* can be done to help our target audience.

2. Objectives of the study

The research study was conducted to validate the following assumptions, from a macro perspective:

1. Ability to Choose Quality of Life

An e-inclusive society implies easy access to information and knowledge to the disabled. Such information and knowledge creates awareness about choices available to the disabled as regards employment, independent living etc. This ability to discriminate between choices makes the disabled capable of choosing quality of life for self.

Whether a person has the actual capability to achieve is influenced among other things by economic opportunities, social facilities and the encouragement and cultivation of initiative.

"Most of our policies for the Internet age are encouraging a situation in which only a small minority of people have, or are able to acquire, the ability to use the new media in ways that strengthen their chances of making choices about how to live their lives. E.g. choices about treatments for illness, about explorations of new skills and jobs, or about their searches for like-minded people. In the case of those (like the disabled) who are unable to use the new media networks in this way, much human potential is being lost. Thus, new media should provide electronic spaces where people can acquire new abilities that can assist them in managing their daily lives.

These abilities are not simply acquiring skills to get on the net, or use the email or discussion list nor is it e-government or e-commerce or e-everything else. These abilities are more profound. As Professor Amartya Sen, the Nobel laureate calls them "capabilities" – i.e. acquired cognitive capacities and the ability to discriminate between alternate choices. New media spaces should be developed in ways that augment people's capabilities in this sense.

Public investment is required in creating information intermediaries that develop and make available the toolkits and other resources that enable citizens themselves to acquire capabilities to become critical, informed participants in democratic processes. This is essential so that people can create a society in the manner that they choose".

- From "New Media and Power of Networks" – Lecture by Prof Robin Mansell, LSE: Role of New Media in Society - 'Capability Approach'

2. Ability to Participate Effectively in Democratic Processes

In an e-inclusive society, where the disabled have easy access to vast information and knowledge, Internet can play a very effective role in promoting/preserving democracy. Today's democracy is not a Direct Democracy (where the individual elects his or her leader) but a Representative Democracy. Hence, pressure groups and lobbies play a very important part in projecting self-interests of various groups in a society to their representatives. From this perspective, Internet as a "Means of Expression" can prove to be a very effective tool. E.g. email (viral email) or a web page or a web community (of people with similar interests or concerns) are much easier to create to voice an expression than say getting mind-share (time or space) on radio/television/print medium.

3. Internet as a Vehicle of Social Change

Media of mass communication play a very important role in bringing about social change. Awareness leads to sensitization, which in turn leads to change in mindsets. Through creation of online communities, which are easy and cost-effective to create, Internet becomes a very good vehicle to bring about social change.

4. Increased Productivity

Improved accessibility directly leads to decline in the time spent in obtaining information. With an increase in web-based opportunities, employment among the disabled would rise. This will lead to increase in human capital by creation of agents who can become more productive through acquisition of knowledge and increased skills. Knowledge will become a source of increasing returns.

5. Discovering more Stephen Hawkings

Technology helps harness the intelligence of Stephen Hawking. If it were not for technology the value of Stephen Hawking to the civilization would perhaps have been zero. Likewise the probability is high that there is more such latent intelligence waiting to be discovered. An online community is an effective platform for discovering and empowering the latent intelligence of the disabled.

The validation of these macro-economic aspects requires studies with large research samples. Working within the limitations of available resources, our purpose was to arrive at early indicators from our small sample that disprove or approve these assumptions. A more detailed study should be followed to arrive at more reliable results. The above-mentioned assumptions were crystallized into some specific objectives for the purposes of this research. The specific objectives for this research were:

1. To reach a deeper understanding of the target audience, and thence, to assess where and how the web can make a difference to them
2. To gauge the general awareness in India about the issue of web accessibility - in the elderly and disabled community
3. To assess Usability and Accessibility of web content – from both availability and limitations of assistive technology and design/content perspective
4. To assess the information sharing needs of the target audience
5. To assess e-Learning related needs of the target audience
6. To assess Local Issues – problems and needs of the elderly and disabled, particular to Indian context

These objectives are not listed in any order of importance. The weightage assigned to an objective determined the number of questions to be asked or if the initial focus group discussions were enough or whether the objective were to be analyzed at the one-on-one in-depth questioning stage.

3. Methodology

The research was designed to be a qualitative study, to be conducted in following phases:

STEP 1: Objectives and Discussion Guide

Freeze the Objectives, the specific areas of information that need to be tested and prepare a draft 'Discussion Guide' (DG - is the flow of questions). The first draft of

the DG was made, taking into account our current best knowledge of the target audience.

STEP 2: Validating the objectives

Meet with the experts (teachers, instructors etc, who are working with the disabled and the elderly) and members of the target audience in a small group of five respondents, to validate the objectives as well as the Discussion Guide.

STEP 3: Freeze the DG

Please see the annexure for the detailed Discussion Guide used for the interviews.

STEP 4: One-on-one Depth Interviews

In-Depth Interviews were imperative to get detailed responses in order to offset the lack of quality information available in this area. These interviews were conducted in the place of residence of the respondents. Further, the interviews included heavy elements of relevant parts of the personal lives of the interviewees to gain a deeper insight into their responses. Given the nature of the users we were looking at the kind of information we were seeking from them, it was critical that we only spoke to one individual at a time.

The 90 to 120 minute interview consisted of 2 broad sections:

- The basic interview
- Observation and Interviewing of those visually impaired that used the Internet, while they surfed.

The in-depth interviews were conducted in the city of Delhi, in India, with 12 visually challenged individuals.

STEP 5: Preparation of Reports

Listen to all tapes, understand, analyze and make a report.

4. Main Findings of the Research

1. Need for Change in Mindset

In India, most visually-challenged pursue humanities because the blind schools do not teach math after primary level and hence they have no choice but to pursue social sciences. However, some visually-impaired students took extra pains to learn mathematics on their own and have trained to become computer programmers, thus opening up new employment avenues. There is a need to change mindset at the policy making level to establish that the visually-challenged can pursue streams other than social sciences. This can be done most effectively by highlighting case studies of blind students who have challenged conventional wisdom and have done well in areas like computer science.

2. Low Awareness about Accessibility

Most of the respondents were unaware of accessible web content and related issues, such as - international web accessibility standards, Section 508 in US etc. However, when we shared this information with them, all respondents felt that there is a great need to disseminate such information and sensitize the policy makers and web developers on this issue.

3. Need for more Accessible and Usable Web Content

As multimedia increasingly becomes the preferred mode of presenting content on the web, users with screen readers find it progressively difficult to access such content. Screen readers cannot comprehend the visual elements like pictures, images and graphics. There is thus a need for providing alternate text equivalent for the visual elements, which the screen readers can read. However, there is need to not only make the web content accessible but also usable.

4. Usage Pattern

The visually-challenged use the internet most often for sending emails, followed by looking for specific information like research assignments in college or new features of a software. Some use it for accessing news sites. Some respondents are keen to use chat engines but cannot do so, since chat engines are not compatible with screen readers. We did not come across any respondent who used Internet for e-commerce. The main reason was because no respondent had a credit card. Issuance of credit cards in India requires a physical signature and since most visually-challenged can't sign, they don't have credit cards.

5. Problems with Screen Reader and Scanning Software

Most respondents used JAWS screen reading software and Kurzweil scanning (OCR) software. However, the main problem with these software is that they speak out in an American or British accent which is very difficult to follow for Indians. A respondent, who is a computer science teacher in a blind school, told us that only 3 out of 10 students are able to overcome the difficulty of accent and continue to pursue learning computers. However, some respondents were so adept with JAWS that they had increased the speech rate because they found the default setting too slow.

The problem with scanning software is that while scanning books that have manually entered underlines or notes (as in the case of used books), the software scans and reads the hand-written notes as gibberish thus making the reading incomprehensible for the visually-impaired students. Respondents suggested that the scanning software should have some option to scan only printed material and ignore any other hand written marks in pencil or pen.

6. Need for e-Learning for the Disabled

The concept of e-Learning was received with great enthusiasm. The reasons provided to us included - it helps in overcoming the basic problems of commuting by bringing the classroom to their home; and that it circumvents any bias that a human instructor or fellow student might have, as in a virtual classroom it is the prerogative of the student to reveal or not reveal his or her handicap.

7. Specialized Audio-only eLearning

Audio-only e-Learning was also well-received. However, there is a major challenge when it comes to describing visual elements like photographs, graphics and especially diagrams and charts. There is thus a need to develop standards so that such visual elements can be described in a manner that they are easily understood by the visually challenged. Respondents suggested that audio books provided on cassettes by RFBD (Recording for the Blind and Dyslexic), New Jersey, USA, have a very good description of video elements. Perhaps RFBD cassettes could serve as benchmarks for audio-only e-learning courses. In this case, it will be worthwhile to incorporate similar guidelines as RFBD to describe visual elements on websites through Alt-Text tags or LongDesc tags.

In this context there is also a need to develop standards such that audio-only e-learning content is not only accessible but also inter-operable. Respondents informed us that DAISY as a standard for Digital Talking Books is gaining popularity (www.daisy.org).

Audio only e-Learning curriculum to teach basics of computers, Internet surfing or web designing would be very popular. Such content will need to be delivered not only on the web but also in the form of CD-ROMs and cassettes.

8. Online Accessible Entertainment

Visually challenged users access the Internet for a specific purpose – say email, or research for an assignment or downloading software – but they seldom use it for general browsing or for entertainment purpose. This was because of two reasons – one, Internet connectivity is difficult and costly; and two, accessibility of information on the web is a challenge that the users preferred to limit accessing the web for solving significant problems. There is thus a need for developing online games, quizzes etc that are accessible and fast to download to make the web a fun place for the visually challenged.

9. Accessible Edutainment Web Content

Even in the context of e-Learning, there is a need for developing “edutainment” web content, that delivers education as entertainment and promotes “learning by doing”, one of the most effective ways of learning.

10. Multi-sensory Internet Interface

From a visual-only interface, the Internet is moving towards a more multi-sensory interface. Auditory interfaces and touch-based interfaces (called Haptic Technology) may be of great advantage to the visually challenged in using the Internet. During our study, we exposed the respondents to the haptic technology mouse (also called a ‘forced-feedback’ mouse). This was received with great interest by the more experienced visually-impaired internet users. The relatively new users were not used to a mouse at all and were not able to use the haptic mouse effectively. However, in-depth R&D into touch-based user-interfaces should be explored as a way to make the web simpler to use for the visually challenged.

However, it must be noted that auditory interfaces, which can take speech input, while very effective for the blind, will pose major problems for the speech impaired. Thus, a more holistic approach needs to be taken and the driving spirit should be "Universal Web Access" as against accessibility for a particular set of disability.

11. Online Community for the Visually Challenged

A strong felt-need for community interaction was identified. A community that targets the disabled in various age groups (students, employed...), parents of the disabled and others associated with disabilities (teachers, NGO workers...). The basic objective of such a portal would be to create a self-help community for the disabled, that helps in problem solving, information exchange, highlighting success stories that inspire and motivate, and help in networking between disabled in India and with other similar communities abroad. Some of the features of the online community that were inferred from the responses are:

- ❖ There is no comprehensive resource directory, which lists specialized health care service providers, special educational institutes etc, easily available in India. Such an online resource directory would be of great help for the visually challenged, their parents and caregivers. Such a directory will also be very useful across other disabilities.
- ❖ Success stories of disabled who challenged conventional thinking and have done well in life should be highlighted. This would serve as good motivational and inspirational material for other disabled and also show them that there are alternatives available to them.
- ❖ Also, we found that while learning computer applications, on many occasions, the respondents could not proceed (error messages given by the computer could not be understood). In such scenarios, they seek help by calling up another visually impaired friend who is a more advanced user (a *guru*). Thus, a section that lists out common problems faced by the visually challenged and their solutions would be of immense value. Even a discussion group or web chat would help not only in problem solving but also in having a more meaningful engagement with the community.

ANNEXURE

Discussion Guide

1. Awareness Related Needs

- Do respondent's feel that Internet has made a significant difference to their lives or has there been no change post Internet.
- If there has been some difference in the life of respondents because of internet, where has the impact been felt most
 - o Students: does internet help in Studies or in developing skills and capabilities
 - o Employed: does Internet help in furthering their career objectives. E.g. training or telecommuting
 - o At Home: More independence – e.g. read the newspaper without help, as a hobby, as an online community member
- Gauge the awareness level on 'web accessibility' as an issue. How aware is the target audience on what is happening globally on this issue.
 - o Are respondents aware of the concept of accessible web content – that there are standards to develop web content in a manner that makes it easily accessible
 - o Are respondents aware that developed countries are passing legislation that makes accessible web content mandatory, at least for the government agencies.
- Are respondents familiar with existing assistive technologies like Microsoft's screen magnifier, screen reader, which come bundled with the Windows OS

2. Accessibility and Usability Related Needs

- Analysis of assistive technologies used
 - o Which ones are most popular and why
 - Across Disabilities – Visually Challenged: Screen Magnifiers, Screen Readers, Equipment used by physically challenged
 - o Which ones are not used and why
 - o What is the usage experience
 - Are the assistive technologies easy to use or is more help required in getting familiar with these assistive technologies
 - o Analysis of the shortcomings – e.g. screen readers in American accent
- Experiment on new technology aids e.g. Logitech's forced feedback mouse
 - o Which features are good
 - o What more is required
- Analysis of Usage Pattern of elderly and disabled on internet
 - o Which functions of the web are used most frequently – email, info, chat, Elderly: e-commerce, e-governance
 - o Which websites are used most and why (what basic need is fulfilled)
 - o Which search engines are most frequently used
 - o Is any particular feature of the browser used very frequently
 - o How much time do respondent spent on the web per week

- Agencies with which the respondent's engage most – do they have websites, if so are they visited frequently, what problems faced (e.g. are the websites updated regularly, are they user-friendly)
- Agencies of which respondents would like a website – govt, ngo, corporate
- Do accessible features really add convenience or is there still scope for improvement (i.e. alt-text, tables...)

The interviewer will have to do in-depth questioning to find out the overall 'experience' of respondents in using the Internet.

- What kind of sites are easiest to use
 - Little text or text heavy sites
 - What kind of navigation – text buttons, animated buttons, mouse-overs...
 - What kind of color schemes and page layouts
 - What kind of fonts are preferred
- Problems faced in using multimedia web content – e.g. audio for hearing impaired

3. Online Community Related Needs

- Is there a felt need to form an online community – both local and international
 - If so, what information/content is required
 - What linkages would be meaningful – govt, ngos, internet experts, international links
 - What features would be useful – chat, bulletin board
 - How should the community be structured – based on interests or needs sought to be fulfilled
 - Is it based on disabilities or is it based on age-groups or both (i.e. blind and deaf or 13-19 years or blind and 13-19)

4. e-Learning Related Needs

- Gauge awareness about e-Learning – do respondents feel that such a trend is catching-on and is it useful for the disabled
- Is the web used for learning and training by the respondents
- If so, which online courses/sites are most used, what problems are faced
- If not, would respondents like to see e-learning sites – what would they consider the most useful online courses, including hobby related courses for elderly
- Are there any locally specific e-Learning needs e.g. based on Indian curriculum
- Is there a need for any technical language access e.g. MathML

5. Localised Needs in India

- Local issues to be identified and explored
 - Design, Content, Aids (e.g. JAWS accent), Lack of Content in local language
 - Availability of Assistive Technologies
 - Which ones have the respondent's heard of
 - Are they available readily
 - For special features would they be willing to pay – how much