Assistive Technology and Employability of the Disabled Persons: A Study with Special reference to India

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Abstract: An attempt has been made through this paper to explain the current situation in respect to the employability of the disabled persons in India and the various measures that can be taken to upgrade the disabled employees and ensure a more meaningful job environment in the current job market.

This paper sheds light on the reason for low employability of the disabled persons and how assistive technology can change the same making the disabled on par with the able bodied and enable them to work on a level playing field in any profession

Key Words: Disabled, Visually Impaired, Employment and Assistive Technology.

1. INTRODUCTION:

The society has to create equal opportunities for the disabled persons in the areas viz: education, training, work, entrepreneurship, participation in cultural and political life. Even though the government of India is endeavouring to mainstream these marginalized persons, there is still more scope for amelioration in terms of access of technology for these marginalized persons. Only technology can level the playing field for these persons and can make them sustain in today's competitive world.

2. EMPLOYMENT SCENARIO:

In India as much as is in many countries, the disabled and visually impaired have to struggle for their employment and only a few have so far managed to succeed and that too due to their inherent leadership qualities and perseverance and educational qualifications as well as the support of assistive technology devices to help in their occupation.

Let us now understand the reasons for Low Employment among the Disabled.

Today, even though we are in the 21st century where information technology has literally revolutionised the job scenario and has created a number of new job placements which were not available earlier; yet the disabled are not given jobs since the people responsible for employing their workforce still have a wrong perception, fear, myth prejudices and notions of the capability of the disabled being able to undertake their responsibilities and perform.

Some of these are enumerated below:

1. That the disabled and visually impaired person would be a drain to their company since they will not be able to perform their tasks and the other employees would have to spend their time to support their responsibilities.
2. They would have to provide additional equipment, which would be expensive to the organisation.
3. That they will be constantly absent due to their inability to commute to the work place.
4. That the disabled cannot understand things and would have to be explained everything and are not capable of making decisions or participating in conversations.
5. That once they employ the disabled they would not be able to dismiss them even if they do not perform their duties.
6. That they will not be able to come to work or be able to live independently specially in jobs away from their homes and family.
7. That they will not be able to operate computers and other devices needed to in the office or work place.

8. That the disabled are incapacitated, stupid, sick and unable to do anything and should be simply made to stay at home.

To dispel these myths, prejudices, fears and wrong perceptions, it is imperative that a regular and constant effort is made to create the awareness among the employers that the disabled are just like any other able bodied employee However, they can perform all the duties of the job profile required by him and all that he needs is the support of some assistive technology to compliment his disability. In fact, it has been proved that the disabled and visually impaired on the contrary perform even better than the sighted in many cases. They are more regular, capable of working for long hours without being distracted as they know that they need to work harder to live up to the expectations of their employers. The introduction of computers, information technology and the internet has paved the way to a super highway opening a whole arena of job opportunities for the disabled and the visually impaired.

In the last decade we have seen the introduction of a series of new adaptive devices and software that empowered the disabled to read and write, operate computers, surf the internet, prepare reports, analyse projects, edit or prepare documents, etc. and one can easily say that the disabled can practically do any job except of course drive a car or fly a plane!

3. What kind of jobs can the disabled do?

This depends on the individual. In general, disabled people can do any kind of work that does not involve piloting a vehicle -- but only if the person has the training, skills, and experience (just like anybody else). That is, a qualified disabled person can do almost anything. There are disabled machinists, disabled writers, disabled software developers, disabled teachers, disabled car mechanics, disabled scientists, disabled executives, disabled nurses, disabled athletes, disabled performing artists, disabled web designers, disabled business owners, disabled secretaries, disabled stockbrokers, disabled journalists, disabled musicians … well, you get the idea.

The only difference between "any other employee" and a disabled person is that the disabled person may need special tools to perform the task, tools that eliminate or lessen the individual's disability and help him to overcome the same to enable him to perform like any other colleague.

Fortunately, thanks to the development of assistive technologies - these are today available.

Question: How do disabled people use computers?

Answer: The use of JAWS Talking software that converts a standard PC into a talking computer thus enabling him/her to independently operate the computer. Instead of using the mouse, the disabled use the keyboard for all functions.

Similarly, persons having low vision can use the computer using the Magic Magnification software that magnifies the entire monitor screen upto 16 times its original size to suit individual comfort levels depending on their level of vision.

Computers have essentially created a level playing field for sighted and disabled people (and people with other physical disabilities) -- where the computer does what it does and people with differing physical abilities just use different tools and various techniques to direct the work.

4. List of computer related jobs that can be done by the visually impaired:

We list some of the job profiles that they can do specially using computers
▪ *Call Centre Operator*
▪ *Phone Banking Assistant*
▪ *Public Relations Officer*
▪ *Telephone Interviewers*
▪ *Telemarketing Executive*
▪ *Help Desk Officer*
▪ *Database Administrator*

- *BPO Executive*
- *Accounts assistant*

We list some of the job profiles that they can do specially using computers

- *Web Master*
- *Bulk Email / Fax / SMS Sender*
- *Secretary/ Receptionist*
- *Computer/ Data Entry Operator*
- *Personnel officer*
- *Telephone operator*
- *Desk Sales Executive*
- *Special answering service provider*

5. Using Assistive Technology to empower Individuals with disabilities at the Work Place:

The following list includes several problematic tasks that persons with vision impairment may experience, and suggestions for assistive technology solutions and ideas to help them.

Task: **Reading Information from Printed Materials**

Solutions:

For those who have Low Vision and benefit from magnification

Use a Hand/Stand magnifier: Hand magnifiers are hand-held devices that can be placed over an object or text to enlarge or magnify what you see. A stand magnifier may sit on a base, on casters or have a clamp with an adjustable or flexible arm. The magnifier can then be placed over the object you want to magnify.

Enlarge Information on Photo Copier

Provide Information in Large Print

The font size should be at least 16 point but preferably 18 point. The font style should be plain like standard Roman or Sans Serif fonts. An example of a plain font is Arial.

Reduce Glare on Printed Materials
To reduce glare, consider closing window disabled, change lighting or consider using non-glaring paper.

Use of colour acetate sheets: Transparent, yellow (or other colour) acetate overlays may be placed over print material to increase colour contrast.
Improved Lighting or Use Task Lighting

Alternative lighting options can be considered if an individual is affected by glare or has sensitivity to light. Eliminating over-head lighting or considering full spectrum lighting may help with glare on paper copy and computer screens. Alternatively, an individual can consider placing a task lamp on the desktop.

Closed circuit television systems like the PRISMA Print Magnifier

The Prisma (sometimes referred to as an electronic video magnifier) uses a video camera to project a magnified image onto a PC monitor or TV screen. It is a lightweight, portable and easy to carry unit. It has many useful features such as:

- Adjustable magnification (upto 53 times the original size)
- Black on White as well as White on Black modes.
- View image in colour or black and white
- Full colour facility to enable the user to magnify photographs, maps, layout plans, diagrams or just about anything in their original colours.

- Very sensitive camera that uses ambient light so there are no disableding reflections. There are discrete assistive lights for low ambient light conditions.

The Prisma CCTV may be an option to consider if a person with a vision impairment benefits from seeing an object magnified but may need something more powerful than a typical hand or stand magnifier. With a CCTV, an individual can view not only printed text but also handwriting, photographs, and even objects, if need be. The Prisma CCTV user is also able to view a form while filling it out or handwriting a memo or cheque.

TVi Print Magnifier: The **TVi** is a hand held magnifier using a small TV camera in the shape of a mouse that is to be attached to any standard television. The mouse has rollers, which facilitate easy scanning of text, and its mobility allows difficult-to-read items such as medicine bottles, cooking instructions, etc., to be magnified easily.

It has 2 models:

1. **TVi Classic** - Black on White mode, White on Black mode with Fixed Magnification of 16x on a 14" screen and 24x on a 21" screen.
2. **TVi Colour** - Full Colour, Black on White, White on Black modes with adjustable magnification of 9x to 18x on a 14" screen and 13x to 26x on a 21" screen 1x to 5x overview mode (depending on distance).

Compact Pocket-Size Video Magnifier: The Compact is a new lightweight pocket-size video magnifier with a 4" (10 cm) high resolution TFT screen (full VGA resolution), battery life of two hours continuous use, 4x or 8x magnification and weighing only 250 grams! It has 5 viewing modes for reading support - colour mode, black/ white, negative black/white and 2 additional false colour combinations (blue-yellow and black-yellow) and a writing mode for writing notes and signing cheques.

Optical Wear

An individual might benefit from using different optical devices, which might include clip-on monocular or loupes; prism spectacles ; binocular systems or a hand held monocular. These are portable low vision aids that can be worn with glasses or head-mounted. These devices may be used for a variety of distance and midrange visual activities such as seeing faces, TV, the whiteboard in meetings, computer screens, packages on shelves, dialing the telephone, and signs while traveling. However, these products will not restore vision to normal.

ClearNote Video Telescope cum Magnifier

This device is an excellent support for low vision persons especially in meeting or board rooms, conference rooms and training halls, etc. It is a telescope cum magnifier which when pointed to the white board/screen zooms the image to the monitor screen placed close to the sitting arrangement so that the person can view the image displayed on the same. It can also magnify the text or image to suit individual comfort levels and is provided with a foot switch to alter the magnification or shift the focus from the TV screen or the laptop or desktop PC as the case maybe.

For Those Who Are Disabled and Those Who Do Not Benefit From Magnification

Optical Character Recognition (OCR) Text Reading Systems

Text Reading Systems include:

- **Stand Alone Text Readers**
- **Scanning & Reading Software**

Stand Alone Text Readers

These text readers automatically convert printed English textbooks, magazines, journals, etc. into speech, thus enabling the visually challenged to read independently. They have a one-touch operation, require no prior computer knowledge & are simple and easy to operate.

Sara Text Reader: The SARA is a twin featured text reader **suitable for the disabled and low vision persons**.

Features
- Navigation keys are easy to find, so the user can read a word or a line at a time, fast forward, rewind, and move up and down the scanned page.
- Has a choice of voices and adjustable speech, rate and volume.
- Attach the SARA to a TV or computer monitor for colourful, large print access to complement speech for low vision users. Has adjustable print type style, colour, size, and spacing to assist low vision & dyslexic users. Allows enlargement up to font size 144.
- Allows reading from and writing to CDs.
- Stores approx. 5 lakh pages of text and has a Built-in microphone.

Scanning & Reading Software

These software convert the PC & Scanner combination into a Text Reading Machine. They require some computer knowledge!

Scanning & Reading Software like Openbook or Kurzweil K1000, allows a person with a vision impairment to scan printed text and receive a synthetic speech output or save it to a computer. Currently, OCR technology cannot convert handwriting to voice output.

The visually impaired can also use Tactile Graphics for studying graphs and charts or layout plans

Task: **Independent operation of Computers**

Solutions:

For those who have Low Vision and benefit from magnification

MAGic Screen Magnification software: MAGic Magnification software enlarges the computer monitor screen from 1.1 to 16 times thus enabling low vision users to operate the computer easily.

Anti-Glare Or Anti-Radiation Computer Screen Guard: Anti-glare filters are designed to help relieve eyestrain, fatigue, headaches and the stress associated with continued viewing of computer monitors by reducing glare. Anti-radiation filters help eliminate exposure to radiation emissions. Some products provide both anti-glare and radiation protection.

For Those Who Are Disabled and Those Who Do Not Benefit From Magnification

JAWS (**J**ob **A**ccess **W**ith **S**peech) **Screen Reading Software:** JAWS, is a user-friendly software that converts a normal PC into a talking computer so that the disabled & visually impaired who have lost vision to a large extent or have only light perception where even magnification cannot help can operate the computer independently.

Refreshable Computer Braille display like Focus or low cost PacMate Portable Braille Display

A Braille display operates by raising and lowering different combinations of pins electronically to produce in Braille what appears on your computer screen. The display is refreshable meaning that the configuration of Braille changes continuously as the user moves around on the screen. The Braille display sits on the user's desk, often underneath the computer keyboard. Braille displays provide direct access to information on the computer screen and it is quiet.

Task: **Taking notes, filling out forms, writing, reporting or documenting as well as giving speeches, making presentations in meetings/conferences.**

Solutions:

For those who are Disabled & those who have Low Vision and benefit from magnification & those who do not

Mobile Speak Pocket screen reading software with a Bluetooth Foldable Qwerty Keyboard

Mobile Speak Pocket software converts a pocket computer or PDA (Personal Data Assistant) popularly also called as a Hand-Held like *iPAQ, Dell, etc.* into a talking one! It enables a visually impaired person to also use a PDA and have access to information, write down notes, surf the internet, send and receive E-mails or quickly jot down memos while travelling, attending a class in college or at a meeting/ conference, etc. Normally the sighted use a stylus to work on Hand-helds while the visually impaired person can use a blue tooth pocket size foldable keyboard.

It supports all standard Windows Mobile applications like Pocket Word, Pocket Excel, File Explorer, MSN Messenger, Pocket Internet Explorer, Windows Media Player and Pocket Outlook related applications such as Messaging, Calendar, Contacts, Tasks and Notes.

The Mobile Speak POCKET screen reader installed on a hand held, offers to be an effective support for people giving easy access to the use of computers anywhere to assist them in their education, profession or employment. In every field of activity, the Mobile Speak POCKET offers the disabled or visually impaired unparalleled support in making them more efficient and independent to perform effectively.

The self employed or business persons can maintain their contact list, tasks to be done, database & entire price list of the products in an Excel format and look up the same immediately when needed, keep Accounts & keep in touch with clients with email connectivity even when away from Office, thus enabling them to have a Mobile Office.

Sales executives, Managers/ Administrators/ Organizational heads can keep track of appointments, take notes during meetings/ conferences/ seminars, communicate with clients, send & receive updated reports to and from their offices while on the move, have a database of products & prices, etc.

Lawyers can record their briefs while talking to their client, maintain their calendar for appointments/ hearings, maintain a database of contacts, get connected to the Internet to surf or download any law reports, case studies from legal websites or for that matter also exchange emails with their clients. Even while they are in the courts waiting for their turn they can revise their notes silently using the headphones.

Journalists can prepare their notes while on the move and send reports to the office immediately thus saving time to meet deadlines.

Insurance agents, Estate agents, Travel agents, Professors, Authors, Communications Experts and a host of other professionals can make effective use of this Mobile Talking Computer.

Adaptive Mini Portable Lightweight Brailler

Adaptive Mini Brailler is a mechanical, six-key braille writer that is lightweight, portable, robust and easy to use!

Features

- Light weight and Portable: *The Adaptive Mini is small and weighs only 2.7 kg!*
- Adjustable Keys: *You can adjust the spacing between the keys as per the size of the user's hands making it Suitable for any age.*
- Quiet and Easy to Use
- Uses Ordinary Typing Paper as well as Braille Paper:
- It's soft touch keys enable Speed Typing which is required when working
- Enables you to make Braille labels on dymo tape or self- adhesive PVC Sheets.
- Comes with a Smart Leather Briefcase or Backpack, with Shoulder Strap making it easy to carry anywhere!

Braille stylus/Braille slate

Mountbatten 5-in-1 Talking Electronic Multi-purpose Braille System

The Mountbatten is a talking portable Braille system which has 5 products all combined into One:

1. Braille Writer

2. Braille Embosser: Works as an embosser when connected to a PC

3. Braille Translator: Automatic **translation of text to Braille** when connected directly to a computer keyboard & Automatic **translation of Braille to text when** connected directly to a regular printer.

4. Silent Note taker: This function enables disabled employees to silently take notes at meetings or prepare documents in an office without making noise.

5. Braille Graphics Printer: Can print Braille Graphics with the help of the TGD Software.

Provides effective Two-way Communication between a sighted colleague or senior not knowing Braille and disabled employees in an **office environment**.

Compact Pocket-Size Video Magnifier for Low Vision Employees

Task: **Using a telephone & computer at the same time especially in Call centres**

Solution: A headset with dual channels can be used with both the telephone and a computer using JAWS screen reading software. It works with the phone system through a computer that indicates which line is being used. JAWS Screen reading software, a Focus 40 or PacMate portable Braille display, or screen magnification software can be used to access the information on the computer/ telephony screen. Alternatively, the user can wear a ear piece from the computer speakers in one ear and a mono-aural headset from the telephone This allows the user to listen to a telephone conversation and hear their JAWS software "speak" to them at the same time.

Task: **Reporting to Seniors, Communicating with associates or contacting customers while on the move:**

Mobile Speak Talking software converts a cell phone into a talking mobile phone. It enables the disabled or low vision person to listen to or send SMS messages, browse through the contact list and call instantly and even quickly make calculations without any sighted help.

Task: **Mobility**

For those who are Disabled & those have Low Vision and benefit from magnification & those who do not

Solutions:

Mobility & orientation training
Mobility aid (e.g., cane, electronic aid)
Install detectable warning surfaces like graded tiles
Install coloured edges on stairs for improved colour contrast
Improve lighting in area
Talking Signs to provide voice messages and/ or Braille Signages for permanent landmarks
Global Positioning Systems
Task: **Public transportation**

Solutions:

Ride with colleague
Modified or flexible work schedule
Shift change to daylight hours
Reassignment

Task: **Repair, Construct, Assemble, Pieces/Parts**

Solutions:

For those who are Disabled & those have Low Vision and benefit from magnification & those who do not

Prisma CCTV Print Magnifier for Low Vision users particularly for near work and small assemblies

Talking micrometer or calliper: These are measuring instruments that will help the visually impaired to know the reading for testing purposes in an assembly line or profession.

Talking Measuring Jug: This is a talking jug with adjustable speech volume that measures different types of liquids in metric - litres and millilitres, imperial - pints and fluid ounces and U.S. - pints and fluid ounces and can convert its readings between any of these. The user selects the type of liquid to be measured, either water, milk, oil based or user defined. The contents of the jug are spoken at the press of a button or automatically as a liquid is added. The user defined function allows the jug to be calibrated for any liquid, or indeed any solid if your recipe calls for a litre of sugar for instance! The container is removable for easy cleaning and can hold up to 2 litres of liquid.

Talking Weighing Scale: An easy to use talking weighing scale that weighs up to five kilos in five-gram steps. Accurate to within two percent of the scale, has a large secure bowl and non slip feet. Weighs in imperial and metric units and can convert weights between them. Touching the bowl causes the weight to be repeated. High and low tones sound every five grams when weights are adjusted slowly to help with precise measurements.

Talking Measuring Tape: A 5 meter talking tape with memory to enable total measurements up to 999.99 meters and automatic conversion of the same in inches, feet, centimeters, and meters.

Hand/Stand magnifier

Tactile / Braille labels or indicators

Task: **Distinguish between colours**

Colour Vision Deficiency is the inability to distinguish some colours and shades. Most people with this condition can identify some colours. Few people are totally "colour disabled."

Solution: **Talking Colour Detector, which can used by the visually impaired and colour disabled users**

Very light and easy to use, this device has a wide range of useful applications from checking the colour of clothes to the ripeness of fruit while shopping! Simply select one of the three available volume levels and hold the front of the unit against almost any surface - paper, cloth, wood, plastic etc. and the colour will be spoken. Supplied with a clip on cover to protect the sensors when being carried in a pocket and an earphone, which turns the speaker off to avoid disturbing others.

Task: **Accessing the Internet**

Solution:

JAWS talking software & Magic magnification software enable the visually impaired to have total access to the internet such as browsing through web pages and managing them.

Talking Pocket Computers i.e. Mobile Speak Pocket installed on PDAs also offer the facility to access the internet and send / receive Emails while on the move.

Other Considerations

Provide training materials or company correspondence in an alternate format such as large print, Braille, computer diskette/CD-ROM, or audiotape

Provide time off for training on assistive technology, mobility training, etc. for example – time off to go for computer training classes, etc.

V.Suggestions for funding purchase of Assistive Technology

Many employers have apprehensions on employing the visually impaired since they are not inclined to make additional investments for purchase of Assistive Technology and therefore avoid employing them. In such circumstances, the candidate can probably look at paying for the same by using any one of the following methods:

- Take a personal loan from a bank
- Sourcing the same by identifying a donor
- Requesting the employer to give an interest free loan with regular deductions from salary
- Contact an NGO registered under the Government's ADIP Scheme where they can give you support upto a certain amount.
- Earn some money by doing a part time job

You can combine self-funding, for example with a charitable donation, a used PC, a free Computer or some vocational rehabilitation assistance.

Be careful not to dismiss this buy-it-yourself option too quickly. You'll gain respect and attention from donors if you're willing to invest part of your own resources into a solution instead of expecting a funding source to foot the entire cost of meeting your needs for assistive technology.

Remember, too, that most people use multiple funding sources to pay for their information access solution. The expectation that a single donor will shoulder the entire cost of assistive technology is usually unrealistic and will likely lead to disappointment.

6.Professions & Job Opportunities for the Visually Impaired

Introduction of computers and the assistive technology has triggered a whole new arena of openings and job opportunities and we are listing some of them:

Administrative
• Administrative Assistant
• Administrator
• Administrative Officer (Secretarial Senior)
• Elected officers (Union Govt. & State Govt.)

Business/ Self Employed
• Business Proprietor
• Call Center Owner
• Cyber Café Owner
• Restaurant Owner / Manager
• Consultant

Finance
• Accountant
• Budget Analyst

• Brokers
• Customer Service
• Estate Agent
• Insurance Agent
• Stockbroker
• Tax Specialist
• Travel Agent
• Chartered accountant

Communication
• Call Centre Operator
• Interpreter – Local Language or Foreign language
• Medical Transcriptionist
• Transcriptionist for Voice Recordings to Text
• Phone Banking Assistant
• Paging Message Operator
• Public Relations Officer
• Telephone Interviewers

Sales & Marketing
• Publicity & Propaganda officer
• Telemarketing Executive
• Desk Sales Executive

Clerical
• Stenographer
• Typist
• Court Reporter
• Petition writer

Computer Related
• Computer Consultant
• Computer Sales
• Computer Trainer
• Computer Network Manager
• Computer Programmer
• Computer Operator
• Data Entry Operator
• Database Administrator
• Software Developer
• BPO Executive
• Program Analyst/Associate
• Remote Software Tester
• Peer Support Part Time
• Technical Assistance Specialist
• Information Technology Access Specialist
• Web accessibility tester
• Software analyst

Legal
• Civil Rights Advocate
• Legal Advisor
• Solicitor

Radio/ TV/ Print Media
• Advertisement Writer, Copy writer
• Announcers at Railway. Stations/ Airports
• Announcers on Radio/TV
• Editor
• Sub-editor
• Copy Editor
• Columnist
• Journalist
• Publisher

Human Resource Development
• Personnel officer
• Management Assistant
• HR Specialist
• Trainer
• Education Consultant
• Professional Personnel Recruiter
• Career Specialist

Management
• Management and Program Analyst
• Information Technology Project Manager
• Senior Director
• Assistant Director
• Telecommunications & Network Administrator
• Call Center Supervisor
• Program Director

7. CONCLUSION:

Disabled Persons can excel in any job or profession with the right choice of assistive devices or aids and appliances available worldwide to help you achieve success, optimum work efficiency and self reliance at the minimum investment.

The technology training provided by various non government organisations, Private and Public institutions will prove beneficial only if educational institutions and employment setups accept and foster the use of technology by the disabled persons by giving equal opportunity for the disabled persons. Hence the need of the hour is whole hearted acceptance of disabled persons in all possible areas by focusing on their ability and forgetting their disability.

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