Assistive Support Through Technologies for Persons with Disabilities in Libraries

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ABSTRACT

This paper aims to give a brief about the services provided by libraries to disable library users using software and hardware technologies. In this era, the development of technologies, information and communication technologies, etc., is widespread and being disseminated and published globally. Usually, it is convenient for a library professional to differentiate between individuals in need of assistance. This paper emphasises specialised equipment, technologies, and services that provide a barrier-free environment to the disabled users in libraries and information centres, leading to many technological innovations and advancements for general and disabled persons. This study will be helpful for persons with disabilities, LIS specialists, and other professional communities to provide information about the situation and the variety of assistive technologies available in libraries.

Keywords: Library services; Information services; Technologies for persons with disabilities; Assistive technologies.

1. INTRODUCTION

Libraries are service provider organisations that endue services to their users without discrimination, including persons with disabilities. The internet becomes a universal inlet for information spreading to serve a versatile data collection. Digital libraries have become a powerful medium for disseminating information by groups or individuals who opt, catalogue, and organise multiple documents. Ranganathan visualised that the library comprises three primary segments:
- the users (library benefactors)
- the books (the information assets)
- the staff (library experts)

On 01 January 1996, India passed the Persons with Disabilities Act 1995, which assures uniformity, equality, dignity, and liberty of every personality and mandates a shared community for all, including disabled citizens. Information is an essential and fundamental right of the nation, including in an unexpected way abled people. Expected information ought to be promptly accessible in reliable habits with no difference among abled and in an incredible way abled people[1]. According to the WHO world report on disability 2011, around 100 lakh people in 15 per cent of the total world population experience certain types of disabilities[2]. Disability is characterised as physical or psychological circumstances impairing a person's ability to walk, function, and perform. There are various types of disabilities, such as:
- Hearing Impaired,
- Visually Impaired,
- Physical Impairment, and
- Cognitive Disability.

Such users need exceptional specialised help, with which they can finish their tasks efficiently.

1.1 Indian Scenario

According to the 2001 census, the number of people with disabilities in India is 210 lakhs, 2.1 per cent of the entire population[3]. The 2011 Census tracked down that a 2.6 crore populace in India is disabled, 2.21 per cent of the total population. It is also roughly calculated that the number of people with disabilities in India increases around 50 lakhs in a year[4]. India is striving to empower its disabled citizens. All kinds of help are being given to the disabled people either by instituting an extraordinary demonstration or by implementing the 'National Policy for Persons with Disabilities, 2006', or by legislative reservation in employment, education, Government schemes, and many other programs[5]. In India, mainly seven national institutes are operating for the advancement of Persons with Disabilities in various fields; these are:
- National Institute for Mentally Handicapped, Secunderabad
- Institute for the Physically Handicapped, New Delhi
- National Institute for Hearing Handicapped, Mumbai
- National Institute for Orthopedically Handicapped, Kolkata
- National Institute of Visually Handicapped, Dehradun
- National Institute for Empowerment of Persons with Multiple Disabilities, Chennai
- National Institute of Rehabilitation Training & Research, Cuttack

Apart from this, many institutes, NGOs, and regional and district rehabilitation centres provide essential services to disabled persons[6].

1.2 International Scenario

Department of Economic and social welfare of the United Nations present a factsheet on disabilities that about 80 per cent of the disabled people reside in developing countries like India, Bangladesh, China, Hungary, Brazil, South Africa, etc[7]. Developed countries such as Canada, USA, United Kingdom, and many European countries are adequately devoted to meeting the needs of their disabled citizens. These countries provide information to people with disabilities by creating national policies. The Americans with Disabilities Act of 1990 was designed to remove prejudicial treatment of people on various grounds like race, age, or sex, including access to public and private services & jobs, schools, transportation, communication, and employment that all are open to the general public[8]. The Americans lay up the majority of libraries with the Disabilities Act. They classified their services in Titles that is;

Title I: Employment
Title II: State and Local Government Programs and Services
Title III: Public Accommodations

The majority of libraries are bound under Section 504 (The Rehabilitation Act of 1973 that defend skilled persons from partiality based on their incapability), and some have responsibilities under Section 508 (The Rehabilitation Act of 1973 enables the removal of barriers to information technology and ICT facilities for persons with disabilities) and other laws as well[9].

2.   LITERATURE REVIEW

Several relevant studies were reviewed to perceive the perception of persons with disabilities related to information systems development. Mulliken & Falloon (2019)[10] discuss the challenges blind users face in obtaining full text. Libraries can provide personnel support to determine full text for blind users from user-recognised contexts. Single sign-on and active linking may enforce authentication because the online content in the library websites, including subscribed documents, often does not comply with the acceptability criteria for blind users. According to Alabi & Mutula (2020)[11] assistive technologies are helpful for people with disabilities. The library administrators should pay adequate attention to the budget and provide a proper location for adopting specific technologies in the library. It is also mandatory that a professional staff be appointed to meet the needs of users with disabilities. Engelhardt, Kosiedowski & Duszy (2020)[12] conducted a study. The focal point of this study is to investigate whether any form of assistive technology in everyday life, such as the INSENSION system, provides significant benefits for people with profound intellectual and multiple disabilities. The study found that the involved users in this study recognised deviations from perceived to unfamiliar caregivers as challenging conditions within the PIMD context. In the paper of Al, Andrade Blanco & Chiranov (2015)[13] Libraries for all projects and the studies brought within the project scope are performed and discussed on the role of libraries as knowledge environments, and they found that local libraries have the potential to be used as knowledge environments. The study of Hill (2021)[14] found that the guidelines provide a perception of inefficiency and convenience in library personnel, library administration, and library support and services issues. While this is not unexpected, the circumstances of the incapacity and other law considerations reflect a shared notion of admission that goes deeper than what the law demands. The study of Harb & Sidani (2020)[15] sought to explore the use of new and intelligent technologies in the development of persons with disabilities in Lebanon and found that newly developed technologies could improve a variety of impairments and other personal qualities of persons with disabilities. The available technologies and policies provided by the government can turn their complicated lives into happy living. The findings of this analysis may help people with disabilities move to an inclusive world through assistive technologies. The Bhardwaj (2021)[16] study aims to elucidate the opinions of visually impaired users in the improvement of knowledge systems in universities. The significant finding of this study is that libraries of Indian universities have inadequate information resources and poor access systems, lack of resources in the local language, the low and up-to-date quantity of resource material and supporting software, and lack of trained and professional staff in using assistive technologies.

3.   SCOPE AND OBJECTIVE OF THE STUDY

The primary purpose of this paper is to provide various types of assistive support to disabled people who cannot do their work smoothly and need someone's cooperation to do their job. For such people in education, the kind of assistive technology a library can help them with has been considered. The study is based on a literature review. In the study of journals written in the past, it was found that there are many types of assistive technologies available in libraries, which are not appropriately used, or there is non-availability of skilled professionals to use them, but what is assistive technology? What is their type? How are they used? There is a tiny mention of it. Therefore, the objective of this paper is to describe the assistive technology services available in the library for different types of disabilities, with the help of which the disabled are making a significant contribution in the field of education.

4.   ASSISTIVE TECHNOLOGIES AND SERVICES

Assistive technologies can help people with disabilities meet their needs quickly and effectively. Many organisations define Assistive Technologies (ATs) as:

- American Library Association defines assistive technology as computer-based technology used to make it compatible with a specific type of person, such as persons with disabilities, and enhance their potential. In simple words, assistive advances insinuate gadgets, items, etc., that are utilised to upgrade or improve the practical capacities in differently-abled people.
- UNESCO (2006) defines assistive technology as a term that refers to the availability of assistive and adaptive devices

to assist people with disabilities; equipment products that improve, enhance, and maintain the functional abilities of persons with disabilities[17].

- The World Wide Web Consortium (W3C) views assistive technologies as programming or equipment specially intended to help disabled people perform day-by-day activities. This definition is adequately wide to oblige the broad scope of accessible technologies.

Assistive technologies empower the disabled to access information assets. Backed by ancillary or adoptive innovations, tasks such as heeding a coursebook, detailing a brochure, understanding functions, printing a Braille duplicate of a page, or computer record can be easily refined. Innovation may reduce use or even bring a limitation to learning[18].

5. ASSISTIVE OR ADAPTIVE TECHNOLOGIES IN LIBRARIES

Notably, more useful assistive technologies exist, such as screen readers, hearing aids, advanced communication devices, adaptive keyboards, etc., as well as accessible media and formats, such as accessible DAISY (Digital Accessible Information System), HTML (Hypertext Markup Language) books, video with captions or subtitles, etc., are helpful. Hence, there is a need to obtain and provide these to the user community in libraries[19]. Assistive technologies enable people with disabilities to pull off the many limitations and obstacles they face across environments. Today, ICT with assistive technologies has helped bridge the digital gap between people with disabilities, making a wide variety of information accessible to persons with disabilities. It may be information and correspondence advances for learning incorporate instructive programming and virtual learning conditions, which goes far in providing better information to the disabled community. Examples of assistive technologies for the visually impaired include screen magnifiers, braille embossers, speech recognition programs, screen readers, text-to-speech synthesisers, talking and large print processors. Libraries and information centres established assistive technology centres, including computer labs and talking book studios, that listen with the text highlighted on a monitor screen after scanning a book and reading it aloud. Libraries can make impressive assistive technology to accomplish better answers for giving access to library assets and administration to their users[20].

5.1 Assistive Services for Visually Impairment or Blindness

Public libraries, NGOs, universities, and institutions are able to provide library services to the visually impaired by using a variety of software, tools, and technologies. The following are some of those techniques:

- Talking Typing Teacher: A new talking typing program for the visually impaired. The features of this software are digital human speech, which is used everywhere in this program. Through this software, they'll enjoy hearing a clear speech from the device screen[21].
- JAWS Pro screen reader: JAWS is a screen reader that helps users who are blind or have low vision use computers. It has a wide range of features, including multilingual speech synthesis, multi-screen support, and Braille support. It was developed by Freedom Scientific, Inc, suitable for Microsoft windows[22].

- ZoomText magnifier/reader: This software is helpful for low vision persons. It enlarges and enhances everything on the computer screen and automatically reads the web pages, documents, etc[23].

- Optical Braille Recognition Scanning Software (OBR): This is a Microsoft windows programming software that permits you to 'read' single and twofold-sided Braille records on a traditional flatbed scanner. It scans Braille records, analyses dot patterns, and interprets them into standard text presented on a computer screen. Ideal for people who work with the blind and are not known to Braile[24].

- Kurzweil 1000: This software assists the blind person without the help of any volunteer. It is a combination of OCR and P.C. that reads printed books.

- Kurzweil 3000: This software helps visually impaired persons to convert digital or scanned printed material into MP3 and provide audio files for listening[25].

- Screen Access For All (SAFA): This is free software and intellectual property of the National Association For The Blind, New Delhi. This screen peruser programming can catch text from the screen and convert it into the sound structure used by visually and low vision individuals[26].

- Braille Translating Software: This software allows the user to type text and convert it into Braille and generate a hard copy.

- Braille Embossers: This is similar to Braille translating software.

- Shruti Drishti (C-DAC): Shruti Drishti is an incorporated text-to-braille [TTB] and text-to-speech [TTS] framework for the visually disabled utilizing information retrieval and extraction procedures. This system enables the visually impaired to use minimum key combinations to browse the Internet[27].

5.2 Assistive Services for Hearing Impairment or Deafness

The adherent assistive services are relevant to users with speech and hearing disabilities:

- Dragon Speech Recognition (Dragon Dictate): This software converts audio or speech into text. It ran on Windows personal computers and was developed by Dragon Systems of Newton, Massachusetts[28]

- iCommunicator: The iCommunicator translates in real-time[29]:
  - Speech or Audio to Text
  - Text/Speech into Sign or Video Language
  - Text/Speech into Computer-generated sound

- Infrared Listening Device: An infrared hearing device is an auxiliary audio device that aids communication with the hearing impaired and consists of an audio stream, an infrared transmitter, and an infrared hearing receiver[30]

- ShrutLekhan Rajbhasha is a Hindi speech recognition software package that allows a machine to differentiate human Hindi speech and provide output in Hindi Unicode

(Devanagari). C-DAC developed it in a co-partnership with IBM[31].

5.3 Assistive Services for Physical Disabilities

Physically disabled persons may require assistance in performing specific physical tasks, including using a computer. Physical disabled using a wheelchair or other equipment that assists them will need a robust and rigid space. Assistive equipment such as chairs, tables, etc., should include their height, position, and other services that can be modified as needed. The following services are provided to these types of disabilities:

- Madentec TrackerPro Computer Input Device: The device replaces a mouse for those with little or no movement of their hands. It's an advanced high-resolution acute camera in a rigid aluminium ring-fence, making it sleek, stand-alone, reliable, sturdy, accurate, and easy to mount. This device can do anything that should be possibly done with a regular handheld mouse[32]
- SofType: This type of software is based on keyboard service in which a basic keyboard is converted into a fully functional on-screen keyboard[33]
- Specific input devices such as joysticks, trackballs, touchpads, switches, and enhanced keyboards are helpful for the physically challenged.

5.4 Assistive Services for Cognitive Disabilities

The adherent assistive services are relevant to users with cognitive disabilities:

- Provide information through Audio/Video format, CD/DVD, and DAISY format
- e-Saadhya (Saral Anukulaney Adhyayan): The e-learning framework is educational for children with gentle mental impediments and chemical imbalance. It is a practical behaviour analysis-based, adaptable and accessible e-learning environment adapted to the educational needs of children with cognitive disabilities. It is an initiative of the e-learning division of the Department of Electronics and Information Technology. C-DAC Hyderabad and Bangalore are implementing it in association with the National Institute of Mentally Handicapped, Secunderabad[34]
- Information through library's websites.

5.5 Some of the Significant Assistive Hardware Services For Persons With Disabilities

- Reading, Scanning, and Writing Softwares: e.g., CAST eReader, WYNN, Window-Eye, OPENBook, SARA, etc.
- Text to Sound (MP3) converters: e.g., text Aloud, etc.
- Screen Magnification Softwares: e.g., ZoomText, MAGic, etc.
- DAISY format readers: e.g., L.P. Player from Labyrinten Data, Victor Reader, Victor Reader soft from VisuAide, etc.
- Simple/Electric wheelchairs
- Adaptive keyboards: e.g., Touch Windows, Unicorn Board, Power Pad, Muppet Learning Keys, etc.
- Magic Magnification Softwares
- Sugamya Pustakalya: Sugamya Pustakalaya is a bunch

of books accessible in India. In India, DAISY Forum has given this service to outfit permission to books to differently-abled. It is ready to turn into the enormous assortment of books in open arrangements in the country and persons who cannot read print books due to blindness, low vision, or any other disability. Sugamya Pustakalya is providing information in DAISY, EPUB, and BRF formats[35].

6. RESULT

People with disabilities are an essential part of our society. Everyone has the right to education in India, so new technologies are necessary to make them accessible to the disabled. The library can provide various services to persons with disabilities and inspire them to utilise the library resources. Libraries should regularly organise orientation programs for the disabled. This paper describes the tools and techniques that can serve disabled users in the library. Ranganathan, the father of library science in India, said that libraries and information centres should provide all kinds of services to meet the needs of all types of users, and he has been insisting on each reader to have their book. Currently, library professionals are embracing developments in science and technologies, mainly information and correspondence advancements and new logical instruments for recording and spreading data. Libraries and Information Centers, and library professionals can modernise the existing library and information system with the help of modern technologies available to the libraries as per the need of today so that an ordinary man and the disabled can get services quickly.

7. CONCLUSION

Assistive technology is imperative and beneficial to both libraries and users with disabilities. Assistive technologies are helpful for persons with disabilities. Library administrators should consider the resources and proper location to use these assistive technologies. It also requires that a professional person be appointed to satisfy the requirements of users with disabilities. With the help of government organisations like the University Grants Commission, National Knowledge Commission, various associations, NGOs, institutions, and universities are working on this issue in different ways so that the disabled can be helped. Libraries play a vital role in collaborative opportunities for persons with disabilities using various technologies.

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His contribution to this study is to provide overall guidance in drafting and correcting the contents of this paper, checking for plagiarism and verification, and proofreading it.