EasyChair Preprint

№ 12286

Information Access for the Visually Impaired in the Digital Age

Niran Adetoro

February 25, 2024

INFORMATION ACCESS FOR THE VISUALLY IMPAIRED IN THE DIGITAL AGE

Introduction

Visual impairment results from diseases, trauma, or a congenital or degenerative condition that cannot be corrected by conventional means. It is a collective term describing an aggregation of various forms and varying degrees of visual handicaps, visual dysfunction and vision loss, which ranges from slight visual and refractive errors, defect in colour blindness, partial sightedness, and low vision to blindness (Obani, 2002). Availability and Access to information materials by persons with visual impairment has received attention of governments, organisations, institutions and individuals who strive to provide library services to them in their environment.

The principle underpinning library and information service provision to persons with visual impairment should be that of availability and equality of access to alternative formats. Unlike sighted people, persons with visual impairment rely on alternative formats such as braille, large prints and talking book or tape recordings and electronic resources to meet their reading needs. (Adetoro, 2009) These materials are usually not available in quantities desirable to persons with visual impairment. The provision of information materials to persons with visual impairment has remained worrisome to producers and providers of alternative formats. A few materials ever get converted to alternative formats. However technology and indeed digital technologies have come to widen access to information for the visually impaired world over.

The digital age is the backbone of a knowledge based economy where the fittest survive whether they have disability or not. The visually impaired can now compete on equal footing with the sighted. The digital age has expanded the world of the visually impaired and to a great extent assisted them overcome lack of access to information and other environmental barriers. Advances in technology have enabled the visually impaired to access resources in variety of ways to suit their needs and requirements. This is really true in schools, but also

increasingly in libraries, public information services and technology available in the home (Craven, 2003)

The Digital Age and Information Provision to the Visually Impaired

The digital revolution has positively affected our society in profound ways. It is really hard these days for anyone to avoid the use of computers and various software applications, searching for information through the internet or using mobile phones. The digital age and advances in technology has significantly changed the information use landscape and for the visually impaired, access to information like a sighted person is key and ability to keep up with the changes in technology is crucial. Until recently, the visually impaired have had restricted access to information, however since the advent of digital formats, the situation had changed for the visually impaired basically because of the possibility to use text-to-speech software that reads digital text on a computer screen clearly and audibly too.

Ensuring equal access to information, an indispensable goal in the establishment of the information society also makes a lot of sense to the visually impaired and indeed all persons with special needs and disabilities. Advances in the digital age particularly digital information and the internet has enabled the visually impaired to come to a more equal level with the rest of the world (Golub, 2002). With advancement in the field of assistive technology for the visually impaired, they can now enjoy almost full access to information available.

The visually impaired can now read from original sources of information, those available on the World Wide Web at the same time as anyone through the use of assistive technologies such as text-to-speech software or Braille display that support speech or Braille output. For using digital information Golub, (2002) stressed that no mediators such as agencies producing alternative formats or volunteers and friends to read are needed. Individuals can now access original sources of information and this is a significant live changing development for persons with visual impairment. (Williamson, Schauder and Bow, 2000)

The Access Problem

The problem of conversion of information materials into alternative formats is that the process is not only time consuming but also expensive. The consequence of this is that information materials in adjusted format becomes available to the visually impaired several months later (if at all) than to everyone else. A small amount of published works is ever made accessible to the visually impaired. The provision of information materials to persons with

visual impairment has remained worrisome to producers and providers of alternative formats. A few materials ever get converted to alternative formats. For instance, only five percent of books published in the United Kingdom (UK) make it into alternative format (RNIB and NLB on Track, 2006). Without alternative formats, persons with visual impairment cannot read and function well as members of the society. This is why it is crucial for every country to have a well organised arrangement for the production and utilization of information materials by its visually impaired citizens. (Atinmo, 2000).

Availability of information materials for persons with visual impairment does not come easily. This is because readable materials for them have to be in special format, in braille, large prints and audio recordings such as talking books. To convert normal print materials to braille, special machines , braille press and computer software are needed. There are a few large prints publication, if any in Nigeria (Atinmo, 2000). For audio materials, a sound proof studio is required in addition to readers willing to volunteer time and energy to record materials. These factors combine to create difficulties in the provision of information materials for persons with visual impairment. (Atinmo, 2000).

The availability of information materials to persons with visual impairment in developed countries such as the United Kingdom (UK) has its problems. The Royal National Institute for the Blind (RNIB) in UK in a commissioned research, (Harris, 2005) reported that blind and partially sighted people are denied access to 95% of books because they are not available in alternative formats. Other studies such as Evans (2000) have reported similar results; even though information materials in braille format for instance, have been proved to be critical to users such that it represents competence, independence and equality (Schroeder, 1996). Four and half percent of books anywhere in the world are made available in format accessible to persons with visual impairment (National Literary Trust, 2005). From the foregoing, it appears that inadequate availability of information materials for persons with visual impairment is a global phenomenon. According to International Federation of Library Association and institutions IFLA (2002), it is most critical in developing countries where 95% of blind people never attend school or are not literate. In using the world wide wide web, there are, however barriers that assistive technologies and information seeking behaviour of the visually impaired impose. There is dearth of literature on the information needs and seeking behaviour. Another significant issue is the Non visual Access to the Digital Library (NoVA) project, within which research has been conducted on the provision

of digital library services with regards to their accessibility to the visually impaired. Digital libraries, online library catalogues, subject gateways, search engines and a couple of for-profit sites from the perspectives of accessible design and linear information seeking have been examined (Golub, 2002).

Assistive Technologies for the Visually Impaired

Computers and assistive technologies have allowed persons with visual impairment to compete on equal footing with sighted persons on the basis of knowledge and technological competence. (Elaydi and Shehada, 2007) The visually impaired are constrained to read only what is available and not what they want to read. Information and communication technology (ICT) and other assistive technologies has given the visually impaired (VI) the realistic possibility of achieving equality in terms of access to information. The access question had consistently thrown open ethical, equity and standards issues and debates all over the world.

ICT and indeed digital technology has revolutionized library and information services for the visually impaired. An emerging trend in recent years has been for the importance of accessibility issues to be recognized by mainstream libraries and organizations providing service to the visually impaired (Braizer, 2007). Access to information using ICT and other assistive technologies had been critical to say the least. This revolution has presented to the visually impaired, immensely interesting opportunities. Roos (2007) argued that digital revolution had offered libraries opportunities to improve their Braille book production outputs; it gave rise to fascinating techniques for making talking books more accessible. The visually impaired also gained almost full access to computers, which changed radically not only the manner in which they do things but especially the manner in which they read.

Assistive technology refers to items, equipment or products whether acquired or modified that is used to create or maintain or improve functional capabilities of individuals with disabilities (Belay, 2003). They involve a Braille display that the visually impaired use instead of a screen, a speech synthesizer (external hardware) or a screen reader (software) that reads aloud text appearing on the screen. Differences between the Braille display and the screen reader are in the alphabets that are used. There is also the need to bear in mind Braille displays on computer screen; the VI accesses one line of the text at a time and sometimes the display does not caption the whole page on the screen. This influences the serial information seeking behaviour of visually impaired users. Braille embossers are another piece of

hardware that enable the visually impaired to have materials printed in Braille. An ideal solution is software that does optical character processing of text on the paper put on the scanner and immediately synthesizes speech; i.e automatically reads a printed page.

Enhanced image devices provide a method of accessing printed materials or personal computer through magnification hardware and software. Closed circuit television (CCTV) is used for print information. With technological advancements, CCTVs will probably use high resolution, flat panel colour displays and smaller digital cameras, which will enhance both the colour image and portability. Optical character recognition systems converts print into an electronic form accessible via adaptive equipment, allowing the visually impaired access to print materials. Drawbacks of this technology include the need to have reasonably high quality print and the inability to recognize hand written materials. In a synthetic speech system, the major method by which the visually impaired access information from a personal computer is composed of a synthesizer for ‘’Speaking’’ and a screen access program that tells the synthesizer what to say. The qualities and current limitations of synthetic speech are described with a note emphasising the likely improvements to come. This includes human-like voices and easy access to all software, including graphics.

Braille access through paperless Braille devices provides another means to access personal computers. These devices are described in details. They offer a major advantage over speech programs by allowing the user to immediately learn the formats of the data on the computer screen. When proofreading, the user quickly catches misspellings, extra spaces between words, and accidental capitalisations. The price remains the major disadvantage. The authors also describe the relative advantages of Braille note takers and Braille printers. Braille note takers, are small portable devices with Braille keyboards for entering information, it uses a speech synthesizer or Braille display for output. They are popular for use in classrooms, meetings, and on business trips due to their size, flexibility, cost and quality of silence during data entry. Braille printers convert text files into hard-copy Braille. Current disadvantages of Braille printers are that they are noisy and expensive. (Schreier, Levanthal & Uslan, 1991)

According to Golub (2002), there are three main types of workstations adjusted for the visually impaired. They are:

1 A completely closed system—one integrated hardware unit comprising of all necessary components (scanners, keyboard, computers)

2 A semi open system- personal computer components that are not integrated into one hardware unit, but as separated.

3 An open system- a typical personal computer with software for the visually impaired (Internet support for a blind internet user).

The main downside to these units of equipment is that they are expensive. Another issue of concern is with minor languages for which text-to-speech software is of low quality or still non-existent.

Persons with disabilities and particularly the visually impaired who use assistive technologies are very restricted in accessing the world wide web content. There is ample evidence to show that one of the main problems in accessing the internet has been poor web design (Williamson, Schauder and Bow, 2000). It is crucial that the visually impaired have access to and use digital formats and this is why countries such as United States, Australia and the European Union have legislations that provides for accessible design. Now there are internationally acceptable guidelines that provide detailed instructions on the design of accessible web pages for the visually impaired. Visually impaired users have difficulties with pages having images and other non-textual elements (scripts, applets, plug-in) without alternative texts, especially if images are used as links. When graphics are used without alternative texts, the user does not know whether they are important or not. There is also the need to avoid functions that can be controlled by a mouse only, as the blind cannot use the mouse. (Christensen, 2001). Other common problems are non-described tables, poor colour contrast and badly chosen colours for colour blind users.

Provision of Online Digital Collections for the Visually Impaired: A Check on Global Practices

At the heart of several initiatives regarding online digital collections for the visually impaired is the promotion of digital library collections for the physically challenged with emphasis on collaborations and the fostering of international resource sharing. There is the need for a union catalogue of accessible formats, as in some countries; there are over a hundred producers of accessible formats, and efficient cross-searching of catalogues of accessible formats at the international level should be an aim to strive for. These catalogues should

include digital texts on the world wide web, for those that are freely accessible such as in project Gutenberg as well as those restricted to the blind, such as in ***Bookshare*** (bookshare.org**) .**

TESTLAB (Testing Electronic systems using Telematics for Library Access for the Blind) is a European Union project aimed at building a central catalogues of accessible library materials and adapting existing OPACs for the blind users. It also promoted the establishment of computer workstations for the visually impaired at local libraries. There are large online national catalogues of accessible formats, such as those of the UK National Library for the Blind (NLB), the Canadian National Institute for the Blind and web access to newspapers, and of the US National Library Service for the Blind and Physically Handicapped. Visually impaired musicians were catered for through a European Project ***(Miracle) which*** aimed at providing a central catalogue of Braille musical scores. It was not meant to be an international catalogue of music only, but also digital files of pieces would be provided with records (Tucker, 1999)

Digital text can be downloaded onto a CD enabling a visually impaired user to make a choice of preferred method of access. Many texts have been made available in digital formats now, however several others are not, especially those new publications that are copyright protected. Digital collections which are made freely accessible contain copyright free documents only. A good example of this is the ***Gutenberg Project.*** There are other digital collections on the internet that can be found in directories, such as IFLA Electronic collections. A digital collection that has paid particular attention to accessibility for the visually impaired is ***Austrian Literature Online*** which provides exam literature for the blind and visually impaired students in Austrian Universities.

In the United States ***Bookshare*** enables people with print disabilities to legally share scanned books which are created by volunteers and members who submit books. Authors and publishers can also submit digital versions of the books, thus saving time and additional work for scanning. ***Tiflolibros*** was a similar project done in Argentina, it enabled the visually impaired to register for free and download books that has been scanned by others, as well as to upload what they have scanned. In the UK Online Originals a publishing company with a strong links with National Library for the Blind makes available for free formatted titles for speech synthesis and refreshable Braille via the NLB website. Also ***KnowUK*** another NLB project is a collection of most heavily used reference in British Libraries. Talking Newspaper

Association of UK provides links to newspapers in the UK and makes newspapers and magazines available as electronic texts, distributed on computer disks, by email or retrieved from a bulletin board service.

Barriers to Use of Assistive Technologies by the Visually Impaired

The challenges to the assimilation and use of assistive technology appear to be a difficult one. First and foremost, it is important that technology adoption and use by the visually impaired must be based on the understanding of user's requirement and enhanced inclusion. Adetoro, 2009)

The specific challenges to achieving the foregoing include limited economic resources on the part of institutions and the V.I persons themselves; the often low level of literacy among the VI, limited technology assimilation and the low level of understanding of the capacity of persons with disabilities generally are major constraints. The major challenges imposed by technology on the VI are predicated on accessibility (Sandhu, Saarnio and Wiman, 2001). Users have to adapt to the norms, which are always set through the design and operation of technology. In today's digital environment, the gap between the VI and their sighted peers in terms of access to information using technology will inexorably widen. An increasingly multi-media society with focus on what is visual will further widen the gap. (Adetoro, 2009)

Affordability of technology constitutes another barrier. The array of assistive technology/devices that help the V.I to use computers has grown, however the prohibitive cost of these products prevents their widespread deployment. This techno-economic view has resulted in an imbalanced situation and society of people who have access and those who have not. Aside the problems of access, the VI are more disadvantaged because of their general functional limitations especially their lack of skills required to operate and use ICT. In Nigeria, like in many developing countries, many times the problem is not lack of potential or lower intellect of the VI, but total lack of opportunities.

A study (Adetoro, 2015) identified the barriers to information and technology use by the visually impaired as follows:

1 Opportunities for schooling both at primary secondary and tertiary levels are very limited.
2 Inadequate, old and in some cases obsolete information resources

3 Visually impaired students, many times lack any form of individualized instruction, which places them at a disadvantage in an integrated school systems.

4 Specialized libraries are a few especially in Africa and other developing countries. This means information access is limited.

5 The world had been slow and in some climes negligent in fulfilling the global policy of equal educational opportunities for all children regardless of their physical, mental and emotional disabilities.

Conclusion

The visually impaired in the digital age surely has opportunities to access information as never before. Assistive technologies and the deployment of different ICT tools to widen access to information resources could provide the visually impaired equal access to knowledge and information on a global scale, thereby making them active participants in the information society and the knowledge economy. These being said, the hurdles to be cleared seemed surmountable if and when concerted efforts are concentrated on addressing the pertinent issues and challenges surrounding use of and access to technology for the visually impaired. These issues which were catalogued in this paper are crucial to achieving the global objective of equalisation of opportunities for all persons with disabilities.

References

Adetoro, A.A. (2009).Relationship among reading interest, information materials availability and alternative format utilization by persons with visual impairment in selected libraries in South-western Nigeria. Unpublished Ph.D Thesis, Department of Library and Archival and Information studies, University of Ibadan, Nigeria.132p

Adetoro, N (2009) Information and Communication Technology as an access equaliser of information : Opprtunities and challenges for Nigeria's persons with visual impairment. *The Information Technologist* 6, 1: 115-122

Adetoro, N (2015) Visually impaired information users in Nigeria: Characteristic, challenges of inclusion and the dilemma of the excluded. Paper delivered at the Africa conference, University of Texas at Austin, 3-5 April

Atinmo, M.I. 2000. Availability and Accessibility of Library Resources to the Visually Handicapped in Nigeria. The Way Forward. *Journal of Association of Libraries for the Visually Impaired.* 1, 1: 15-22.

Belay, T. E (2005) African Perspective on Visual Impairments ICT and Policies: A Personal Experience, a Variety of Perspectives and technological solution. A Paper presented at the world summit on the information society workshop on ICT and persons with disabilities. Kran Exhibition Park, Tunis, Tunisia 16 Nov. 11p.

Braizer, H (2007) The role and activities of the IFLA Libraries for the Blind section. ***Library Trends***, 55 (4) pp. 864-878.

Craven, J (2003) Access to electronics resources by visually impaired people. Information Research, 8 (4) Retrieved October, 2008 fom http://informationr.net/ir/8-4/paper156html.

Elaydi H.A. and Shehada, H (2007) A source of inspiration. ACT for visually impaired students at the Islamic University of Gaza. Paper presented of the ICTA conference held 12-14 April Hammanet, Tunisia. Retrieved 5th, September 2008 from

www.esstt.rnu.tn/utic/tica2007/sysfiles/medias/docs/p.32paf.

Evans, M.K. 2000. Serving the needs of visually impaired information seekers in UK public libraries. *Paper presented at the 66th IFLA Council and General conference. Jerusalem, 13 – 18 August*. Retrieved 5th Nov., 2005from http/www.ifla.org/iv/66/paper/111-158E html.

Golub, Koraljka *Digital libraries and the blind and visually impaired.*, 2002 . In 4th CARNet Users Conference - CUC, Zagreb (Croatia), 25-27 September 2002. [Conference paper]

Harris, T. 2005. Demography of Visual Impairment in the UK. Best Practice Manual Chapter 5. Retrieved 3rd Dec., 2005 from http/www.bpm.Nb-online.org/chapter5html

International Federation for Library Association and Institutions 2002. Libraries for the blind section: strategic plan, 2002-2003. Retrieved 5th of Nov., 2005 from http.www.ifla.org/contacts.

National Literacy Trust 2005. Blindness, Visual Impairment and Literacy. Retrieved 4th Oct. 2005 from http/www.literacytrust.org.uk/canadareads/crf/2005/literacy html.

Obani, T.C. 2002. Developing Library and Information Policy for the Visually Impaired in Nigeria. *Journal of the Association for Visually Impaired.* 1, 2: pp.1-7.

Roos, J.W (2007) Libraries for the blind as accessible content publishers: copyright and related issues ***Library Trends.*** 55(4) pp 879-916

Sandhu J.S, saarnio I and Wiman R (2001) Information and communication technologies and disability in Developing countries . Retrieved 5th, September 2008 from http// site resources. World bank.org/DISABILITY/resources/280658-117260 9480904/information commsandhll.pdf.

Schreier, E M, Levanthal, D D & Uslan, M M (1991). Access technology for blind and visually impaired persons. Technology and Disability, 1 (1) 19-23

Schroeder, F.K. 1996. Perceptions of Braille Usage by Legally Blind Adults. *Journal of Visual Impairment and Blindness.* Retrieved 4th Nov., 2005 from http/www.plexxa.org/papers/index/html

Tucker,R N(1999) The MIRACLES and the blind musician. Exploit Initiative 3 retreived from http://www.exploit-lib.org/issue3/miracle

Williamson, K.; Schauder, D.; Bow, A. Information seeking by blind and sight impaired citizens : an ecological study. // Information Research. 5, 4(2000). http://informationr.net/ir/5-4/paper79.html (04-08-2002)