

The Place of Assistive Technology Devices in Facilitating Reading for Children with Visual Impairment in the Twenty First Century Nigeria

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Abstract

This paper was premised on the thesis that children with visual impairment (CVI) in the 21st Century Nigeria have the right to be taught to read, write and profit from advantages of reading including appreciation of literature, and that it is the primary responsibility of government to ensure that this right is not denied them under any guise. To actualize this thesis, the four methods by which CVI read were discussed to pave the way to appreciate the difficulties that they encounter in learning to read Braille, which is the primary method of reading by CVI. Low vision children read print with magnifying devices which are not readily available, and this makes these children to compulsorily read Braille. The array of assistive technology devices that can diversify reading media options for the children, address the difficulties they encounter in reading through unsuitable media, and which, in the process facilitate convenient reading for the CVI were presented. Classroom pedagogic barriers to teaching CVI to read such as unqualified and inexperienced teachers, on the one hand, and the very limited awareness about the key place of the devices, their expensiveness and unavailability in schools, on the other hand, were briefly discussed. Four suggestions that can address the barriers to teaching CVI to read, and to provide the devices were put forward. These include awareness creation about assistive technology devices

and their place in facilitating reading for CVI, special teacher curriculum review to include and emphasize assistive technology devices for reading, the provision of the devices /resources in schools, funding and other stakeholders' involvement in the provision of assistive technology devices.

Key Words: Assistive Technology Devices, Children with Visual Impairment, Braille Reading, Visual Impairment, Literature Appreciation and 21st Century Nigeria

Introduction

Human beings are born into a language space and culture which is a tool to communicate and meet needs. Language consists of a commonly agreed system of communication unique to a culture and represented by speech, writing or gestures. Encyclopedia Britannica (nd) sees language as a system of conventional spoken (verbal), manual (gestures) or written symbols by means of which human beings as members of a social group and participants in its culture express themselves. Languages are meant to be understood through symbols, the recognition and understanding of which is called reading.

Many definitions of reading abound from decoding meaning from words, to decoding symbols but not word calling. Andzayi (2004) defined reading as involving not only word recognition and pronunciation but the ability to derive meaning or understanding from prints that are read visually. Reading is an interaction between the author of a given text and the reader of the text (Babudoh, 2004). An inclusive definition of reading from Wikipedia says it is a process of taking in the sense or meaning of letters, symbols especially by SIGHT or TOUCH (emphasis mine). By including symbols that can be read by sight (eyes) or touch (tactile, touch and haptic sense), the definition acknowledges that reading can be done as well by those with various degrees of visual loss who use touch / tactile perception to read the symbols. Willings (2019) avers that literacy and reading skills are foundational skills that will allow students to access all areas of the curriculum.

Touch or Braille reading is the principal method of reading by individuals with visual loss. Braille itself is a system of dot reading and writing. The alphabets, letters and words are brailled, or transcribed into

raised dots that can be felt and read by fingers from left to right. Braille has been in existence since 1824 that it was developed by Louis Braille in France who was himself a blind teacher in the School for the Blind. To date, no system or mode of reading by children with visual impairment has surpassed the superiority of Braille as a means to read and write through touch. This notwithstanding, Braille is expensive, bulky, scarce and cannot be read or written by most people (Sykes & Ozoji 1992). In addition, Braille reading speed is sustained by the sensitivity of the fingers particularly when the reader is younger. Age affects this sensitivity as well as the speed of Braille reading. Braille reading by fingers has limitations when compared with visual reading. Visual reading is by far faster than dot reading. Without technological devices the ranges and speed of reading by individuals with visual impairment will continue to lag behind their sighted peers in educational and personal / career pursuits.

Assistive technology is a device or tool or system designed to assist individuals with visual impairment overcome limitations imposed by visual loss in living a meaningful and competitive life in a sighted world. It is an indispensable mechanism for reading and writing. It opens and widens opportunities that enable individuals with visual impairment to venture into various forms of reading that enables them to equalize reading ability of others. Without Perkins Braille machine (assistive technology) for instance, many individuals with visual impairment (blindness) will be consigned to write with slate and stylus which is slower and laborious in writing Braille. Assistive technology helps to compensate individuals with visual loss in the reading process. Assistive technologies range from low cost to high end and include reading, writing and communication technologies, (Sengam, 2020)

Learners with Visual Impairment (loss) have visual deviation that ranges from myopia, for instance, to total blindness or no light perception. They are called people with low vision if they have some residual vision or people with blindness if the vision loss is severe or total. In real life only a very negligible number of people with visual loss have no light perception. Research has shown that about 85% of people with severe visual loss have some residual vision usable in some activities such as mobility. They are thus a heterogeneous group. Ozoji, Unachukwu and Kolo (2016) identified two perspectives to define and classify visual impairment, namely, medical, which uses the result of

Snellen Chart tests; and educational, which uses inability to read print even when enlarged. Each of these definitions modalities raises the need for assistive technology such as lens and Braille machine respectively. Bauman (1969; 256) identified blindness as a factor in the total life system more or less affecting all other factors in that system. Ozoji, Unachukwu and Kolo (2016) confirm Bauman's statement that visual impairment has multiple impacts on an individual due to the immense role vision plays in learning when compared with other senses. The implication of educational definition is that the person resorts to or relies on other means or systems such as haptic or auditory sense organs to be able to read. Fundamentally, a person with visual impairment reads majorly through Braille as an assistive technology device to read and to advance towards sighted readers' level in educational pursuits.

Literary appreciation is a genre of reading at its finest level. Meaningful reading is expected to end with comprehension which is the ladder to literature appreciation. Anigbogu and Uwakwe (2016) define literature appreciation as “reading, understanding and making a critical judgment of the theme, style, use of figurative and non-figurative language as well as other elements of a literary work”. Children with visual impairment ought to be aided and directed in their reading to read for comprehension and literature appreciation. This level is achievable by many of them, given the fact that they employ audio-aided reading with listening which tends toward literature appreciation. This level can define and redefine their career path into the literatures. With proper teaching of reading for comprehension and the assistive technologies backup, this goal becomes attainable by many of them.

The world has already been in the 21st century in since 2001. By the mid-century, Nigeria is expected to turn its back on analogues and look up to a world that is technology-driven in all its educational operations. It is an era in which assistive technology devices should take firm roots in the education sector, including facilitating reading for children with visual impairment. It should be an era for competitive reading because all the hurdles against reading would have been eliminated. This is reading excellence in the new normal where visual loss-friendly devices are equalizing the performances of the visually challenged with those of the sighted, thus preparing the visually challenged to be functional readers now and in the future.

The thrust of this discussion centres on three premises, a) that children with visual impairment have the right to be professionally taught to read, write and profit from advantages of reading including literature appreciation, b) that it is the primary responsibility of government to ensure this right is not denied under any guise, and c) Braille reading is slow and tedious; and left to itself, its readers will hardly advance reading to literature appreciation. To drive the discussion, the reading process engaged by these individuals shall be discussed to appreciate the difficulties they encounter in reading and the value of assistive technology devices in their reading efforts. The various types and uses of assistive technology devices that foster reading for individuals with visual loss will be presented. Challenges likely to be encountered in fostering reading for individuals with visual impairment shall be highlighted. The discussion shall end with four suggestions that will address the identified challenges which, if successfully heeded, will lay the foundation for proper teaching of reading and application of assistive technology devices to enhance it. Ultimately, the new vista of reading raises the hope and promise that CVI will begin to read competitively and gradually become good readers and will progressively attain literature appreciation status in life.

Reading By People with Visual Loss

People with visual loss can read print with difficulties but better, faster and more pleurably with various assistive technology devices depending on their degree of visual loss (whether the reader has low vision or has no light perception) or choice and convenience of assistive technology device available to them. Individuals with minor visual loss/low vision can use magnifying devices such as optic lens. Majority with severe visual loss (blindness) ordinarily read Braille which is an embossed dot reading. By choice, others read through auditory mode by listening to pre-recorded instructional/educational/ serials materials. The world of ICT has broken down the barriers to reading for these people, thereby minimizing the ability difference in reading by all learners irrespective of their visual status. The media of reading could be visual, tactile, auditory and electronic.

a. **Print reading by magnification**

Print reading is done visually either through normal vision or through magnifying lenses if vision is impaired. Magnifying glasses are simple optical devices used for viewing details of objects with some magnification. They make print appear larger than it actually is. They come in many styles and sizes. Just as reading glasses, magnifying glasses are designed to support vision, therefore, do not hurt the eyes; they may create initial discomfort until the eyes get accustomed to them. Magnifiers and reading glasses belong to convex lens.

Reading does not stand alone but in essential components of vocabulary, phonemic awareness, phonics and comprehension which is the final goal of reading. Olufemi (2018) avers that comprehension is the last component and most important aspect of reading because reading without comprehension is more or less a waste of time and resources. Individuals with all types of refractive errors and other moderate visual dysfunctions can read with magnifying lens and compete with those without visual impairment. People with mild-moderate visual loss can access school curricula up to higher degrees by use of magnifying lenses or convex lens. Magnifying glasses are typical assistive technology devices.

b. **Tactile reading**

Braille is a tool, a system of embossed dots that are arranged in cells of six dots in a 2 by 3 arrangement. Each cell has provision for six dots which can represent a letter, word, numeral or punctuation mark depending on how the dots are arranged. For instance, dot one alone in the first space of the cell means letter "A". Letter "B" is represented by dots 1 and 2 while letter "C" is captured by dots 1 and 3 etc. Braille is read with the fingers and has three grades or levels. Braille grade one contains standard 26 letters of the alphabet written in full spelling, each word Brailled letter for letter and used to teach Braille to children and beginners. Grade two Braille also has the same 26 standard letters but uses contractions of letters to form words. Contractions reduce space of writing, increase speed of reading and reduce storage of Braille books. People can read Braille by moving their finger tips from

left to right across the lines of dots. Lowenfeld's (1980) research showed that the first and second fingers of both hands are the most preferred ones; and that the index fingers of both hands are predominantly used as reading fingers. Sighted people read Braille visually not with fingers.

Braille is a code by which many languages and subjects may be written and read. Thus, virtually, most languages can be written using Braille codes. In Nigeria, the Nigerian Educational Research and Development Council (NERDC) has developed the three Nigerian major languages of Hausa, Igbo and Yoruba in Braille. This means one can write in any language using Braille. Through Braille individuals with visual impairment can participate in class activities at all levels of education and obtain academic qualifications like others. Thus, individuals with visual impairment can study the sciences, technology, arts, mathematics with the benefit of Braille. For instance, the University of Jos graduated one mathematics degree graduate with severe visual loss mostly by Braille reading and writing.

In comparative terms, print reading has a lot of advantages over Braille reading. Print reading is faster than touch reading. Some of the reasons include that vision is instantaneous, can see the page space at a glance, can permit the application of reading skills and techniques, etc. On the other contrary, learning to read Braille is much more difficult; it taxes one's memory to a great extent; spelling problems are more pronounced because of contractions; the speed of touch reading is three to four times as slow as visual reading (Lowenfeld), Braille books are much larger and thus take up a great deal of storage space, etc.

c. **Auditory reading**

Auditory readers ordinarily read and hear words silently, but not by lips, tongue or vocal cords. The literature indicates that they read in the 200 to 400 words-per-minute range. Auditory readers prefer listening to a lecture than reading a textbook. Auditory learning style is learning by hearing and listening. It is a cliché that CVI listen to music more than other.

One can read to auditory learners or they can listen to pre-recorded materials. They are good at writing responses to lectures they

have heard, at oral exams and are good at story telling. They are best through their sense of hearing. They are said to remember things easily. They like hearing themselves and allow others talk. Sykes & Ozoji (1992,168) insist that “Recorders are now available that can 'compress' speech allowing blind and low vision individuals to achieve parity with print readers in terms of reading speed and comprehension”. Radio is accepted as a value device for teaching macro-language skills of reading, listening, speaking and writing. It is, therefore, no surprise that it is widely used in developed countries for teaching and learning, probably because CVI achieve much of their learning through listening.

d. **Electronic reading**

Electronic devices facilitate reading for everybody but more specifically for individuals with visual impairment. Examples of electronic devices include desktop computers, laptop computers, smart phones, smart watches, tablet computers and e-readers.

The four modes by which individuals with visual impairment can read and write are: visual – magnifiers; tactile – Braille; auditory – listening devices, and visual – tactile –auditory-electronic devices have been identified and how they facilitate reading for them. These devices are assistive technologies in their rights.

Assistive Technology Devices that Facilitate Reading for Individuals with Visual Impairment

Washington.edu defines assistive technology as technology used by individuals with disabilities in order to perform functions that might otherwise be difficult or impossible. The Technology Related Assistance to Individuals with Disabilities Act of 1988 (Tech Act) described assistive technology device as “any item, piece of equipment or product system, whether acquired commercially off the shelf, modelled or customized, that is used to increase, maintain or improve functional capabilities of individuals with disabilities”. Assistive technology service is seen as part and parcel of assistive technology which the Individuals with Disability Act (IDEA) of 2004 explains as “any service that directly assists a child with a disability in the selection, acquisition or use of AT device”. The service, according to the Act,

includes “evaluating the needs of a child for AT, purchasing, leasing or otherwise providing the AT, selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing or replacing AT, coordinating and using other therapies, interventions or services with AT, training or technical assistance for such a child, and training or technical assistance for professionals in the education of the child”

There are varieties of ATD that can facilitate reading from basics to literature appreciation for individuals with visual impairment. The list below displays some of these technologies. They are examples of soft/hard ware devices that can help these people read printed materials or surf the web. The assistive technology devices in this discussion are those mostly used by individuals with various degrees of visual loss. Persons with other impairments have their devices as well.

1. Devices for low vision individuals. The primary work of devices for low vision people is magnification of prints, its projection on a screen, color filtering for those with colour blindness, reading glasses etc. Typical devices include magnifying lenses, magnifying hard/software. With these devices, low vision people can access print like other sighted individuals. (see figure 1)
2. Devices for Braille reading and writing. The focus of devices here is to transform print into tactile/dot format that individuals with severe visual loss (blindness) who cannot read print either in its normal or enlarged form can access print like others. Typical devices under this category include Perkins Braille, Thermophone, Braille Translation software and Braille printers (see figure 1)
3. Devices for audio reading. The audio reading devices present life/recorded materials to be listened to by individuals who prefer audio to print and tactile reading. Typical examples include Radio, Cassettes, FM listening systems, special talking book, etc (see figure 1)
4. Devices in ICT/electronic for reading. With the use of electronic/ICT devices, individuals with severe visual loss can access print reading. Typical examples of electronic devices include computer-based reading software, JAWS (Jobs Access With Speech), CCTV, smart phones, Refreshable Braille displays, etc. (see figure 1)

With the assistance of these assistive technology devices, individuals with visual impairment can compete favourably with their sighted peers in reading. It is common knowledge that not everything in print is in Braille or audio format. Enabling individuals to access print is one of the main targets of ATD. This way, ATD provides unlimited support to pupils with visual impairment in their curriculum and extracurricular pursuits.

Visual (Low Vision)	Tactile (Severe Visual Loss)	Auditory (Low vision/severe vision loss)	Electronic (Low Vision / Severe Vision loss)
*Magnifying lens	*Braille	*Audio text	*Electronic braille
*Projector	*Braille Translation	*Computer based	note taker
*Reading Glasses	Software	reading software	*Electronic Braille
*Optic magnifiers	*JAWS (Job	*FM listening	writer
*Large print	Access with	systems	*Closed circuit
*Color filter	Speech-screen	*Cassette recorders	Television (CCTV)
*Screen readers	reader)	*Special Talking	*CCTV with
*Video magnifiers	*Braille Book	books	distance camera
*Magnifying	maker	*Audio descriptors	*Electronic
hardware	*Pekins Braille	*Text –to-speech	magnifiers
*Magnifying	*Braille	and Braille output	*Smart phone,
software	Printers/Embosser	*Postcast	Iphone, cell phone
* Screen magnifiers	*Type writers	*Radio	with inbuilt reading
	*Refreshable		apps to read
	Braille Display		newspapers for
	*Reading /		instance
	Scanning software		*digital
	*Text-to-Braille		encyclopedia for
	translation software		IVI
	*Screen readers for		*Personal digital
	the blind		assistants
	* Braille printers		*Screen reader with
			Braille devices
			*Computer based
			reading software
			*JAWS(Job access
			with speech is a
			screen reader
			* Kurtzwell
			Education
			* Refreshable
			Braille Displays
			* Colour ID

Figure one: ASSISTIVE TECHNOLOGY DEVICES – READING MEDIA MATRIX

The Challenges

The challenges that militate against reading and assistive technology devices are interrelated, poor teaching of reading versus lack of assistive technology devices in teaching reading to individuals with visual impairment. Teaching reading by inexperienced teachers is bad pedagogical practice in itself and teaching reading without ATD only exacerbates woeful teaching of reading to individuals with visual impairment. The state of teaching reading to this group should be seen to have assumed high point crises that will continually leave these people as struggling readers unless urgent steps are taken now to revisit the situation.

One principle of special needs education pedagogy is the use of instructional materials and assistive technology devices to make the instruction concrete, and to compensate the learners for the limiting effect of their impairment in the learning process. It is common knowledge that over 70% of learning is visually-mediated, (Sykes & Ozoji 1996) meaning the individual with visual loss has only about 30% of learning to grapple with the remaining sensory organs. The stress, frustration, the obstacles that stand on the way of learning by CVI can significantly be reduced by the application of ATs in their learning process.

A major challenge in this field is the lack of awareness of the place of AT in teaching a child with visual loss. If the stakeholders in their education were to realize the harm the lack of ATD had done and will continue to do to these children in and out of school, much earlier effort would have been expended to equip the schools with sufficient ATDs to make their education competitive with others. Akang (2014) found out that in most schools for the blind in Nigeria, children were helplessly made to read Braille irrespective of the state of their residual vision. The researcher had to import low vision aids from India to be able to study their impact on reading comprehension of the children. The result showed a remarkable reading comprehension achievement of the experimental group that used the low vision aids over the achievement of the control group. The study recommended that vision screen should

be carried out in schools to determine the vision status of children and those of them that need low vision aids. Ignorance is therefore the bane of adequate teaching of reading to CVI.

Poverty is another challenge in the procurement of the ATDs majority of which, especially the hi-tech types, could be quite expensive and almost entirely imported. Considering the dollarization of Nigerian currency and the Naira exchange rate, a simple low tech AT cost could be mind blowing to look at. In spite of this, with a strong political will and curbing of systemic corruption in the country, the purchase of these devices would not be a problem for a government interested in the education of these individuals. The big question is whether the education of CVI based on expensive ATDs – unaffordable by many, can the education of the children be accessible and affordable?

Nigerians generally are poor readers, many read to pass examinations and most stop reading after graduation. This state of reading in and out of school breeds poor reading culture in the country and poor attitudes towards teaching reading, provision of reading resources and lack of interest in anything that involves reading such as governance. The situation is worse for CVI. The few basic books in schools are neither in Braille nor in audio format or e-format for CVI to benefit from.

Globally, parents are recognized as major team players in teaching their children from home, buying reading books for the children, providing language rich family environment and growing reading interest in their children. If majority of parents are poorly educated, whose literacy level is abysmally low and most of who do not have faith in western education, and do not send their CVI to school, the situation is only more than worse for the children.

ATD, apart from being expensive, have interrelated services attached to their usage in schools. A school or parent may not just buy any AT device without need evaluation, selecting, designing, fitting, customizing, training or obtaining technical assistance from the appropriate professionals. To do this is akin to self-medication in medical practice. The cost of securing these consulting services only makes the procurement of ATs beyond the reach of most schools and

parents. Even when purchased, the enabling environment to operate them is a challenge in itself. Are they safe in schools? Is electricity stable to operate the high tech devices?

Suggestions

The thesis of this discussion is to help CVI develop good reading habits with the support of ATD that will take them to literature appreciation. They are entitled to the benefit of reading such as mental stimulation, vocabulary improvement and knowledge acquisition. The following suggestions can improve reading skills of CVI as well as institutionalize ATD in the education of the CVI because of the help it renders to them such as writing documents, browsing the internet, using of computers, smart phones, etc.

1. There is perceived low awareness of ATDs among Nigerians and the role they play in quality education of CVI. Massive awareness creation about the indispensable place of ATDs in the literacy advancement of CVI is the key to their education and functional living in the society. This awareness is a necessity for all stakeholders in the education of the CVI including parents, teachers, government and education-based agencies who serve the educational needs of Nigerians, including the CVI. The Ministry of Education should take the responsibility for this awareness creation. In the United States of America, the American Foundation for the Blind produces a monthly online Tech magazine which reviews tech products and online resources for people with vision loss called Accessworld®. Ozoji, Akang & Dala also hammered of awareness about low vision aids and reading by low vision children. All stakeholders in the education of CVI need re-orientation towards CVI reading and ATDs. In India, Senjam (2020) identified awareness creation as the first and foremost strategy to improve ATD services for CVI among teachers, potential beneficiaries, care givers and families.
2. Special Teacher Training Institutions, as a matter of policy should make a strong case for a review of their curriculum to include adequate space to assistive technology devices for teaching children reading, which is a key to studying all other subjects in schools. This presupposes that the institutions

should have the ATDs, and the staff is adequately tooled to teach and demonstrate their uses during micro-and practice teaching of pre-service teachers. The Ministry of Education and regulatory agencies National Commission for Colleges of Education (NCCE), National Universities Commission (NUC) and Universal Basic Education Commission (UBEC) are urged to consider this review as a matter of urgency.

3. CVI should be exposed to their appropriate mode of reading – visual, tactile, auditory and electronic in order to equalize their reading ability with their peers. Consequently, the availability of reading resources backed by effective teaching of reading and ATD should be part of the school resources' new normal both in special and inclusive classrooms. The principle of equity requires that ATDs, no matter how expensive they may seem, should be purchased for CVI reading and other subject studies. Publishers of Nigerian school books can emulate Oxford University Press that has initiated e-books for Nigerian children. E-books in literature, basal readers, drama, and poetry books for CVI will impact significantly on their interest in reading.

5. Funding is the root of the success of teaching reading and availability of ATDs. The newly established National Commission for Special Education should take it up to source for funds both from private and public sources in order to provide the necessary ATDs for schools. TETFund can be resorted to for funding of ATDs in schools. Development partners can direct their support towards education in developing countries such as Nigeria to the supply of assistive technology devices. MTN scholarship to special needs students in higher institutions is commendable. Extending such support to assistive technology devices will help far more CVI than just one person that enjoys the scholarship.

Conclusion

This discussion on reading for CVI and the place of ATD in enhancing the reading is basically an exploratory advocacy attempt to call attention of stakeholders to the education of these children stressing that the present effort at teaching them reading is a great disservice and a failure. The visual loss places a great deal of stress on their learning to read and enjoying it to literature appreciation level principally because

of the absence of ATDs in teaching them. The various such devices that should constitute major school resources were pointed out. The challenges blocking the opportunity of ATD included limited awareness of their place in teaching, teacher inexperience of the ATD, near non-availability of ATDs in schools and exorbitant costs of their purchases. Various suggestions to tackle the challenges were put forward. In the end, it is expected that ATDs will become common school resources in teaching reading to CVI in Nigerian schools. Following from this expected new normal, CVI can naturally take to the literatures as careers, and be functionally literate for a meaningful living among the sighted.

References

- Akang, I.A. (2016). *Impact of low vision aids on reading comprehension of learners with low vision in Kaduna state special education centre*. Unpublished Masters Thesis, University of Jos.
- Andzayi, C. A. (2004). *Research in second language reading using a single – subject experimental design: Some fruitful findings for teaching reading*. Jos LECAPS Publishers.
- Anigbogu, N. & Uwakwe, G. D. (2016). Literary appreciation in A. E. Ogu; R. C. Ihejirika and O. A. Emejuru (Eds). *Use of English and communication skills for tertiary education*. Owerri: Cel-Bez Publishing Co. Lte
- Bauman, M. K. (1969). Dimension of blindness in M. H. Goldberg and J. R. Swinton (Eds). *Blindness research: The expanding frontiers*. Penn: The Pennsylvania State University Press.
- Babudoh, B.G. (2014). Enhancing Literacy ability and competence of learners with reading difficulty using comprehension therapy. *Journal of International association of special education* 15 (1) 48-57.
- Britannica (n d). *Language definition, types, characteristics and facts* Britannica.com
- Individuals with Disability Act (2004). Author.

- Lowenfeld, B. (1980). Psychological problems of children with severely impaired vision. In W. M. Cruickshank (Ed). *Psychology of exceptional children and youth (4th edition)*. Englewood Cliffs: Prentice Hall.
- Olukemi, M. (2018). *Effects of audio-media on reading comprehension performance of students with visual impairment in Government vocational training centre for the Blind*, Unpublished. M. Sc. Thesis in the Department of Special Education, University of Jos.
- Ozaji, E. D.; Unachukwu, G. C. and Kolo, I. A. (2016). *Modern trends and practices in special education*. Abuja: Nigerian Academy of Education.
- Ozaji, E.D, Akang, I & Dala, B G (2016). *Impact of low vision aids on the reading of comprehension of learners with low vision in Kaduna, Nigeria: An exploratory study* Conference paper presented at the 10th WARIMA international conference and workshop held at the Medical Research Council Unit, Banjul, The Gambia.
- Senjam, S. S. (2020). *Dephi Journal of Ophthalmology*, AuthorA Do1<http://dx.org/10.7869/djo.496>.
- Sykes, K. C. & Ozaji, E. D. (1992). *Teaching blind and low vision children*. Zaria: ABU Press.
- The Technology Related Assistance to Individuals with Disability Act (Tech Act.) (1988). Author.
- Washington.edu. *What is assistive technology?*
<https://www.washington.edu>
- Willings, C. (2019). *Reading instruction for individuals who are blind or visually impaired*. Teacingvisuallyimpaired.com