# APPLICATION OF ASSISTIVE TECHNOLOGY IN THE EDUCATION OF CHILDREN WITH VISUAL IMPAIRMENT

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**Abstract**

This paper focused on the application of assistive technology in the education of children with visual impairment. It identified assistive technology as a product of science and technology modified, to maintain, and improve functional capacity of these children. Assistive technology ranges from traditional one like Braille machine to modern ones such as open book scanning software, Close Circuit Television (CCTV) and refreshable Braille display. The paper also classified assistive technology, identified their instructional application, relevance such as helping this group of learners to access the general curriculum in an inclusive setting and increase their functional ability in reading and writing. It articulates strategies for encouraging the culture of using assistive technology and concluded that stakeholders should assist the visually impaired to acquire and use these devices through Free Acquisition Scheme (FAS) and capacity building on the use of sophisticated ones designed to meet the 21st century challenges of educating the visually impaired.

The right to functional education for all humans including children with visual impairment dates back to the United Nations convention and declaration on human right of 1948, since this declaration/convention states that were signatory to the document especially as it relates to education have made several attempts to domesticate the provisions of the convention. As part of the aforementioned convention, the Nigerian government has legalized access to qualitative education to all irrespective of their sex status, ability/disability. In addition to the constitutional provision, educational policies such as Education For All (EFA), Inclusive Education (IE), MDGs on education and Universal Basic Education (UBE) mandate all levels of government to universalize access to quality basic education. Constitutional provisions for these policies empower every Nigerian child with/without disability to have access to functional education that leads to self and national development.

In Nigeria, the current approach to education is inclusion. With this approach, children with/without special needs are required to be educated in the same classroom. This strategy is considered the best if properly implemented because it increases the level of social interaction between the so called "normal" and those with special needs. To enhance the desired social interaction as well as gain optimally from inclusive education, children with special needs particularly those with visual impairment must have increased and sustainable access to the general curriculum despite adaptation that may be required in some exceptional cases.

One of the ways to access the general curriculum by the visual impaired is through assistive technology (Smith, 2007). Advancement in science and technology has influenced all aspects of human life including education of children with visual impairment (Orim, 2012). According to Hitchcock and Stahl, (2003) assistive technology is critical to the participation of persons with disabilities in

workplace, community, and at school, thus, it removes barriers that restrict people's lives. For instance, assistive technology provides text-to audio translation to those who cannot access prints. It seemingly compensate for the lost ability.

In the United States of America, application of assistive technology devices in the education of children with visual impairment has been legalized since 25th October, 2004 when PL 108-364 (Assistive technology Act, 2004) was signed into law by president George W. Bush (Smith, 2007). The law mandates stakeholders to budget for these devices, build capacity of the users, demonstrate new ones and provide related services.

In this paper, focus is on the application of assistive technology devices in the education of children with visual impairment. Also, emphasis is on the concept of assistive technology, their instructional application, relevance and strategies for developing a culture of using assistive devices in the education of children with visual impairment in Nigeria.

The Concept of Assistive Technology and Services

In recent times, assistive technology and services have become common features in the literature of special needs education particularly for the visual impaired. They have been conceptualized differently by various scholars. Here it is viewed from two perspectives, the devices perspective and services perspective. According to the individual with Disability Education Improvement Act, 2004 (PL 108-364), assistive technology devices are objects, pieces of equipment, or products that are purchased commercially, modified or customized for use to improve, increase or maintain the skill(s) of a child with disability. It does not include any surgically implanted medical device or its replacement. Assistive technology Act 2004 (law that facilitates increased accessibility to the general curriculum through technology) sees it as any device regardless of its sophistication, that enables the user to enhance his/her functional capabilities. This paper defines assistive technology as any device that is the product of science and technology designed to act as the lost part/organ of the body; it compensates the impaired part/organ in terms of helping in the performance of the function(s) that would have been otherwise difficult due to an impairment. It can be powered with/without electricity. The word electricity as used here includes dry cell battery.

Assistive Technology Service (ATS)

Hunt and Marshall (2005) held that assistive technology device is any service that directly aids an individual with a disability in the selection, acquisition/use of any assistive device(s). Simply put, it involves any training or capacity building activities that help the user purchase, maintain and make appropriate use of the device.

From the foregoing, the effectiveness of any AT depend on the assistive services received by the user. This implies that, since children with visual impairment need varied assistive technology and services depending on the impairment/severity, various forms of training (services) are also needed to ensure that users derive optimal utility from these devices. This places a demand on the stakeholders such as the manufacturing companies, government, teachers etc beyond the cost of acquiring these devices.

**Classification of Assistive Technology (AT)**

An intellectual navigation of literature in assistive technology for the visual impaired shows that the task of classifying assistive technology for these special learners is fairly

difficult, due to their number, nature, configuration and types. They range from simple ones like Braille machine to more sophisticated ones like Close Circuit Television (CCT) and Braille embosser.

The common among the classification is the Olayi model of classification. He grouped assistive technology into two, namely the traditional and modern represented by abacus and refreshable Braille Display (Olayi, 2002). In this paper, assistive technology is classified into four:

**Devices that increase access to prints:** These are devices that improve and increase the ability of visually impaired to access prints. Ability to read print would have been difficult if not impossible for these learners but AT has given alternative to Braille as a medium of interaction and exchange of ideas. Typical example of these devices is Close Circuit Television (CCTV), Screen Enlargement software, Optical Character Recognition (OCR) with speech and scanner and refreshable Braille display.

**Devices that increase auditory access to print:** The auditory organ of the visually impaired tends to be very active (Hunt and Marshall (2005) opined that with assistive technology such as speech software (JAWS), recorded and talking books their access to information and communication is increased.

**Device that increases tactile access to print.** Considering that their sense of sight is impaired the sense of touch becomes one of the mostly used senses. Braille printers help the visually impaired by converting print to Braille when attached to word processors. This device implicates the use of tactile output.

**Devices that increase independent travel skills:** According to Mcrk, Koerng and Ashcrost (1990) one of the ways AT is relevant to the visually impaired is that it reduces their dependability on human assistance. These devices (electronic travel aids, or canes) are aids to independent travel and provide supplementary information about the environment which are mainly the school and classroom.

**Instructional Application of Assistive Technology**

**Table 1: Shows Instructional Areas and Assistive Technology Use**

| S/N | Instructional Areas | Assistive Technology |
|---|---|---|
| 1 | Reading | Close circuit television (CCTV), open book scanning software, print-speech software through, phones/computers, Braille embosser, Braille translation software, refreshable Braille displays etc. |
| 2 | Computation | Talking calculator, clock with larger numbers, abacus, measurement tools, Braille and raised markings, money identifiers etc. |
| 3 | Study skills | Electronic organizers, Braille note takers, colour - coded files, etc. |
| 4 | Listening and comprehension | Print-speech software, open book scanning, audio-book, audio tape, Braille audio note takers. |

Source: Adapted from Smith (2002), Hunt and Marshall (2005).

**The Relevance of Assistive Technology and Services**

As the name implies, these are devices that provide appropriate assistive services to enhance the capacity of these clients. This breakthrough in science and technology has enhanced their access to quality education and improved the rate of social interaction in a globalized world. Haager and Klingner (2005) hold that assistive technology and services have adequately addressed barriers that would have restricted special learners in school and community. Hoover and Patton, (2004), Hunt and Marshall (2005) stated categorically that assistive technology and services are relevant to the visually impaired in the following ways:

i. They increase their performance in school related activities such as assignments and class work.
ii. Their access to print that would have been difficult but now ATS has increased their reading, accessing of mails and other correspondence.
iii. Assistive technology has remarkably reduced over dependence on human assistance as a guide in and out of school especially in traveling, reading, writing, mobility and orientation.
iv. Their self-concept/esteem have equally been improved hence they equate themselves with others (when they can perform the same functions with their peers).
v. Their social interaction skills are not left out from the influence of AT, since with the use of u-tube, face-book, 2go, twitter etc (social network packages) their social network has expanded.

Mack, Koering and Asheroft (1990) warned that stakeholders such as teachers should not over-look their responsibility of ensuring that these devices are profitably used by their clients.

Strategies for Encouraging the Culture of Using Assistive Technology

In a developing country like Nigeria, 75% of the children with visual impairment have poor socio-economic family background and consequently, the problem of digital divide envelopes them very well. They hardly afford basic education and human survival skills. It is against this background that this paper requires stakeholders in the education of the visually impaired to:

vi. Assist in the provision of assistive technology through Free Acquisition Scheme (FAS).
vii. Build the capacity of users to be able to apply sophisticated ones necessary for their education.
viii. Government in particular should make the use of AT in schools a law as it is done in the developed world.
ix. Researchers should be encouraged in the area of developing software that will assist the visually impaired to access information and communicate locally.
x. Direct their efforts towards this direction rather than over concentrating on HIV/AIDs prevention and control.

**Conclusion**

Educating the visually impaired without the necessary emphasis on Assistive Technology Service as well as an enabling law on this area (ATS) will amount to technically excluding these clients from a qualitative education for individual and national development, most importantly, excluding them from inclusive practices and trends going on all over the world. Thus, this paper recommends that, for these learners to be properly educated through inclusive approach, the aforementioned strategies should be adopted by stakeholders in the education of these clients.

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