# APPLICATION OF ICT IN CLASSROOMS FOR LEARNERS WITH VISUAL IMPAIRMENT IN AN INCLUSIVE SETTING IN NIGERIA

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**ABSTRACT**

*Applications of ICT in classrooms for learners with visual impairment in an inclusive setting will assist this category of learners achieve equal educational opportunity like their sighted counterparts. This paper discusses in details the concepts of learners with visual impairment and information and communication technology (ICT). It highlights the rules of using ICT in teaching learners with special needs in an inclusive setting and the materials needed by learners with visual impairment in an inclusive setting. The paper pointed out how ICT enhances learning of learners with visual impairment in an inclusive setting. It further dealt with application of ICT in classrooms for learners with visual impairment in an inclusive setting. Conclusion is drawn and the paper suggested that adequate funds should be allocated for the purchase of ICT devices and software that will assist this category of learners to achieve equal educational opportunities with sighted learners.*
***Keywords:*** *Application of ICT, Learners with visual impairment, Inclusive setting, Nigeria.*

## Introduction

Application of information and communication technology (ICT) in teaching learners with visual impairment in an inclusive setting is of great benefit to this category of learners. This is because, ICT devices will help learners with visual impairment achieve equal educational opportunity, acquire skills and competences, and use the ICT devices to search for information like the sighted learners. This is in line with the provision of National Policy on Education (NPE, 2014) on the goals of ICT in special education, which revealed that the major goals of ICT in special education are to achieve adequate education for all cases. Moreover, the elements of the goals include the special needs learners to have access to diverse curriculum, to live independent live, to enjoy parity with others in information technology usage, to have equal opportunity with others, to become technologically literate and be free to be what they wants to be, to go where they want to go and actualize their potentials (Ozoji, 2005).

Inclusive setting in this paper refers to a learning environment where learners with visual impairment are taught together with their sighted counterparts. Ozoji

(2010) maintain that inclusive setting involves changing and modifying of regular school content, structures, and strategies for all learners to be taught together in the same classroom. Therefore, application of ICT in teaching learners with visual impairment in an inclusive setting will assist in ensuring easy access to education by this category of learners as stated in the national policy on education (NPE, 2014) that all necessary facilities that would ensure easy access to education shall be provided to learners with special needs.

**Concept of Learners with Visual Impairment**

The term visual impairment refers to partial sightedness, low vision and other disorders of the eye, which prevent persons from normal use of the eye for academic and other purposes. This is in line with the definition of Kumari (2015) who defined visual impairment as the limitation of actions and functions of the visual system. Adebayo (2010) also defined learners with visual impairment as those that have problem with their sight. This involves the low vision and the partially sighted. Kumari (2015) further explained that, the visually impaired are people with little or no sight or people with profound visual loss to the extent that they cannot read or write ordinary print (small, medium or large) but use Braille as their means of communication. The persons with low vision refers to individuals who are certified as visually impaired because they have some residual vision that could be useful within a few inches. Such sight is always minimal for the performance of any schoolwork without special adaptations such as low vision aids or magnifiers and specialized help. The partially sighted are those whose vision is not severely defective. They can read large prints or regular prints under special conditions. Some of them suffer from errors of refraction such as myopia (short sight) or hypermetropia (long sight). The person with visual impairment is not very difficult to detect. Certain external characteristics help one to infer that somebody is blind.

Uche, Nene and Getrude (2015) asserts that a visually impaired learner has a limited vision to an extent that the individual requires educational modifications and adaptations in order to benefit from any learning activity that involves the use of sight. This assertion considers the extent to which a child's vision affects learning and makes special methods and materials. Dafwat and Dada (2013) also conceptualize learners with visual impairment as referring to persons with some amount of visual problems that could be remediated by either surgical operation or optical correction. All these forms of eye disorders can affect the academic performance of learners with visual impairment if there is no adequate and appropriate educational intervention in their education, like technological intervention.

**Concept of Information and Communication Technology (ICT)**

ICT refers to a system that processes, stores, transfers and communicates information. The information can take many different forms such as text, numbers, pictures, sounds, video and multimedia. Danlami and Isa (2018) defined ICT as a

broad – based technology (including its methods, management and applications) that supports the creation, storage, manipulation and communication of information. Ozoji (2010) also opined that ICT and information technology (IT) are at times used interchangeably to portray how technology can be used to generate, manage and mass disseminate information worldwide within a time and cost economy. To Adamu (2007), ICT deals with the processing of information using electronic devices.

Furthermore, ICT is a combination of concepts like computers, telecommunication, electronic mail (e-mail), etc. introduced to suit our managerial and organizational needs and to serves as requirement for educational and information control and development. Emmanuel (2004) posited that ICT has three components, which include ICT that process information, such as computer systems, those that disseminate information, such as telecommunication systems and those that facilitate the presentation of information such as multimedia facilities. Similarly, Dada (2013) reported that there are three main components of ICT: information; the use of computer to transform data into information, communication; transmission of information through networks and technology; the expertise used for the transmission. The understanding of these components will avail one of the opportunities of what ICT really is.

**Importance of ICT to Learners with Special Needs**

ICT are of great importance to learners with special needs due to their special learning needs and conditions. Nkwoagba (2011) suggested the following as importance of ICT to learners with special needs:

i. **ICT encourages individualized instruction and independent study programme:** With the use of ICT, learners with special needs can be involved in exploration, experimentation and self-discovery. Through this, learners can study on their own with little assistance given to them when needed. It also encourages learning disabled children and slow learners to bring out their potentialities with little assistance they are motivated to achieve learning.

ii. **ICT encourages Independent Living:** With help of ICT, learners with special needs will be able to do most of the daily activities by themselves without too much assistance from other people.

iii. **ICT Aid in the Assessment of Special Needs Programme:** ICT has four applications in special needs education assessment which include, computer assisted information search, data analysis, data storage and assessment. In developing countries, information about instruments, location and address are very difficult to obtain but with use of ICT all these information are very easy to obtain.

iv. **ICT Serve remedial and compensatory purposes:** ICT aids such as prostheses, CD rooms, CDs, lenses, computer games, enchanted learning, audio books and tapes, ultrasonic canes, scanners, voice synthesizer, Jaws etc. are all used in remediating and compensating for deficiencies resulting from disabilities in special needs learners.
In addition, Danlami and Isa (2018) viewed the following as some of the benefits of ICT to learners with special needs:

v. **ICT Encourage Social Behavior:** They encourage turn taking, foster talking and negotiating and the ability to develop problem-solving skills e.g. char – room, computer internet, programme. ICT help to sustain retention and increase attention span, memory span and concentration of special needs learners especially the learning disabled, the mentally retarded etc. vi. Through ICT (especially internet and extranet) special needs learners can seek explanation, computer experiences, investigate problems, reflect, reason and learn many concepts in the school. ICT helps them to learn how to learn and think about what they learn and develop the spirit of self - reliance and confidence. ICT provide a rich context for language exploration and allow special needs learners to experiment at their own interest and pace.
vii**. Extra sensitivity to special needs diagnosis and prognosis:** ICT can be utilized to diagnose and evolve baseline for special needs intervention programming in a way that every minute detail required for effective and efficient intervention should be provided. For example, the computerized audio logical assessment makes it possible to organize cluster sitting in acoustic amplified classroom.

viii. **Application of computer intervention system computer assisted programmes:** ICT is usable as intervention for remediating and enhancing the learning capacity of special needs learners. The World Wide Web (www), e-learning and e-mail are the internet resources that can greatly enhance information use in special needs education or intervention. The Internet led cyberspace provides online classes for all categories of learners. Intervention strategies like the use of simulation games, programme instruction, the McGrath curriculum by exclusive software are designed to assist students to achieve accelerated progress are such ready examples in the advanced countries. This curriculum-based adaptation is highly used for children experiencing specific learning disabilities e.g. dyslexia, as well as the gifted and talented.

**Rules of Using ICT in Teaching Learners with Special Needs in an Inclusive Setting**
There are various rules governing the implementation of ICT in classroom settings. Muhammed and Gidado (2004) suggested ten golden rules to be followed during the implementation of ICT in the classroom as follows:

a. Identify the learning aims and objective for the learners, which can be enhanced by the use of ICT.
b. Ensure that the learners have enough ICT skills to be able to carry out the activity.
c. Select appropriate ICT resources to meet learning aims.
d. Plan the training of the activity to include non-ICT.
e. Plan enough lessons to enable activity to be completed.
f. Decide on the groupings of learners (sometimes they should be grouped).
g. Introduce the lesson to all learners first before working on any ICT.
h. Intersperse the ICT activity with whole class guidance and direction
i. allow enough time for the learners to reflect and evaluate their achievements at the end of the lesson.
j. Allocate homework or other assessed work.

Other rules governing the implementation of ICT in an inclusive classroom for learners with visual impairment according to Danlami and Isa (2018) are:

a) Ensure that learners with visual impairment have basic knowledge of computer. This include:
- Understanding basic computer hardware components and terminologies.
- Understanding the concepts and basic functions of a common computer operating system.
- Identify common types of file extensions (e.g. doc, pdf, html, jpg, gif, xls, ppt, rtf, exe)
- Learning to start up, log on, and shut down a computer system properly etc.

b) Ensure that learners with visual impairment have proficiency in using productivity software: using productivity software involved creating documents of various types and saving in a desired locations, retrieving existing documents from the saved location and selecting, copying and pasting text in a document or desired locations as well as naming, renaming, copying and deleting files.

c) The learners should possess electronic communication skills**:** They include: Emailing, using a common email program (e.g. Ms outlook, Gmail, apple mail), composing, sending, replying, forwarding messages, adding attachment to message, retrieving attachments from an email message and understand what an electronic discussion list is and how to sign up and leave one (e.g. listserv, listproc).

d) Ensure that learners with visual impairment have acquired internet skills: They should learn how to set up an internet connection and connect to the internet. They should have a working knowledge of the World Wide Web and its function, including basic site navigation, searching, installing and upgrading a web browser. Use. Use a browser effectively including bookmarks history,

toolbar, forward and back buttons. Use search engines and directories to find information on the web. Understand and effectively navigate the hyperlink structure of the web. Understand how to keep your information safe while using the internet.

e) They should acquire knowledge of moving files: This include, understanding the purpose of secure file transfer protocol (SFTP), and secure copy protocol (SCP), log in and connect to a distance server using secure shell client (SSH), transfer files by uploading or downloading, view and change folder or document security settings and copying files from hard disk to storage devices and vice versa.

To apply ICT in teaching learners with visual impairment, the above-mentioned rules must be put into practice in an inclusive classroom for them to achieve equal educational opportunity.

**Materials Needed by Learners with Visual Impairment in an Inclusive Setting**

Managing learners with visual impairment in an inclusive classroom requires special materials and equipment. Kerri (2017) opined that in order to meet learners with visual impairment's educational needs, specialized services, appropriate instructional books, and materials (including Braille), as well as specialized equipment and technology should be integrated.

Dada (2013) and Adebiyi (2017) opined that learners with visual impairment require learning materials in an inclusive classroom that include slate and stylus, Braille machine and Braille paper (for reading and writing), tylor's frame, cubarithm and abacus (for mathematical calculations). Furthermore, Adebiyi (2017) revealed that learners with visual impairment need adapted aids (for physical education and motor development) and adapted materials (for creative cultural and other subjects). Moreover, supportive services should be provided in addition, to enhance the normal educational strategies as well as provision of counseling services.

Dada (2013) also reported that learners with visual impairment require special materials and technology for their education that include mobility cane for movement, digital recorder for recording lecture, talking word processor for hearing information, Kurzweil reading machine for converting printed information to sound, telescope for enlarging print material, optacon for accessing printed information on either hard copy or video.

According to Adamu (2016), the following ICT devices are needed by learners with visual impairment in an inclusive setting:

**Talking words Processor**: This is a word processing programme that produces speeches, sentences or screen that can synthesize, and read back the texts to the learners with visual impairment. This helps learners with visual impairment to monitor

their work, and with auditory feedback, these learners can correct their spelling as well as their spoken words.

**Screen Magnification Systems**: This can be useful to learners with low vision, as it increases the font size of words or sentences as well as icons, and the use of mouse can help learners with low vision to see more information.

**Screen Reader**: This is another device, which read back the text within and other programmes. This highlights the text as it is being read. It can be used to read information from one's mails and texts scanned from a book for persons with low vision.

**Digitally Designed Calculators, Wristwatches, Talking books and Braille Printers** with inscription can provide conducive atmosphere for learners with visual impairment resulting in effective learning.
Adamu (2016) stresses that learners with visual impairment can also learn using books that are stored in computers for easy usage rather than searching for such references in the library shelves. Most of these books may not be available. Even if found, they need someone to read to them. Nevertheless, screen reader search for these documents would be easy. Danlami and Isa (2018) also suggested the following ICT devices to be used in teaching learners with visual impairment in an inclusive setting:

**Electronic Braille Writer:** This is like an electrical typewriter, but it has inbuilt speech functions such as translation from print to Braille and automatic correction. It helps in translating mathematical and scientific equations and symbols to Braille for their identification, recognition, understanding and application.

**The Tellatouch:** It is a simple device used for communicating with deaf blind persons who know braille. The keys on the device are arranged like those on the standard typewriter keyboard. There are six keys at the bottom row, which are similar to those on the Braille writing machine. When a key is depressed on the keyboard, it activates a braille cell on the other side of the tellatouch. The individual can feel the Braille letters activated by the keyboard.
**Lifestyle Candy:** This is an electronic magnifier, which helps the low vision learner or elderly people to read small letters on books or document. It can also perform simple magnification functions. Lifestyle can change the text colour and background colour so that the user can read texts comfortably. Users can select preferred colour mode out of 5 colour modes. The user can change the magnification rate from 1.5 X to 22 X as he/she wants and its focus feature also helps users to read anything that he/she wants to read.

**Application of ICT in Classrooms for Learners with Visual impairment in an Inclusive Setting**

Various ICT devices and software are used in educating learners with visual impairment in inclusive settings due to their educational needs. Kerri (2017) stresses that learners with visual impairment rely on specialized materials in order to meet their individual learning needs, and teachers are required to identify ways to alter their teaching in order to meet those individual learning needs.

ICT devices and software play a vital role in enhancing learners with visual impairment in the process of learning. Adesola (2008) asserts that ICT can enhance learners with visual impairment through provision of switch access to classroom activities, translating text into speech and speech into text, preparing work, which is specially adapted with large fonts, symbols and particular colour. This will give learners with visual impairment some level of independence in partaking in activities and the ability to work in an inclusive setting.

Nwalado and Obro (2014) also highlighted the opportunities that the ICT presents for enhancing the quality of learning of learners with visual impairment in an inclusive setting to include: providing encouragement for learners to reflect on how they learn, apply theory and research on learning and principles of good online learning environments, making learning more easy and visible, encouraging collaboration and team work among learners with visual impairment, offering greater access to learning for more people and increasing the skills of learners with visual impairment.

**Conclusion**

Teaching learners with visual impairment in an inclusive setting requires application of different ICT devices and software, due to their special learning needs, visual disabilities and for them to achieve equal educational opportunity with their sighted counterparts. Some of the ICT needed by this category of learners include talking words processor, screen magnification system, screen readers, braille printers, life style candy, digitally designed calculator, and electronic braillewriter as well as the tellatouch.

**Suggestions**

The paper suggested the following:

1. Adequate funds should be allotted to all levels of education for the purchase of ICT devices and software for the education of learners with visual impairment.

2. Workshops and seminar should be organized regularly for teachers of learners with visual impairment on ICT usage and application in classroom settings.

3. The ICT devices and software should be available, accessible and usable by learners with visual impairment.

4. Non-governmental organizations (NGOs) should intervene in the procurement of the ICT devices for learners with visual impairment.

5. Constant power supply should be made available to power the ICT devices for learners with visual impairment in our primary schools, secondary schools and tertiary institutions.

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