**Adapting ICT Skills in the Education of Students with Visual Impairment During the Pandemic Era**

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***Abstract***

*This study focuses on the adaptation of ICT skills in the education of students with visual impairment during the pandemic era. The spread of COVID-19 was sudden worldwide and the disease affected over nine million persons and resulted in the death of over 450,000 people. The pandemic almost destroyed the world order as all developmental activities which boost an individual country’s economy were all at a standstill not excluding education. Governments all over the world developed some interventions in the education sector to enable students to learn from home. The use of ICT is slowly imbibed by students with visual impairment in Nigeria, this is important because ICT helps students with visual impairment learn from home through its platform such as the Radio, Television, Digital Audio Books and so on. The online and on-air classes are a good and welcome development, however, most of these might not be possible for students with visual impairment without the assistance of their parents or guardian. From the literature, it was discovered that some of the programmes that were aired during the pandemic to improve the education of students in Nigeria neglected the peculiarity of students with visual impairment thereby making it imperative for the government and stakeholders in the education sector to adapt ICT as the most important platform in remote learning for students with visual impairment.*

**Keywords:**Adapting,ICT Skills, Visual Impairment, Pandemic Era

**Introduction**

Information and Communications Technology (ICT) is a collection of concepts that refers to a system of gathering, processing, storing and presenting data. These are technologies that provide access to information such as computers, the internet and electronic delivery systems such as televisions, radios, and midgets among others. Visual impairment is a condition that spans from a low perception of light to outright loss of vision and students living with such conditions can only be educated through special education interventions, such interventions rely solely on the one-to-one approach of their caregivers, and this has been severely hampered by the recent outbreak of the COVID-19 pandemic which restricted interaction among people worldwide.

The spread of the COVID-19 pandemic was sudden and devastating worldwide. According to (World Health Organisation, 2020), the disease affected more than 9.1 million persons and resulted in about 473,000 deaths worldwide. Global lockdowns were announced and this led to the closure of schools. As a result, countries introduced several models of educating students while adhering to containment measures. One of the interventions developed was the remote learning model. Countries like the US and the UK relied on technological advancement to create virtual classes for their students. However, in Nigeria, state governments introduced online learning programmes through the radio and television but these interventions were discovered to be ineffective. (Uchenna, Maximus, Charity & Chinedu, 2021). It has become imperative to understand ways through which ICT can be used to remotely educate students with visual impairment in the pandemic era in Nigeria.

The learning environment has been expanded beyond the confines of physical classrooms as ICT has facilitated a wide range of interventions that have made remote learning easier than it was before, with ICT, learning can now take place any time of the day and anywhere in the world. The availability of online resource materials has made learning possible anytime within 24 hours of a day. The latest trends in ICT have transformed the regular classroom into other mini classrooms among different environments which encompasses all learner- cantered themes (Castro & Aleman, 2011).

ICT as a tool in academic pursuit is highly beneficial to the education of students with visual impairment because it is key to getting the latest digital information efficiently and effectively. The proper use of ICT exposes visually impaired students to the latest trends in technology and this improves their learning process. Before the inclusion of ICT in the education of students with visual impairment, they rely solely on the Braille materials which has led to their experiences being outdated as the materials are not up to date as and when due. Also, ICT challenges students with visual impairment to become creative and artistic. According to Chai, Koh and Isai 2010, the creativity showcased by students when learning how to use ICT helps students to develop new understanding in their areas of learning. The ICT helps to promote both individual students based learning as well as a collaborative learning environment by giving them access to try innovative methods both independently and through group efforts. These efforts are in alignment with the needs of remote teaching and learning during the pandemic era. ICT also improves various levels of the teaching and learning process through the new possibilities for the education of students with visual impairment which were hitherto not available; these possibilities include better autonomy, clearer capabilities as well as creativity both for the teachers and students(Lowther, Inan, Strahl & Ross, 2008).

**ICT available for remote education of Students with Visual Impairment in Nigeria**

The inequality in global technology access has resulted in different approaches to the education of visually impaired students during the COVID-19 pandemic. The divide is between the rich and poor nations of the world; such divide also widens from the urban to the rural areas in developing countries. In adapting ICT for the education of students with visual impairment in the pandemic era, online platforms are the best interventions available for remote access. However, as a result of low accessibility to the poor population of the nation due to various factors ranging from finance, technological know-how and poor power supply, online platforms have been discovered to have the least reach among ICT available for remote education of students with visual impairment in low income or developing countries such as Nigeria.

According to United Nations International Children’s Emergency Fund (UNICEF 2020), the statistics for the reach of online platforms in the education of students during the COVID-19 pandemic in some countries stood as low as 10% of their population. The report cited challenges such as; electricity problems, low internet connectivity and insufficient devices for students and households as the main factors mitigating the widespread online intervention. In Nigeria, the government attempted to educate students from home at the peak of the pandemic; they employed the radio and television. Educational programmes were developed, and teachers were co-opted to give instructions to students, however, according to Uchenna, Maximus, Charity and Chinedu, 2021, the outcome of the action was not the desired response. It was discovered that most of the students engaged in the exercise did not get the needed academic intervention.

Furthermore, in Nigeria, there is a serious divide in the digital space which is a result of the digital literacy gap. Even when available, many students lack technical understanding of how to operate the devices needed for such online learning. The education of students with visual impairment is specialised and as a result, the use of technology in their education requires prior adaptation to the best modes of using technology for the visually impaired. Although the use of ICT is slowly being imbibed by visually impaired students in Nigeria, it is crucial to understand their ability to learn through such platforms.

Taking cognisance of the challenges stated above, there are few technologies available for the education of students with visual impairment in Nigeria using ICT. According to United Nations Children’s Emergency Fund 2020, many governments have developed multiple learning modalities which include those that require little or no technological know-how in their application. These technologies are commonly available even in low-income environments. In grouping the interventions UNICEF classifies such interventions into high-tech modalities and low-tech modalities.

The high-tech modalities refer to online platforms such as the Internet and mobile applications while the low or no-tech modalities refer to television, radio, SMS and printed learning materials. In other to adapt ICT to the education of students with visual impairment during the pandemic in Nigeria it is important to combine both the high tech modalities such as (internet learning) as well as packaged curriculum developed for radio and television education. Also, some ICT tools such as digital (audio) books, digital classrooms, video conferencing, social media and some featured mobile apps, can be adapted to cater for the peculiar needs of remote education of students with visual impairment in Nigeria. Below are some selected ICT tools for the remote education of students with visual impairment in Nigeria:

1. **Radio:** The radio is a communication device which relays on radio waves for signalling and communication. These waves are electromagnetic. The aim of radio is communication through the audio channel. Information is sent and received using both the transmitters in the radio stations and the transistor receivers in the radio set. The radio is a popular means of communication in low-income areas because it is relatively cheap. The radio is a very reliable medium of communication for students with visual impairment because of the reliance on the sense of hearing. After the outbreak of the COVID-19 pandemic, it became imperative to continue educational activities during the global lockdown. According to World Bank 2020, the radio became a valuable tool in bridging the gap between students and their physical classrooms. Countries such as Argentina in South America developed educational programmes on the radio which ran for 7 hours. Such programmes consisted of academic lessons which were anchored by the teacher and a conductor (journalist, artist or scientist). In Asia, Bangladesh state-owned radio started broadcasting educational lessons for students from grades six to ten. These lessons ran from 9:00 AM to 12:00 PM. In Africa, the South African Department of Basic Education launched the education radio curriculum support programmes for learners impacted by school closures. The program was broadcasted among 13 radio stations, covering subjects such as Mathematics, Physical Science, English, Life Science and Accounting. In Nigeria, there was a similar situation where the state governments run radio stations started providing students with academic activities. The programmes were more accessible when compared to other forms of remote education interventions but various challenges attributed to the radio as a means of education were noted. As stated by UNICEF (2020), radio penetration rates are quite low in some countries such as Bangladesh where it was reported to be as low as 10%, this is because it has been overtaken in popularity by television and mobile phones. Also, the radio is a popular means of communication for students with visual impairment because of its bearing towards the hearing sense however the radio comes short in the provision of tactile instructions which is the most important aspect of the education of students with visual impairment. The stated challenges to the use of radio as an ICT tool in the education of students with visual impairment in Nigeria can be addressed through the use of physical instructors in the form of a guardian or the parent of the child with visual impairment who will serve as an interpreter to the instructions given by the teachers on the radio. This will allow for much-needed tactile learning as well as providing remote education while maintaining pandemic rules of social distancing and isolation.
2. **Television:** Television is an ICT device which relies on radio waves to broadcast moving images and sound. Television is a mass medium which relies on both visual and audio to pass information. The signal is broadcasted by the tele-broadcasters from the television house and is received by the televise sets through various means. Television has evolved throughout its inception and it is now in its digital age. Television as means of instruction is relatively stable because it combines both audio and visual signals, however for students with visual impairment there is the challenge of sight. The sound signals from the television can be of help, also some forms of visual impairment allow for partial sight or the use of light receptors. Television was a vital tool of instruction after the outbreak of the COVID-19 pandemic across the world, countries developed content aimed at educating students at home through the television as a medium of instruction. According to World Bank (2020), countries such as Austria in Europe developed special education programs for students at all school levels using their TV Osterreichischer Rundfunk 1 (ORF1). The programmes ran between 6 to 9 am for preschool and primary school children, while also taking care of students between the ages of 10 and above for another three hours. The contents consisted of documentaries, information segments and explanation videos. In South America Costa Rica's government developed virtual content for teachers, which included virtual classroom guides for autonomous work etc which was used in public media to broadcast educational programs for all stakeholders in the education sector. In Asia, the Indian government developed a group of 32 Direct To Home (DTH) channels which were involved in telecasting educational programs round the clock and making them accessible across the country. The channels aired subjects for classes 9 -12, higher education as well as postgraduate studies. The intervention also involved out-of-school children, vocational education and teacher training. In Africa, Kenya's Ministry of Education shared guidelines for enhancing teaching and learning for its 15 million students that were out of school because of the lockdown. The educational TV channel was developed by the Kenyan Institute for Curriculum Development (KICD) to broadcast education programmes in line with the curriculum of education in Kenya. The Nigerian government created programmes for the students at home on the National Television Authority (NTA) the content ran for two hours a day and aimed at satisfying the educational need of the out-of-school pupils. However, it was noted that the programs lack content for students with visual impairment in the country. Also, a broader look at the use of television globally in the education sector during the pandemic shows that proper emphasis was not laid on the use of television as a form of instruction for students with visual impairment. Although television aims to communicate both the sense of sight and hearing, it can be adopted to educate students with visual impairment remotely if well harmonized. This is possible if a secondary source of guidance is available on ground. On the eve of the pandemic, a teacher couldn't be physically present at every home of their students but with proper guidance and the availability of the parents, instructions passed through the television will be well interpreted. Television is important as a medium of instruction because it creates an added form of visual reinforcement which is hitherto not present in the radio as a medium of instruction. Television is better than the radio as a medium of instruction because of the added form of visual information as noted by UNICEF ROSA Guidance (2020), well-designed self-learning TV and radio programming can be quite effective. Although such programs must not only have traditional subjects but also contain guidance for parents, students' mental health and well-being, arts and music. A major disadvantage of television as a medium of instruction is the lack of interactivity in programs produced for the education of students with visual impairment, this can be addressed through the parents and caregivers who should be encouraged to watch the programs and facilitate activities afterwards. Also, other innovative and cost-effective technologies such as mobile phones can be used for interactivity when such television programmes are on air.
3. **Digital (Audio) Books:** An audiobook is a sound recording of a book; these are digital versions of a book that can be played in audio form. In other words, there are voice recordings of the text of a book in an audio version. A digital book contains exact words of the written version of the book, however, it can only be listened to on a secondary device such as smartphones, tablets, computers, mini speakers, home theatres, car radios and any electronic device that plays audio files. The audiobooks are created in formats such as mp3, wma and aac. All the above-listed formats enable consumer electronic devices to play the files for students with visual impairment, the audiobooks are an important component of academic activities. It allows them to read materials without using Braille, while Braille is the primary form of communication for students with visual impairments, the audiobooks are faster to read because of their narrative technique. It is also common practice for students with visual impairment to record their notes using voice recorders on their smartphones or midget. Across Europe, counties have recognized the importance of e-learning systems and as a result, have leveraged the relatively high technological advancement in their region to develop interventions that use digital books as tools for the education of students with visual impairment during the pandemic era. For instance, in Bulgaria, the Ministry of Education and Science launched an e-learning system which started on the 16th of March 2020 and provided students with online textbooks from grades 1-10 free (World Bank, 2020). The initial aim of this intervention was to bring education to the students at home during the pandemic, it has also made a large percentage of digital books available for students with visual impairment in the country. In Nigeria, the Federal Ministry of Education and the Universal Basic Education Commission set up a separate task team responsible for coordinating education response to the COVID-19 pandemic and the team aimed to provide resources to support students across the Nation to continue their education through learning from home. The “Learn at Home programme” initiative was taken by the group, and an important point of the initiative is the presentation of online resources which include digital books which could be assessed on the taskforces dedicated webpage within the federal Ministry of Education website. These audiobooks can be used by students with visual impairment in order to learn from home and be at par with their sighted contemporaries. Unfortunately, there are some factors militating against the actualisation of the goals stated above, one such factor is the uneven spread of internet network coverage in Nigeria. Without good internet connectivity, materials cannot be downloaded online and as a result, the materials are useless. Also, the availability of devices needed to download such materials is not evenly distributed. Many students with visual impairment living in the rural areas of the country do not have access to basic devices such as a smartphone which is needed to download and play such materials. Finally, the power supply is erratic, thereby making consistent use of the available resources almost impossible. While the audiobook is a very important component in the ICT and education of visually impaired students during the pandemic, other factors have limited its impact in Nigeria.
4. **Video Conferencing:** Video conferencing is a collection of technologies that consist of the reception and transmission of audio and video signals by users in different locations in real-time. Video conferencing is the process of sending and receiving visual and audio signals simultaneously through the use of designated devices such as a computer and internet connection. It is like a television connection that includes video calls too. This tool is very important in remote learning because it brings the classroom into the room of every student. It also allows for 100% interaction between both sources. It brings together a multitude of people on a single screen sharing real-life footage for all parties involved. The video capacity tool can be leveraged in the education of students with visual impairment during the pandemic through proper use of its interactive mode, like other forms of ICT available to students with visual impairment it requires the assistance of a caregiver or parent on ground with the students. Video conferencing is more suitable for learning than radio and television because the teacher or instructor can have a real-time assessment of the impact of their lessons on the students. Instructions can be modified or individualised based on these findings without being physically present with the students with visual impairment. In the U.S.A., the videoconferencing tool was adopted to engage students at home during the pandemic. According to the report by (Penny et al, 2020), following the outbreak of the COVID-19 pandemic, 61% of students in the U.S.A and Canada attended online courses, although 43% of students with visual impairment were unable to access online programs because of their impairment, this was a result of other factors. Also, it was noted that over 95% of students with visual impairment needed orientation and mobility training to achieve their goals even when they were taught remotely by their O&M specialist. These were possible majorly by the use of video conferencing means of instruction. The relevance of this finding to this work cannot be overemphasized, because it proves that video conferencing is a viable tool in ICT that can be of immense use for the remote education of students with visual impairment in Nigeria. However, there were some challenges facing the use of video conferencing as a tool in the educating of students with visual impairment during the pandemic era, such included poor power supply, poor financial background to set the needed devices, poor interconnectivity, poor technical knowhow to mention a few. But if the above challenges can be overcome the videoconferencing tool will improve the capacity to adapt ICT in the education of students with visual impairment in Nigeria.

**Conclusion**

While the pandemic ravaged the world and brought educational activities to a standstill globally, ICT was the major source of intervention, which reinforces the notion that ICT can offer more in the education of students with visual impairment. The experience during the COVID-19 pandemic also proves that if well leveraged, Nigeria can achieve success in the education of students with visual impairment with the adaptation of available ICT tools. The Federal Government and all stakeholders are therefore encouraged to develop the ICT capabilities of the country to the level where both the urban and rural dwellers can have access to tools that will advance the education of students with visual impairment.

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