Enhancing the Language Education of Students with Special Needs in Nigeria through Information and Communication Technology (ICT): Challenges and Prospects

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Authors' contributions

This work was carried out in collab oration among all authors. Author EUO designed the work, wrote the introduction and the concept of special need education in Nigeria. He also looked at how ICT can support the language education of students with special needs and the challenges and prospects of the use of ICT in special education in Nigeria. Author ACO wrote ICT resources for learners with hearing impairment and ICT resources for visually impaired learners. Author CCN wrote ICT resources for speech impaired learners and ICT resources for people with learning disabilities. All authors read and approved the final manuscript.

Opinion Article

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ABSTRACT

New technologies contribute to the improvement of the learning process, by offering richer sources of language learning materials. We have witnessed in this age the emergence of multimedia programmes and other technologies to help learners with impairments. Computerized assisted instructions, joysticks, communication boards and software packages promote creativity and make learning more interesting even for people with special needs. The aim of this paper is to discuss the role of ICT in enhancing language education for physically challenged learners so as to increase their function abilities. The paper looks at the concept of special education in Nigeria and the advantages of using ICT in special education. It examines ICT resources for learners with hearing impairment, ICT resources visually impaired learners, ICT resources for speech impaired learners and ICT resources for learners with learning disability. It also takes a look at the challenges and prospects of the using of ICT in special education in Nigeria. It recommends among others that to ensure the effective use of ICT in the education of people with special needs giving its role in enhancing teaching and learning, the educational authorities should ensure access to appropriate technology in order to help achieved the educational goals and standards. They should also provide time for the teachers to plan and learn how to integrate the technology. This could be done through in-service and pre-service training of teachers.

1. INTRODUCTION

"Access to the curriculum can be difficult for children with disability. Unfortunately, many aspects of the curriculum were inaccessible to these children until the advent of information and communication technologies (ICT) in recent years. Innovative educators have begun to recognize the potential of computers to compensate for the loss of normal means of access to educational materials and other resources. "Students with impairment can participate and engage in learning using ICT solutions, including assistive technology, text-to-speech software, and digital learning platforms" [1]. "Peripheral devices and other ICT equipment can be used to compensate for learner's lack of motor control. The use of ICT to support various pedagogic practices has been found to have a positive impact on the learning environment and learners with special needs. Some special needs students may have difficulty with reading, writing, spelling due to disability. Others may have a visual or hearing impairment or an emotional or behavior problem which could use the support of a computer aided technology. Students who find it difficult to write, may find the keyboard a useful tool to record their work. There is also the availability of speech to text software which can alleviate these difficulties. For visually impaired students, different colored screen fonts, icon menu and sizes can be altered to help the learner to read the text or use audio output. Pupil with hearing impairment may need symbols and pictures to enhance the meaning of text.

Graphics can be used to stimulate writing and illustration overlays can also make writing more accessible when using a concept keyboard. For behavioural problem the use of educational game can help to motivate the students to engage with learning" [2].

"If the environment can be organized through the application of ICT, children with special needs can learn with ease. Some societies have come to realize that handicap children deserve special attention to enable them contribute their quota in national development" [2]. According to Osakwe [2] "the school system now faces increasing pressure to raise standards, develop social and personal skills, broaden curriculum, pay greater attention to equal education opportunities and prepare young people for rapid changing world. Invariably, the modern trend all over the world is shifting towards addressing the educational plights of students with one form of disabilities or the other so as to better their life. The rational, behind this is contingent upon the fact people with disabilities too have invaluable roles to play in national development and to be able to do this effectively and meaningfully, their education needs to be given proper attention. It is in view of this that students with special needs should be given special facilities to aid their performance. It is on this note that ICT becomes a potent tool for enhancing special education in Nigeria".

Since the last decade Africa's political leaders and policy makers seem to have committed themselves to "harnessing information and

communication technologies towards development". Areas like agriculture, industries commerce and trade have ever since been at the heart of this technological advancement. Computerized research works have contributed to increase production and productivity in rural areas. Ironically however, formal education in Africa seems to have benefited the least from the use of advanced technology, certainly because educational technology requires precise organization, not only in itself but also for its efficient application within the educational system. This paper therefore sets out to explore some challenges facing the use of ICT resources in educating students with disabilities, it also suggests the way forward.

2. CONCEPT OF SPECIAL NEEDS EDUCATION IN NIGERIA

"The concept of special needs education has been defined in various ways by scholars. For instance, Burke, Firestone and Chapel" [3] defined special education as "a form of instruction that's designed to meet the needs of students with disabilities so that they can learn the same skills and information as other children in school". For Adima, Ladipo and Abosi (1981, as cited in Oladejo) [4], special education is an aspect of education that treats people as individuals and makes allowances for the use of special equipment and methods of teaching according to individual needs. UIS-UNESCO [5] defines "special education as an education designed to facilitate the learning of individuals who, for a wide variety of reasons, require additional support and adaptive pedagogical method in order to participate and meet learning objectives in an educational programme". "Special education serves children with emotional, behavioral, or cognitive impairments or with intellectual, hearing, vision, speech, or learning disabilities; gifted children with advanced academic abilities; and children with orthopedic or neurological impairments" (https://www.britannica.com/topic/special-education). Smith, as cited in Fibainmine and Adeyinka [6] defined it as "that profession concerned with the arrangement of educational variables leading to the prevention or elimination of those conditions that produce significant defects in the academic, communicative, locomotors or adjective functioning of children". For Mba [7], special education is an ideal general education in which individual differences are considered and provided for The federal government of Nigeria gives a comprehensive

definition, when it defines special education as: "The education of children and adults, who have learning difficulties because of different kinds of disabilities – blindness, partial sightedness, deafness, hardness of hearing, mental retardation, social maladjustment and limb deformity or malformation, due to circumstances of birth, inheritance, social position, mental and physical health patterns, or accident in later life" [8].

The objectives of special education as contain in FRN [8] include:

a) To give a concrete meaning to the idea of equalizing educational opportunities for all children; their physical, mental and emotional disability notwithstanding;

b) To provide adequate education for all handicapped children and adults, in order that they may play their role in contributing to the development of the nation.

c) To provide opportunities for exceptionally gifted children to develop their skills at their own pace, in the interest of the nation's economic and technological development.

According to the National Policy on Education [9], "people with special needs are to be provided with inclusive education services in schools, which normal persons attend, in age-appropriate general education classes, directly supervised by general teachers. For special needs education persons who cannot benefit from inclusive education, special classes and units shall remain in special schools, to receive the same quality of education in the other setting." This paper is focusing on the education of students with disabilities, who might be disadvantaged in the regular educational programmes. It examines how the applications of ICT can enhance learning thereby enabling students with disabilities to contribute to national development.

3. HOW ICT CAN SUPPORT THE LANGUAGE EDUCATION OF STUDENTS WITH SPECIAL NEEDS

According to Dikusar [10], "technology can simplify the educational process for people with disabilities". The way in which ICT can be made accessible to engage and facilitate the learning for students with special needs has increased with the advancement of technology. Pacheco, Yoong and Lips [11] assert that "student with

impairment used a combination of ICTs to enhance their learning experience". According to APC [12], ICTs can help disabled pupil teachers and pupils promote their skills. ICTs can be used for language development activities; symbol or picture enhanced text can bring meaning to point. ICTs can be used to support individual students' needs". ICT resources can include computer access devices such as switches, adopted mouse and keyboards communication aids and specialized software.

Issues that surrounded the use or the introduction of ICT in the classroom are often centered on the lack of confidence on the teacher's ability to support the technology and whether or not the technology is appropriate to the student's specific need and their abilities. Teacher education graduates should have an understanding of the implications of learning technology, information technology and communications technology for educational practice. Today, teachers have access to a range of curriculum support materials targeted at the use of ICT to support learning for the type of students they teach and the areas. Most school environment in the developed countries are supportive of teachers and students' use of ICT built on a shared vision that prepare students with disabilities to learn, work and live successfully in a knowledge-based, global society. "Curriculum personnel are readily available to teachers, with expert experience on integration of ICT in learning and teaching process" [13].

According to Jamieson [13], a frame work was developed to articulate the areas of impact of ICT in schools and strategies for monitoring and evaluating each of the areas of impact at the school and system levels. It has been found that the use of ICT has consistently improved student's attitude towards learning and their own self-concept. Through the use of ICT students develop an appropriate level of capacity, and achieve learning outcomes across the curriculum at a higher level. These achievements are significant for students with disabilities as there is a variety of input and output available providing the opportunity for students who are physically handicapped to be involved in similar learning activities as other students. For some students, computers provide the only environment which they can manipulate and the only tools that reduce their level of disability.

With the learner participation in the learning process, ICT can help learners take control of constructing their understanding, acquiring new skills and allowing them to respond to their own learning styles. ICT allows for better communication, collaboration, information access and creative expression of ideas. To ensure the productive use of ICT in the classroom, there are needs for a regular assessment of needs, training and support for both students, teachers and helpers and constant evaluation to ensure that the technology is appropriate for a specific need of a student. According to Pacheco, Yoong and Lips [11] "special technology allows increasing the independence of a particular student freeing himself from the constant need for direct teacher involvement. As a result, a student can choose the speed of learning that is convenient for him which leads to more personalized learning".

4. ICT RESOURCES FOR LEARNERS WITH HEARING IMPAIRMENT

Hearing loss is an invisible condition resulting in communication problem that can ultimately interfere with learning and social development. Hearing is critical to speech and language development, communication and learning. The earlier hearing loss occurs in the child's life, the more serious on the child development. The major ways in which hearing loss affect children is the delay that hearing loss can have in their development of speech and language skills and the learning problems caused by language deficits that can result in reduced academic achievement. There are various types of hearing loss which can be identify under two categories: conductive (not permanent) and sensorial (permanent). Conductive hearing affects the outer ear which prevents signals being transmitted to the inner ear, whereas sensorial is the damaged inner cochlea or nerve endings [14]. Students who were deaf from birth or as a result of illness in childhood may lip read and/or use sign language. The extent of the hearing loss determines the effect that it may have on the student's educational and social development. Hearing impaired students can often have limited vocabulary range which can affect their reading and spelling ability, this is particularly an issue for a student who has suffered impairment from early childhood, as opposed to losing hearing in later life and often informs a more visual preference to learning [15].

According to David, Kiose and Tzelepi [16], "hearing impaired persons' inclusion and engagement in the society can be improved by the use of ICTs. They offer the deaf new opportunities." The information age has witnessed the emergence of multimedia programmes and other technologies to help hearing impaired students develop their sign language and reading skills, the computer is now often referred to as a multimedia device and is able to present information in a variety of ways. CD-ROMS used text, still and moving images and sounds to convey information. Word processor allows you to mixed text and images to give additional meaning to written material. Text can be created from letters, words and phrases, rather than having it built up letter by letter. This can help students concentrate on the meaning flow of their writing. Video clip of signing can be added to other software or incorporated into multimedia presentations.

Computer derived technology is beginning to offer new communication access opportunities for deaf people. Text can be sent quickly using special technology such as the MINICOM system or by using electronic mail on a computer or by fax. Video phones and computer video conferencing are becoming more common and will allow the deaf to use signing. The video caption system uses an additional decoder which is attached to provide subtitles from video that have been captioned. The ease with which text can be edited helps children to organize and rearranged their writing in a way that will be very difficult on paper. Whole word and phrase input is available from overlay keyboards or on screen world lists. Pictures, signs and symbols on the screen or on an overlay can be used to create text. Topic and subject specific word lists will help children use new or unfamiliar words thus increasing their vocabulary. Software such as inclusive writer, clicker 5 and writing with symbols 2000 can link text with symbols to give many different writing, spelling and sentence construction activities. Contantinou et al (2018, as cited in David, Kiose and Tzelepi, [16]) opine that "for students with hearing loss, there is a need for educational institutions to effectively utilize visual learning equipment, adaptive device such as FM system, and speech-to-text transcriptions".

5. ICT RESOURCES FOR VISUALLY IMPAIRED LEARNERS

According to Oladejo [4], the visually impaired are individuals who have difficulties in one or more functions of their visual system. They are also either totally or partially sighted. In his own definition, Salvin [17] said that "visually impairment is a term experts use to describe any kind of vision loss, whether it's someone who cannot see at all or someone who has partial vision loss. Some people are completely blind, but many others have what is called legal blindness. They haven't lost their vision completely but have lost enough vision that they'd have to stand 20 feet from an object to see it as well as someone with perfect vision could from 200 feet away". The type of partial sigh from which a learner may suffer is extremely varied reflecting the scores of eye complaint which exist. It is therefore essential, before stating any teaching programme, to establish a student degree or useful vision and determine what lighting condition suits best and what methods are to be used for reading and writing. A key issue in the assessment process is the stability of the condition. If is felt that the condition may alter, it is essential that re-assessment of the chosen equipment is built in to review cycle.

In general, visual impairment results in the complex of both literacy and numeracy problems. All reading and writing task are made lower and harder by visual loss. Typically, a child will write phonetically or have spelling problems because of an imperfect memory of the shape and length of word. For many visually impaired or blind students computer can enable access to the curriculum by providing alternative method of reading and recording work. Not all learners require large print, but high contrast print is easier for many learners to see their own hand written work. For these students, a word processor with suitable font size on screen allows may prove useful especially if the computer screen allows for good contrast, with high quality resolution and picture stability. There is a range of alternative hardware and software which can make it easier for a visually impaired to use a computer. Of the software features, many are offered within standard windows but are also offered by a range of other software packages [18]. The visually impaired students are provided with the following teaching materials to aid them during teaching/learning process: electronic Braille talking book, talking calculator, talking word processor, screen magnifier, screen readers and big pointer utilities. According to Idowu, Bokoh and Bell [19], "Provision of ICT tools for the visually impaired had received tremendous attention all over the world since

Louis Braille modified an early invention of Charles Barbier to produce braille in 1892. Information resources for the visually impaired are converted into format that are usable to them; these formats include Braille, talking book/audio recordings and large print to meet their information needs which are the manual format of information source. Talking books are audio recordings or tapes, cassettes and compact disk from books and materials which the visually impaired can listen to, thereby providing the opportunity of reading through listening to the visually impaired. Screen magnifier ensures productivity in touch and control. It reads aloud, characters and words as you type, boosting confidence and accuracy". ICT resources help alleviate the information challenge of people with visual impairment and improve their functional abilities.

6. ICT RESOURCES FOR SPEECH IMPAIRED LEARNERS

According to Oladejo [4], people with speech disorder are those that experience lack of development and stimulation which affect the effective mental formation of words or their physical production. Adima, 1991 as cited in Ugbe and Madu [20] defines speech impairment as any speech which draws unfavorable attention to the speaker whether unpleasant sound, inappropriateness from the age level, or lack of audibility. Technology also can be of help to people with communication impairments. For example, computer software with speech synthesizer and expanded keyboard can be used to demonstrate vocabulary skills, early grammar skills and social communication among toddlers (www.apple.com/disability/language). Hanson (2024) opines that "students with impairment can participate and engage in learning using ICT solutions, including assistive technology, text-to-speech software, and digital learning platforms".

According to UC Berkeley [21], "Speech input software provides people with alternative way to type text and control the computer. Users can give the system commands to perform mouse actions. They can tell their computer to click or use a menu item". Hanson (2024) asserts that "ICT in special education also has the important benefit of enhancing social and communication skills. For instance, pupils unable to communicate orally can express themselves more clearly using alternative and augmentative communication (AAC) tools, including voice output communication aids and dynamic displays. This can boost their self-esteem and confidence while expanding their social engagement and integration prospects".

7. ICT RESOURCES FOR PEOPLE WITH LEARNING DISABILITY

The term "Learning disability" is a general term used to refer to difficulties a person may possess in either writing, reading, listening, speaking, reasoning or computing. It is important to know that while they are those who exhibit difficulty in all area mentioned many are deficient in only certain aspects while excelling in others. Information and communication technology provides tools to disable students to reduce the cognitive demands of task by serving as memory aids. "The inclusive use of New Technology helps students with learning disabilities to learn" (Starcic & Bagon, 2014 as cited in Andreja) [22]. There is several software available that help teach kids with disabilities in a step by step, broken down manner. Some of these software is available on CD-ROM that can help teach disabled readers focus on phonetic identifications.

Computer also provide ways of helping disabled students by highlighting of main ideas, electronic dictionary, thesaurus, other resources include drill and practice programme, overlay keyboard, word list facilities and talking word processors.

8. CHALLENGES AND PROSPECTS OF THE USE OF ICT IN SPECIAL EDUCATION IN NIGERIA

With the advancement of technology, the ways in which ICT can be made accessible to engage and facilitate the learning for students with special needs has increased. Unfortunately, such information and communication technologies, appear to be widely and effectively used everywhere but in Africa. In Nigeria for example not much had been done to integrate ICT in the education of students with special needs, this is due to several factors which include:

- **Inadequate funding:** Nigeria education is not adequately funded, and this also has effect on the education of students with disabilities. Certain educational materials, facilities, software and equipment which could have enabled them to learn without tears are not adequately provided. Most of the ICT appliances are very expensive and are unaffordable to most schools for the disabled in the country.

- **Unpreparedness of teachers to integrate ICT in teaching and learning processes:** many teachers of the disabled are not ICT literate and cannot maximize the potentials of ICT in teaching students with special needs. Successful implementation of technology in the classroom is often dependent on the skill, knowledge and commitment of the classroom teacher. Not only do teachers need to have the appropriate training and support to include students with disabilities, they also have certain responsibilities in preparing student teachers to deal with technology in the classroom. According to Forman (2006, as cited in Ibe, W. et al, 2009, FCE, Obudu, Nigeria, Unpublished communication), "Technology does not have the advantage of giving students with disabilities more independence and control of their learning; however, the teacher must have the skill in being able to assist in using the technology and be able to give the support if there is failure for it to be used properly".

In terms of developing teacher's competence in embedding ICTs in pedagogy in-service and pre-service teacher education system should be provided by the Federal Government. Teachers should be supported to select appropriate applications of ICT to address the requirements of the intended curriculum. Institutions in the countries saddled with the responsibility
of training teachers in special education should be empowered to carry out this task. This will lead to the production of more academically sound and qualified teachers for the disabled students. The successful integration of ICT in learning and teaching of the disabled will prepare students with disability to learn, work and live successfully in the knowledge-based global society. The government should ensure that curriculum support personnel are available to teachers, with expert experience in integrating ICT in learning and teaching processes.

- **Architectural Design Policy:** The architectural designs of most of the institutions where the education of students with disabilities take place did not take into consideration the special nature of the people. It is essential to position equipment safely and in a way that the student can use it comfortably. Height adjustable tables are useful for students with physical disability. Wrist rest and

support can provide additional support. It is important that the students do not have strain to see the screen and that his/her hands rest comfortably on the keyboard and mouse/joystick/touch screen without making him/her hunch his shoulders or raise his elbows. A bookstand or angled copyholder can hold books and work sheets so that they are easily visible beside the monitor.

9. CONCLUSION AND RECOMMENDA-TIONS

The role of ICT enhancing language teaching and learning processes for people with disabilities has been made evident in this paper. ICT empowers students with physical disabilities, enabling them to access the curriculum in the same way as their peers. The appropriation and the generalization of the effective utilization of ICT in the education of people with special needs will enable them become functional thereby contributing to national development. With the use of information and communication technology equipment, students learn much faster than they would have done, had they remained in traditional classes. It is true that the development and production of educational technology for the disabled will be costly in terms of money, time and man power. However, today more than ever before the use of educational technology required a reordering of educational thinking: it does have significant implications for curriculum development, course planning and delivery, teacher training, and even the building of classroom facilities. Government should be courageous enough and willing to address problems which impede teachers from achieving the full advantage offered by computer applications.

To ensure the effective use of ICT in the education of people with special needs, the following requirements are to be met:

- Fitting technology to educational goals and standards.
- Having a vision for the use of technology to support curriculum.
- Providing for both in-service and pre-service training of teachers.
- Ensuring access to appropriate technology.
- Providing time for teachers to plan and learn how to integrate technology.
- Providing for technical support use.

Meeting these requirements will ensure a successful integration of technology into the classroom and give our disabled brothers and sisters a sense of belonging.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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