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Information and Communication Technology in Special Needs Education: Implications for Teaching and Learning in Inclusive Classrooms

[1]Aliu, Charity U.Ph.D., [2*]Amwe, Racheal A. Ph.D. and [3]Menta, Leah Homsuk

[1]Department of Special Education and Rehabilitation Sciences, Faculty of Education, University of Jos
Email:charityaliu50@gmail.com
[2*]Department of Special Education and Rehabilitation Sciences, Faculty of Education, University of Jos
3Department of Special Education and Rehabilitation Sciences, Faculty of Education, University of Jos
Email: leahmenta44@gmail.com

*Corresponding author's Email:amweracheal44@gmail.com

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Information and Communication Technology (ICT) has gained popularity in contemporary Nigeria and has emerged as an effective approach in classroom teaching and learning process in this era of globalization. ICT applications are one of the most viable tools in achieving the Sustainable Development Goals (SDGs) of promoting quality education as well as reducing inequality thereby, promoting equitable access to educational services irrespective of a learners' specific and unique educational needs. The paper examines Information and Communication Technology (ICT) in special needs education and its implications for teaching and learning in inclusive classrooms. The paper presents an outline of ICT and special Needs Education (SNE) and also the rationale for ICT in inclusive classroom settings. More so, adaptive technology and learners with special needs and also strategies for effective adaptive learning inclusive classrooms are highlighted. The paper concludes by providing recommendations in terms of establishing a Special Education Laboratory (SEL) in all states in Nigeria that will provide training to special education teachers in the effective use and modification of assistive technology to suit the unique needs of learners with special educational needs.

Keywords: Information and Communication Technology (ICT), classroom teaching and learning process

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INTRODUCTION

Learners with special educational needs require special intervention and programmes due to their sensory, cognitive or intellectual and physical impairments. Special educators are expected to design instruction that will maximize the potentials of learners with special educational needs in the classroom. To achieve the universal access to education as outlined in the National Policy on Education (2013) and also achieve sustainable goals, teachers of students with special needs must be aware of ICT potential, acquire necessary knowledge and operational skills to adaptation and design of ICT tools and devices as it is as an appropriate apparatus for promoting universal and equitable learning.

The World Health Organization (WHO, 2020) asserts

that disability is any restriction or lack of ability, usually one that prevents a person from performing an activity within the range considered normal for a human being. It recognizes that the disability can be physical, sensory, cognitive and intellectual. The visually impaired (blind), speech impaired, physically challenged (wheelchair users, ambulant persons etc.), and those with multiple disabilities are considered disabled.Data according to the World Bank Report(using data from the 2018 Nigeria Demographic and Health Survey and qualitative research) has estimated that about 29 million of the Nigerian population and an estimated seven percent(7%) of household members above the age of five (5) are living with a sensory, physical, intellectual disability. These figures gets even higher because available data likely underestimate prevalence (Varalaksmi, Martines, Aderemi-Ige, Espinoza, &Illesami, (2020).

All learners regardless of their special educational needs, gender, race, colour, genetic traits, religion or belief or disabilityhas a right to equitable education. Student with special needs experience learning difficulties as a result of a physical, sensory, cognitive/intellectual, emotional/behavioral impairment. Therefore, they experience difficulties with reading, writing, speaking, numeracy etc. (Kaur, 2022).As outlined by Polirstok (2015), creating an emotionally safe classroom environment where students can be successful involves not only high approval interactions between students and teachers, but also requires an emphasis on structure and routine as well as the use of ICT. It is therefore evident that ICT has the capacity to provide enriching educational experiences for learners with special educational needs such as independence, motivate and engage students, collaborative learning options, hands on activities, internet-based communications, educational software, fieldwork and so forth.

Inclusive education ensures that all students are part of the school regardless of their strength and weaknesses in any area thereby becoming part of the school community (McCarthy, 2000).The United Nations, in an effort to protect and enhance the rights and opportunities of such persons, agreed formally on the Convention on the Rights of Persons with Disabilities in 2007. However, by May 2022, countries have formally ratified the convention ofwhich Nigeria is a signatory. The guiding principles of the convention include nondiscrimination, full and effective participation and inclusion in society, equality of opportunity, accessibility and respect for the capabilities of children with disabilities amongst others (United Nations, 2008). Therefore, the full inclusion of children with special needs in inclusive settings provides an opportunity for teachers to identify classroom management principles, embrace assistive technology resources and also adopt practices that promotes diversity and acceptance.

ICT AND SPECIAL NEEDS EDUCATION

ICT includes a wide variety of products that store, retrieve, manipulate and transmit or receive information electronically in a digital form. It consists of hardware, software, networks and media for collection, storage processing and presentation of information (voice, data, text and images)(Hata, Wang, Yuwono, & Nomura, 2003). The effective use of ICT resources and adapted technology ensures that learning materials, texts, notes and instructional materials are provides in formats that can be assessed by the learner (e.g., visual, audio, tactile etc.). There is need for an ICT framework for universal learning in classroom environments at all educational levels. These include; a) computers, educational software and websites, b) computer and science laboratories, c) curriculum and instruction, d) libraries, e) counselling and other student services (Burgstabler, 2021).

Students with special needs experience learning difficulties as a result of a physical, sensory, cognitive/intellectual, emotional/behavioral impairment. Therefore, the use of ICT resources is inevitable and should be utilized at all levels of education. In recent times the use of ICT in classroom teaching and learning is characterized by numerous challenges including policy frameworks and poor implementation, limited accessibility, inadequate technical skills and support, teacher competency amongst others.However, acontemporary issue facing the educational system in Nigeria is the adequacy, accessibilityan adaptation of teaching and learning materialsincluding ICTresources. Therefore, there is need to provide data to curb the death of research and significant data that is necessary for policy, planning and provision special education services in Nigeria.

RATIONALE FOR ICT IN INCLUSIVE CLASSROOM SETTINGS

Students with Special Needs. Kosovo Educational Research Journal, 6(1), 44-63
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Learners with special educational needs can compete favorable with their peers without special needs with the effective use of a functional information and communication technology. This enables them benefit maximally from classroom instructions and also has a potential for maximizing the potentials of persons with special needs as well as Morina, Halimaj and &Orhani,(2025) asserts that technological developments have brought new opportunities to support marginalized individuals and groups, including students with special

needs in recent decades. With the advancement in technology, learning tools should be made more accessible to learners with special educational needs.

Similarly, the findings of a systematic review in a recent study indicated that children with special needs in inclusive and special schools perform poorly academically compared to their non-disabled peers (Adjei, Osei, Edusei & Nakua, 2024). In addition, as posited by White, Saran and Kuper (2018) and several other researchers, accurate data and records of classroom teaching and learning outcomes, enrolment, attendance and academic performance in schools are difficult to find which makes it difficult to track their academic goals. However, this is typical in Nigeria and Sub-Saharan Africa. This scenario has posed a need for more research to evaluate the impact ICT in classroom teaching and learning for learners with special educational needs in Nigeria.

In lieu of the fact that the Nigerian government ratifies the UN-convention on Rights of Personswith Disabilities on 24th September 2010, all laws, policies and programmes/interventions in the county are expected to comply with the provisions of the convention. In addition, Section 7 the National Policy on Education (2013,), outlined the ICT accessories, necessary facilities, equipment, materials and other assistive devices that would endure easy access to quality education of learners with special needs. However, is this is yet to be adapted for full implementation in Nigeria posing a challenge to equal access in teaching and learning amongst learners with unique educational needs in special and inclusive classrooms.

Consequently, poor monitoring and supervision of classroom teaching and learning in special needs education in Nigeria is existent. This is essential for stakeholders in education to determine whether the inclusive education policy the United Nations has mandated for its member countries is beneficial. It is also crucial in determining and establishing high quality education by 2030 as spelt out in the Article 24 of the United Nations Convention on Rights of Persons with Disabilities (Adjei, Osei, Edusei & Nakua, 2024). In addition, Aron and Loprest (2012) had strongly asserted that monitoring the academic achievement of students with special needs is the only way to establish if they are learning in schools.

The Sustainable Development Goals (SDGs) has clearly emphasized that ‘no one is left behind’ so whether systems are related to health, education amongst others there is need to identify those who are likely to be left behind which includes persons with special needs. SDG Goal four (4) promotes quality education for all andto deliver on this goal, education financing must become a national investment priority. Furthermore, measures such as making education free and compulsory, increasing the number of teachers, improving basic school infrastructure and embracing digital transformation are essential (United Nation, 2023). All learners regardless of their special educational needs, gender, race, colour, genetic traits, religion or belief or disability has a right to equitable education as clearly spelt out in the SDGs.

ASSISTIVE TECHNOLOGY AND LEARNERS WITH SPECIAL NEEDS

Assistive technology has been a major advancement in the field of education globally and most especially to learners with special educational needs. As opined by Muller (2010), assistive technology is a term that describes any product or device with a primary purpose of improving an individuals’ functioning, independence and promote their wellbeing.Assistive technologies (AT) are products and devices which are designed or adapted for people with disabilities. AT includes all products, services and systems that improve the health, functioning and independence of individuals5. As such, general definitions of AT include technologies that support people with a range of communication, sensory or physical impairments (Department of Education, 2025).

The integration of technology and media into regular classroom instruction has tremendous potential to facilitate the successful inclusion of students with Learning disabilities into regular classroom settings (James, 2007).In a study by Amwe and Dommak, (2021), on the effects of assistive technology on the academic performance of pupils with disabilities in inclusive schools in Jos, Plateau State revealed that assistive technology devices can influence the performance of pupils with disabilities in inclusive classrooms. Therefore, assistive technology plays a critical role in closing a gap between students with special needs and their counterparts without special learning needs.Some of these assistive devices that are found in special and general education classrooms for learners with learning disabilities in accordance to the research conducted by Raskind and Stanberry (2006) and Daiute (1992) include the following:

a) Electronic math work sheet: Electronic math worksheets are software programs that can help students organize, align, and work through math problems on a computer screen.

b)Alternative keyboards:These programmable keyboards have special overlays that customize the appearance and function of a standard keyboard.

c)Speech Synthesizers/Screen Readers**:** These systems can display and read aloud text on a computer screen, including text that has been typed by the user, scanned in from printed pages (e.g., books, letters), or text appearing on the Internet.

d)Word prediction software programs**:** Word prediction software can help a user during word processing by "predicting" a word the user intends to type.

e) Talking Calculator:A talking calculator has an in- built

speech synthesizer that reads aloud each number, symbol, or operation key a user press, it also vocalizes the answer to the problem.

f) Proofreading Software Programs:Students who struggle with writing (e.g., spelling, grammar, punctuation, word usage, and sentence structure) may benefit from software programs (included in many word processing systems) that scan word processing documents and alert the user to possible errors.

g) Touch Screens: allows direct selection or activation of the computer by touching the screen, making it easier to select an option directly rather than through a mouse or keyboard (American Foundation for the Blind, 2012).

In addition, assistive technology is a vital option it gives to the teacher in addressing different learning styles for individual students using visual, auditory and tactile approaches and so that students become more independent.Similarly, assistive technology increases the frequency of assignment completion and contributes to improved motivation, ease frustration, increase motivation of students with learning disabilities to complete assignments and most importantly feel more accepted by his peers in the general education classroom.

STRATEGIES FOR EFFECTIVE USE OF ASSISTIVE TECHNOLOGY IN INCLUSIVE CLASSROOMS

Assistive technology plays an especially essential role in inclusive classrooms and its relevance cannot be overemphasized from assessment, classroom management, record keeping, assessment, lesson planning and presentation of learning instructions so as to bring about a quick or rapid change in an individual' learning abilities in various facets. It makes some of the routine teaching tasks easier, makes learning interesting and also allows a teacher to create learning activities and set up inclusive learning environments that enable learners with special needs participate actively in the classroom and maximize their learning potentials.

As outlined by Jagota, (2018) effective provision and utilization of assistive technology will help to achieve the following:

a) Enhance Academic Achievement: Assistive Devices enhance participation and achievement of students with disabilities in their educational programs. Assistive Devices fulfils the needs of students with disabilities in academic areas like reading, writing, spelling and mathematics, b) Makes the child independent: Assistive technology devices are only the beginning of a long road to independence. With the help of Assistive Technology children with significant disabilities can increase their meaningful participation across school, home, work, and community settings. c) Augmentative Communication:

Students with severe expressive communication impairments have difficulty in communication with peers and adults within their environments, d) Interact in Educational or Social Environment:

Assistive technology enhances the chances for students who have a wide range of physical and intellectual disabilities to be more autonomous and interact in educational or social environments and e) Helps in Social Development:

Assistive technology helps the disabled students in their social development (often students with special needs find it hard to connect with their normal peers, making it difficult for them to make friends and hence face isolation and sometimes depression). Thus, it helps in developing self-determination, self-advocacy and independent living skills.

Therefore, as asserted by Evmenova (2020), factors such as coordination and collaboration between service providers, situated training, technology integration with fidelity anddata-driven decision-making are imperative for effective implementation of assistive technology inclusive classrooms.

CONCLUSION AND RECOMMENDATIONS

The full implementation of inclusive education is gaining momentum in Nigeria and also globally. There are several forms of assistive of technology offer necessary supports for students with special learning needs in order to enable them access the curriculum and benefit maximally from classroom instruction. Despite the challenges of ICT in inclusive settings, special educators are encouraged to endure that they provide better learning experiences and opportunities to all students, including those with unique abilities and needs. Based on the discussions above the following recommendations are proffered:

1. There is need to carry out research that will inform policy and development in effective adaptation and design of ICT tools and devices to suit the specific need of learners with sensory/cognitive/developmental and physical impairments.
2. There is need to develop specific programmes and providing services in the education of learners with educational needs.
3. There is also need to ensure full implementation of the existing policies in special needs education. These include the National Policy on Special Needs Education in Nigeria (2015), Revised National Policy on Inclusive Education in Nigeria (2023) and The National Implementation Guidelines for ICT Education (2019).

4. There is need to establish “Special Education Laboratory” in all states in Nigeria that will provide training to special education teachers in the adaptation ofexisting assistive technologies and design of ICT tools and devices to suit the unique needs of learners.
5. There is also need to organize periodic workshops and seminars and training sessions for special education teachers and relevant stakeholders in special need education on design, adaptation and modification of ICT tools and devices.

REFERENCES

Adhei, E. S., Osei, E. Edusei, A. K. &Nakua, E. K. (2024). A systematic review of academic performance of children with disabilities (CWDs) in inclusive educationschools in Low Cost and Middle-Income Countries (LMICs). *Hellion* 10 (3). Doi: 10.1016/j.heliyon.2024.e25216.

Aron, L. &Loprest, P. (2012). Disability and education system. *Future Child*. 2012:22 (1): 97- 122.

Amwe, R. A. &Dommak, F. N. (2021). Effects of assistive technology on the academic performance of pupils with disabilities in inclusive schools in Jos, Plateau State*. International Journal of Academic Research in Education and Review.*9 (5), 259-265. Doi:10.14662/ijarer2021.210.

Department of Education (2025). Developing a competency framework for effective assistive technology training. Department of Education. In Slaughter R. & Griffiths T. (Eds). Government Social Research. Available at https://ww.gov.uk/government/publications.

Burgstabler, S. (2021). A universal design framework for addressing diversity, equity and inclusion on postsecondary campuses. *Review of Disability Studies,*Vol. 17 No. 3 (2021): Conference Proceedings of the 36th Annual Pacific Rim International Conference on Disability & Diversity. Retrieved from https://www.rdsjournal.org/index.php/journal /article/view/1071.

Daiute, C. (1992). Multimedia composing: extending the resources of kindergarten to writers across the grades. *Language Arts.* Sally Bacon Press.

Evmenova,A. (2020). Implementation of Assistive Technology in Inclusive Classroom. In Chambers,D. (Ed.) *Assistive Technology to Support Inclusive Education*. *International Perspectives on Inclusive Education,* Vol. 14, Emerald Publishing Limited, Leeds, pp. 177-193. Retrieved from https://doi.org/10.1108/S1479-363620200000014014

Federal Ministry of Education (2013). National Policy on Education. Federal Republic of Nigeria. Federal Capital Territory, Abuja, Nigeria

Federal Ministry of Education (2015). National Policy on Special Needs Education in Nigeria. Federal Republic of Nigeria. Federal Capital Territory, Abuja, Nigeria.

Federal Ministry of Education (2019). National Implementation Guidelines for ICT Education Federal Republic of Nigeria. Federal Capital Territory, Abuja, Nigeria

Federal Ministry of Education (2023). National Policy on Inclusive Education in Nigeria (Revised). Federal Republic of Nigeria. FME. Federal Capital Territory, Abuja, Nigeria. Retrieved from https://education.gov.ng/inclusive-education-policy//

Hata, A., Wang H., Yuwono, J. & Nomura, S. (2003).Assistive Technologies for Children with Disabilities in Inclusive and Special Schools in Indonesia. World Bank Group and Inclusive Education Initiative. Retrieved from https://documents1.worldbank.org/ curated/en/099543306052328820/pdf/IDU01f278 8e204497047d60a3ea05db5ca5d1a6b. pdf

Jagota, U (2018). Role of Assistive Technology in Inclusive Classrooms. *Journal of Emerging Technologies and Innovative Research (JETIR),* Volume 5, Issue 6, 164-168. Retrieved from https://www.jetir.org/papers/JETIR1806409.pdf

James, E. (2007).*The influence of assistive technology on students with learning disabilities in the inclusive classroom.* California Press.

Kuper, H., Saran, A. & White, H. (2018). Rapid Evidence Assessment (REA) of what works to improve educational outcomes for people with disabilities in low and middle income- countries: Campbell collaboration. *New Delhi and International Centre for Evidence on Disability* 2018, 16(3) 1104, Campbell collaboration, London. Retrievedfrom http://service.gov.uk

McCarthy, M. M. (2000). *Inclusion of children with disabilities: seeking the appropriate balance.* Guilford: McGraw-Hill.

Morina, M., Halimaj, H. &Orhani, S. (2025). Technology as an Assistive Tool for students with special needs. *Kosovo Educational Research Journal,* 6 (1), 44-63.

Muller, A. (2010). Software assistive technology for the blind and visually impaired. Guidelines for building accessible and usable interfaces: a review of assistive and accessibility problems. Retrieved from https://www.amazon.com/software.22/02/20.

Polirstok, S. (2015) Classroom Management Strategies for Inclusive Classrooms. *Creative Education*, 6, 927-933. doi:10.4236/ce.2015.610094.Retrieved https://www.scirp. org/journal.

Raskind, M. & Stanberry, K. (2006). *Assistive technology for kids with learning disabilities. An overview.*Schwab Learning Centre.Retrieved Oct 3, 2013, from https://www.schwablearning.

World Health Organization. (2020). Disability and health.United Nations. Retrieved from https://www.who.int/news-room/fact-sheets/detail/disability-and-health

United Nations(2023). Sustainable development goals. United Nations Sustainable Development Retrieved from https://www.un.org.sustainabledevelopment/education/.

United Nations (2008). Convention on the Rights of Persons with Disabilities. Retrieved from https://www.un.org/development/desa/disabilties/convention-on-the-rights-of-persons with-disabilities/guiding-principles/convention.html.

Varalaksmi, V., Martines, R. M., Aderemi-Ige, T. J., Espinoza, S. N. &Illesami, M. G. (2020).Disability inclusion in Nigeria: a rapid assessment of challenges and opportunities. Policy Commons .https://policycommons.net/artifacts/1430470/disability-inclusion-in-nigeria2047297/