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ORIGINAL RESEARCH ARTICLE

Examining Digital Technology and Special Needs Education in Nigeria

Abdullahi Bn Umar[1], Zainab Mansour Sarki[1] and Haruna Muhammad[2]
[1]Department of Computer Science, Yusuf Maitama Sule Federal University of Education, Kano State, Nigeria
[2]Department of Chemical Engineering, Federal Polytechnic Bida, Niger State, Nigeria

ABSTRACT
The digital divide and the potential of digital technologies in facilitating adaptive learning and inclusive education for individuals with disabilities have been widely studied, noting unequal access to education by this vulnerable group. However, little research has explored the consequences of digital exclusion and over-dependence on digital technologies for inclusive education of students with disabilities in developing countries with limited technology infrastructure, such as Nigeria. It is on this premise, that this study reviews the existing literature on the state of digital exclusion of students with disabilities and examines whether emerging technologies are bridging the existing exclusion gaps. To achieve this, a literature review was conducted to identify relevant sources for the study through searches in databases such as Google, Google Scholar, Scopus, Web of Science, and Wiley Online Library. A total of 182 literature sources were identified and retrieved from these databases. After screening, 24 literature sources that strictly focused on digital inclusion, the state of digital technology inclusion for individuals with disabilities, assistive learning technologies, and Challenges of inclusive education in Nigeria, met the criteria for inclusion and were included in the study. Accordingly, Universal Design Learning (UDL) and Relative Deprivation Theory (RDT) were employed to guide this study. The review analysis exposed inadequacies in assistive technology tools, limited access to other emerging technologies, insufficient digital skills, and a lack of political will to implement education policies for people with disabilities in Nigerian education practices. A practice that further exacerbates existing exclusion gaps in equitable access to quality education by students with disabilities.

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INTRODUCTION
Available studies have shown that persons with special needs (PwSNs) have been socially excluded from benefiting from social services, which is an infringement of their fundamental human rights as enshrined in the United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD). The CRPD places persons with special needs high on the global agenda for holistic consideration in policies and programs (Elekanachi et al., 2023). While this policy, though, focuses on protecting the rights of PwSNs to access social services generally, the United Nations Sustainable Development Goal (SDG4) specifically emphasizes inclusive, qualitative lifelong learning for all (Agbabiaka et al., 2024). Considering the estimated growth of about a billion PWSP globally (Ijadunola et al., 2018), and the socioeconomic vulnerability of this group to marginalization (Ojiaka, 2024), and stigmatization among youths in developing countries like Nigeria, with an estimated 18 million PwSNs, excluding them from equitable and qualitative access to education and lifelong learning, especially entrepreneurship skills that prepare them for future engagements, especially in the present digital technology-driven economy, would be a clear violation of the United Nations convention on the Rights of Persons with Disabilities. Digital technology has remained the bedrock on which digital transformation and the digitalization of all facets of life, including education, are based.

The rapid ongoing transformation of education systems in developed countries, driven by the digital revolution, could offer improved quality of life and learning opportunities for PwSNs. Thus, integrating digital technology into the education system has become inevitable in this digital economy. In developing countries, however, where a significant population of PwSNs already face socioeconomic exclusion from the conventional education system due to poor or lack of accessibility to infrastructural facilities, poor policy implementation (Agbabiaka et al., 2024), insufficient funding, lack of or inadequate human and material resources (Umeh, 2024), and digital skills, digitalizing the education system in Nigeria, for instance, could amount to widening the existing exclusion gaps PwSNs are facing.

Correspondence: Abdullahi Bn Umar. Department of Computer Science, Yusuf Maitama Sule Federal University of Education, Kano State, Nigeria. ✉ abdullahiu226@gmail.com.
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This was evident from a recent study by Guobadia and Ekuobase (2024), which estimated the Digital Learning Culture Index (DCLI) of the Nigerian secondary education system at 0.21. This trend of exclusion, according to Ojiaka (2024), can be attributed to high poverty rates, which are strong barriers to their inclusive education, lack of access to information, discrimination, and stigmatization. Overall, institutionalization of special centers for educating and training PwSNs in Nigeria, separate from public schools and training centers, is a clear manifestation of discrimination and their exclusion (Elizabeth and Adewunmi, 2023). Although the digital divide and the potential of digital technologies in facilitating adaptive learning and inclusive education for individuals with disabilities have been widely studied, noting unequal access to education by this vulnerable group of individuals, little research effort is known to have explored the consequences of the digital exclusion and over-dependency on digital technologies for inclusive education of students with disabilities in developing countries with limited technology infrastructure such as Nigeria. It is on this premise, that this study reviews the existing literature on the state of digital exclusion of students with disabilities and examines whether emerging technologies are bridging the existing exclusion gaps. To achieve this, the study provides answers to the following research questions:

1. What is the state of digital infrastructure and access to emerging technologies for the inclusion of individuals with disabilities in Nigeria's education system?
2. Do government policies on inclusive education impact positively on students with disabilities in Nigeria?

1.1 *Theoretical Frame*

Emerging facts from recent studies reveal that PwSNs remain exposed to violations of their rights, capable of excluding them from socioeconomic development of the individual and country at large, thus limiting their freedom of association, interaction, and access to social services, due to their isolation from other students in regular school settings (Elekanachi et al., 2023). Rights violation in this study refers to the lack of qualitative and equitable access to education and lifelong learning (Pannulo et al., 2025). The theoretical frameworks that align with the study's focus are the Relative Deprivation Theory (RDT) and Universal Design for Learning (UDL). This theory asserts that evaluations of exclusion based on personal circumstances are relative to social and temporal contexts, while UDL creates a flexible, accessible, and digital learning environment suitable for digital instructional delivery (Pannulo et al., 2025). Other digital exclusion theories assume that socioeconomic status consistently influences individual engagement with digital technologies across different contexts. Thus, a shift towards RDT would benefit empirical or theoretical research studies with a focus on the digital divide/inequality by incorporating context-specific explanations into existing personal and structural understandings of digital exclusion (Helsper, 2017). Under this theory, Helsper (2017) proposed the concept of the social relativity of digital inequalities, which postulates that digital exclusion depends on perceptions of individuals in relation to others' attitudes and engagement with digital technology tools in a context-specific approach.

REVIEW PROCEDURE

This study adopts a systematic review of the literature in line with the PRISMA standard for reporting systematic reviews, including meta-data analysis.

2.1 Literature Identification

The literature for this study was identified and retrieved through searches of databases such as Google Scholar, Scopus, and Web of Science, using common syntactic search approaches to identify relevant studies. The keywords in Table 1 were used to retrieve a total of 182 pieces of literature from the databases identified above. The retrieved articles were initially screened for relevance solely on title and abstract, and then the full text was reviewed prior to selection.

Table 1: Search Keywords

Database	Initial Search terms	Retrieved Articles
Google	Disabilities AND digital Exclusion Assistive technology tools AND education Inclusive education AND Nigeria	[40]
Google Scholar	Disabilities AND digital Exclusion Assistive technology tools AND education Inclusive education AND Nigeria	[61]
Scopus	Disabilities AND digital Exclusion Assistive technology tools AND education Inclusive education AND Nigeria	[31]
Web of Science	Disabilities AND digital Exclusion Assistive technology tools AND education Inclusive education AND Nigeria	[27]
Wiley Online Library	Disabilities AND digital Exclusion Assistive technology tools AND education Inclusive education AND Nigeria	[23]

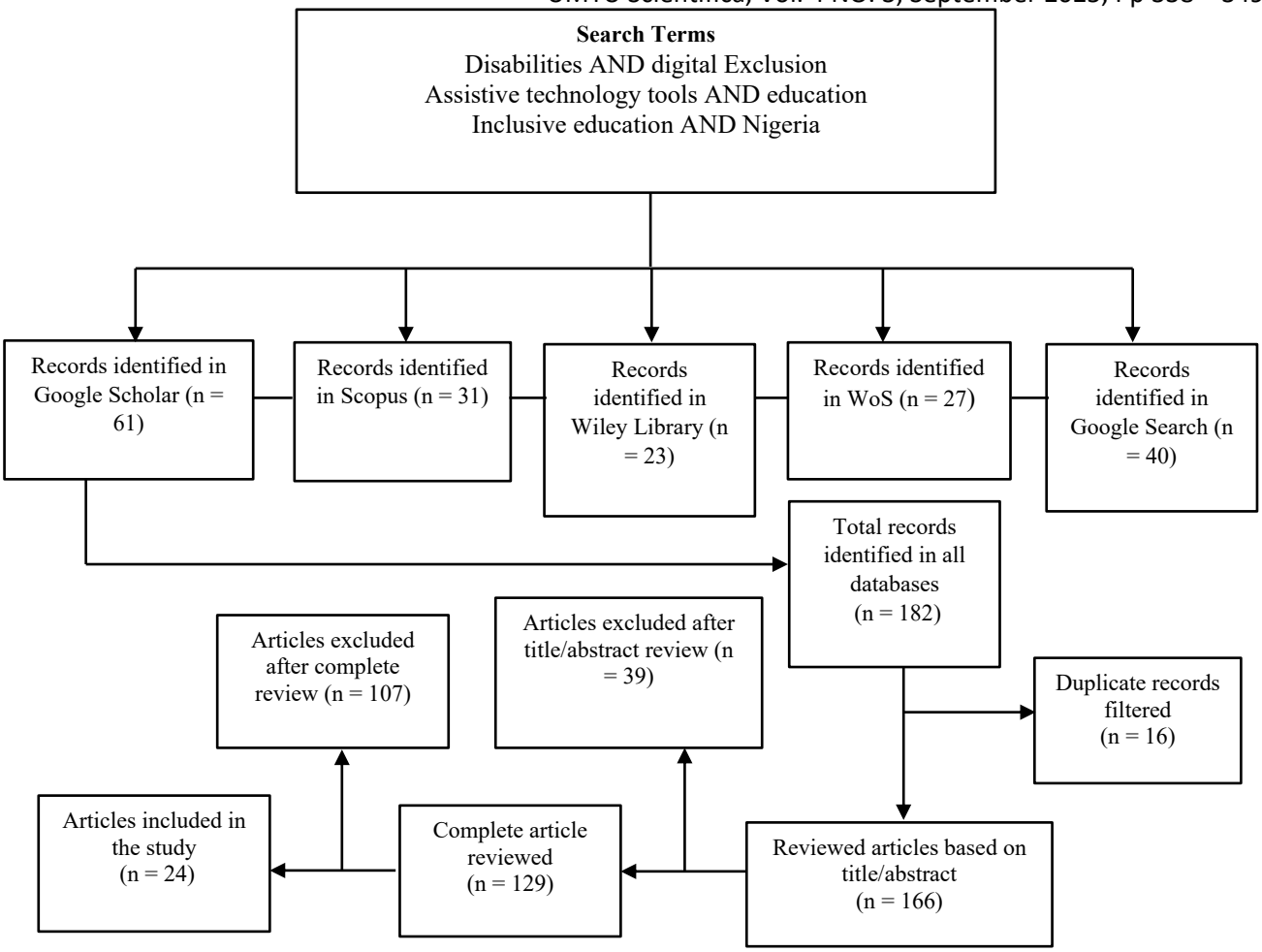

Figure 1: PRISMA Flowchart on Screening of Relevant Articles for Inclusion in the Study

2.2 *Screening and Selection*

2.2.*1 Selection Criteria*

The inclusion and exclusion criteria defined the selection criteria for including particular literature. Common strategies used to determine the eligibility of studies for inclusion/exclusion from the study are to avoid bias and possible outliers that may affect the reliability of the results.

2.2.2 Inclusive Criteria and Exclusive Criteria

In this study, the criteria for article inclusion were based on the following:

Language of publication: The paper must be written in in English language

Peer-reviewed: the article must have undergone peer review and been published

Study Focus: the study must focus on the following themes: "digital inclusion", "the state of digital technology inclusion for individuals with disabilities", "assistive learning technologies", and "Challenges of inclusive education in Nigeria".

Type of research: both empirical and non-empirical, including review research studies

Regional and socioeconomic status: The paper must focus on developing countries with low-income/poor socioeconomic status.

Consequently, retrieved articles that failed to meet the above-mentioned criteria, including those retrieved multiple times, were outrightly excluded from the study. Upon application of these criteria, 24 articles were considered relevant and were accordingly included in the study. The details of the screening procedure that led to this number (24) of included studies are presented in Figure 1.

2.3 Data Extraction

To provide useful information, facilitate understanding of the transparent processes leading to the systematic review of this study, and enable replicability of this work, the study presents metadata from the 24 included literature sources in Table 2, following the PRISMA standard procedure. This relevant information resulted from the review of full-text articles after screening 182 identified and retrieved articles from various databases.

Table 2: Relevant Met-data from Included Studies

Citation	Title	Objective	Methodology	Database
Murtadlo et al. (2025)	Inclusive education in Africa: Transforming higher education in low-income countries	To analyze inclusive education initiatives in African higher education institutions.	Systematic literature review	Scopus
Arakpogun et al. (2023)	Bridging the digital divide in Africa via universal service funds: an institutional theory perspective	The purpose of this paper is to provide evidence-based policy recommendations for improving the implementation of universal service funds (USF) with a view to closing the digital divide in Africa.	The paper adopts a qualitative approach that draws examples from various African countries, supported by 25 interviews.	Scopus and Web of Science (WoS)
Adam et al. (2025)	The effects of digital transformation on inequality: do the mediating impact of digital inclusion and ICT regulatory environment matter	The purpose of this paper is to examine the linkages between digital transformation, digital inclusion, the ICT regulatory environment, and economic inequality.	Utilizing a hypothesized model grounded in the capabilities theory and analyzing secondary data from 130 countries	Google Scholar
Ibe and Ezeala (2025)	Assessment of Special Material Resources for Implementation of Inclusive Secondary Education in Nigeria	Examined the availability of specialized material resources absolutely needed for the execution of inclusive secondary education for students who are Deaf, Mute, Blind, and Autistic in Nigeria	Conceptual Analysis to assess the resources that enable the implementation of Inclusive education at the secondary level in Nigeria	Google Scholar
Ijadunola et al. (2018)	Engendering a conducive environment for university students with physical disabilities: assessing the availability of assistive facilities in Nigeria.	To assess awareness and availability of assistive facilities in a Nigerian public university	Interviewed with a semi-structured questionnaire	Web of Science (WoS) and Scopus
Ahmadu et al. (2025)	The Impact of Technology Policies on Education and Workforce Development in Nigeria	To assess how technology policies impact educational systems and workforce development in Nigeria	A survey research design	Google Scholar
Agbabiaka et al. (2024)	Students with Disabilities and Facilities Accessibility in a Northern Nigerian Public University: Dismantling Exclusion in Achieving SDG4	To examine students with disabilities and facility accessibility, bridging exclusion gaps for achieving Sustainable Development Goal 4 (SDG4)	A survey questionnaire design was used.	Web of Science (WoS)
Amaonye et al. (2024)	A theoretical model for promoting digital inclusion for students with visual impairment in the Nigerian higher education system	Proposes a theoretical model for advancing the inclusion of students with visual impairments in higher institutions in Nigeria	An open-ended Survey questionnaire design was used	Google
Tangwe and Nizeyumukiza (2025)	Digitalization for Equity and Inclusion: Fostering Sustainability in Education	To examine the potential of digitalization to advance equity, inclusion, and the quality of education, while also fostering its sustainability in the education sector.	Descriptive research design	Google

To be continued next page

Table 2 continued

Citation	Title	Objective	Methodology	Database
Manzoor and Vimarlund (2018)	Digital technologies for social inclusion of individuals with disabilities	To explore which types of information communication technology-based applications and/or digital services have been suggested to facilitate the social integration of people who suffer from different types of disabilities	Systematic literature review	Web of Science (WoS), and Scopus
Mikropoulos and Latraki (2022)	Digital technology supports science education for students with disabilities: A systematic review	presents a systematic literature review on the contribution of technology in science education for students with disabilities	Systematic literature review	Web of Science (WoS), Scopus, and Google Scholar
Safari et al. (2023)	Digital technology design activities—A means for promoting the digital inclusion of young adults with intellectual disabilities	To explore whether and how participation in digital technology design activities can support the digital inclusion of young adults with intellectual disabilities	Open-ended interview	Web of Science (WoS), Scopus, and Wiley Online Library
Rizk and Hillier (2022)	Digital technology and increasing engagement among students with disabilities: Interaction rituals and digital capital	To explore the role that digital technologies play in facilitating greater engagement among students with disabilities	Open-ended interview	Web of Science (WoS), Scopus, and Google Scholar
McNicholl et al. (2019)	The impact of assistive technology use for students with disabilities in higher education: a systematic review	examines the impact of assistive technology (AT) on educational and psychosocial outcomes for students with disabilities (SWDs) in higher education	Systematic review	Web of Science(WoS), Scopus, and Google Scholar
Johansson et al. (2020)	Disability digital divide: the use of the internet, smartphones, computers, and tablets among people with disabilities in Sweden	To describe the use of and perceived difficulties in the use of the internet among people with disabilities, and to explore digital divides between and within disability groups, and in comparison with the general population.	A survey questionnaire	Web of Science(WoS), Scopus, and Google Scholar
Hongngm et al. (2022)	The Development of Digital Technology to Support Learning in Children with Disabilities	To develop digital technology that supports learning in children with disabilities and test the effectiveness of digital technology used in children's learning	Survey research design	Google Scholar
Venkatesan (2023)	Digital Literacy in People with Disabilities: An Overview and Narrative Review	To examine the themes, topics, and issues on or about disparities in accessibility, employment opportunities, social inclusion, and education options between people with disabilities and those without, and explore the availability of measurement tools for assessing digital aspects in people with disabilities	Systematic Review	Google Scholar

To be continued next page

Table 2 continued

Citation	Title	Objective	Methodology	Database
Sanchez et al. (2024)	What Is Known about Assistive Technologies in Distance and Digital Education for Learners with Disabilities	Aimed at finding out what is known about distance education mediated by assistive technology, based on an analysis of the characteristics of scientific production	Systematic Review	Web of Science (WoS), Scopus
Ariza and Hernandez (2025)	A Systematic Literature Review of Research-based Interventions and Strategies for Students with Disabilities in STEM and STEAM Education	conducted a systematic literature review focused on interventions and strategies in STEM and STEAM education for SWDs	systematic literature review	Web of Science (WoS), Scopus, Google Scholar
World Bank (2022)	Disability Inclusion in Nigeria: A Rapid Assessment	To better understand the challenges around disability inclusion across the various types of disabilities, and to identify drivers and opportunities for inclusion that could be leveraged in a development context.	Desk review of published and grey literature, a mapping of services, and an online questionnaire-based assessment	Google
Elekanachi et al.(2023)	A Portrait of the Rights of Children with Disabilities in Nigeria: A Policy Review	To examine the extent to which Nigeria's current disability and childhood policies have integrated the two child and disability related conventions from the UN	Systematic Review	Scopus, PubMed
Arimoro, (2019)	Are they not Nigerians? The obligation of the state to end discriminatory practices against persons with disabilities	To among others, highlight the plight of persons with disabilities in Nigeria and the need to protect disabled persons in the country	Systematic Review	Web of Science (WoS) and Scopus
Gull et al. 2025	A Systematic Review of Challenges Faced by Students with Disabilities in Higher Education	To identify important hurdles to higher education for students with disabilities, as well as examine the lack of accessibility and assistance	Systematic Review	Scopus and Google scholar
Asres, (2025)	Inclusive education practices and their legal frameworks for special needs students in Ethiopia	To critically explore the practice of inclusive education and enabling legal structures, integrate it, and outline areas of gaps for further research.	Systematic Review	Web of Science (WoS) and Scopus

FINDINGS SYNTHESIS

State of Assistive Technology in Nigeria's Education System

Ijadunola et al. (2018) investigated the availability of assistive technologies in Nigerian higher institutions through interviews with 52 students with disabilities. Their findings show limited use of assistive technologies on campus and students' lack of awareness of their availability, indicating they are not even available. Just like in Tangwe and Nizeyumukiza (2025), whose study examines the influence of the digitalization of the education system on advancing equitable, quality, and inclusive education, while paving the way for sustainability in the education environment. Their study revealed a deficiency in the availability of digital technology tools, including assistive devices that cater to the needs of students with disabilities, limiting their unequal accessibility to quality education and social engagement.

These findings are consistent with those of the World Bank (2020) study, which found that students with disabilities in Nigeria have limited access to education due to a lack of adaptive learning resources, technical skills for both teachers and students, and a restricted learning environment, including technology platforms that address their needs. Their findings suggest that the concept of social theory is more appropriate for understanding how inclusion and exclusion should occur in education. Furthermore, the study by Ariza and Hernandez (2025) also revealed the exclusion of students with disabilities, attributing it to a lack of accessibility to educational technology resources, among other factors, especially under the Universal Design for Learning (UDL), which is meant to accommodate their needs. These findings align with the work of Gull, Kaur, and Basha (2025), which highlighted barriers to education of students with disabilities at the higher degree level and, at the same time, investigated the lack of accessibility and assistance. They found that, in line with numerous studies, students with disabilities have been excluded by marginalization, stigmatization, and disenfranchisement of their fundamental rights to equitable quality education. They also identified environmental barriers to accessibility, lack of funding, lack of adaptive infrastructure, and insufficient digital training for both staff and students. However, despite the underlying potential of assistive technologies for inclusive education, according to the study, the availability, accessibility, and use of these tools in Nigeria and other developing countries remain daunting.

Meanwhile, Johansson et al. (2020) conducted a survey to determine the trend in internet usage among Swedish individuals with disabilities and, at the same time, to explore digital exclusion among students with disabilities and compare it with the rest of the population. Their findings show disparities in digital inclusion across subgroups of these vulnerable individuals, underscoring the need to study the digital divide among PwSNs independently rather than through homogeneous studies. In line with this goal, the study by Hongngm et al. (2022) developed digital technology that facilitates learning for children with impairments and determined how effectively its use can influence academic engagement. Their study found that the effectiveness of digital technology in promoting learning among children with disabilities exceeded the common threshold, indicating significant technological support for effective and inclusive learning. Reinforcing these findings, Rizk and Hillier (2022) explores how digital technology enhances collaboration among disabled students, as the population of individuals with disabilities has continued to rise over the past decade. Results from the study show that assistive technologies can catalyze student interaction, ushering in new collaborative ways for both abled-bodied and disabled students. Revealing a paradigm shift in student-teacher interaction through technology. Apparently, the potential and diverse influence of technology-mediated learning environments on individuals with disabilities has not been discovered. This is evident in the publications of McNicholl et al. (2019), who conducted a systematic review of the influence of assistive technologies on psychosocial and educational aspects, and how these affect learning outcomes for students with disabilities in higher education. Their study, like others, shows that assistive technologies can be a driver of students' academic collaboration, including their transformative potential from a psychological perspective. However, these technologies can also constitute barriers to the effective adoption of assistive technology tools, limiting students with disabilities' academic achievement.

Policy Implementation and the Success of Inclusive Education in Nigeria

Arimoro (2019) highlights the challenges of persons with special needs in Nigeria, focusing on their right to equitable access to education and protection. The study found that the right to equitable and quality education for individuals with special needs was limited, as evident in the number of school-age children who are out of school due to their inability to afford the special education school system, while noting that discriminative practices against this group of persons further contribute to their incapacitation socially and technologically. For example, Safari et al. (2023) investigated how participation in the design activities of digital technologies can leverage the inclusion of young persons with disabilities. They identified four aspects: improving digital skills and knowledge, showcasing skills and competence, adapting to digital technology, and motivating interest in technology use, which suggested that participation in technology design activities can facilitate the digital inclusion of individuals with intellectual disabilities.

In a similar vein, Asres (2025), after exploring inclusive education practices and the enabling legal structure in Ethiopia, noted how the country promoted inclusive education through various policies and laws; however, it is not implemented, a findings consistent with the study of Ejim and Okoye (2025), which examine the Nigerian policy on discrimination against persons with disabilities and the status of its implementation in education and other social spheres. Their findings, even though they acknowledge the act's signing into law in 2019, show that its implementation remains on paper.

An instance of this is the acknowledgement of disparities in digital and technological access in developing African countries such as Ethiopia, Algeria, Congo, Somalia, and Nigeria, as found by Arakpogun et al. (2023). Their study also highlighted limited empirical research as a key factor hindering progress in bridging Africa's digital exclusion gaps, despite the formulation of various policies, including the Universal Access Service (UAS) through the Universal Service Funds (USF). These findings were attributed to weak or absent policy implementation, among other factors. In addition, Ahmadu et al. (2025), after careful examination of the impact of technology policy on education in Nigeria, found that technology disparities across regions in the country are among the deficiencies that inclusive education in Nigeria suffers from. This scenario was also noted in Adam et al. (2025), who observed an alarming rate of these disparities in low-income countries, where individuals with disabilities

confront significant barriers, including limited access to the internet and assistive technologies that enhance inclusivity. This observation is not dissimilar to those of Murtadlo et al. (2025), who found that Algeria, Nigeria, Ethiopia, Congo, Somalia, and Uganda face serious inclusive education challenges, citing inadequate infrastructure, societal stigma, and educators' training as obstacles. Granted that Nigeria has been making efforts to successfully integrate digital technologies into its education system, but very little is known about the provision of digital technology infrastructure and state-of-the-art assistive technology tools that would facilitate inclusive education for the less privileged.

Barriers to Disability-friendly Infrastructure, Technology, and Skills

Venkatesan (2023) analyzed the literature on themes, issues, and topics related to digital technology accessibility for persons with disabilities, highlighting its benefits for social services, such as education and employment opportunities, for social inclusion and inclusive education. Additionally, the study explored available assessment tools for evaluating digital interactions in persons with disabilities. The analysis revealed that little effort has been reported on digital literacy skills among persons living with disabilities, underscoring the need to bridge the existing digital divide gaps, especially for this group of vulnerable people. To further gain insight into fulfilling these requirements, Sanchez et al. (2024) conducted an analysis of the scientific literature on distance education facilitated by assistive technologies. The study found that scientific research on the use of assistive technology to support persons with disabilities was limited across all levels of education, except for individuals with hearing and visual impairments, where greater use of assistive technology devices was observed. As a result, a systematic review by Mikropoulos and Latraki (2022) was conducted to examine the impact of technology on science education, particularly for students with disabilities. It also shows that disabled students perform significantly below their non-disabled peers, highlighting the need for pedagogies associated with specific technologies and for technological affordance that meets the needs of this group.

This clearly affirmed digital exclusion of PwSNs in the Nigerian education system (Amaonye, 2024), attributing this challenge, among others, to accessibility, insufficient digital skills, the non-digitalization of the higher education system, and a lack of adaptive/learning technology tools to support their learning deficiencies. It exacerbated the digital exclusion gaps in the emerging technology landscape, prompting an investigation into ICT and other digital tools suitable for facilitating social inclusion among individuals with disabilities (Manzoor and Vimarlund, 2018). Therefore, highlighting the significant impact of technology in facilitating social inclusion for persons with disabilities across various walks of life, particularly by organizations such as the European Commission, remains challenging. This is evident in the low percentage (27.8%) of PwSNs who can afford higher education, largely due to the high poverty rate of approximately 70%. This study merely identified and discussed technologies and technology platforms that support individuals with specific disabilities for social inclusion, overlooking the crucial aspects of its availability, affordability, accessibility, and usability.

Agbabiaka et al. (2024), guided by the social model of disability and social cognitive theories, examined facility accessibility for disabled students on the campuses of Nigerian higher institutions that restrict their free movement or active participation in technology-driven learning environments. The study found that these facilities are lacking and, where available, are grossly insufficient to meet the varying educational needs of PwSNs, even as various technologies and other assistive learning resources abound. Thus, limited technology infrastructure, digital literacy, and affordability were also noted as delimiting factors hindering the success of digital inclusion. This constitutess an infringement of the fundamental right to education of vulnerable individuals in most developing economies, according to the findings of Arimoro (2019). Suppose this trend persists as digital transformation continues. In that case, the education and social integration of individual with special needs in Nigeria and other low-income countries in Africa and beyond will undoubtedly suffer serious setbacks.

RESULTS AND DISCUSSION

Policy Implementation Shortfalls

Nigeria's education system has undergone various policy transformations – from Universal Primary Education (UPE), Universal Basic Education (UBE), Nigeria Digital Learning Policy (NDLP) to Sustainable Development Goals 4 (SDG-4) – inclusive education policy – all aimed at advancing academic achievement, boosting enrollment, and increasing participation, especially for inclusive education and girl-child education. However, these policies remain unimplemented in Nigeria's education system, except on paper. A similar scenario was observed in Ethiopia, where the inclusive-education policy is inefficient. This shortfall in policy regulation and implementation by the government, as a critical stakeholder, negatively impacts the success of inclusive education. As a consequence, it infringes the fundamental rights of citizens to equitable access to education for social integration and socioeconomic development.

A further scrutiny of the findings as contained in section three of this study revealed the ineffectiveness of the policy in facilitating inclusive education. This fact is supported by the findings in Arimoro (2019), who noted that the right to equitable access to education for persons with disabilities has been infringed, considering the number of school-age children who are out of school. A trend that has already partitioned individuals at the border of the able-bodied and the disabled, resulting in discrimination. No doubt, this disparity has become more pronounced with advances in technology. Therefore, rather than mitigating digital disparities, it further escalates the existing digital-exclusion gaps. Consequently, it can be observed that government policies on inclusive education have yet to yield a significant impact on the education of

individuals with disabilities in Nigeria, thereby addressing the research question Q2.

Infrastructural and Access Barriers

Even with all these policies in place, the Nigerian education system is still facing numerous challenges, such as the deplorable state of infrastructure, a disability-friendly environment, poor funding, limited supply of learning resources, and weak policy implementation. Expectedly, the emergence of digital technologies, which ought to have mitigated the majority of these challenges, particularly inclusive education aligned with SDG-4 goals, is further aggravated by limited access to technology, disabilities, and the lack of sufficient knowledge and skills. These arguments are consistent with the majority of the findings of (Ijadunola et al. 2018; McNicholl et al. 2019; Rizk and Hillier, 2022; Agbabiaka et al. 2024; Sanchez et al. 2024; Tangwe and Nizeyumukiza, 2025; Ariza and Hernandez, 2025), which reported limited technology access and digital technology infrastructure that meet the diverse needs of individuals with disability, hindering the success of inclusive education in Nigeria – indicating a worrisome state of exclusion of students with disabilities in Nigeria's education system. Accordingly, this addresses research question Q1.

Figure 2 presents barriers to digital accessibility for inclusive education of individuals with disabilities, how they interact with one another, and their impact on digital exclusion.

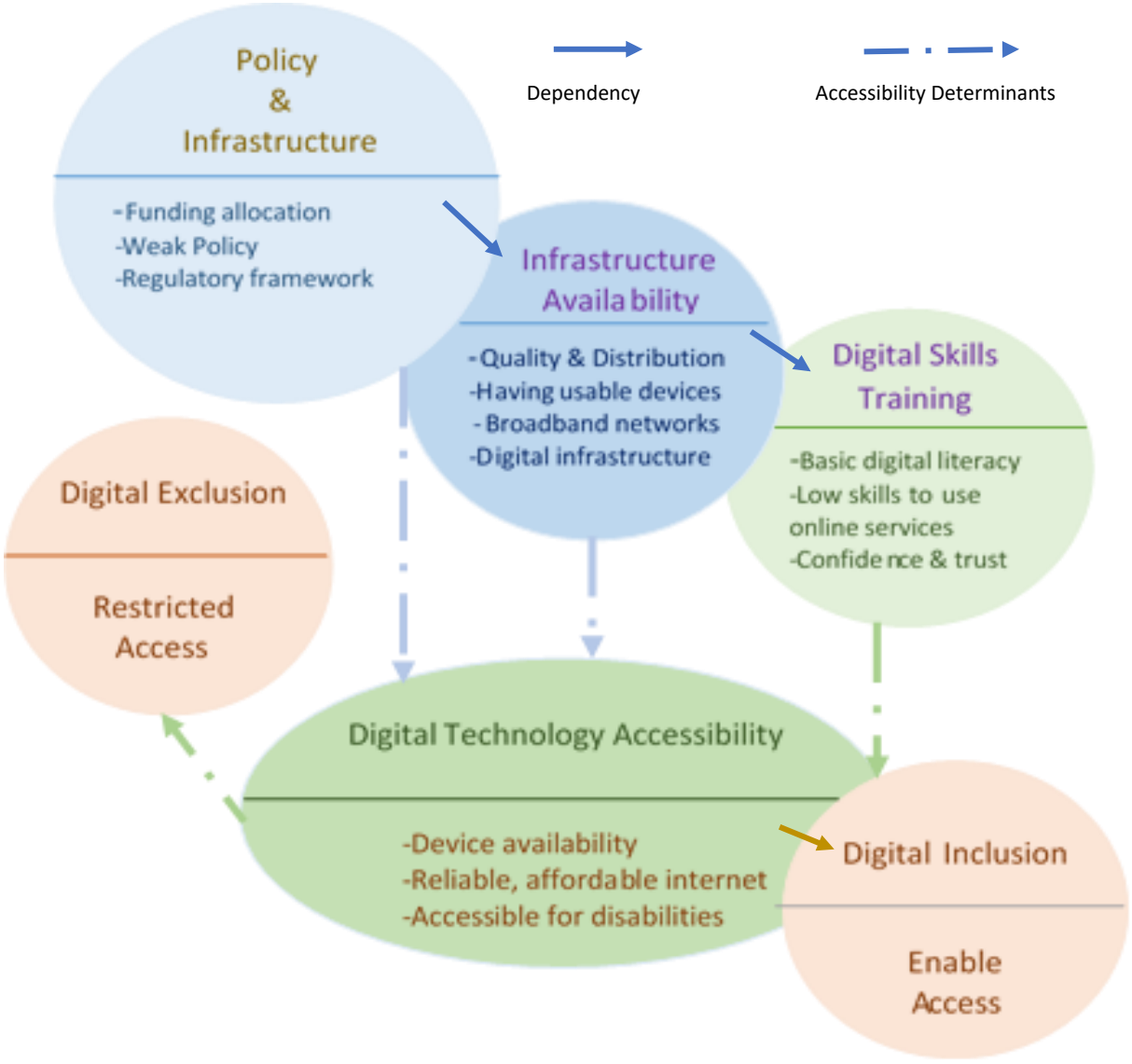

Figure 2. Conceptual Model Depicting Barriers to Digital Access and Their Impact on Exclusion

Policy Implementation

Policies and regulations for the implementation of inclusive education are a primary responsibility of the Government. A timely and efficient discharge of these responsibilities provides an enabling environment, which determines: digital infrastructure – availability of broadband and devices, accessibility standards, and subsidy considerations for low-income individuals or institutions. Hence, the standard, distribution, and type of infrastructure are dictated by the policy.

Infrastructure

Infrastructure covers both buildings and digital devices and services – as well as Computers, assistive devices,

high-speed internet connectivity, public Wi-Fi availability, and a reliable power supply. All are prerequisites without which digital accessibility cannot be achieved.

Digital Training Skills

Digital accessibility cannot occur despite the provision and availability of policy and infrastructure unless users acquire sufficient technical training, knowledge, and skills to effectively and optimally use these infrastructural facilities. The lack of periodic training and empowerment – which should be a continuous process given the dynamic nature of technological growth – can significantly hinder digital access.

Digital Accessibility

Accessibility encompasses the availability of all requirements that enable participation in the digital world, including digital devices such as computers, assistive devices, high-speed internet connectivity, affordability, an enabling environment, disability-friendly buildings, digital literacy skills, infrastructure, proper regulation, and policy implementation. All these, put together, are interrelated barriers that determine digital inclusion or exclusion, particularly for persons with disabilities, from benefiting from social services, including education, in Nigeria and other developing or low-income countries globally.

Overall, although the study used Nigeria as a case study, similar scenarios were observed in other developing/developed countries Sweden having 93% of students with disabilities in a specialized school settings, others include Algeria, and Ethiopia, just as France – over 80% of students with disabilities in regular school, Finland – with 51% hybrid, 39% mainstream, and 10% specialized, Germany runs both mainstream and specialized schools, and United Kingdom provides for 51% mainstream and 45% specialized schools, while in Italy, 100% of students with disability were all accommodated in the mainstream classes, taken the lead among the most developed nations in implementing inclusive education practices.

CONCLUSION

This study draws on available literature to show that the influence of technology-assisted learning on adaptive, personalized learning, and inclusive education has long been studied. The focus all along has been on its positive impact, without consideration of its potential consequences: technology-access disabilities for a significant number of people living with disabilities, particularly in technology-disadvantaged developing countries, including Nigeria. The study's review findings cite unequal access to education for individuals with disabilities as due to the ineffectiveness of education policies, infrastructural deficiencies, the non-availability of assistive technology tools, and a lack of knowledge and skills in their use – all barriers to inclusive education for this group. This suggests serious neglect on the part of the government, which is a critical stakeholder on whose shoulders lie the responsibilities of policy formulation and implementation, enforcement, and the provision of digital technology tools, infrastructure, and an enabling environment. The study therefore, contends that research efforts investigating the resultant implications of technology-access disabilities, though limited, are paramount to the success of inclusive education in Nigeria. However, the review scope was not limited to a specific disability, which is diverse, but rather looked at holistically. Future studies could examine digital technology-access disability for specific disabilities. Overall, the government's strong commitment to promoting and protecting the rights of all its citizens to education, particularly for individuals with disabilities, in line with NDLP and SDG-4 policies, is crucial for the country's socioeconomic growth and development.

This serves as a clarion call for governments, policymakers, educational institutions, and non-governmental organizations to strictly enforce, supervise, and ensure that citizens' rights to equitable and quality access to education and technology-assisted tools, including the opportunities that accompany them, are protected, irrespective of individual status.

RECOMMENDATION

This study has highlighted disparities in access to education between the non-disabled and their disabled counterparts in many institutions of learning in developing countries due to digital-access marginalization – fostering segregation and stigmatization – is evident in the proliferation of special schools and institutions of higher learning for special needs students in Nigeria. In light of this, the study recommends that existing institutions for special needs students be abrogated, strict enforcement of policies, provision of accessibility-friendly infrastructural support, adequate and procurement of relevant digital technology tools, and digital technology literacy support for educators – all being promising indices that can mitigate barriers to inclusive education, referencing strategies adopted by some leading developed countries such as Italy, Sweden, America and Britain.

REFERENCES

Adam, O. I., Alhassan, D. M., Shaibu, A., Mumin, A. M., & Abdulai, I. (2025). The effect of digital transformation on inequality: Does the mediating effects of digital inclusion and ICT regulatory environment matter. *Journal of Innovative Digital Transformation*. [Crossref]

Afolayan, S. & Olakunle, G. A. (2018). Engendering a conducive environment for university students with physical disabilities: Assessing availability of assistive facilities in Nigeria. *Disability and Rehabilitation: Assistive Technology*. [Crossref]

Agbabiaka, I. H., Olatunji, A. S., & Saleh, M. (2024). Students with disabilities and facilities accessibility in a Northern Nigerian public university: Dismantling exclusion in achieving SDG-4. *Facilities, 42*(11), 928–946. [Crossref]

Ahmadu, H. U., Suleiman, Y., Bello, A., & Adeoye, M. A. (2025). The impact of technology policies on education and workforce development in

Nigeria. *International Journal of Social Sciences and Management Research, 11*(2), 237–259. [Crossref]

Amaonye, B. C. (2024). A theoretical model for promoting digital inclusion for students with visual impairment in the Nigerian higher education system. *Inclusion Perspectivas Pedagogica en el ambito Social, 11*, 11–37.

Arakpogun, O. E., Whalley, J., Wanjiru, R., Elsahn, Z., & Kummitha, K. R. R. (2023). Bridging the digital divide in Africa via universal service funds: An institutional theory perspective. *Information Technology and People, 36*(8), 126–154. [Crossref]

Arimoro, A. (2019). Are they not Nigerians? The obligation of the state to end discrimination practices against persons with disabilities. *International Journal of Discrimination and the Law, 9*(2). [Crossref]

Ariza, J. Á., & Hernández Hernández, C. (2025). A systematic literature review of research based interventions and strategies for students with disabilities in STEM and STEAM education. *International Journal of Science and Mathematics Education*. Advance online publication. [Crossref]

Asres, G. W. (2025). Inclusive education practices and their legal frameworks for special needs students in Ethiopia. *International Journal of Inclusive Education*. Advance online publication. [Crossref]

Ejim, A. E., & Okoye, U. O. (2025). Evaluating the implementation of the disability act in Nigeria: What are the challenges? *Journal of Social Work in Developing Societies, 7*(1), 22–40. [Crossref]

Elekanachi, R. U., Shikako, K., Snider, L., & Dahan-Oliel, N. (2023). Portrait of the rights of children with disabilities in Nigeria: A policy review. *International Journal of Environmental Research and Public Health, 20*(21), 6996. [Crossref]

Elizabeth, S. A., & Adewunmi, T. A. (2023). Inclusion of persons with disabilities in Nigeria: A prerequisite for national sustainable development. *Saudi Journal of Humanity and Social Sciences, 8*(11), 342–350. [Crossref]

Gubadia, E. F., & Ekuobase, G. O. (2024). An estimation of digital learning culture index of secondary in Nigeria. *Education Research International, 2024*(1), Article 6671155. [Crossref]

Gull, M., Kaur, N., & Basha, E. S. (2025). A systematic review of challenges faced by students with disabilities in higher education. *Annals of Neurosciences*. Advance online publication. [Crossref]

Guobadia, E. F., & Ekuobase, O. G. (2024). An estimation of digital learning culture index of secondary education in Nigeria. *Education Research International, 2024*, Article ID 6671155, 1–16. [Crossref]

Helsper, J. E. (2011). *Digital disconnect: Issues of social exclusion, vulnerability and digital disengagement*. Paper presented at the Perspectives of Web 2.0 for Citizenship Education in Europe, Brno, Czech Republic.

Helsper, J. E. (2017). The social relativity deprivation exclusion: Applying relative deprivation theory to digital inequalities. *Communication Theory, 27*(3), 223–242. [Crossref]

Hongngam, K., Injumpa, D., & Chanapai, K. (2022). The development of digital technology to support learning in children with disabilities. *International Education Studies, 15*(4), 117–124. [Crossref]

Ibe, V. T., & Ezeala, I. L. (2025). Assessment of special material resources for implementation of inclusive secondary education in Nigeria. *European Journal of Contemporary Education and E-Learning, 3*(2), 28–36. [Crossref]

Ijadunola, M. Y., Ojo, T. O., Akintan, F. O., & Adeyemo, O. A. (2018). Engendering a conducive environment for university students with physical disabilities: Assessing availability of assistive facilities in Nigeria. *Disability and Rehabilitation: Assistive Technology, 14*(4), 1–8. [Crossref]

Johansson, S., Gulliksen, J., & Gustavsson, C. (2020). Disability digital divide: The use of the internet, smartphones, computers and tablets among people with disabilities in Sweden. *Universal Access in the Information Society, 20*, 105–120. [Crossref]

Manzoor, M., & Vimarlund, V. (2018). Digital technologies for social inclusion of individuals with disabilities. *Health and Technology, 8*, 377–390. [Crossref]

McNicholl, A., Casey, H., Desmond, D., & Gallagher, P. (2019). The impact of assistive technology use for students with disabilities in higher education: A systematic review. *Disability and Rehabilitation: Assistive Technology*. [Crossref]

Mikropoulos, T. A., & Iatraki, G. (2022). Digital technology supports science education for students with disabilities: A systematic review. *Education and Information Technologies, 28*, 3911–3935. [Crossref]

Murtadlo, M., Komalasari, R., Nisa, K., Hikmatiar, H., & Suryana, C. (2025). Inclusive education in Africa: Transforming higher education in low-income countries. *Scientific African, 28*, e02708. [Crossref]

Ojiaka, C. J. (2024). Right to non-discrimination as a silver bullet towards achieving inclusive education for persons with disabilities in Africa. In A. A. Agboga, N. T. N. Nkongho, & E. E. N. Ebol (Eds.), *Inclusive Education Developments in Africa* (pp. 85–100). Springer. [Crossref]

Pannullo, L., Böttinger, T., & Winkelmann, J. (2025). Inclusive and digital science education—A theoretical framework for lesson planning. *Education Sciences, 15*(2), 148. [Crossref]

Rapp, C. A., & Corral-Granados, A. (2024). Understanding inclusive education - A theoretical contribution from system theory and the constructionist perspective. *International Journal of Inclusive Education, 28*(4), 423–439. [Crossref]

Rizk, J., & Hillier, C. (2022). Digital technology and increasing engagement among students with

disabilities: Interaction rituals and digital capital. *Computers and Education Open, 3*, 100099. [Crossref]

Safari, M. C., Wass, S., & Thygesen, E. (2023). Digital technology design activities—A means for promoting the digital inclusion of young adults with intellectual disabilities. *British Journal of Learning Disabilities, 51*, 238–249. [Crossref]

Sánchez, J., Reyes-Rojas, J., & Alé-Silva, J. (2024). What is known about assistive technologies in distance and digital education for learners with disabilities? *Education Sciences, 14*(6), 595. [Crossref]

Tangwe, A. T., & Nizeyumukiza, J. (2025). Digitalization for equity and inclusion: Fostering sustainability in education. *Journal of Higher Education and Learning, 2*(1), 19–37.

Venkatesan, S. (2023). Digital literacy in people with disabilities: An overview and narrative review. *Global Journal of Arts Humanity and Social Sciences, 3*(12), 1475–1494. [Crossref]

World Bank Group. (2020). *Disability inclusion in Nigeria: A rapid assessment*. International Bank for Reconstruction and Development/ The World Bank.