

# Digital Integration into the Nigerian Educational System: Impact and Challenges

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*Abstract- Digital technology has become an important part of contemporary education, changing how schools provide instruction, manage information, communicate with learners and prepare students for work and civic participation. In Nigeria, national and institutional initiatives have expanded the use of digital platforms, online resources, mobile learning and technology-supported administration. The progress, however, is uneven. This paper examines the development, educational effects and major constraints of digital integration in Nigeria through a conceptual review of policy documents, international reports and recent studies on technology supported education. The review shows that digital integration can widen access to learning materials, support flexible instruction, improve communication and strengthen administrative processes. It can also connect learners with wider knowledge networks and develop skills that are relevant to an increasingly digital labour market. These benefits are limited where schools lack dependable electricity, broadband connectivity, appropriate devices, technical support and adequately prepared teachers. Rural-urban inequalities, high access costs, fragmented implementation, inadequate maintenance, limited locally relevant digital content and concerns about privacy and academic integrity further complicate adoption. The paper argues that technology provision alone is insufficient. Sustainable integration requires coordinated investment in infrastructure, teacher professional development, digital content, technical support, monitoring and equity-focused interventions. Nigeria's National Digital Learning Policy provides a useful policy foundation, while initiatives such as the 3 Million Technical Talent Programme and the Blueprint - CT - Dev Project indicate continuing national investment in digital capacity. The paper concludes that digital education should be treated as an education system reform rather than as a stand alone technology project.*

**Keywords:** digital integration, information and communication technology, digital learning, Nigerian education

## I. INTRODUCTION

Education systems are being reshaped by the rapid growth of digital technologies. Computers, mobile devices, broadband networks, learning management systems, digital libraries, online assessment tools and communication platforms now form part of the educational environment in many countries. The change is not simply about replacing printed materials with electronic materials. It concerns the organisation of teaching, the availability of learning resources, the ways teachers and learners communicate, and the skills that schools are expected to develop. Digital competence has consequently become an important component of participation in contemporary social and economic life.

Nigeria has a large and diverse education system in which the potential of digital technology is considerable. Technology can support access to learning materials where physical resources are scarce, provide alternative channels for teacher-learner communication, and make educational services more flexible. During the COVID-19 school closures, remote learning initiatives demonstrated both the usefulness of digital delivery and the consequences of unequal access. In Edo State, for example, the Edo-BEST@Home programme used mobile phones, virtual classrooms and teacher support to continue learning during school closures. The World Bank reported that the programme reached 930 of 1,000 primary schools within months of its launch, although access to devices and connectivity remained uneven (World Bank, 2024).

Nigeria has also strengthened its policy attention to digital learning. The official Federal Ministry of Education website contains the Draft National Digital Learning Policy which identifies infrastructure,

access devices, connectivity, computing/storage, security, funding, capacity building, monitoring/evaluation and content development as major areas (Federal Ministry of Education [FME], 2023). At the tertiary level, the Blueprint-ICT-Dev Project, launched in 2025 with support from the Agence Française de Développement, seeks to strengthen digital infrastructure and ICT capacity in selected federal universities (National Universities Commission [NUC], 2025).

At the skills development level, the 3 Million Technical Talent Programme seeks to develop a large pipeline of technical talent through training, partnerships and practical learning opportunities. {Federal Ministry of Communications, Innovation & Digital Economy (FMCIDE 2023)}. These initiatives indicate that digital transformation is increasingly linked to both educational reform and national economic development.

Nevertheless, the presence of policies and projects does not automatically produce effective classroom use. The central concern is whether technology is available, affordable, usable and pedagogically appropriate. A school with computers but no reliable electricity, connectivity or technical support may possess equipment without possessing a functioning digital learning environment. Similarly, a teacher who has access to a platform but has received little training may continue to rely on familiar methods. This paper therefore examines digital integration into Nigerian educational system identifying impacts and challenges involving infrastructure, people, policy, pedagogy, finance and equity.

## II. DIGITAL INTEGRATION, GLOBALISATION AND THE KNOWLEDGE SOCIETY

Digital integration is closely linked to globalisation because digital networks make it easier and faster to exchange information across geographical boundaries. Giddens (1990) explained that modernity increasingly separates social relations from immediate geographical settings, thereby fostering relationships between people who may be distant from one another (pp. 18–21). In contemporary

education, digital technologies have intensified such connections by enabling teachers, researchers and learners to communicate and exchange information across geographical boundaries. Digital education can also support the development of knowledge based skills by enabling learners to locate, evaluate, interpret and apply information. Through online resources, multimedia activities and collaborative platforms, students can develop critical thinking, creativity, communication and problem-solving skills when appropriately guided by teachers.

The relationship between technology and education should therefore focus on pedagogical value rather than technology itself. United Nations Educational, Scientific and Cultural Organization. (UNESCO 2023) emphasises that educational technology should be selected according to learning objectives, contextual conditions and available evidence, while adequate attention should be given to teacher preparation and evaluation (pp. 17–19). This is particularly important in Nigeria, where educational institutions differ in infrastructure, language, income and access to professional support. Digital integration can also strengthen universities' participation in international research and academic networks through digital libraries, online learning systems and improved ICT infrastructure (NUC, 2025). However, Nigeria should not simply reproduce technology models developed in high-income countries. Imported systems may be difficult to sustain because of connectivity, cost, technical and cultural challenges. Sustainable digital integration therefore requires local adaptation, participation and attention to Nigerian educational priorities.

## III. POLICY AND INSTITUTIONAL DEVELOPMENT IN NIGERIA

Nigeria has strengthened its digital education policy through initiatives addressing connectivity, digital skills, teacher competence and technology-supported learning. A major development is the National Digital Learning Policy, which identifies infrastructure, access devices, connectivity, security, funding, capacity building, monitoring and evaluation, and content development as important areas for implementation (Federal Ministry of

Education, 2023). These components are interconnected because effective digital learning requires more than the provision of devices.

Teacher competence is also central to policy implementation. UNESCO (2023) emphasises the importance of developing teachers' capacity to use technology effectively for teaching and learning (pp. 167–173). The 3 Million Technical Talent Programme (3MTT) further supports Nigeria's digital development by providing technical skills through online and physical learning arrangements (FMCIDE, 2023). At the university level, the Blueprint-ICT-Dev Project seeks to strengthen digital infrastructure and ICT capacity in selected federal universities, supported by €38 million in financing from the French Government through AFD (NUC, 2025).

However, effective implementation depends on translating national policies into practical actions at institutional and school levels. Clear responsibilities, adequate funding, maintenance plans, measurable indicators and continuous monitoring are required. Institutional leaders should also provide technical support, encourage teacher development and ensure that digital tools are connected to curriculum objectives and learners' needs. Thus, successful digital integration requires coordinated policy, institutional leadership, adequate resources and sustained implementation, rather than focusing only on the acquisition of technology.

#### IV. METHODOLOGY

This paper adopts a conceptual and narrative review approach. It synthesises evidence from policy documents, official programme information, international education reports and recent scholarly literature concerning digital learning and ICT integration in Nigeria. The approach is appropriate for examining a broad system level issue in which infrastructure, teacher preparation, policy, equity and educational practice interact.

The review was organised around four questions:

- (1) What forms of digital integration are emerging within Nigerian education?

- (2) What educational and institutional benefits are associated with digital integration?
- (3) What major barriers restrict effective and equitable use?
- (4) What policy and institutional actions are required to strengthen implementation?

The sources were examined for recurring themes rather than combined statistically. Priority was given to recent Nigerian policy and programme documents, including the National Digital Learning Policy, the 3 Million Technical Talent Programme and the Blueprint-ICT-Dev Project. Recent evidence on online learning challenges was also considered. For example, Akaeze and Akaeze (2024), based on interviews with lecturers from different regions of Nigeria, identified unreliable internet connectivity, power outages, limited technological resources, inadequate training and weak institutional support as recurring barriers to online learning. Such evidence provides a useful complement to policy documents because it shows how system constraints are experienced by practitioners.

International sources were used to place Nigerian developments within the wider education-technology literature. The *Global Education Monitoring Report* highlights the importance of appropriate technology use, teacher preparation, contextual relevance, and evaluation in education (UNESCO, 2023). Similarly, the World Bank's analysis of learning continuity demonstrates that remote learning can help sustain education during disruptions, while also highlighting the importance of infrastructure and equitable access (World Bank, 2024).

The analysis followed a thematic process. First, information relating to access and infrastructure was grouped together. Second, evidence on teaching, learning and teacher competence was examined. Third, institutional and administrative effects were considered. Fourth, equity, sustainability, cybersecurity and policy implementation were reviewed. Finally, the themes were interpreted together to identify implications for Nigerian education.

## V. IMPACT OF DIGITAL INTEGRATION ON ACCESS TO LEARNING

One of the strongest arguments for digital integration is its capacity to expand access to educational resources. A physical library has limits in terms of opening hours, space and the number of copies available. Digital repositories can provide access to books, articles, videos, simulations and other resources beyond the immediate school environment. For teachers, online materials can support lesson preparation and professional learning. For learners, they can provide opportunities to review content at a convenient time and revisit explanations that were difficult during classroom instruction.

Mobile technology is particularly relevant to Nigeria because access to computers is not uniform. During school closures, mobile phones provided a practical channel for reaching learners where dedicated computers were unavailable. The experience of Edo-BEST@Home showed that mobile communication, virtual classrooms and teacher support could be combined to maintain educational contact during disruption (World Bank, 2024). This experience suggests that digital education in Nigeria should not be designed only around high-cost computer laboratories. Mobile friendly and low bandwidth resources can form an important part of an inclusive strategy.

Digital platforms can also extend opportunities for learners who face geographical barriers. Students in communities with limited access to specialist teachers may use online resources to obtain explanations, demonstrations or supplementary materials. At tertiary level, digital libraries and research networks can connect students and academics with wider bodies of scholarship. The Blueprint-ICT-Dev Project is intended partly to strengthen such institutional capacity in selected universities (NUC, 2025).

Access, however, should be defined more broadly than connection to the internet. A learner may technically have internet access but be unable to participate consistently because of data costs, electricity shortages, device sharing or poor network

quality. Similarly, a school may have a computer laboratory that is rarely used because of maintenance problems. Meaningful access therefore requires affordability, reliability, suitable content, technical support and opportunities to use the technology for learning.

The issue of equity is particularly important. If digital resources are introduced without addressing differences in household income, location, disability, gender or language, technology may widen rather than reduce educational inequalities. UNESCO (2023) emphasises the importance of contextual relevance and equitable access when technology is introduced into education (pp. 17–19, 48–63). In Nigeria, this implies greater attention to accessible design, offline resources and community-based access points.

Digital integration should consequently be assessed by its educational reach rather than by equipment counts. Useful indicators include the proportion of learners who can access learning materials, frequency of meaningful use, teacher support, affordability, accessibility for learners with disabilities and the extent to which rural schools benefit. These measures would provide a stronger basis for evaluating whether digital investment is contributing to educational equity.

## VI. IMPACT ON TEACHING, LEARNING AND LEARNER ENGAGEMENT

Digital technology can broaden the range of teaching methods available to educators. Video demonstrations, interactive presentations, simulations, digital quizzes, collaborative documents and educational applications can support different forms of explanation and practice. These tools are particularly useful when they are selected to address a specific learning objective. Technology should not be introduced merely because it is new; its value depends on whether it improves understanding, practice, feedback or access to useful information.

Digital tools can support learner centred activities. Instead of receiving information only through lectures, students can search for evidence, compare

sources, create presentations, participate in discussions and work collaboratively. Such activities can develop communication, information literacy, creativity and problem-solving. The teacher's role also changes from being the sole source of information toward guiding learners in selecting reliable resources, interpreting information and applying knowledge.

Assessment can benefit from digital integration. Online quizzes can provide immediate feedback, while learning management systems can record participation and progress. Digital portfolios can allow learners to demonstrate projects and practical work over time. For teachers, electronic records can make it easier to identify areas in which students require additional support. Nevertheless, digital assessment introduces concerns about academic integrity, unequal access and the validity of online examinations. Institutions therefore need assessment systems that combine technology with appropriate supervision and clear academic standards.

The experience of the COVID-19 pandemic demonstrated that digital tools can support continuity when physical classrooms are disrupted. It also revealed the limitations of relying on online delivery without sufficient preparation. In Nigeria, educators experienced problems associated with electricity, connectivity, devices, training and institutional support. Akaeze and Akaeze (2024) found these issues among lecturers using e-learning platforms across different regions. The lesson is that emergency digital delivery cannot substitute for long-term system preparation.

Digital integration can also increase opportunities for professional learning among teachers. Online courses, webinars, communities of practice and digital resource banks can reduce geographical barriers to professional development. UNESCO (2023) emphasises that developing teachers' digital competence requires ongoing preparation, professional support, and opportunities for practical application rather than relying solely on one-time training. Nigerian teacher education institutions can use this approach by combining face-to-face

workshops with sustained online mentoring and practical classroom applications.

The quality of the educational outcome remains dependent on pedagogy. A teacher can use an interactive board without changing the underlying teaching method, just as a printed textbook can be converted into a PDF without improving learning. Effective integration therefore requires teachers to understand when technology adds value, when a non-digital method is preferable and how to combine digital resources with discussion, practical activity and direct instruction.

#### VII. IMPACT ON ADMINISTRATION, COMMUNICATION AND WORKFORCE PREPARATION

Digital integration can improve educational administration by enabling institutions to manage student records, staff information, attendance, assessment results and reporting more efficiently. Well-designed digital systems can reduce paperwork, improve access to information and support evidence-based planning. Technology also strengthens communication among schools, students, parents, staff and other stakeholders through email, messaging platforms and virtual learning systems. During the Edo-BEST@Home programme, teachers used phone calls, text messages and WhatsApp alongside virtual classrooms to maintain communication with learners and parents (World Bank, 2024).

At the tertiary level, improved digital infrastructure can strengthen research, teaching and institutional collaboration. The Blueprint-ICT-Dev Project is intended to enhance ICT capacity and digital services in participating universities (NUC, 2025). Digital integration also supports workforce preparation by helping learners develop skills relevant to technology-driven workplaces. The 3MTT Programme reflects Nigeria's wider commitment to developing technical talent and digital skills (FMCIDE, 2023). However, workforce preparation should extend beyond basic technical operation to include information literacy, privacy, cybersecurity, ethical technology use, copyright and responsible online behaviour. Effective governance is equally

necessary to protect digital records and ensure appropriate access, data security and accountability. Thus, digital integration can strengthen administration, communication and employability when supported by effective governance and responsible technology use.

#### VIII. INFRASTRUCTURE, ELECTRICITY AND CONNECTIVITY CHALLENGES

Infrastructure remains a major constraint to effective digital education in Nigeria. Digital learning depends on reliable electricity, devices, internet connectivity, software, technical support and regular maintenance. Weakness in any of these areas can disrupt teaching and learning. Unreliable electricity is particularly problematic because many digital devices require continuous power. Schools may therefore need alternative energy sources such as solar systems, although these require adequate funding and maintenance.

Connectivity is another significant challenge. Poor network coverage, high data costs and limited broadband access can prevent learners and teachers from participating consistently in online activities. These difficulties can be reduced through low-bandwidth platforms, downloadable materials, offline content, local networks and community digital centres. The National Digital Learning Policy recognises infrastructure, devices, connectivity, security, computing resources and funding as interconnected requirements for effective digital learning (Federal Ministry of Education, 2023). Similarly, Akaeze and Akaeze (2024) identified unreliable internet, power outages and limited technological resources as important barriers to online learning among Nigerian lecturers.

Addressing these challenges requires long-term planning and attention to the full cost of digital infrastructure, including installation, maintenance, replacement, security and training. Institutions should select technologies according to local conditions rather than relying on systems that require constant high-speed internet. Ultimately, the goal should be reliable and sustainable educational use, not simply the provision of large numbers of devices. A smaller,

well-maintained digital system may provide greater educational value than extensive equipment that becomes unusable after initial funding ends.

#### IX. TEACHER COMPETENCE, FUNDING AND POLICY IMPLEMENTATION

Teachers are central to effective digital integration because they determine how technology is selected, used and connected to learning activities. Providing devices without strengthening teachers' digital competence is unlikely to produce sustained improvement. Teacher competence involves technical skills, digital pedagogy, information literacy, assessment, communication and responsible technology use. Continuous professional development is therefore essential. Beyond short workshops, teachers need regular practice, mentoring, peer support and technical assistance. UNESCO (2023) emphasises that teacher preparation should develop the capacity to use technology effectively for teaching and learning rather than focusing only on operating particular devices.

Adequate funding is equally important because digital integration requires continuous expenditure on electricity, connectivity, maintenance, software, replacement equipment, technical personnel and professional development. Policies should therefore include realistic budgets and measurable implementation targets. Effective coordination among government agencies, educational institutions, development partners and private organisations is also necessary to reduce duplication and clarify responsibilities. School and institutional leaders should support professional development, provide technical assistance and ensure that technology is linked to curriculum objectives. Overall, sustainable digital integration requires a balanced investment in technology, teachers, funding, leadership and policy implementation. This approach can help Nigeria move from temporary technology projects to consistent and meaningful digital practices in education.

X. RURAL–URBAN INEQUALITY,  
SUSTAINABILITY AND DIGITAL  
SAFETY

Digital integration can deepen existing inequalities when urban schools have better access to electricity, telecommunications infrastructure, internet services and technical support than rural schools. Rural institutions often experience weak connectivity, inadequate power supply, limited technical personnel and difficulties replacing damaged equipment. Addressing these disparities requires priority investment in underserved communities through rural broadband, subsidised connectivity, shared devices and community digital centres. Such interventions should involve local communities to ensure effective management, security and maintenance.

Sustainability should also be considered from the beginning of every digital project. Institutions need adequate funding for maintenance, technical support, replacement of obsolete equipment and staff training. Digital safety is equally important because increased technology use exposes schools to risks such as unauthorised access, data loss, phishing, mal-ware, cyber-bullying and academic misconduct. Institutions should establish clear data-protection policies and train staff and learners in account security, privacy and responsible technology use. Online assessment should incorporate appropriate supervision and tasks that emphasise application and explanation rather than simple reproduction.

Language and cultural relevance are further considerations. Digital materials should reflect Nigerian learners' experiences and educational needs. UNESCO (2023) emphasises the importance of contextual relevance in technology-supported education. Therefore, teachers, curriculum specialists, language experts and technology developers should collaborate in producing accessible and locally relevant content. Overall, effective digital integration requires a balanced approach to equity, sustainability, safety, relevance and inclusion, rather than focusing solely on internet connectivity or the provision of devices.

XI. DISCUSSION

The evidence reviewed indicates that digital integration has considerable potential for Nigerian education, but the benefits are conditional. Technology can expand access, support communication, improve administration and provide new opportunities for learning. At the same time, weak infrastructure, unequal access and limited teacher preparation can reduce or even reverse these benefits. The central issue is therefore not whether digital technology should be used, but under what conditions it can improve educational outcomes.

A major lesson is that access and quality are inseparable. Providing a device does not guarantee learning. Students need relevant content, teachers need pedagogical support, and institutions need dependable infrastructure. This conclusion agrees with UNESCO's (2023) view that the use of technology in education should respond to clearly defined learning needs and be appropriate to the educational, social and cultural contexts in which it is implemented. It is also consistent with Nigeria's National Digital Learning Policy, which treats devices, connectivity, infrastructure, funding, security, capacity building and content development as connected components (Federal Ministry of Education, 2023).

The Nigerian experience during COVID-19 provides a useful example. Remote learning allowed education to continue in some settings, but unequal access meant that the experience was not the same for all learners. The Edo-BEST@Home programme showed that mobile-based approaches could extend reach when computer ownership was limited (World Bank, 2024). This suggests that future digital education programmes should provide several modes of access, including mobile, offline and face-to-face options.

The review also shows that teacher competence is a system requirement rather than an optional addition. Teachers are responsible for selecting tools, organising learning activities and helping students judge information. Professional development should therefore focus on practical classroom use, not only on basic computer operation. Mentoring, peer

learning and technical support can help teachers move from awareness to sustained practice.

National initiatives provide important opportunities. The 3MTT Programme can contribute to the development of technical talent and strengthen the wider digital ecosystem, while the Blueprint-ICT-Dev Project provides targeted support for university infrastructure and digital capacity (FMCIDE, 2023; NUC, 2025). Their longer-term contribution will depend on coordination with school-level education, teacher preparation and broader infrastructure development.

The review further suggests that digital integration should be treated as a public-service reform. Education authorities need reliable information about connectivity, device access, teacher competence, system use and learning outcomes. Monitoring should focus on educational results rather than only on inputs. For example, the number of devices distributed is less informative than the proportion of learners using them meaningfully and the extent to which teachers receive support.

Finally, equity must remain central. A national digital education strategy that primarily benefits well-connected urban institutions may increase educational differences. Priority funding should therefore be directed toward underserved communities, while technologies should be selected according to local conditions. Nigeria's digital education future will be stronger when infrastructure, pedagogy, inclusion and accountability are planned together.

## XII. RECOMMENDATIONS

The study recommends that education authorities strengthen electricity supply, internet connectivity and digital infrastructure, particularly in rural and underserved schools. Digital projects should be funded beyond initial procurement to cover maintenance, replacement, cybersecurity, technical support and teacher development. Continuous professional development should be provided to teachers in digital pedagogy, information literacy, online assessment and responsible technology use,

supported by mentoring and practical classroom application. Nigerian educators, curriculum specialists, language experts and technology developers should collaborate to produce accessible digital resources that reflect local contexts and, where appropriate, Nigerian languages. Low-bandwidth and offline options, including downloadable materials, mobile learning, educational radio and community digital centres, should be expanded to support learners with limited connectivity.

There is also a need for stronger coordination among government agencies, educational institutions, development partners and private organisations to reduce duplication and promote common standards. Digital education programmes should incorporate systematic monitoring of access, usage, teacher competence, learner participation, learning outcomes, maintenance and equity. Institutions should strengthen cybersecurity and data protection through clear policies and regular training on privacy, account security and responsible online behaviour. Priority should be given to rural, disadvantaged and learners with disabilities through subsidised connectivity, shared devices and inclusive digital resources. Finally, digital literacy should be integrated across the curriculum so that learners develop information evaluation, communication, creativity, problem-solving and responsible technology-use skills alongside technical competence.

## XIII. CONCLUSION

Digital integration has become an important part of Nigeria's educational development. It can improve access to resources, support flexible teaching, strengthen communication and administration, and prepare learners for participation in a digital economy. National initiatives such as the National Digital Learning Policy, 3MTT Programme and Blueprint-ICT-Dev Project demonstrate increasing institutional attention to this agenda.

The review nevertheless shows that technology cannot compensate for weak educational foundations. Reliable electricity, connectivity, devices, teacher competence, relevant content, technical support and effective governance are necessary for sustained use.

If these conditions are absent, digital projects may remain underused or create new inequalities.

Nigeria therefore needs a coordinated approach that combines infrastructure investment with human capacity, contextual content, equity focused access and strong monitoring. Digital education should be planned as a long-term component of education reform rather than as a series of isolated technology projects. With sustained attention to these conditions, digital integration can contribute meaningfully to a more accessible, resilient and responsive Nigerian education system.

#### XIV. LIMITATIONS OF THE STUDY

The study does not estimate the effect size of digital integration on student achievement and does not represent every state, school type or educational level in Nigeria. Digital integration also changes rapidly, so programme details and technologies may evolve. The study should therefore be read as a policy oriented synthesis rather than as a substitute for state or school level empirical studies.

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