



DIGITAL TRANSFORMATION AND ICT INTEGRATION IN NIGERIAN POLYTECHNIC EDUCATION: OPPORTUNITIES, CHALLENGES, AND THE PATH FORWARD

Henry. Azuka, Ifeakor¹, Onyia, Chisom Kenekwukwu², Solomon. Benedict Ominyi³,

Ikekukwu. F. Okoye⁴ and Bakare Azubuike Godwin⁵

Federal Polytechnic Ngodo-Isuochi, Abia State, Nigeria

School of Engineering Technology

Corresponding Author's email: ih.azuka@fpi.edu.ng

Phone: 08039333477

Abstract

Polytechnic education is essential to Nigeria's economic development and technological workforce. However, due to obstacles related to infrastructure, finances, and policy, the integration of information and communication technology (ICT) in Nigerian polytechnics is still unequal. As the federal government increases efforts to digitize tertiary institutions through initiatives like the Nigerian Research and Education Network (NgREN) and the Tertiary Education, Research, Applications and Services (TERAS) platform, polytechnics encounter both challenges and opportunities in embracing these technologies. Based on recent policy updates, institutional case studies, and empirical research, this paper highlights a notable gap between infrastructure provision and actual use. While institutions like Kwara State Polytechnic and Federal Polytechnic Nasarawa lead in digital adoption, many struggle with poor ICT use, lack of digital skills among staff, and infrastructure issues, including unreliable electricity supply. The article shares findings from a study on ICT resource use in federal polytechnics, showing that available resources are underused due to inadequate knowledge and skills. It concludes with suggestions for improving ICT integration through targeted skill development, sustainable infrastructure funding, and strong leadership commitment.

Keywords: digital transformation, ICT integration, polytechnic education, Nigeria, TERAS platform



1. Introduction

The global move toward digitalization has fundamentally changed education. Integrating technology is now essential for institutions to stay relevant and competitive. In Nigeria, the federal government has shown commitment to this transformation through various policies and infrastructure investments aimed at modernizing tertiary education. The recent launch of the upgraded Nigerian Research and Education Network (NgREN) and its connection with the Tertiary Education, Research, Applications and Services (TERAS) platform marks a significant step in this direction, creating a digital ecosystem that links institutions to research resources, online learning platforms, and institutional insights (FMINO Press Releases, 2025).

Polytechnics play a key role in Nigeria's education system by training technically skilled graduates for the workforce. The National Board for Technical Education (NBTE) has long recognised the need for ICT skill development within polytechnics, viewing Internet connectivity as crucial for advancing Technical and Vocational Education and Training (TVET) (VON, 2025). However, despite significant investments from the Tertiary Education

Trust Fund (TETFund) and others, the uptakes of digital platforms in polytechnics remain uneven and often disappointingly slow (Tribune Online, 2025).

This article explores the current state of digital transformation in Nigerian polytechnics, highlighting both the opportunities from national initiatives and the ongoing challenges that hinder effective ICT integration. It uses recent policy announcements, institutional case studies, and empirical research to give a complete picture of the digital progress of Nigerian polytechnics and what steps are needed to speed up improvement.

2. Literature Review

The discussion on digital transformation in Nigerian tertiary education has evolved considerably over the last decade, shifting from debates about infrastructure provision to concerns about utilization and sustainability. Echono, Executive Secretary of TETFund, has made a clear case for technology in education. He argues that rapid population growth and limited classroom space make technology the only real solution to increasing access to quality education. He stresses that students should use mobile devices to access content,



engage in learning, and gain skills, without being confined to physical classrooms (Tribune Online, 2025).

However, the gap between infrastructure provision and usage has become a key issue. Despite billions of naira spent on ICT infrastructure across institutions, many universities, polytechnics, and colleges of education have not fully embraced technology in teaching, research, and administration. This resistance shows in various ways, such as institutions running outdated websites, submitting paper requests despite digital directives, and failing to get staff and students on board with available platforms (Tribune Online, 2025). The result is wasted investment and decreased global competitiveness, with Nigeria currently ranked 189th in education competitiveness worldwide and 25th in Africa, trailing smaller nations like Rwanda and Mauritius, which have effectively used ICT in education.

The TERAS platform offers a well-rounded solution to these challenges. Developed by TETFund, TERAS provides a variety of digital services, including academic repositories, plagiarism detection, online learning platforms, digital literacy programs, and access to academic journals

and databases. When combined with NgREN's high-speed national education network, these services can be accessed through a unified gateway that supports e-learning, cloud computing, and research collaboration. The platform is meant to be more than just a technical tool; it aims to be "an educational lifestyle" for students, lecturers, administrators, and government planners (Tribune Online, 2025).

Recent developments also point to artificial intelligence as the next major step in educational transformation. The International Institute of Online Education (IIOE) Nigeria National Centre has been leading discussions on digital transformation through policy dialogues, resulting in the draft National Higher Education AI Framework. This framework addresses the need for responsible, ethical, and safe use of AI in teaching, learning, research, and administration, acknowledging that AI tools are rapidly entering higher education, even without formal oversight (Businessday NG, 2025).

3. Methodology

This article takes a mixed-methods approach, combining data from various sources to provide a thorough analysis of



digital transformation in Nigerian polytechnics. The study draws on policy documents and official announcements from the Federal Ministry of Education, TETFund, and NBTE; empirical research on ICT resource use in polytechnics; institutional case studies documenting digital transformation initiatives; and stakeholder views from workshops and policy discussions.

A key empirical base for this article is a study by Shehu (2025) that looked into ICT

resource use in the teaching and learning of Office Technology and Management (OTM) programs at five federal polytechnics in Northwest Nigeria. The study took a quantitative approach using 5-point Likert scales to gather data via online surveys, with 99 academic staff members participating. The survey aimed to capture lecturers' experiences in using ICT resources such as hardware, software, and digital educational materials.

Table 1: Distribution of Survey Respondents by Polytechnic

Polytechnic	Number of Respondents	Percentage
Federal Polytechnic, Kaura Namoda	22	22.2%
Federal Polytechnic, Kaduna	21	21.2%
Federal Polytechnic, Bauchi	20	20.2%
Federal Polytechnic, Damaturu	18	18.2%
Federal Polytechnic, Gusau	18	18.2%
Total	99	100%
Source: Shehu, M. (2025). The Impact of ICT Resource Utilization in the Teaching/Learning of Office Technology and Management Programme of Federal Polytechnics in Nigeria. <i>KIU Journal of Education</i> , 5(1), 45-62		



4. Results and Discussion of Findings

4.1 ICT Utilization Levels among Polytechnic Lecturers

The study by Shehu (2025) shows considerable differences in how polytechnic

academic staff use ICT resources. The findings reveal that even though ICT resources are available in these institutions, their actual use for teaching and learning is not optimal.

Table 2: Level of ICT Resource Utilization by Polytechnic Lecturers

ICT Resource Category	High Utilization (%)	Low Utilization (%)	Mean Score	Interpretation
Hardware (computers, projectors, interactive boards)	38.4%	61.6%	2.84	Low utilization
Software (applications, learning management systems)	31.3%	68.7%	2.51	Low utilization
Digital educational resources (e-libraries, online journals)	28.3%	71.7%	2.43	Low utilization
Communication tools (email, discussion forums)	45.5%	54.5%	3.12	Moderate utilization
Source: Shehu, M. (2025). The Impact of ICT Resource Utilization in the Teaching/Learning of Office Technology and Management Programme of Federal Polytechnics in Nigeria. <i>KIU Journal of Education</i> , 5(1), 45-62.				

The findings show that across all ICT resource categories, usage levels are mainly low. Digital educational resources, like e-libraries and online journals, have the lowest usage rates. Only 28.3% of respondents

reported high use. This is worrisome given TETFund's significant investments in providing access to academic databases through the TERAS platform (FMINO, 2025). Even hardware resources, which



might be seen as essential to ICT integration, show low use, with 61.6% of respondents indicating limited use of computers, projectors, and interactive boards in their teaching.

4.2 Barriers to Effective ICT Integration

The study identifies two main barriers to effective ICT use: insufficient knowledge and skills among academic staff, and unreliable electricity supply. These findings match broader observations about the challenges Nigerian tertiary institutions face in their digital transformation efforts.

The skills gap is a significant constraint. Even when ICT infrastructure exists, many lecturers lack the confidence and skills to integrate these tools effectively into their teaching methods. This issue echoes Echono's observation that institutions have not enrolled staff onto platforms like TERAS, despite clear directives and available resources (Tribune Online, 2025). The challenge is not just technical; it also involves a cultural shift. Moving from traditional teaching methods to technology-enhanced learning requires a basic change in mindset and practice.

Disruptions to electricity supply make the skills challenge even more pressing. An

unreliable power supply undermines the effectiveness of ICT-based teaching methods, making lecturers hesitant to invest time in developing digital skills when they cannot count on consistent access to technology. This infrastructure shortcoming is a systemic issue that individual institutions cannot solve alone. It needs coordinated action at various government levels.

4.3 Institutional Leadership and Digital Champions

Despite these challenges, some polytechnics show what can be achieved with dedicated leadership and strategic investment. Kwara State Polytechnic has emerged as a model of digital transformation, successfully hosting computer-based tests for external organizations, including the University of Ilorin Teaching Hospital and serving as a hub for JAMB examinations. The institution's state-of-the-art CBT facilities, robust infrastructure, and dedicated personnel have positioned it as a leader among Nigerian polytechnics. Notably, the polytechnic's recent selection as a participating institution in the federal government's iDICE (digital and creative enterprise) project recognizes its progressive



approach to integrating ICT into educational delivery.

Similarly, Federal Polytechnic Nasarawa has announced a comprehensive digital transformation initiative beginning with its ICT Centre and extending to key administrative units, including the bursary, registry, and academic departments. The Rector's vision encompasses creating a system that operates with integrity and consistency, where decisions are binding across all levels. This institutional commitment extends to curriculum innovation, with the polytechnic developing railway engineering technology programmes that prepare students for specialised technical careers (IIOE Nigeria National Centre, 2025).

These success stories demonstrate that digital transformation is achievable in the Nigerian polytechnic context. Common elements across these institutions include visible leadership commitment, strategic investment in infrastructure, and deliberate efforts to align technology adoption with institutional vision. However, the gap between these exemplars and the majority of polytechnics remains wide, suggesting that systemic solutions are needed to elevate performance across the sector.

4.4 National Initiatives and Institutional Response

The federal government has launched several initiatives aimed at accelerating digital transformation across tertiary institutions. The NgREN-TERAS integration, launched in late 2025, creates a unified digital ecosystem connecting institutions to research resources, online learning platforms, and institutional analytics. A pilot phase beginning in 2025 will include selected polytechnics alongside universities and colleges of education from all geopolitical zones (FMINO, 2025). Additionally, the \$40 million Blueprint ICT Development Project, funded by the French Development Agency, aims to digitise administrative systems, develop hybrid academic programmes, and strengthen transnational education linkages across ten federal universities, with potential lessons for the polytechnic sector.

However, the institutional response to these initiatives has been disappointing. Echono has publicly lamented the "recalcitrance" of some tertiary institutions towards embracing technology, warning that billions of naira already invested in ICT infrastructure would be wasted if not properly utilized (Tribune Online, 2025). This resistance is particularly



troubling given the demonstrated potential of technology to enhance educational outcomes: during COVID-19 lockdowns, TETFund's partnership with states and broadcast media to deliver syllabus-based lessons contributed to one of Nigeria's best WAEC results in years.

The disconnect between national investment and institutional adoption suggests that supply-side interventions alone are insufficient. Without corresponding demand-side efforts to build capacity, incentivize adoption, and hold institutions accountable for utilization, infrastructure risks becoming monuments to good intentions rather than tools for transformation.

5. Conclusion

Digital transformation in Nigerian polytechnic education stands at a critical juncture. The federal government has made substantial investments in ICT infrastructure and platforms, creating the foundational elements for a technology-enabled education system. Initiatives such as NgREN, TERAS, and the emerging National Higher Education AI Framework provide a coherent policy direction and technical architecture for digital integration.

Some polytechnics have demonstrated what is possible with committed leadership and strategic investment, serving as models for the sector.

Yet the evidence presented in this article reveals a troubling gap between infrastructure provision and actual utilization. Across federal polytechnics, ICT resources remain underutilized due to insufficient staff skills and unreliable electricity supply. Institutional resistance to technology adoption threatens to waste billions in public investment while consigning Nigerian graduates to an education that falls short of global standards. The consequence is diminished competitiveness: Nigeria's 189th global ranking in education competitiveness reflects a failure to leverage technology for educational transformation.

The COVID-19 experience demonstrated that when technology is effectively deployed, learning outcomes can improve. The challenge now is to translate that lesson into sustained institutional practice. This requires moving beyond infrastructure provision to address the cultural, capacity, and accountability dimensions of digital transformation.



6. Recommendations

Based on the findings and discussion presented in this article, the following recommendations are offered for strengthening digital transformation and ICT integration in Nigerian polytechnic education:

1. Mandatory Capacity Building Programmes

TETFund and NBTE should institute mandatory, certified digital skills training for all polytechnic academic staff, with progressive specialization from basic ICT literacy to pedagogical integration of specific platforms such as TERAS. Training should be tied to promotion criteria and continuous professional development requirements.

2. Institutional Accountability Mechanisms

TETFund should link future ICT infrastructure funding to demonstrable utilization metrics, including platform onboarding rates, digital resource access statistics, and evidence of technology-enhanced teaching practices. Institutions failing to meet minimum utilization

thresholds should face progressive consequences, including funding reductions.

3. Sustainable Power Infrastructure

The federal and state governments should prioritize reliable electricity supply for polytechnics through dedicated feeders, solar mini-grids, or other sustainable solutions. Without consistent power, ICT investments cannot achieve their intended impact regardless of institutional commitment.

4. Leadership Development

NBTE should establish a fellowship programme for polytechnic rectors and ICT directors focused on digital transformation leadership, drawing on successful models from institutions such as Kwara State Polytechnic and Federal Polytechnic Nasarawa. Peer learning and mentorship can accelerate adoption across the sector.

5. Curriculum Integration

Polytechnics should systematically embed digital skills across all programmes, ensuring that every graduate, regardless of discipline, possesses foundational ICT competencies relevant to their field. This aligns with the federal government's dual



certification initiative, combining academic qualifications with vocational skills.

6. Expanded Public-Private Partnerships

NBTE and polytechnics should actively pursue partnerships with technology companies, telecommunications operators, and international development partners to supplement government investments with expertise, infrastructure, and innovative solutions.

7. Research and Knowledge Sharing

A national observatory on digital transformation in polytechnic education should be established to document innovations, track progress, disseminate best practices, and inform evidence-based policymaking.

7. References

Federal Ministry of Information and National Orientation. (2025). Education Ministry Launches Upgraded NgREN–TERAS Integration To Deepen Digital Transformation In Tertiary

Education. FMINO Press Releases. <https://fmino.gov.ng/education-ministry-launches-upgraded-ngren-teras-integration-to-deepen-digital-transformation-in-tertiary-Education/>

Tribune Online. (2025). TETFund boss bemoans the resistance of tertiary institutions to embrace technology. Tribune Online. <https://tribuneonline.ng/tetfund-boss-bemoans-resistance-of-tertiary-institutions-to-embrace-technology>

IfG.CC. (2012). NG: Govt to boost ICT infrastructure in polys. Institute for eGovernment. <http://www.ifg.cc/aktuelles/nachrichten/regionen/173-ng-nigeria/41688-ng-govt-to-boost-ict-infrastructure-in-polys.html>

Voice of Nigeria. (2025). Nigerian Polytechnic To Go Digital, VON <https://von.gov.ng/nigerian-polytechnic-to-go-digital/>



IIOE Nigeria National Centre. (2025).
Consensus-Driven Digital Transformation:
How IIOE

Nigeria National Centre is
Pioneering an AI-Ready Academic Future.
International

Institute of Online Education.
<https://ar.ichei.org/knowledge/collection/2000.html>

Leadership Newspapers. (2025). Kwara
Poly's Digital Transformation: A Model for
Sustainable

Employment Opportunities.
Leadership.ng. <https://leadership.ng/kwara-polys-digital-transformation-a-model-for-sustainable-employment-opportunities>

Businessday NG. (2025). TETFund decries
poor use of ICT infrastructure in tertiary
institutions despite the
government's investment. Businessday

<https://businessday.ng/news/article/tetfund-decries-poor-use-of-ict-infrastructure-in-tertiary-institutions-despite-governments-investment>