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Roles of Information Infrastructures in Teaching and Service Delivery among Lecturers and Researchers in Nigerian Universities: Theory & Praxis

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Information infrastructure is the technology base on which knowledge work of the 21st century is done. To Nigerian scholars and researchers in the field of university, the availability, quality and accessibility of information infrastructure, including hardware, software and networks, digital library resources and institutional systems through which these resources are managed and mediated, is a determinant of the quality of teaching, the efficiency of research, and the efficiency of academic services delivery. Digital competency and technology-enhanced learning is explicitly required in all academic subjects by the National Universities Commission (NUC) Core Curriculum and Minimum Academic Standards (CCMAS) 2022, and is available to registered academics in universities in Nigeria via HINARI, AGORA, OARE, and EBSCO Host. However, there remains a profound theory-praxis divide: empirical research continually reports poor ICT infrastructure, lack of digital resources, poor technical support, and under-investment as the impediments to successful information infrastructure utilisation in Nigerian universities. The paper will discuss the application of information infrastructure in teaching and service delivery of Nigerian university lecturers and researchers using a dual theoretical-praxis approach. It is grounded on three theoretical models: Davis (1989) Technology Acceptance Model (TAM), DeLone and McLean (2003) Information Systems Success Model (ISSM) and Rogers (2003) Diffusion of Innovations (DoI) Theory. Based on peer-reviewed empirical research across several Nigerian universities and geopolitical regions, TETFund intervention data, NUC policy documentation and international comparative evidence, the paper captures what information infrastructure can do when installed effectively and what limits full implementation of information infrastructure in the Nigerian context. It has five substantive sections that explore: the conceptual landscape of information and information infrastructure; the present condition of information infrastructure in the Nigerian universities; the role of teaching and research in six dimensions of infrastructure; the multi-layered challenges that limit effective implementation; an evidence-based strategy framework to close the theory-practice gap. It makes some recommendations to the university administrators, TETFund, the NUC, LIS professionals, and individual lecturers.

Keywords: Information Infrastructure, ICT, Teaching, Research, Nigerian Universities, Service Delivery, Lecturers, TETFund, NUC, Library, Digital Resources, LMS, TAM, DeLone and McLean, DSpace

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INTRODUCTION

The information infrastructure in higher education is the collective combination of physical, digital and institutional structures that facilitate the generation, storage, processing, retrieval and distribution of information to support the triple-

fold mission of the university (teaching, research, community service). To Nigerian university professors and researchers, this infrastructure includes computer hardware and peripheral devices; local area network and internet connectivity; computer applications such as SPSS, NVivo and Stata, MATLAB, Mendeley and Microsoft Office; digital library resources such as electronic journals, databases and institutional repositories; online teaching platforms such as Learning Management Systems (LMS), Zoom, and Google Classroom; and the institutional policies, technical support systems

This centrality of infrastructure is recognised in the regulatory and policy environment. The CCMAS (2022) of the NUC explicitly includes digital competency and technology-enhanced learning as a prerequisite in all disciplines, a formal acknowledgment that information infrastructure is no longer a service on the periphery but is a central academic need. Since its inception, TETFund, the most important intervention agency of the government in the tertiary education sector, has directed investments into ICT infrastructure development, training of academic staff, funding of research, and development of libraries in federal and state universities (TETFund, 2023; Anachuna et al., 2024). Nonetheless, as demonstrated in the empirical evidence reviewed in this paper, there remains a consistent and destructive theory-praxis gap: between what information infrastructure should be like in Nigerian universities to be able to live up to current pedagogical and research standards, and what they actually have and actually use.

The research in the Challenges of ICT Usage among Academic Staff in Nigerian Universities published in IIARD (2025) established that the most pressing issue with ICT usage was the lack of ICT training amongst academic staff (mean=3.75, SD=0.58), followed by poor network coverage in areas with rural institutions (mean=3.67, SD=0.58) and insufficient maintenance of The ICT training studies conducted by Springer (2024) in Nigerian universities revealed that the country has a shortage of trained teachers and the necessary infrastructure such as computers and high-speed internet connections. These results are not in a vacuum: they are a systemic issue that cuts across institution types, geopolitical regions, and academic fields and requires the long-term, evidence-based, multi-stakeholder response that this paper suggests.

THEORETICAL FRAMEWORKS

This paper is analyzed using three established theoretical frameworks that span technology acceptance, information system quality assessment and innovation diffusion.

Technology Acceptance Model (TAM)

According to Davis (1989), Technology Acceptance Model, it is assumed that the intention to use an information system depends on two fundamental perceptions: Perceived Usefulness (PU) which is a perception of the extent to which the use of the technology will enhance job performance and Perceived Ease of Use (PEOU) which is a perception of whether the technology is effortless. TAM has been widely tested in the education technology situations all over the world and its usage in the case of Nigerian university ICT adoption is substantiated by empirical evidence. Those lecturers who believe that LMS systems, online databases, or statistical analysis software (high PU) will make a difference in their productivity as a teacher or researcher are much more likely to adopt and continue using such systems. On the other hand, information infrastructure is perceived difficult to use (technical complexity, lack of training, poor performance) and adoption is repressed even in the face of theoretical usefulness of the technology. That is why the paradox is recorded in the Nigerian university research: the infrastructure exists, but it is not used to the full extent, since the attitude toward the ease of use is deliberately lowered by the lack of stability in the power supply, inadequate connectivity, and lack of technical support.

DeLone and McLean Information Systems Success Model (ISSM)

The updated Information Systems Success Model by DeLone and McLean (2003) recognises six dimensions of information system quality that collectively define system success: Information Quality (accurate, timely, complete), System Quality (usable, reliable, responsive), Service Quality (response to technical support), Information Use (frequency and nature of use), User Satisfaction (positive appraisals of the system), and Net Benefits (educational outcomes, When applied to the information infrastructure of the university of Nigeria, the ISSM offers a diagnostics model: the quality of the system should be high, with high quality of hardware and constant electricity supply; the quality of information should be high, with access to up-to-date, authoritative databases of academic information; and the quality of service should be high, with efficient technical support. The systematic shortcomings recorded in Nigerian universities in all six dimensions of the ISSM characterize the apparent inefficiencies of the infrastructure performance, as well as the principles of remedial design that a remediation approach should take into consideration.

Diffusion of Innovations Theory (DoI)

The Diffusion of Innovations Theory created by Rogers (2003) defines five characteristics of the rate of innovation diffusion in a social system relative advantage (better than other options), compatibility (in line with current values and practices), complexity (ease of use and understanding), trialability (can be tested), and observability (visibility of results to others). The DoI framework can be used to shed light on why some information infrastructure technologies spread faster than others in the context of the Nigerian university: mobile internet access spreads fast since all five attributes are favourable (high relative advantage, high compatibility with existing social media use, low complexity to simple browsing, freely trialable and observable benefits). In comparison, LMS platforms and institutional repositories have a slow diffusion process due to high complexity (training and long-term engagement are necessary), low trialability (institutional commitment is required), and uncertainty about the benefits of the research is not observable (and obvious to many academics).

Table 1: Theoretical Frameworks — Summary Application to Nigerian University Information Infrastructure

Theory	Core Construct	Application to Nigerian University Information Infrastructure
TAM (Davis, 1989)	Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) determine adoption intent	Unreliable power/internet suppresses PEOU, driving underutilisation despite infrastructure presence; training improves PU and drives adoption
ISSM (DeLone & McLean, 2003)	6 dimensions: Info Quality, System Quality, Service Quality, Use, Satisfaction, Net Benefits	Nigerian university systems score poorly on System Quality (unreliable hardware/power) and Service Quality (technical support) — directly degrading Use, Satisfaction, and Net Benefits
DoI (Rogers, 2003)	5 innovation attributes: relative advantage, compatibility, complexity, trialability, observability	High complexity and low trialability slow LMS and IR adoption; strategies should improve all five attributes through training, incentives, and visible success models

Table 1: Author's Synthesis (2024)

CONCEPT OF INFORMATION AND INFORMATION INFRASTRUCTURE

Academically, information is processed, organised and contextualised information that adds meaning, minimises uncertainty and allows informed decision making and knowledge building (Chowdhury & Chowdhury, 2007). Information is the input, medium and output of academic activity in the university: lecturers utilize information to make the teaching resource; students utilize information to build insights and competence; researchers utilize information to determine a gap, design study, gather and analyse data and share the results, and administrators utilize information to run the institutions efficiently. The quality, currency, accessibility and relevance of information available to each of these user communities are the key factors that determine the quality of what is produced by the user communities.

The information infrastructure, as theorised by Star and Ruhleder (1996) in their seminal framework, infrastructure studies, is more than a set of technologies; it is a socio-technical system incorporated in practice. Star and Ruhleder distinguish eight properties of infrastructure: embedded in other structures and social arrangements, transparent in its use (need not be reinvented in each task), reach not just in a single event or site practice, learned as a part of membership in professional communities, conventions of community practice, embodied in standards, built on an installed base, and becomes visible when it fails. The final attribute, infrastructure visibility in failure is most painfully demonstrated in the Nigerian universities, where the reliance of information infrastructure is most evident when electricity is cut off, internet connectivity is lost, or a database subscription has expired and teaching or research that has grown to rely on such systems grinds to a halt.

In the context of the Nigerian university, information infrastructure may be classified into six functional levels, which include (1) physical infrastructure (computers, servers, peripherals, projectors, smart boards); (2) networking infrastructure (LAN, Wi-Fi, internet connectivity with NGREN and commercial ISPs); (3) software infrastructure (A proper academic information infrastructure involves the proper provision of all the six tiers, interoperability, and sustainability.

STATE OF INFORMATION INFRASTRUCTURE IN NIGERIAN UNIVERSITIES

Physical and Network Infrastructure

Nigerian universities have seen a material change in their physical information infrastructure in the last ten years, which can be attributed to the activities of TETFund and institutional capital investment. The mandate of TETFund involves building and renovating buildings and laboratories, acquisition of teaching and research facilities, ICT infrastructure, and creation of facilities that core institutions need to run its activities (TETFund, 2023). Anachuna et al. (2024) have discovered that the expression of TETFund made a considerable positive impact on the research growth and infrastructure in the Federal universities of South-East Nigeria. According to Ogunode and Agbor (2023) in AKSU Journal (2025), TETFund has significantly provided computer laboratories, network infrastructure, and library facilities to tertiary institutions in Nigeria, especially in the North-Central region.

The investments in ICT infrastructure by NUC/TETFund have, however, been reported as unevenly distributed, with urban campuses and older federal universities receiving a larger portion, and newer and state institutions, polytechnics and rural-campus institutions being much less served (Ojo and Akinyemi, 2021; IREJE, 2024). The IIARD (2025) survey on ICT challenges among academic staff in Nigerian universities revealed that slow bandwidth (mean=3.05, SD=0.61), poor maintenance of the current facilities (mean=3.21, SD=0.69), and the lack of network coverage in rural areas (mean=3.67, SD=0.58) were still unchanged across the types of institutions. Investigating the chosen university libraries in the Kwara State, Adeyemi et al. (2025) discovered that even though solar energy to power ICT facilities had been implemented in response to epileptic grid electricity, the lack of basic connectivity and the quality of hardware remained at the core of the problem.

Digital Library Resources and the NUC Virtual Library

The NUC Virtual Library is the largest coordinated information infrastructure intervention in higher education in Nigeria - making registered academics of Nigerian universities available to some 95,000 e-journals and thousands of e-books via such platforms as HINARI (health and life sciences), AGORA (food and agriculture), OARE (environment), EBSCO Host, and the NUC e-journal portal. When available and utilized well, this pool of resources revolutionizes the research environment of the Nigerian scholars, availing them access to academic literature at international levels which would be prohibitively costly when subscribing on an individual basis. To provide some context, an individual subscription to Elsevier journals can cost between 3,000 and 15,000 dollars per year; the NUC Virtual Library is a virtual library where thousands of Elsevier journals are available at almost no marginal cost to the institution.

This notwithstanding, the level of awareness and use of Virtual Library resources is documentably poor. The research always indicates that a large number of lecturers and the students are not aware of the entire number of resources that are available, they are not knowledgeable about how to search effectively or they are not able to use the resources at all because of the limitation in connectivity. This awareness-utilisation gap is a traditional second-level information infrastructure gap: the infrastructure is in place (provided at a national level) but is not delivering the desired information output due to the lack of the conditions, awareness and reliable connectivity, at the point of consumption. To fill this gap, library-based information literacy interventions are needed, and not merely an investment in technical infrastructure.

Learning Management Systems

LMS platforms, such as Moodle, Blackboard, Google Classroom and Canvas, offer the infrastructure of digital course management that changes the potential of asynchronous, flexible, and documented interaction of teaching-learning. According to Yusuf and Alabi (2020), cited in IREJE (2024), a number of Federal Universities in Nigeria have been successful in adopting digital tools/platforms like Moodle, Blackboard, and Google Classroom. The adoption of LMS increased a lot after the COVID-19 pandemic, which required an immediate shift to online teaching and unveiled the potential and the restrictions of the digital teaching infrastructure of Nigerian universities. The article by Eli-Chukwu and colleagues (2023) presented obstacles that e-learning faced in the Nigerian higher education during the pandemic era: poor internet connectivity, insufficient access to devices, and insufficient lecturer digital pedagogical competence each inhibited the quality and equity of online education.

Table 2: Information Infrastructure Components — Roles, Evidence, and Quality Assessment

Infrastructure Component	Role in Teaching	Role in Research	Evidence from Nigerian Context
Internet Connectivity (NGREN / commercial ISP)	Online teaching; LMS access; virtual classrooms; Zoom sessions	Database access; global collaboration; publication submission	IIARD (2025): slow broadband speeds (mean=3.05); CITAD (2025): 27M without telecom access nationally
NUC Virtual Library (95,000+ e-journals)	Supplementary readings; course resource lists; current content	Literature review; journal access; open access publishing	Provisioned nationally but awareness/utilisation remain suboptimal; connectivity constraint at point of use
Computer Hardware / Labs	Presentation preparation; course material creation; student practicals	Data analysis (SPSS/Stata/NVivo); manuscript preparation	TETFund interventions positive but unevenly distributed (Anachuna et al., 2024; Ogunode & Agbor, 2023)
LMS (Moodle/Blackboard/Google Classroom)	Course delivery; assignment/assessment management; student interaction	Research data sharing; collaborative writing; research project management	Federal universities progressing; polytechnics and state universities lagging (Yusuf & Alabi, 2020; Eli-Chukwu et al., 2023)
Institutional Repository (DSpace/EPrints)	Thesis access; supplementary course materials	Research output dissemination; open access; citation enhancement	Only 31 Nigerian universities have DOAR-registered repositories as at Nov 2023 (Aghoghovwia & Ekereuche, 2024)
Statistical Software (SPSS/R/Python/Stata)	Research methods instruction; quantitative data projects	Quantitative/qualitative analysis; mixed-methods research	Licencing costs prohibitive for many state universities; open-source alternatives (R, Python) underutilised due to training gaps
Power Infrastructure (Solar/Generator backup)	Enables continuous technology-dependent teaching activity	Enables continuous data analysis and digital research	Libraries adopting solar power (Adeyemi et al., 2025); widespread use of generators increasing operating costs

Table 2: Author's Synthesis (2024); sources as cited

TEACHING ROLES OF INFORMATION INFRASTRUCTURE IN NIGERIAN UNIVERSITIES

Technology-Enhanced Course Delivery

The information infrastructure is the one that changes the teaching process that is a uni-modal, lecturer-centred, chalk-and-talk experience to a multi-modal, student-centred, evidence-based pedagogical experience. Nigerian lecturers can use smart classrooms with projectors, interactive whiteboards, and internet access to include video demonstrations, live data visualisation, interactive polling (via tools like Mentimeter or Kahoot) and access to current research evidence during lectures in real time, which has been shown by research to be associated with higher student engagement, retention of knowledge and academic achievement. Olawoyin and Akinola (2023) reported the presence and use of cloud computing technologies in teaching and learning in Nigerian universities and reported that there was high but institutionally disproportionate adoption with private universities and better-resourced federal universities leading the pack.

Olorunfemi and Yusuf (2023, cited in IREJE, 2024) verified the knowledge about digital teaching tools among the lecturers of the Nigerian university of Kogi State but reported the lack of understanding that takes place between awareness and systematic implementation of a digital teaching tool into the routine pedagogy. Oluwaseyi (2024, cited in Springer) discovered that the skills of teachers were not sufficient to integrate ICT in teaching and learning in that, many teachers had no technical skills to teach with the use of ICT as most teachers did not have training opportunities. This skills gap is not a motivational one as Nigerian lecturers always say they would like to make better use of digital tools, but a structural one due to insufficient pre-service and in-service training in ICT pedagogy.

Learning Management Systems and Blended Learning

Learning Management Systems (LMS) are the most significant digital change of teaching structures in the university in the modern era. An effective LMS offers a consistent, organized, online learning platform where course content, evaluation exercises, student discussion boards, student performance records, and interaction between lecturer and student exist within one platform that is available at all times, on any internet-enabled device. To Nigerian university students who might not have enough libraries time, trustworthy textbook access, and high student numbers that diminish lecturer-student interaction, a good LMS could play a significant role in the democratisation of access to the high quality of teaching materials. Yusuf and Alabi (2020) established that a significant number of Federal Universities in Nigeria have been actual in LMS implementation, and Moodle, Blackboard, and Google Classroom are all present throughout the system.

Nonetheless, successful LMS implementation will not only take software installation, but also a stable, fast, and consistent internet connection among lecturers and students, technical support, training of lecturers in the content design, development of assessment tests, and interpretation of analytics as well as ensuring that students are digital literate enough to learn online on their own. Ogundele and Taiwo (2022) report the quality-learning divide caused by insufficient digital infrastructure in Nigerian universities, as the digital divide among students, with affluent, urban students being able to use home broadband and rural and low-income students potentially having to use campus WiFi shared with thousands of other users, essentially undermines the fairness of teaching based on LMS.

Research Support and Information Infrastructure

Reach at all levels of the research lifecycle is directly supported by information infrastructure. The literature review basis can be found in the database portfolio of the NUC Virtual Library; statistical software (SPSS, R, Stata) will be used to analyse the data; reference management tools (Mendeley, Zotero) will be used to structure and format references; institutional repositories will be used to disseminate the output; and a reliable internet will be used to collaborate internationally, submit peer reviews, and communicate research. A key indicator is a critical benchmark that Nigeria presently spends an estimated 0.13% of GDP on research funding- compared to 2.4% in China, 0.85% in South Africa and the 1% minimum recommended by the African Union and the world average of 1.7%. This long-term underinvestment in research directly limits the information infrastructure on which research can be conducted: unless academics in Nigeria subscribe to international databases, have access to computational resources and laboratory equipment, and technical research support, they can not carry out research at internationally competitive levels.

The deficiency of the information infrastructure, which obstructs the quality and quantity of research, is reported in PMC (2024) research on building research capacity in Nigeria according to which a Nigerian research group used the institutional access to the databases of diaspora-based collaborators to gain access to databases and journal articles that would otherwise have necessitated substantial financial investment in the work of researchers in Nigeria, an informal workaround that demonstrates More informal workarounds are not the answer, but the systematic and adequately-funded delivery of information infrastructure that will allow Nigerian academics to compete on equal terms with their global counterparts.

CHALLENGES TO INFORMATION INFRASTRUCTURE USE IN NIGERIAN UNIVERSITIES

Table 3: Multi-Level Challenges to Information Infrastructure Deployment — Evidence and Impact

Challenge	Specific Manifestation	Evidence / Scale
Chronic Underfunding	Nigeria spends 0.13% GDP on research; university per-student funding far below global peers	SGCI/TETFund (2025): 0.13% vs AU target 1%; per-student funding ~$1,500 vs $10,000+ in mid-tier developed-country universities
Erratic Power Supply	Interrupts technology-dependent teaching; damages hardware; forces generator dependence at high cost	IIARD (2025): consistent documentation across institutions; libraries adopting solar as emergency response (Adeyemi et al., 2025)

Continuation of Table 3

Inadequate Internet Bandwidth	Slow broadband speeds (mean=3.05); insufficient campus WiFi for student population; rural area non-coverage	IIARD (2025); NCC (2024): Nigeria broadband penetration 44.43% end-2024; 27M without telecom access (CITAD, 2025)
Digital Skills Deficit	Lecturers lack skills for LMS design, database searching, statistical software, open access publishing	IIARD (2025): lack of ICT training most pressing issue (mean=3.75); Springer (2024): inadequate trained teachers in Nigerian universities
Geographic / Institutional Inequality	TETFund investments concentrated in urban campuses and older federal universities; North-Central and North-West lag	Ojo & Akinyemi (2021): uneven distribution concentrated in urban campuses; TETFund NW study: NW universities need urgently expanded intervention (IJARA, 2024)
Low Institutional Repository Adoption	Only 31 DOAR-registered repositories in Nigeria as of Nov 2023; South-West dominant (12 of 31)	Aghoghovwia & Ekereuche (2024): 31 repositories nationally; South-East study confirmed status and challenges; directly constrains global visibility
Software Licencing Costs	SPSS, NVivo, Stata, Endnote licences prohibitively expensive for most state universities; open-source alternatives underadopted	Open-source tools (R, Python, Zotero, QGIS) available but require training investment many universities do not provide

Table 3: Author's Synthesis (2024); sources as cited

STRATEGY FRAMEWORK: CLOSING THE THEORY-PRAXIS GAP

Table 4: Comprehensive Strategy Framework for Information Infrastructure Enhancement in Nigerian Universities

Strategic Pillar	Specific Interventions	Responsible Actor	Theoretical Basis
1. Funding Architecture	Minimum 5% of university capital budget for ICT; TETFund dedicated ICT Infrastructure Grant; federal research funding towards AU 1% GDP target	FGN; University Councils; TETFund	ISSM: System Quality requires adequate funding; SGCI/TETFund (2025): 0.13% → 1% GDP target
2. Power Independence	Solar-powered smart classrooms and computer laboratories; UPS installations for server rooms; community microgrids	University management; Federal Ministry of Power; TETFund	ISSM: System Reliability; TAM: PEOU improves with reliable power (Adeyemi et al., 2025)
3. Digital Skills Development	National Academic Digital Pedagogy Training Programme (NUC-mandated); compulsory LMS training for new academic staff; library-led database literacy; TETFund AST&D expansion	NUC; TETFund; University Libraries; Springer (2024)	TAM: PU and PEOU both improved through structured training; DoI: complexity reduced
4. Virtual Library Utilisation	National NUC Virtual Library awareness campaign; mandatory e-resource orientation for all incoming students and staff; library-embedded database literacy across disciplines	NUC; University Libraries; NLA	ISSM: Information Quality and Use; DoI: observability of research benefits drives adoption

Contination of Table 4

5. Institutional Repository Mandate	NUC to mandate DSpace/EPrints IRs for all accredited universities; faculty OA deposit obligation; IR metadata standards for discoverability	NUC; University Libraries; Individual academics	Aghoghovwia & Ekereuche (2024): 31 → 260+ repositories needed; Webometrics transparency score improvement
6. Open Source Software Adoption	Transition to open-source statistical tools (R, Python, JASP, PSPP); Zotero/Mendeley for references; LibreOffice for productivity; university-wide licencing for essential proprietary tools	University ICT Directorates; Departments; Libraries	DoI: relative advantage and trialability high for free tools; ISSM: Net Benefits improve with cost reduction

Table 4: Author's Strategic Framework (2024); theoretical basis cross-referenced as cited

TETFund as the Primary Financing Mechanism

The contribution of TETFund in the information infrastructure of Nigerian universities is both fundamental and indispensable. Its regular interventions include building and renovating of structures and laboratories, acquisition of teaching and research facilities, training and development of academic staff, research and book production, capacity, and the provision of ICT infrastructure (TETFund, 2023). A TETFund NW University study (IJARA, 2024) revealed a strong positive difference between TETFund interventions and infrastructural development as well as library development in the North-West universities - which validates the effect of TETFund when resources are effectively deployed. The study however also proposed significant intervention in the North-West and other under-resourced areas to curb the geographic differences in the quality of information infrastructure in geopolitical areas of Nigeria.

An Information Infrastructure Grant Scheme specifically within the intervention portfolio of TETFund (ring-fenced against building construction and other capital projects) would help solve the present predicament of ICT infrastructure improvements vying against building construction with other capital projects in accessing limited TETFund allocations. The NUC has already suggested that institutions should allocate at least 10 percent of recurrent budget to library and information resource development; regular implementation of this recommendation by accreditation would harness institutional resources in collaboration with TETFund interventions.

The Role of Academic Libraries as Information Infrastructure Competency Centres

Nigerian university academic libraries are strategically placed to be information infrastructure competency centres-institutions that do not merely avail access to digital information sources, but also construct the capacity of lecturers, researchers, and students to utilise information infrastructure efficiently and in an ethical manner. This repositioning is not only to be found in the traditional library role as a provider of passive resources but also in the active building of capacity: conducting database searching workshops, training in reference management (Mendeley, Zotero), training in statistical software orientation (R, SPSS basics), training in information literacy dissemination (institutional repositories, open access journals), and in information literacy teaching embedded in discipline curricula.

This broadened library role is consistent with the best practice in libraries reported in the literature in Library and Information Science and with the particular advice of Nigerian library studies such as Ajani and Buraimo (2022), Abu and Okafor (2023), and the TETFund NW study (IJARA, 2024). By positioning themselves as co-investigators in research support, instead of as custodians of resources, university librarians have a direct impact on the pedagogical and research payoffs of the information infrastructure, and they create the argument that the library should be continually invested in as part of institutional resource allocation decisions.

CONCLUSION AND RECOMMENDATIONS

Information infrastructure is not an ancillary service in the 21st-century Nigerian university. It is the background technological infrastructure under which successful teaching, efficient research, quality service provision and eventually the global competitiveness of academic institutions in Nigeria relies. The evidence analyzed repeatedly indicates that information infrastructure in the Nigerian universities, although undergoing positive changes due to the efforts of TETFund and institutional funding, is in a pathetically and systemically poor state in comparison with the requirements of modern

higher education. The gap between theory and praxis is a reality, an expensive and solvable thing, but to solve it, there must be long term, multi stakeholder dedication to the issue, which can be effected through the strategic framework the paper provides.

- The Federal Government must create a special national ICT Infrastructure Fund to universities under the jurisdiction of TETFund that has a minimum annual allocation of 0.5% of the education sector budget devoted to upgrading campus networks, installing smart classrooms, LMSs, and developing institutional repositories.
- University Councils must require that at least 5% of the annual capital budget of the institution be ring-fenced to invest and maintain ICT infrastructure and as a line item in annual budget submissions to NUC as part of the accreditation review.
- Full implementation of DSpace or EPrints institutional repository should be a compulsory accreditation requirement of the NUC, and all faculty must deposit research outputs within six months of publication or otherwise public release.
- A NUC-led National Academic Staff Digital Pedagogy Certification Programme, offering all lecturers in Nigerian universities with accredited, structured training on LMS administration, database search, reference management and open-access publishing within three years of employment should be introduced.
- University libraries: University libraries should set up Research Support Unit coordinated by subject librarians: Providing bibliometric analysis services, database searching training sessions, reference management workshops, institutional repository promotion/advocacy, and open-access publishing advice, making the library the main information infrastructure competency centre in the university.
- Information infrastructure interventions in North-East, North-West, and South-South universities- the geopolitical areas least served by the current TETFund allocations- should become a priority area of equity and national development concern by TETFund.

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