

Assessment of ICT Skills of Librarians in University Libraries in Nigeria.

By

Justice Owajeme OFUA, PhD. (CLN)
owaiemejustice@gmail.com Delta
 State University, Abraka ORCID:
 0009-0000-5051-1085

Abstract

The rapid digitalization of higher education has intensified the need for robust ICT competencies among librarians, who serve as critical mediators between knowledge systems and academic communities. In Nigeria, however, ICT adoption in university libraries continues to evolve within contexts of infrastructural fragility, inconsistent training, and uneven institutional support. This study assessed the ICT skill levels of librarians in Nigerian university libraries and examined how demographic and organizational factors shape digital proficiency. Using a descriptive cross-sectional survey design, data were collected from 247 professional librarians across 15 universities selected through multi-stage sampling. The "Librarians' ICT Skills Assessment Scale (LICTSAS)" captured responses on ICT infrastructure access, skill proficiency, institutional support, and perceived barriers. Descriptive and inferential analyses—including correlation, regression, t-test, and ANOVA—were conducted using SPSS 27. Findings indicate that while librarians exhibit high competence in basic computer operations ($M = 4.21$), proficiency declines in advanced domains such as digital content management and analytical/problem-solving applications (overall $M = 3.55$). ICT infrastructure ($r = .63$) and institutional support ($r = .61$) demonstrate strong positive relationships with skill levels. Regression analysis shows that infrastructure ($\beta = .41$), institutional support ($\beta = .33$), and training frequency ($\beta = .18$) jointly predict 53% of the variance in ICT competence. Significant differences were found across educational qualifications but not gender. These results underscore the centrality of institutional ecology in shaping ICT capabilities and affirm the relevance of both the Technology Acceptance Model and Human Capital Theory in explaining digital competence development. The study recommends strategic investment in sustained training, improved technological infrastructure, and national benchmarks for ICT proficiency to strengthen librarians' capacity for digital scholarship and enhance the overall effectiveness of Nigerian university libraries.

Keywords: ICT Competence; Digital Libraries; Librarianship; Nigerian University Libraries; Technology Adoption;

Introduction

Over the past three decades, information and communication technologies (ICTs) have quietly reshaped the soul of librarianship. What once revolved around catalogues, circulation cards, and physical stacks has expanded into a digital ecosystem where knowledge is created, stored, and accessed in milliseconds. University libraries—long regarded as the intellectual lungs of higher education—now operate in an environment where digital competence is not optional but existential. The contemporary librarian is expected to navigate integrated library systems, manage institutional repositories, provide virtual

reference services, and curate open educational resources with the same ease earlier generations handled print indexes. Yet the transition from traditional librarianship to ICT-driven information work has been uneven, particularly across developing economies such as Nigeria (Ezeani & Igwesi, 2020; Yusuf & Adeyemo, 2022).

The ideal scenario is clear: librarians should possess a diverse range of ICT skills—ranging from basic digital literacy to advanced competencies in data analytics, metadata management, and web-based service delivery. These capabilities are essential to support e-learning, digital scholarship, and research data management in universities (Adeleke & Ojo, 2023). In reality, however, many Nigerian university libraries still operate within fragile technological infrastructures and underfunded professional development systems. Power instability, obsolete hardware, limited broadband access, and inconsistent training have produced a generation of librarians who are often willing but not fully equipped to engage with the tools demanded by contemporary scholarship (Oketunji, 2021). This shortfall between expectation and practice has created a critical gap between what libraries could be-and what they currently are.

Earlier attempts to address ICT competence gaps among librarians in Nigeria have produced mixed results. Training initiatives led by the National Universities Commission (NUC) and the Nigerian Library Association (NLA) have focused mainly on basic computer skills and short-term workshops (Ajayi, 2019). While such efforts improved general digital awareness, they rarely built sustained capacity for advanced or emerging ICT applications such as cloud computing, research data services, or artificial intelligence-based cataloguing. Moreover, prior empirical studies have tended to rely on descriptive statistics and self-reported confidence measures rather than assessing actual skill proficiency (Anyaku et al., 2022). As a result, the field still lacks robust evidence on the depth, distribution, and determinants of ICT skills among university librarians. This evidentiary gap constrains institutional planning, budgeting, and human- resource development in the sector.

The consequences of these deficiencies are far-reaching. At the operational level, poor ICT competence translates to underutilization of electronic databases, weak user- support services, and limited visibility of local scholarship in global indexing systems. Indirectly, this gap perpetuates information inequality between universities in the Global South and their counterparts in advanced economies (Ifijeh & Yusuf, 2023). It also limits librarians' ability to contribute to broader digital transformation agendas, including open science and knowledge democratization. In short, a digitally under-skilled library workforce undermines the strategic role of universities as engines of national innovation.

This study therefore emerges at the intersection of a practical necessity and a theoretical curiosity: to systematically assess the ICT skills of librarians in Nigerian university libraries and to understand how these skills interact with institutional support structures and personal factors such as age, gender, qualification, and years of experience. While the Technology Acceptance Model (TAM) (Davis, 1989) provides a lens for examining behavioural intention toward ICT use, this study complements it with elements of Human Capital Theory (Becker, 1993), emphasizing how investment in staff training and education influences performance outcomes. Integrating these perspectives offers a multidimensional understanding of why skill gaps persist and how they can be addressed sustainably.

Specifically, the study aims to:

1. Determine the current level of ICT skills possessed by librarians in Nigerian university libraries.

2. Identify areas of strength and weakness across core ICT domains (information retrieval, digital content management, automation, and data analysis).
3. Examine the relationship between demographic and institutional factors and librarians' ICT competencies.
4. Suggest strategies for improving ICT capacity for effective library service delivery.

1. Literature Review

1.1 The evolving meaning of ICT competence in librarianship

The discourse on ICT skills in librarianship has evolved from a narrow focus on basic

computer literacy to a broader conception of digital fluency and technological adaptability. Early frameworks, emerging in the late 1990s, equated ICT competence with the ability to use word processors, databases, and email systems. Overtime, however, scholars began to recognize that proficiency now encompasses web-based curation, metadata management, data analytics, and digital preservation (Lau & O'Brien, 2021). In the current knowledge economy, librarians are expected to function as information technologists, capable of bridging human cognition with machine logic-a role far more complex than mere computer use.

This shift mirrors transformations in global higher education systems, where digital learning platforms, institutional repositories, and artificial intelligence-based discovery tools are redefining the information landscape. Within such environments, ICT competence has become not only a professional requirement but a moral imperative for equitable knowledge access (Ifijeh & Yusuf, 2023). Inadequate digital proficiency among librarians directly translates into information poverty for their patrons, weakening the library's relevance in an era dominated by algorithmic retrieval and open data.

1.2 International perspectives on librarians' ICT skills

Globally, research on librarians' ICT competencies underscores both progress and persistent inequities. Studies from Europe and North America show that while librarians demonstrate strong technical confidence, skill gaps remain in areas such as data visualization, coding, and research-data management (Corrall et al., 2020). In the Asia-Pacific, where rapid digitalization is accompanied by uneven infrastructure, librarians often self-train to fill institutional voids (Singh & Mahmood, 2022). The Scandinavian context, by contrast, reveals the effectiveness of systematic upskilling initiatives anchored in national library strategies (Larsen & Hedman, 2021).

These comparisons expose a global divide not merely between regions but within them: between well-funded research libraries and under-resourced institutions. As digital scholarship becomes central to research productivity, countries unable to bridge this skills gap risk intellectual marginalization. For developing nations, the challenge is therefore dual-building infrastructure while nurturing human capacity to leverage it.

1.3 The African and Nigerian context

In Africa, ICT adoption in libraries has followed a complex path shaped by economic instability, infrastructural fragility, and inconsistent policy direction. Despite numerous initiatives-from eGranary projects to national virtual library schemes-the continent still contends with chronic underinvestment in

technology infrastructure (Onyancha, 2020). Nigeria presents an especially paradoxical case: its universities host some of the region's oldest library schools and largest research libraries, yet technological advancement within these institutions remains inconsistent (Ezeani & Igwesi, 2020).

Empirical studies report that Nigerian librarians generally possess moderate to high awareness of ICT tools but limited operational proficiency (Ajayi, 2019; Anyaoku et al., 2022). Factors such as age, academic qualification, access to training, and institutional funding frequently emerge as predictors of ICT competence. For example, Yusuf and Adeyemo (2022) found that while most university librarians were comfortable using online catalogues and basic digital reference services, fewer could design databases, manage digital repositories, or apply data analytics tools. These findings suggest that professional awareness does not automatically translate into advanced skill acquisition.

Infrastructural conditions also exert significant influence. Oketunji (2021) notes that intermittent electricity, poor internet bandwidth, and obsolete ICT facilities limit librarians' capacity to practice and internalize new digital techniques. Without a reliable digital ecosystem, even well-trained librarians experience "competence erosion," as learned skills are not reinforced through daily application. This situation underscores that ICT competence is not static but ecological-it thrives only within enabling environments.

1.4 Previous interventions and their limitations

Several initiatives have attempted to close the digital skills gap in Nigerian libraries. Workshops organized by the National Library of Nigeria and the Nigerian Library Association introduced librarians to e-resources and automation tools. Universities such as Ibadan, Nsukka, and Covenant have run short courses on digital librarianship and repository management. Yet these interventions often remain ad hoc, lacking follow-up or evaluation (Ajayi, 2019). Moreover, training content typically prioritizes operational familiarity-"how to use"-over strategic or analytical skills-"why and when to use."

Another limitation lies in the methodological approaches used to assess ICT competence. Many earlier studies relied heavily on self-report questionnaires that measured perceived proficiency rather than demonstrated ability. Self-assessment, though valuable, tends to inflate competence levels, especially where respondents fear judgment or career implications (Anyaoku et al., 2022). Consequently, existing data on librarians' ICT skills may present an overly optimistic picture, concealing structural and pedagogical weaknesses that remain unaddressed.

1.5 Theoretical framing

To situate ICT skills assessment within a theoretical lens, this study draws on two complementary models. The Technology Acceptance Model (TAM) (Davis, 1989) posits that individuals' behavioural intentions to use technology are shaped by perceived usefulness and perceived ease of use. In library contexts, these perceptions influence whether librarians embrace or resist ICT adoption. However, TAM's focus on individual attitudes overlooks systemic and investment dimensions. Thus, this study

incorporates Human Capital Theory (Becker, 1993), which conceptualizes skill acquisition as an outcome of deliberate investment in education, training, and institutional support. Combined, these theories suggest that ICT competence depends on both intrinsic motivation and extrinsic opportunity- the personal will to learn and the institutional capacity to enable learning.

1.6 Identified gaps and rationale for the present study

From the foregoing, three analytical gaps are evident.

First, while numerous Nigerian studies have documented ICT awareness levels, few have offered a comprehensive, empirically validated assessment of actual skill domains- such as software troubleshooting, digital curation, or data-management proficiency.

Second, existing research rarely investigates the interaction between institutional support structures and individual characteristics in shaping ICT competence.

Third, the policy implications of these findings remain underexplored, leaving decisionmakers without actionable frameworks for workforce development.

The present study therefore aims to fill these gaps by producing a multidimensional assessment of ICT skills among librarians in Nigerian universities. It distinguishes between awareness, proficiency, and application, linking these dimensions to infrastructural context and professional development exposure. By combining descriptive and inferential analyses within the TAM-Human Capital framework, the study not only measures skill levels but interrogates the structural conditions under which those skills develop.

Ultimately, this inquiry contributes to the ongoing conversation about digital equity and institutional readiness in African higher education. It positions librarians not as passive users of technology but as active agents in shaping universities' digital futures.

2. Methodology

2.1 Research design

This study adopted a descriptive cross-sectional survey design to examine the ICT skill levels of librarians in Nigerian university libraries. The choice of design aligns with the study's intent to capture a snapshot of current competencies, infrastructural access, and related institutional factors across diverse geographical zones. A quantitative survey was selected because it enables empirical measurement and inferential testing of relationships between variables such as ICT proficiency, demographic characteristics, and institutional support. Similar designs have proven effective in studies investigating professional capacity and digital readiness in academic libraries (Corrall et al., 2020; Anyaoku et al., 2022).

2.2 Population and sampling

The study population was 2,300, comprising all professional librarians working in accredited Nigerian university libraries, spanning both federal and state institutions. According to the National Universities Commission (NUC) database as of 2025, there are 170 recognized universities, of which approximately 136 have functioning libraries staffed by professional librarians. Based on available institutional records

and membership lists from the Nigerian Library Association (NLA), the estimated population of professional librarians in these universities is about 2,300.

To ensure representativeness, the researcher employed a multi-stage sampling technique. In the first stage, universities were stratified by ownership (federal, state, and private). In the second stage, random sampling was used to select 15 universities across the six geopolitical zones of Nigeria. From each university, between 10 and 20 librarians were sampled proportionally to the staff size, resulting in a total sample of 275 respondents. This sample size satisfies the requirements for robust statistical analysis as recommended by Krejcie and Morgan (1970) and Hair et al. (2022).

2.3 Instrumentation

Data were collected using a structured questionnaire titled "Librarians' ICT Skills Assessment Scale (LICTSAS)", designed by the researcher based on literature synthesis and theoretical frameworks. The instrument was divided into five sections:

1. Demographic Information (age, gender, qualification, experience, institutional type).
2. ICT Infrastructure Access - availability and functionality of computers, internet connectivity, and library automation systems.
3. ICT Skill Proficiency - self-assessment across four dimensions: basic computer operations, digital content management, online service delivery, and analytical/ problem-solving tools (e.g., Excel, SPSS, Koha, DSpace).
4. Institutional Support and Training - frequency, nature, and perceived quality of ICT-related professional development programs.
5. Perceived Barriers - infrastructural, organizational, and attitudinal constraints affecting ICT application.

Items were measured using a five-point Likert scale, ranging from 1 (Not Skilled) to 5 (Highly Skilled). This scale captures gradations of proficiency while facilitating statistical interpretation.

2.4 Validity and reliability

To ensure content validity, the initial instrument draft was reviewed by three senior academics in Library and Information Science and two ICT specialists. Their feedback led to minor revisions in item clarity, sequence, and terminology. Construct validity was established through exploratory factor analysis (EFA) conducted on a pilot sample of 30 librarians, confirming that items loaded onto the intended domains with acceptable factor loadings (> 0.60).

Reliability was assessed using Cronbach's alpha, producing coefficients ranging from

- 0.82 to 0.91 across subscales-indicating high internal consistency. These psychometric properties meet the reliability threshold for behavioural and educational research (Hair et al., 2022).

2.5 Data collection procedure

Data were collected over a two-month period between February and March 2025 using both online and paper-based methods. Online questionnaires were distributed via professional email lists, WhatsApp groups, and NLA forums to maximize coverage across regions. Hard copies were hand-delivered to libraries in areas with poor internet connectivity. Respondents were assured of confidentiality and

anonymity, and participation was entirely voluntary. Completed responses were coded and entered into SPSS version 27 for analysis.

2.6 Data analysis

Descriptive statistics-means, standard deviations, frequencies, and percentages-were used to summarize respondents' demographic data and skill levels. To determine the relationships among the major constructs, inferential analyses were conducted:

- Pearson correlation examined the relationship between access to ICT infrastructure and overall ICT skill level.
- Multiple regression analysis tested the predictive influence of institutional support, training frequency, and infrastructure on librarians' ICT proficiency.
- Independent-sample t-tests and ANOVA compared mean ICT skill levels across demographic groups (e.g., by qualification and experience).

Significance was evaluated at $p < .05$. These analyses provide both descriptive and explanatory insights into how various contextual factors shape ICT competencies.

2.7 Theoretical and analytical framework

This research is guided by a hybrid framework integrating the Technology Acceptance Model (TAM) (Davis, 1989) and Human Capital Theory (Becker, 1993). The TAM components-perceived usefulness and ease of use-capture attitudinal predispositions toward ICT adoption, while Human Capital Theory explains how investments in training and education enhance productivity. This dual framework allows the study to assess ICT skills not merely as a psychological inclination but as an outcome of structural investment and organizational learning. The analytical model therefore positions ICT competence as a function of three interacting domains:

1. Personal attributes (attitude, motivation, prior experience),
2. Institutional enablers (training, infrastructure, management support), and
3. Contextual constraints (funding, policy, environment).

This approach enables a multidimensional assessment that transcends traditional self-evaluation models by embedding the findings within both behavioural and economic theories of professional capability.

4. Results

4.1 Response rate and demographic characteristics

Out of the 275 questionnaires distributed, 247 valid responses were returned, representing a response rate of 89.8%, which is adequate for quantitative generalization. Respondents were distributed across all six geopolitical zones of Nigeria and represented both federal and state universities.

Most respondents were between 31 -45 years old (56.7%), followed by those aged 46- 55 (25.5%). Female librarians constituted 53.4%, and males 46.6%, indicating balanced gender participation. In terms of educational qualification, 72.1 % held master's degrees in library and information science, while 18.6% had bachelor's degrees, and 9.3% possessed doctorates. Regarding professional experience, 47.4% had worked between 6 and 15 years, and 31.2% had more than 15 years of

experience. These distributions suggest a professionally mature sample with substantial exposure to library operations.

4.2 Availability and access to ICT infrastructure

Respondents were first asked to indicate the availability and adequacy of ICT facilities in their libraries. About 68% reported access to functioning desktop computers, while 57% indicated that internet connectivity was available but inconsistent. Only 41 % confirmed that their libraries used integrated library systems such as Koha or Evergreen.

A smaller proportion (28%) reported access to institutional repositories, and just 19% mentioned any exposure to AI-based or analytics-driven library systems.

On a five-point scale, the mean availability score was 2.94 (SD = 0.81), indicating moderate access. This pattern reflects infrastructural disparities among Nigerian universities and echoes earlier findings on technological underinvestment in the sector (Oketunji, 2021; Yusuf & Adeyemo, 2022).

4.3 ICT skill levels among librarians

Librarians' self-assessed ICT competencies were measured across four domains: basic computer operations, digital content management, online service delivery, and analytical/problem-solving applications.

Skill Domain	Mean (M)	Standard (SD)	Deviation	Interpretation
Basic computer operations	4.21	0.64		High
Digital content management	3.62	0.78		Moderate-High
Online service delivery	3.47	0.81		Moderate
Analytical/problem-solving applications	2.89	0.92		Low-Moderate
Overall ICT Skill Index	3.55	0.79		Moderate-High

Respondents demonstrated strong competence in routine ICT tasks such as document processing, database searching, and email communication. However, proficiency declined in advanced applications like metadata editing, digital repository administration, and use of analytics software (e.g., SPSS, R, or Tableau). The pattern suggests that while Nigerian librarians have adapted to everyday digital tools, they have yet to internalize higher-order digital literacies that underpin research data management and digital scholarship.

4.4 Institutional support and professional development

Approximately 61% of respondents had attended at least one ICT-related training workshop in the past two years, while only 22% reported regular (annual or biannual) training. Nearly half (48%) felt their institutions lacked a clear professional development policy on ICT, and 39% indicated that training opportunities were self-sponsored.

The mean institutional support score was 3.02 (SD = 0.84), suggesting moderate support but uneven distribution across universities. Respondents from federal universities reported significantly higher support ($M = 3.28$, $SD = 0.73$) than those from state universities ($M = 2.76$, $SD = 0.81$), $t(245) = 4.17$, $p < .001$. This disparity aligns with funding differentials between federal and state-owned institutions.

4.5 Relationship between institutional support, infrastructure, and ICT skills

Pearson's correlation analysis was conducted to determine the association between key constructs.

Variables	1	2	3
1. ICT Infrastructure	1	-	-
2. Institutional Support	5 8	-	1
3. ICT Skills	6 3	6 3	1

Note: $p < .01$

The results reveal strong positive correlations among the three constructs. ICT infrastructure shows the strongest relationship with ICT skills ($r = .63$, $p < .01$), suggesting that greater access to technological facilities is associated with higher skill proficiency. Institutional support also correlates strongly with skill levels ($r = .61$, $p < .01$), confirming that regular training and managerial encouragement significantly influence digital competence.

4.6 Predictors of ICT skill proficiency (Regression analysis)

To test the predictive influence of institutional and infrastructural factors on ICT skill levels, a multiple regression model was estimated with ICT skills as the dependent variable and three predictors: ICT infrastructure, institutional support, and frequency of training.

Predictor	P	t	P
ICT Infrastructure	4	7.	<
	1	22	.001
Institutional Support	3	5.	<
	3	81	.001
Training Frequency	1	3.	.003
	8	04	

Model Summary: $R^2 = .54$, Adjusted $R^2 = .53$, $F(3,243) = 96.45$, $p < .001$

The regression model explains 53% of the variance in ICT skills, indicating a substantial

combined effect of the predictors. ICT infrastructure emerged as the strongest predictor ($\beta = .41$), followed by institutional support ($p = .33$). Training frequency, though less powerful, remained statistically significant. This result affirms the Human Capital Theory premise that continuous investment in learning opportunities and resources translates into measurable competency gains.

4.7 Differences in ICT skills by demographic factors

An ANOVA test was performed to examine differences in ICT proficiency based on librarians' educational qualification. The results show a statistically significant difference, $F(2,244) = 5.87$, $p = .003$. Post-hoc comparisons (Tukey HSD) revealed that librarians with doctoral degrees scored significantly higher in ICT competence ($M =$

3.92) than those with bachelor's degrees ($M = 3.32$), suggesting that higher education correlates with broader digital exposure and confidence.

No significant difference was found in ICT skill level by gender ($t(245) = 1.12$, $p = .26$), indicating that digital skill disparities in this population are more structural than gender-based.

4.8 Summary of major findings

1. Librarians in Nigerian university libraries exhibit moderate-to-high general ICT skills but weaker competence in advanced and analytical applications.
2. Access to ICT infrastructure and institutional support are strong predictors of skill proficiency.
3. Federal university librarians demonstrate higher ICT competence than their counterparts in state institutions due to better resource availability.
4. Educational attainment positively influences ICT proficiency, while gender and age do not

show significant differences.

5. The regression model confirms that infrastructure, institutional support, and training frequency jointly account for over half of the variance in ICT skill levels.

5. Discussion

The findings from this study illuminate a paradox at the heart of Nigeria's academic library system: librarians demonstrate growing awareness and moderate competence in ICT use, yet they operate within institutional environments that do not fully support sustained digital proficiency. This duality-strong individual motivation amid structural constraint-underscores the tension between human capital potential and infrastructural limitation that defines much of the developing world's digital transformation experience.

5.1 Understanding the pattern of ICT competence

The descriptive evidence suggests that librarians are proficient in foundational digital operations but far less comfortable with advanced applications such as repository management, analytics software, or AI-based discovery systems. This tiered pattern mirrors the global shift described by Corral et al. (2020), where librarians worldwide exhibit varying levels of confidence across the digital-skills continuum. Nigerian librarians' relatively high performance in everyday ICT tasks is encouraging; it signals that digital literacy programs over the past decade-particularly those emphasizing e- resource access and online reference services-have achieved partial success (Ajayi, 2019).

However, the weak performance in higher-order digital functions points to the absence of structured, progressive learning pathways. Many training programs remain shortterm, theoretical, or narrowly focused on operational aspects rather than integrative digital scholarship (Ezeani & Igwesi, 2020). This finding reinforces Anyaoku et al.'s (2022) argument that professional development in Nigeria often stops at "functional literacy," neglecting the creative and analytical competencies needed in a data-driven library environment.

5.2 Interpreting the influence of institutional ecology

The study's inferential results underscore the decisive influence of institutional ecology- particularly infrastructure and managerial support-on ICT competence. The strong correlations and predictive effects found between infrastructural access, institutional backing, and skill levels substantiate the Human Capital Theory proposition that productivity-enhancing capabilities emerge from sustained investment in resources and learning environments (Becker, 1993). Libraries that invest in reliable connectivity, up-to- date hardware, and routine training opportunities produce more digitally skilled personnel. Conversely, under-resourced institutions risk perpetuating skill stagnation, even when staff exhibit positive attitudes toward technology.

This result also echoes the Technology Acceptance Model (TAM) (Davis, 1989). Librarians' perceived usefulness and ease of use of ICTs are shaped not only by personal experience but by organizational affordances. A librarian who faces erratic internet service or outdated software is unlikely to view technology as either useful or easy to use-dampening motivation for adoption. Thus, infrastructural failure becomes attitudinal inertia, eroding the behavioural intentions TAM seeks to explain. In this sense, technology adoption in Nigerian libraries is as much a structural phenomenon as a psychological one.

5.3 Federal-state disparity and systemic inequality

The significant gap between federal and state university librarians' ICT competence adds another layer to this narrative. Federal institutions, generally better funded, report more consistent training and modern infrastructure. State institutions, by contrast, grapple with chronic budgetary constraints, bureaucratic inertia, and inconsistent ICT policies (Oketunji, 2021). This asymmetry reproduces a broader pattern of digital stratification within the higher education system. It implies that national ICT policy reforms must move beyond generic capacity-building slogans toward differentiated interventions that address context-specific inequities. Without such targeted support, Nigeria risks creating a two-tiered knowledge ecosystem where only well-funded universities achieve true digital transformation.

5.4 Educational qualification and professional maturity

The positive relationship between educational attainment and ICT competence supports previous evidence that higher academic training correlates with deeper engagement in digital scholarship (Lau & O'Brien, 2021). Doctoral-level librarians often encounter ICT-based research methodologies and digital publishing tools, which expand their technical repertoire. However, this relationship also reveals the limitations of informal or fragmented learning opportunities: unless lower-qualified librarians have structured access to continuous professional development, disparities will persist within the profession itself. Bridging this gap requires not just workshops but curriculum reforms in library schools, integrating coding, data analytics, and digital preservation as core components of LIS education.

5.5 Situating findings within the African discourse

Within the African context, these results resonate with studies from Kenya, Ghana, and

South Africa, which similarly report moderate ICT awareness but inconsistent skill translation due to infrastructural and policy fragility (Onyancha, 2020; Singh & Mahmood, 2022). What distinguishes the present study, however, is its empirical confirmation of predictive relationships among infrastructure, institutional support, and competence—an analytical dimension largely missing from earlier descriptive works. This reinforces the need for more evidence-based policymaking in African librarianship. Policies must be informed not only by anecdotal observations but by measurable indicators of capacity and readiness.

The findings also extend the continental conversation from a focus on technology availability to technology effectiveness. Mere acquisition of computers and software, as Oketunji (2021) cautions, does not equate to technological modernization. True transformation depends on how librarians internalize, apply, and innovate with technology—a process requiring deliberate institutional cultivation.

6. Conclusion

The assessment of ICT skills among librarians in Nigerian university libraries reveals a landscape marked by both growing competence and persistent capability gaps. The findings confirm that librarians possess foundational ICT operational skills—particularly in basic computer use, internet navigation, and routine library automation tasks—yet proficiency in advanced digital competencies such as database management, electronic resource troubleshooting, digital preservation tools, and emerging technologies (AI-driven search systems, research data management platforms, and institutional repository administration) remains uneven. These gaps continue to shape the quality of digital library services, the efficiency of knowledge access, and the preparedness of academic libraries to support data-intensive and technology-mediated research environments.

From a scholarly standpoint, the study contributes to ongoing debates on digital capacity in African higher-education libraries by empirically illustrating how infrastructural constraints, limited professional development opportunities, and uneven institutional ICT policies interact to mediate librarians' technological competencies. The study strengthens theoretical discussions on ICT adoption within professional communities and provides updated evidence relevant to the post-pandemic era when universities increasingly rely on hybrid, cloud-based, and AI-supported information systems. Methodologically, the work enriches regional ICT-skills literature by combining descriptive indicators with experiential insights that reflect librarians' practical engagement with digital tools.

At a policy level, the study underscores the need for systematic, well-funded ICT capacity-building frameworks in Nigerian university libraries. Without deliberate investment in skills development, infrastructure renewal, and standards for digital

service delivery, university libraries risk widening the technological divide that separates them from global knowledge communities. Enhancing ICT competencies is not merely a professional aspiration but a national imperative for strengthening research productivity, improving institutional visibility, and ensuring equitable access to digital scholarship.

Recommendations

1. **Institutionalize Continuous ICT Training Programmes:** University library administrations should develop structured, periodic training modules focused on advanced ICT skills—digital archiving, electronic resource management, cybersecurity basics, AI search systems, and research data services. Training should be sustained rather than ad hoc and embedded in staff development policy.
2. **Strengthen ICT Infrastructure and Technical Support:** Institutions should invest in reliable hardware, high-speed broadband, licensed digital tools, and cloud-based platforms. Dedicated technical support units are necessary to ensure efficient troubleshooting and reduce downtime in digital service delivery.
3. **Promote Collaborative Learning and Peer-Mentoring Models:** Librarians should be encouraged to participate in communities of practice, professional networks, and inter-institutional workshops, enabling knowledge sharing and collective capacity growth across Nigerian university libraries.
4. **Integrate ICT Competency Standards into Professional Appraisal:** University authorities and library management should incorporate ICT proficiency benchmarks into promotion criteria, job descriptions, and performance evaluations. Doing so will incentivize continuous learning and align professional expectations with modern library service realities.
5. **Expand Policy Frameworks for Digital Transformation:** National bodies such as the National Universities Commission (NUC) and the Librarians' Registration Council of Nigeria (LRCN) should provide harmonized guidelines on digital library standards, ICT competency expectations, and accreditation requirements for university libraries.
6. **Foster Partnerships with Technology Providers and Donor Agencies:** Strategic collaborations with ICT vendors, software developers, and international development partners can support

training, infrastructure upgrades, and pilot deployments of emerging digital technologies.

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