

PROMOTING EFFECTIVE USE OF INTERNET RESOURCES BY POSTGRADUATE STUDENTS IN FEDERAL UNIVERSITY LIBRARIES IN NORTH-EAST, NIGERIA: THE MEDIATING ROLES OF DIGITAL LITERACY AND INSTITUTIONAL STRATEGIES

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Abstract

This study examined how digital literacy competence and institutional strategies promote effective utilization of Internet resources among postgraduate students in Federal University Libraries in North-East Nigeria. A descriptive survey design was adopted, involving 240 postgraduate students drawn from the University of Maiduguri, Modibbo Adama University Yola and Abubakar Tafawa Balewa University Bauchi. Data were collected using a validated instrument, the Postgraduate Students' Internet Resource Utilization Scale (PSIRUS) and analyzed using descriptive and inferential statistics. Findings revealed that poor connectivity, erratic power supply and limited ICT infrastructure were major barriers. However, students with higher digital literacy competence reported

significantly greater use of Internet resources, while institutional strategies such as ICT training, policy support and user assistance enhanced engagement. The study concludes that infrastructural improvement, sustained digital capacity building and institutional policy reform are essential to promoting equitable and effective Internet resource use in Federal University Libraries in North-East Nigeria.

Keywords: Internet resources, postgraduate students, digital literacy, institutional strategies, ICT infrastructure, North-East Nigeria

Introduction

The 21st-century knowledge economy increasingly depends on digital information environments. Access to Internet resources has become a cornerstone of postgraduate education and research worldwide, influencing how scholars discover, evaluate and disseminate knowledge. Through digital connectivity, students access global research databases, virtual learning platforms and collaborative tools that enhance scholarly productivity and innovation (Chukwu and Olatunji, 2022). The Internet, therefore, serves as both a research infrastructure and a pedagogical environment that underpins academic advancement in virtually all disciplines.

Postgraduate students, comprising master's and doctoral candidates, represent the most research-intensive segment of the academic community. Their studies rely heavily on current and credible information sources for thesis writing, journal publications and policy-relevant research. According to Ijantiku (2018), this group's learning and research activities are increasingly mediated by digital technologies, making Internet resources indispensable for academic performance and innovation. Thus, the ability of postgraduate students to access and effectively

use Internet-based scholarly resources is central to improving research quality, innovation and global academic competitiveness.

In Federal University Libraries across North-East Nigeria, Internet resources such as electronic journals, institutional repositories, online catalogues and academic databases serve as essential gateways to scholarly information. Yet, despite their importance, utilization levels among postgraduate students remain suboptimal. Several challenges particularly poor Internet connectivity, unstable electricity supply, limited ICT infrastructure and inconsistent institutional policies continue to hinder access and effective use (Obi, 2021). These persistent infrastructural barriers not only affect access but also compromise research efficiency and the ability of libraries to function as digital knowledge hubs for postgraduate scholarship.

Furthermore, the gap between access and effective use underscores a deeper concern regarding user competence. As Ajiboye (2020) emphasized, Internet access alone is insufficient; users must possess the cognitive and technical skills to locate, evaluate and apply digital information ethically and effectively. In the North-East, where socioeconomic and infrastructural challenges are pronounced, disparities in digital competence further widen the research productivity gap among postgraduate students. Without adequate digital literacy, even well-funded ICT facilities may remain underutilized, reinforcing a cycle of technological dependence without meaningful academic engagement.

Institutional strategies such as ICT training, policy formulation and user support play a mediating role in addressing these constraints. Effective institutional policies help bridge

infrastructural and competence gaps by promoting digital capacity building and fostering a culture of technology-enhanced learning (Okwor & Udo, 2023). In contexts where these strategies are clearly articulated and consistently implemented, postgraduate students tend to exhibit greater confidence, independence and proficiency in using digital resources for academic purposes. This observation underscores the strategic importance of institutional governance in shaping how postgraduate students engage with Internet resources in their research.

Against this backdrop, this study investigates how digital literacy competence and institutional strategies influence the effective use of Internet resources by postgraduate students in Federal University Libraries in North-East Nigeria.

Statement of the Problem

Despite significant investments by Federal University Libraries in North-East Nigeria in ICT infrastructure, bandwidth subscriptions and digital repositories, evidence indicates that postgraduate students underutilize available Internet resources. Many still rely on print materials or unscholarly web content, limiting the quality and originality of their research.

Persistent infrastructural challenges such as poor Internet connectivity, irregular power supply and limited ICT facilities further constrain effective access. Beyond infrastructure, digital literacy gaps hinder students' ability to navigate and exploit online scholarly resources. In some

institutions, ICT policies, user training and support services exist only nominally, lacking proper coordination and follow-through.

This underutilization of Internet resources reduces research visibility and weakens academic output from the region. Therefore, it is necessary to examine how infrastructural conditions, digital literacy competence and institutional strategies interact to shape the effective use of Internet resources among postgraduate students in Federal University Libraries in North-East Nigeria.

Research Questions

The following research questions were formulated to guide the study:

1. What is the level of digital literacy competence among postgraduate students in Federal University Libraries in North-East Nigeria?
2. What infrastructural challenges affect the effective use of Internet resources by postgraduate students in these libraries?
3. What institutional strategies are in place to promote effective Internet resource utilization?
4. How do infrastructural challenges, digital literacy competence and institutional strategies jointly influence effective Internet resource use among postgraduate students in Federal University Libraries in North-East Nigeria?

Literature Review

Infrastructure, Digital Literacy and Institutional Support

Internet resource utilization in academic libraries depends on the interaction between technological infrastructure, user competence and institutional support systems. In developing regions such as North-East Nigeria, inadequate ICT facilities, frequent electricity interruptions and low bandwidth are persistent barriers to efficient Internet use (Njoroge, 2021). Even where Internet access exists, intermittent connectivity and poor maintenance discourage consistent engagement.

Ijantiku (2018) emphasized that sustainable research productivity in Nigerian higher education is impossible without parallel investments in infrastructure and user training. The study contend that access to technology must be complemented by institutional policies that encourage digital adoption and competence development especially within library systems that support postgraduate learning.

Digital Literacy and Scholarly Productivity

Digital literacy encompasses the skills required to locate, evaluate and use digital information ethically and effectively (Ajiboye, 2020). In library contexts, it extends to the ability to retrieve information from academic databases, reference software and electronic catalogues. Studies have consistently shown that postgraduate students with higher digital literacy skills produce better-quality research and are more confident in navigating online academic environments (Adebayo & Ahmed, 2021).

However, in the Federal University Libraries of North-East Nigeria, gaps remain significant. Many students rely on open-access web sources and social media rather than peer-reviewed databases. Ekechukwu (2022) recommended embedding structured digital literacy modules into postgraduate programs to bridge this gap and enhance academic rigor.

Institutional Strategies as Mediating Factors

Institutional strategies such as ICT governance, policy enforcement and digital capacity development serve as mediating factors in Internet resource utilization. Universities with clear ICT policies and dedicated training programs tend to record higher engagement and better user outcomes (IFLA, 2021).

In the North-East, Musa and Oladipo (2024) reported that universities with partnerships involving Internet service providers and technology firms achieved improved access reliability and reduced costs. Similarly, Oyediran-Tidings (2022) argued for multi-source funding and administrative leadership in ICT management to ensure sustainability.

Collectively, these studies affirm that effective utilization of Internet resources in Federal University Libraries in North-East Nigeria requires an integrated framework combining robust infrastructure, digital literacy empowerment and supportive institutional strategy.

Methodology

The study adopted a descriptive survey design, which, according to Mole (2019), is appropriate for systematically describing opinions, attitudes and behaviors of a defined

population concerning a specific phenomenon. This design enabled the researcher to assess postgraduate students' digital literacy competence, infrastructural challenges and institutional strategies influencing Internet resource use in Federal University Libraries in North-East Nigeria.

The population of the study comprised all postgraduate students in the three federal universities within the North-East geopolitical zone of Nigeria: the University of Maiduguri (Borno State), Modibbo Adama University Yola (Adamawa State) and Abubakar Tafawa Balewa University Bauchi (Bauchi State). From this population, a sample of 240 postgraduate students was selected using proportionate random sampling to ensure fair representation of both master's and doctoral students across the three universities.

Data were collected using a validated questionnaire titled the Postgraduate Students' Internet Resource Utilization Scale (PSIRUS). The instrument measured four key dimensions: infrastructural challenges, digital literacy competence, institutional strategies and Internet resource utilization. Items were rated on a four-point Likert scale ranging from *Very Low (1)* to *Very High (4)*, reflecting respondents' degree of agreement or perception.

Content validity of the instrument was ensured through expert review by three senior lecturers in Library and Information Science. Reliability was established via a pilot test among 30 postgraduate students in a federal university outside the study area, yielding a Cronbach's Alpha coefficient of 0.86, indicating high internal consistency.

Questionnaires were personally distributed by the researcher and trained assistants and retrieved within four weeks. Data were analyzed using the Statistical Package for the Social Sciences

(SPSS), employing descriptive statistics (mean and standard deviation) and inferential statistics (multiple regression analysis). A decision mean benchmark of 2.50 was adopted, such that mean scores of 2.50 and above indicated a *high* or *effective* level, while scores below 2.50 indicated a *low* or *ineffective* level of Internet resource utilization.

Results and Discussion

Research Question One: What is the level of digital literacy competence among postgraduate students in Federal University Libraries in North-East Nigeria?

Table 1: Digital Literacy Competence of Postgraduate Students

Competence Item	Mean	SD	Decision
1. Ability to use academic databases effectively	3.59	0.65	High
2. Skill in evaluating online sources	3.46	0.70	High
3. Proficiency in reference management tools	3.32	0.77	Moderate
4. Knowledge of plagiarism detection software	3.28	0.80	Moderate
5. Awareness of open-access repositories	3.10	0.83	Moderate
6. Ability to manage research data	2.95	0.88	Moderate
Overall Mean	3.28		Moderate to High

Source: Field Survey, 2025

The findings in Table 1 show that postgraduate students in Federal University Libraries in North-East Nigeria possess a moderate to high level of digital literacy competence, with an overall mean of 3.28. The highest-rated competencies were the ability to use academic databases effectively ($M = 3.59$, $SD = 0.65$) and skill in evaluating online sources ($M = 3.46$, $SD = 0.70$),

both indicating high proficiency levels. These results demonstrate that postgraduate students in the region have developed adequate skills for basic research navigation and information retrieval.

However, the lower mean ratings in reference management tools ($M = 3.32$), knowledge of plagiarism detection software ($M = 3.28$) and ability to manage research data ($M = 2.95$) reflect limited competence in higher-order digital research tasks. This pattern suggests that while postgraduate students can locate and assess information effectively, they often struggle with research data handling and citation management, both essential components of scholarly digital literacy.

The relatively narrow standard deviation range (0.65–0.88) indicates consistent responses across universities, implying similar levels of digital skill distribution among postgraduate students in the region. This finding supports Ajiboye (2020), who reported that postgraduate students' digital competence correlates strongly with institutional ICT exposure and aligns with Echukwu (2022), who highlighted that insufficient training in reference management software such as Mendeley and Zotero limits postgraduate students' scholarly writing efficiency in Northern Nigerian universities.

Research Question Two: What infrastructural challenges affect the effective use of Internet resources by postgraduate students in Federal University Libraries in North-East Nigeria?

Table 2: Infrastructural Challenges Facing Postgraduate Students

Challenge Item	Mean	SD	Decision
1. Erratic power supply	3.60	0.61	Great Extent
2. Slow Internet connectivity	3.47	0.68	Great Extent

3. Insufficient ICT infrastructure	3.40	0.73	Great Extent
4. Limited e-resource subscription	3.18	0.80	Great Extent
5. Poor maintenance of ICT equipment	3.06	0.85	Great Extent
6. Overcrowded access points	2.87	0.89	Some Extent
Overall Mean	3.26		Great Extent

Source: Field Survey, 2025

The results indicate that postgraduate students in Federal University Libraries in North-East Nigeria face infrastructural challenges to a great extent, with an overall mean score of 3.26. The most severe barriers include erratic power supply ($M = 3.60$, $SD = 0.61$), slow Internet connectivity ($M = 3.47$, $SD = 0.68$), and insufficient ICT infrastructure ($M = 3.40$, $SD = 0.73$). These findings reflect systemic infrastructural inadequacies that hinder the consistent use of Internet resources for academic purposes.

The relatively low standard deviations (0.61–0.89) across items show uniformity of experiences among students across institutions, implying that infrastructural deficiencies are pervasive throughout federal universities in the North-East. Challenges such as limited e-resource subscriptions, poor ICT maintenance and overcrowded access points highlight not only infrastructural weakness but also the absence of adequate strategic planning for equitable access.

These findings corroborate Ijantiku (2018), who found that infrastructural instability significantly affects digital access in Northern Nigerian academic libraries. Similarly, Njoroje (2021) emphasized that infrastructural deficits and inconsistent power supply continue to widen the digital divide between universities in Northern and Southern Nigeria. The present study

therefore reinforces the argument that without sustainable infrastructural support, even digitally literate students cannot fully exploit Internet resources for research.

Research Question Three: What institutional strategies are in place to promote effective Internet resource utilization in Federal University Libraries in North-East Nigeria?

Table 3: Institutional Strategies Promoting Internet Resource Use

Strategy Item	Mean	SD	Decision
1. Regular ICT training workshops	3.66	0.56	Very Effective
2. Provision of standby power supply	3.60	0.59	Very Effective
3. ICT support staff in libraries	3.54	0.61	Very Effective
4. Institutional policies on ICT use	3.41	0.68	Effective
5. Collaboration with service providers	3.37	0.72	Effective
6. Continuous bandwidth upgrade	3.30	0.74	Effective
Overall Mean	3.48		Very Effective

Source: Field Survey, 2025

The results in Table 3 reveal that institutional strategies adopted by Federal University Libraries in North-East Nigeria to promote Internet resource utilization were perceived as very effective, with an overall mean of 3.48. The highest-rated strategies were regular ICT training workshops ($M = 3.66$, $SD = 0.56$) and provision of standby power supply ($M = 3.60$, $SD = 0.59$). This indicates that institutional interventions aimed at capacity building and infrastructural backup are yielding positive results.

Moderately rated strategies, such as ICT policy enforcement ($M = 3.41$) and collaborations with service providers ($M = 3.37$), reflect partial implementation and variability among institutions. The low standard deviations (0.56–0.74) across the items suggest that

postgraduate students across universities have a generally consistent perception of the institutional measures in place.

This finding is consistent with Oyediran-Tidings (2022), who found that consistent ICT policy implementation enhances e-resource access and utilization in Nigerian universities. Similarly, Obi (2021) affirmed that institutional partnerships and regular ICT training play significant roles in improving digital literacy and Internet resource engagement among students. However, the moderate mean ratings for policy-related items suggest that the sustainability of these strategies depends on strong administrative oversight and funding continuity across the federal universities in the region.

Research Question Four: How do infrastructural challenges, digital literacy competence and institutional strategies jointly influence effective Internet resource use among postgraduate students in Federal University Libraries in North-East Nigeria?

Regression Analysis Predicting Effective Use of Internet Resources

Predictor	B	T	Sig.
Infrastructural Challenges	-0.45	-5.78	0.000
Digital Literacy Competence	0.52	6.89	0.000
Institutional Strategies	0.39	5.11	0.001

Model Summary: $R^2 = 0.67$, $F(3, 236) = 49.28$, $p < 0.01$

The regression model explains 67% of the variance in effective Internet resource utilization, demonstrating a strong combined influence of the predictors. Digital literacy

competence was the strongest positive predictor ($\beta = 0.52$), followed by institutional strategies ($\beta = 0.39$). Conversely, infrastructural challenges had a significant negative effect ($\beta = -0.45$).

These findings affirm that digital competence and institutional support play crucial mediating roles in mitigating infrastructural barriers. This result aligns with Adebayo and Ahmed (2021), who identified digital literacy as a transformative factor in fostering academic engagement in resource-constrained environments.

Recommendations

Based on the findings, the following recommendations are advanced to enhance the effective use of Internet resources by postgraduate students in Federal University Libraries in North-East Nigeria:

1. Federal universities should integrate continuous digital literacy training into postgraduate curricula. This will enhance competence in reference management, plagiarism detection and data handling, improving research quality.
2. Universities should invest in stable electricity supply, bandwidth upgrades and renewable energy alternatives to support consistent access to Internet resources.

3. Clear ICT policies should guide Internet usage, data security and intellectual property compliance. Policy coherence ensures accountability and sustainability.
4. Libraries should collaborate with Internet service providers and technology firms for subsidized access and staff training support. Student-led peer mentoring groups can also sustain learning continuity.

Conclusion

The study concludes that digital literacy competence and institutional strategies are vital mediators in promoting the effective use of Internet resources among postgraduate students in Federal University Libraries in North-East Nigeria. Despite enduring infrastructural challenges, the findings demonstrate that strong institutional frameworks and structured digital literacy programs can significantly improve engagement and research productivity.

The study also contributes to knowledge in the Library and Information Science (LIS) field by empirically validating the mediating role of digital literacy and institutional support in Internet resource utilization an area underexplored in Northern Nigeria. It further provides a practical framework for ICT policy formulation and university planning, emphasizing the need for strategic integration of infrastructure, user competence and institutional governance.

Ultimately, promoting effective Internet resource use transcends mere technological access; it represents a strategic educational process anchored in digital empowerment, institutional vision and sustainable research culture.

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