

Digital literacy skills and competencies for effective research activities by library and information science postgraduate students in public universities in South-East, Nigeria

Humphrey O. Nwaogu, *PhD*¹ and M. N. Ngwuchukwu², *Prof.*
Crawford University, Faith City, Igbesa, Ogun State, Nigeria¹
Department of Library Science, University of Nigeria, Nsukka²
E-mail: Nwaoguhumphrey@crawforduniversity.edu.ng

Abstract

This study investigated the digital literacy skills and research competencies required for effective research activities among library and information science (LIS) postgraduate students in public universities in South-East, Nigeria. Adopting a descriptive survey research design, the study covered 319 postgraduate LIS students across federal and state universities in Abia, Anambra, Ebonyi, Enugu, and Imo states. Data were collected using a validated questionnaire and analysed using frequencies, percentages, mean, and standard deviation. Findings revealed that while basic digital facilities such as internet access, email applications, and productivity tools were available and used to a high extent, advanced research tools like reference managers, data analysis software, digital collaboration platforms, and content creation tools were poorly utilised. Major challenges identified include lack of funding, inadequate ICT training, inconsistent internet connectivity, low motivation, and limited institutional support. Furthermore, students showed moderate proficiency in information retrieval and basic digital operations but lacked competence in managing academic databases, using research support technologies, and adapting to emerging digital environments. The study concludes that while LIS postgraduate students in public universities in South-East, Nigeria have access to basic digital tools and possess foundational digital skills, their proficiency in advanced research competencies remains low. The study recommended integrated digital literacy programmes within LIS curricula; funding and support, awareness and motivation, 24/7 digital access and policy implementation; ultimately, fostering digital competencies among LIS students is crucial for enhancing research quality and ensuring readiness for a digital academic landscape.

Keywords: Digital literacy skill, competencies, LIS postgraduate students, ICT in education, academic libraries, university infrastructure, South-East, Nigeria

Introduction

Digital literacy skills and research competencies have become indispensable for effective research and academic success, particularly for postgraduate (PG) students in higher education institutions such as universities. The growing integration of digital technologies into all sectors: economy, governance, education, and social life, has amplified the need for these skills in the 21st century. Digital literacy emerged in the 1990s, alongside the rapid development of the internet, evolving from basic computer literacy to encompass a broader set of competencies including digital communication, information management, and innovation.

The concept of digital literacy, first introduced by Glister 1997, extends beyond the mere technical ability to operate computers. It involves the capacity to understand and effectively use information from a variety of digital sources. Initially focused on stand-alone computing skills, digital literacy now includes the competent use of mobile technologies, internet platforms, and social media. Over time, its scope has expanded to embrace multiple literacies such as media literacy, information literacy, reproductive literacy, visual literacy, and social-emotional literacy. Digitally literate individuals can communicate, collaborate, and interact more efficiently in academic, professional, and

social settings. Researchers such as Ogochukwu (2015) and Pewhairangi (2016) affirm that digital literacy contributes to improved economic opportunities, enhanced job performance, and overall quality of life by equipping individuals with essential technical, cognitive, and social competencies. PG students are expected to possess a broad spectrum of digital skills; including critical thinking, digital communication, media literacy, digital citizenship, and lifelong learning, to engage effectively in research, collaboration, and scholarly dissemination.

Digital literacy also includes the ability to locate, evaluate, organise, and create information using digital tools. Bell and Shank (2008) emphasise that it goes beyond operating digital devices, encompassing the capacity to assess, summarise, and communicate information in digital environments. Other studies have shown that digital literacy enables rapid access to extensive information resources and supports global collaboration and knowledge sharing (Oyedapo & Ojo, 2013; Mulat & Natarajan, 2020).

The integration of information and communication technologies (ICT) into education necessitates a paradigm shift from analogue to digital platforms. This is especially crucial at the postgraduate level, where research is a core component. Postgraduate students must not only adapt to evolving digital technologies but also cultivate confidence and competence in using a range of digital tools for research and academic engagement (Emery, 2020; Maya & Suseno, 2022). Such adaptability is key to academic success and participation in technology-driven societal transformation.

Closely related to digital literacy is the concept of digital competence, which refers to the combination of knowledge, skills, attitudes, and experiences needed to

use technology effectively in academic, professional, and social contexts (Jisc, 2020). Ferrari (2013) and Khan & Bhatti (2017) define digital competence as the confident, critical, and creative use of ICT for problem-solving, collaboration, and innovation. These competencies are vital not only for PG students but also for educators integrating digital tools into pedagogical practices.

Postgraduate students in Library and Information Science (LIS) require advanced digital competencies to search, evaluate, organise, and communicate digital information essential for research. These skills support academic inquiry and enhance collaboration with supervisors and peers. UNESCO (2018) further underscores the importance of digital literacy for employment, entrepreneurship, and lifelong learning, calling attention to the safe and ethical use of digital technologies.

Thus, digital literacy and digital competence are essential for postgraduate students to succeed in their academic and research endeavours. These skills enable efficient navigation of complex digital environments, fostering improved research outcomes and meaningful societal contributions. Postgraduate programmes, whether diploma, master's, or doctoral demand a high level of digital literacy to meet the research-intensive requirements of their curricula. Students who possess strong digital literacy skills exhibit improved research capabilities, confidence, and positive attitudes toward scholarly engagement. These qualities drive academic development, continuous learning, innovation, and problem-solving (Iyang & Mngutayo, 2018). For doctoral students, especially, digital skills are indispensable for conducting empirical research in increasingly digitised academic settings, producing innovative and high-impact research outputs (Jisc, 2020).

Most postgraduate programmes combine coursework with research or focus entirely on independent research. Regardless of the format, students must acquire essential research competencies, including the ability to locate, evaluate, and utilise digital information effectively (Oloniruha et al., 2023). These competencies are rooted in digital literacy and are critical for conducting scholarly work at an advanced level.

In the field of LIS, postgraduate students face evolving professional roles influenced by rapid technological advancements. To remain relevant, they must possess up-to-date digital competencies and be able to meet the demands of contemporary academic and professional environments (Nkanu, Iyishu & Ogar, 2013). The absence of adequate digital and information literacy skills can impede academic achievement and limit future career prospects (Adeoye & Adeoye, 2017).

Research is a cornerstone of university education and a fundamental driver of national development (Ajiboye et al., 2023). Research competence comprises a wide array of skills, including the ability to identify research problems, review existing literature, formulate hypotheses, conduct data analysis, and communicate findings. These skills are underpinned by cognitive, communicative, motivational, and ethical components (Yarullin, Bushmeleva & Tsyrukun, 2015; Adkison & Glaros, 2012). Effective research competence contributes to academic excellence, professional advancement, and innovation, ultimately driving societal progress (Ibidapo-Obe, 2010). Universities are therefore tasked with developing postgraduate students' research capacities, critical thinking, and leadership skills, preparing them for both scholarly excellence and societal impact (Khalili, 2020).

The digital revolution has dramatically transformed the research landscape, expanding access to digital resources and internet connectivity globally, including in developing countries such as Nigeria (Bell, 2021). Postgraduate students in Nigerian universities need digital literacy to effectively retrieve current and relevant research materials online for their academic success.

Statement of the problem

In the contemporary digital era, digital literacy and research competencies are essential for postgraduate students, especially those in Library and Information Science (LIS), who must efficiently manage, retrieve, and disseminate information. Despite increased access to digital tools and resources, concerns remain regarding the adequacy of digital literacy and research competencies among postgraduate LIS students in universities in South-East, Nigeria. Limited access to modern technologies, inadequate training, and infrastructural deficiencies may impede the acquisition and application of these vital skills. Consequently, this may compromise research quality, hinder effective engagement with digital information resources, and negatively affect academic performance. It is therefore necessary to assess the current levels of digital literacy and research competence among these students, identify existing skill gaps, and examine the underlying factors influencing their development.

Research questions

The following questions are answered in the study:

1. What digital facilities are available to postgraduate LIS students for conducting effective research in universities in South-East, Nigeria?

2. What digital literacy skills and research competencies do postgraduate LIS students possess for effective research activities in these universities?
3. To what extent are the available digital facilities accessed and utilised by postgraduate LIS students for research activities in universities in South-East, Nigeria?
4. What challenges do postgraduate LIS students encounter in acquiring and applying digital literacy skills and research competencies for effective research?
5. What institutional or pedagogical strategies can be implemented to improve the acquisition and application of digital literacy skills and research competencies among postgraduate LIS students in universities in South-East, Nigeria?

Literature review

Digital literacy has progressed beyond basic computer skills to encompass a broader range of competencies, including the ability to access, evaluate, create, and communicate information using digital tools (Ng, 2012). For postgraduate students, particularly those in Library and Information Science (LIS), digital literacy is no longer optional; it is a critical requirement for academic success. Eshet-Alkalai (2004) conceptualises digital literacy as comprising several dimensions: photo-visual literacy, reproduction literacy, branching literacy, information literacy, and socio-emotional literacy. These are all essential for effective research in the modern digital environment.

In the Nigerian context, Ajiboye and Ekere (2021) observed that while postgraduate students may have access to basic digital tools, many struggle with more advanced digital literacy skills. Their study

attributed this to limited training opportunities and unequal access to digital facilities across institutions. Similarly, Adamu et al. (2024), in a survey of 377 postgraduate students in Kaduna State, found that although students could identify research needs, use multiple search engines, and select appropriate resources, disparities existed among institutions. The authors strongly recommended that university libraries implement regular digital literacy training.

Osinulu (2021) evaluated the digital competencies of library officers (paraprofessionals) in Ogun State and reported high proficiency levels, suggesting that institutional capacity for training is available and could be extended to postgraduate students. Dime et al. (n.d.) also noted that university librarians in South-South Nigeria exhibited strong technological skills in managing electronic resources, further supporting the feasibility of librarian-led digital training initiatives.

On a broader scale, a continental review by Shikali and Muneja (2024) examined the digital adaptations of academic libraries across Africa during the COVID-19 pandemic. The study found that while tools such as virtual reference services, off-campus access, email, and conferencing platforms were adopted, ongoing challenges: including limited digital literacy, inadequate ICT infrastructure, and unreliable internet connectivity—continued to hinder effective postgraduate research.

Research competencies encompass the ability to design, execute, analyse, and communicate research effectively. These competencies are foundational to postgraduate academic development. Chukwuemeka and Ezeani (2016) found that LIS postgraduate students in Nigerian universities often lack essential skills such as conducting literature reviews, performing statistical analysis, and managing citations.

These deficiencies were linked to weak curricula, lack of mentorship, and poor integration of ICT in LIS education.

Anunobi and Udem (2011/2012) assessed LIS postgraduate students at Nnamdi Azikiwe University, Awka, and the University of Nigeria, Nsukka. While students exhibited high knowledge levels in locating (87%), evaluating (82%), and using (88%) information, their practical research skills were only moderate (mean = 3.34). The study also revealed significant differences between the institutions and advocated for curriculum enhancements such as practical internships focused on skill acquisition.

Jatto, Fasola, and Abioye (2024), in a study involving 100 LIS postgraduate students, reported that although participants demonstrated competencies in information literacy such as identifying information needs, locating, evaluating, and using Management Information Systems (MIS), their research productivity remained low (Weighted Mean = 2.11). A statistically significant correlation between information literacy skills and research productivity was found ($r = 0.445$, $p < 0.05$), prompting recommendations for integrating ICT literacy and information literacy training within LIS curricula to boost research output.

Ugwulebo and Ugwuanyi (2020) highlighted several challenges confronting LIS postgraduate students, including poor digital skills, limited access to online databases, high internet costs, and inadequate institutional support. Their study, conducted among LIS postgraduate students in South-East Nigeria, also found that many students relied on smartphones for research due to the lack of access to laptops or desktop computers. This dependence significantly limited their engagement with scholarly databases and robust research tools.

The availability and accessibility of digital tools are crucial determinants of both digital literacy and research competencies. Olanrewaju and Okorie (2020) noted that ICT infrastructure in many South-East Nigerian universities remains underdeveloped. Despite some efforts to provide Wi-Fi, e-resources, and computer laboratories, postgraduate students often depend on personal devices and mobile data due to erratic power supply and poorly maintained facilities.

Ngulube (2017) stressed the urgent need for LIS curricula across African universities to integrate digital literacy as a core competency. In a comparative study, he found that students who undertook dedicated coursework in digital research tools demonstrated significantly higher levels of research output and academic engagement. Ajiboye et al. (2022) evaluated information literacy and research skills training programme at the Federal University of Agriculture, Abeokuta. The two-day workshop covered a wide range of topics, including Microsoft Word, literature review techniques, the use of Mendeley, e-resources, citation management, plagiarism awareness, and sourcing scholarly information. The programme received positive feedback, with participants calling for annual iterations. It led to the development of tailored IL curricula for each college and fostered interdisciplinary collaboration. The authors recommended that similar initiatives be implemented on a national scale.

Methods

The study employed a descriptive survey research design, which is suitable for collecting factual and detailed data without manipulating variables. This method allows the researcher to gather generalisable insights from a representative sample, reflecting the characteristics of the larger population. The

research was conducted within the South-East geopolitical zone of Nigeria, comprising Abia, Anambra, Ebonyi, Enugu, and Imo States. This region was selected due to its concentration of universities offering Library and Information Science programmes and its socio-economic and academic significance.

The study population consisted of 319 postgraduate LIS students (MLIS/MLS and PhD) from both federal and state universities within the region. A total enumeration sampling technique was adopted, involving the inclusion of the entire population in the study. This method was feasible due to the manageable size of the population.

Data were collected using a self-constructed questionnaire, designed to elicit information on students' digital literacy skills and research competencies. To ensure the instrument's validity, it was reviewed by experts in the field for clarity, content accuracy, and relevance. A pilot test was subsequently conducted with a similar group of students from a different university,

yielding a reliability coefficient of 0.80, indicating acceptable internal consistency. Data collection was conducted by the researchers and trained assistants, which facilitated clarity, sincerity, and proper understanding among the respondents. For data analysis, frequencies, percentages, mean, and standard deviation were utilised. In addition, the study employed Statistical Package for the Social Sciences (SPSS) version 22 to ensuring a robust and systematic interpretation of the findings.

Results

This section deals presentation and discussion of the results obtained from the study.

Research question one: What digital facilities are available to postgraduate LIS students for conducting effective research in universities in South-East, Nigeria? The data in Table 2 provide answer to this question.

Table 1: Names of the public universities in the South East Nigeria with NUC LIS accredited programmes and number of respondents

S/N	Universities	Postgraduate	
		PhD	MLIS
1	Abia State University, Uturu	30	48
2	Imo State University, Owerri	35	40
3	Madonna University, Okija	-	-
4	Nnamdi Azikiwe University, Awka	5	5
5	University Of Nigeria, Nsukka	45	55
6	Michael Opkala University, Umudike	5	11
7	Alex Ekwueme Fedral University, Ndufu-Alike	-	7
8	Enugu State University, Enugu	10	23
9	Ebonyi State University, Abakiliki	-	-
	Sub-Total	130	189
	Total	319	

Source: Offices of the Heads of Department of library and information science of the universities

Table 2: Available facilities for postgraduate LIS students to conduct effective research in public universities in South-East, Nigeria

S/N	Digital devices	Availability		Remark
		Frequency (f)	Percentage (%)	
1	Website	7	100%	Available
2	Internet service	7	100%	Available
3	E-mail application	7	100%	Available
4	Apple's face time	0	0%	Not Available
5	Computer	7	100%	Available
6	Web forms	7	100%	Available
7	Wikis application	7	100%	Available
8	Blog	7	100%	Available
9	Ask-a-Librarian application	2	28.6%	Not Available
10	Co-browsing application	0	0%	Not Available
11	Tango software	0	0%	Not Available
12	Google application	7	100%	Available
13	Live chat application	2	28.6%	Not Available
14	Apple's face time software	3	42.9%	Not Available
15	Instant Messaging software	7	100%	Available
16	Libchat application	1	14.3%	Not Available
17	Skype application software	7	100%	Available

Table 2 presents a detailed overview of the availability of various digital devices and applications in universities located in South-East Nigeria. The analysis reveals a strong presence of basic digital infrastructure across these institutions. Notably, 100% of the universities surveyed have access to essential digital tools such as websites, internet services, email applications, computers, web forms, wikis, blogs, Google applications, instant messaging software, and Skype. This widespread availability suggests that foundational digital communication and collaboration tools are well-established in these academic environments.

However, the table also highlights significant gaps in the adoption of more specialized or advanced digital tools. For instance, none of the universities have access to Apple's face time, co-browsing applications, or Tango software, indicating a lack of support for certain video conferencing and real-time collaboration technologies. Furthermore, other tools such as the Ask-a-Librarian application (28.6%), live chat

applications (28.6%), Apple's face time software (42.9%), and Libchat (14.3%) show limited availability, suggesting inconsistent support for real-time or interactive digital reference services across the institutions.

The disparity between the high availability of general digital tools and the low adoption of advanced, often user-centered communication tools may reflect challenges such as funding limitations, lack of technical expertise, or insufficient demand for certain services. Overall, while the core digital infrastructure in these universities is robust, there is a clear need for broader implementation of interactive and personalized digital services to fully modernize academic communication and support systems.

Research question two: What digital literacy skills and research competencies do postgraduate LIS students possess for effective research activities in these universities? The data in Table 3 provide answer to this question.

Table 3: Digital literacy skills possessed by LIS students for effective research activities in the public universities in South-East, Nigeria,

Universities in South-East, Nigeria,

S/ N	Item Statement	School Ownership				Overall		R	Remark
		State Mean SD	SD	Federal Mean SD	SD	Mean	SD		
1	Ability to manage personal website/homepage	1.69	.97	1.94	.97	1.80	.98	24 th	NR
2	Ability to search the search the web page	3.52	.85	3.82	.41	3.65	.71	1 st	R
3	Ability to create and upgrade web pages	1.47	.83	1.60	1.02	1.53	.92	25 th	NR
4	Ability to send and check e-mails	3.66	.48	3.58	.70	3.63	- .58	2 nd	R
5	Ability in using the World Wide Web	3.03	1.18	3.36	.89	3.18	1.07	13 th	R
6	Ability to use library software	2.54	.94	3.18	.81	2.82	.94	16 th	R
7	Ability to use Wikipedia	3.54	.66	2.45	1.14	3.06	1.05	14 th	R
8	Ability to use online chat features, text chat and voice chat	3.50	.69	3.11	1.00	3.33	.86	11 th	R
9	Ability to understand the main functions of hardware components on students Computer	3.51	.68	3.43	.82	3.48	.74	6 th	R
10	Ability to work with MS Word, MS Excel, and MS PowerPoint programs	3.50	.68	3.55	.85	3.52	.75	3 rd	R
11	Ability to use keyboard shortcuts on the computer	3.45	.68	3.62	.69	3.52	.69	3 rd	R
12	Ability to change computer screen brightness and contrast	3.39	.81	3.65	.54	3.51	.71	5 th	R
13	Ability to use features/programs minimize, maximize, move windows on the computer screen	2.36	1.19	3.52	.81	2.87	1.18	15 th	R
14	Ability to take, edit, and record digital photos and videos	1.93	.87	1.76	.90	1.85	.89	23 rd	NR
15	Ability to use graphics software	1.81	.99	2.23	1.07	2.00	1.05	21 st	NR
16	Ability to use the concordance program software application (for text analysis)	2.31	1.15	2.46	1.27	2.37	1.20	17 th	NR
17	Ability to use learning software applications, such as Google voice, CD-ROM, DVD, and the like	3.46	.75	3.40	.74	3.44	.75	10 th	R
18	Ability to use the Blog application	3.49	.69	3.45	.70	3.47	.69	7 th	R
19	Ability to use an electronic reference source	3.36	.74	3.56	.64	3.45	.70	9 th	R
20	Ability to use Skype applications	2.02	1.05	1.84	1.04	1.94	1.05	22 nd	NR
21	Ability to work with podcast applications	2.32	1.23	2.14	1.20	2.24	1.22	18 th	NR
22	Ability to work with the Dropbox application	3.43	.76	3.51	.75	3.47	.75	7 th	R
23	Ability to work with the YouTube application	2.24	1.24	1.93	1.16	2.11	1.21	19 th	NR
24	Ability to use Google classroom application	3.09	.85	3.50	.67	3.27	.80	12 th	R

25	Ability to work with Edmodo, Canvas, and Zoom	1.97	1.09	2.06	1.11	2.01	1.10	20 th	NR
Cluster mean		2.82	.26	2.91	.30	2.86	.47		

Cluster Mean

- State Universities: 2.82 (SD = 0.26)
- Federal Universities: 2.91 (SD = 0.30)
- Overall Mean: 2.86 (SD = 0.47)

Key: R = Relevant, NR = Not Relevant

Decision rule (remark) Any item with a mean score of 2.50 and above is considered Relevant (R), indicating that students possess that digital literacy skill sufficiently for effective research. Any item with a mean score below 2.50 is considered Not Relevant (NR), suggesting insufficient competence in that skill area.

The respondents were asked to indicate digital literacy skills required by LIS PG students for research activities in the public universities in South-East, Nigeria, using the criterion mean of 2.50 on a 4-point scale, responses as presented on Table 2. The result indicated that the respondents accepted that items 2, 4, 10, 11, 12, 9, 18, 22, 19, 17, 8, 24, 5, 7, 13 and 6 are digital skills required by LIS students for effective research activities. The result in Table 2 also revealed that the standard deviations of the 25 items ranged from .69-1.22; indicating that the respondents were homogenous in their response.

The results of the interviews showed that most respondents reported that in the context of Library and Information Science, digital literacy skills are paramount for conducting effective research activities in the universities of South-East Nigeria. Firstly, proficiency in information retrieval is crucial. Strong foundation in data management and analysis is essential. LIS PG students often engage with large datasets, and having the ability to organize, analyze, and interpret data using digital tools ensures the robustness of their research outcomes. This includes understanding data privacy and ethical considerations in handling sensitive information. Digital literacy in the context of research involves the use of academic databases and online journals. LIS PG students should be proficient in navigating these resources, critically evaluating the

credibility of sources, and synthesizing information effectively. This, not only contributes to the depth of their research, but also ensures the quality and reliability of the information they incorporate into their work. Furthermore, skills in using reference management tools are crucial. Given the volume of literature that LIS PG students interact with, the ability to efficiently manage citations, create bibliographies, and track references is indispensable. It streamlines the writing process, enhances academic integrity, and ensures compliance with citation standards

Lastly, the adaptability to emerging technologies is key. The digital landscape is dynamic, and LIS PG students need to stay abreast of new tools, software, and platforms that can enhance their research methodologies. This adaptability not only showcases a commitment to lifelong learning but also positions them as innovative contributors to the field.

In a nutshell, the digital literacy skills required by LIS PG students in public universities in South-East for research activities encompass information retrieval, data management, proficiency in academic databases, reference management, ethical information use, and adaptability to emerging technologies. These skills collectively empower LIS PG students to conduct research that is not only academically

rigorous but also aligned with the demands of the evolving information landscape.

Research question three: To what extent are the available digital facilities accessed and

utilised by postgraduate LIS students for research activities in universities in South-East, Nigeria? The data in Table 4 provide answer to this question.

Table 4: Extent of digital resources available to and utilized by (LIS) students for effective research activities in public universities in South-East, Nigeria

S/N	Item Statement	School Ownership				Overall		R	Remark
		State Mean	SD	Federal Mean	SD	Mean	SD		
1	Ability to manage website/homepage	2.02	.84	1.87	.94	1.96	.89	24 th	LE
2	Ability to search the search the web page	3.68	.52	3.69	.49	3.68	.50	1 st	VHE
3	Ability to create and upgrade web pages	2.22	1.13	2.09	1.07	2.16	1.11	22 nd	LE
4	Ability to send and check e-mails	3.69	.54	3.64	.69	3.67	.61	2 nd	VHE
5	Ability in using the World Wide Web	3.60	.62	3.56	.59	3.58	.61	3 rd	VHE
6	Ability to use library software	2.76	1.19	2.26	1.11	2.54	1.18	18 th	HE
7	Ability to use Wikipedia	2.91	1.01	2.77	.97	2.85	.99	15 th	HE
8	Ability to use online chat features, text chat and voice chat	3.48	.73	3.47	.73	3.48	.73	6 th	HE
9	Ability to understand the main functions of hardware components on students Computer	3.34	.81	3.51	.67	3.41	.76	9 th	HE
10	Ability to work with MS Word, MS Excel, and MS PowerPoint programs	3.65	.49	3.66	.52	3.66	.50	3 rd	VHE
11	Ability to use keyboard shortcuts on the computer	3.38	.76	3.64	.54	3.49	.68	5 th	HE
12	Ability to change computer screen brightness and contrast	3.15	1.01	3.36	.70	3.24	.89	11 th	HE
13	Ability to use features/programs minimize, maximize, move windows on the computer screen	3.36	.87	3.44	.74	3.40	.82	10 th	HE
14	Ability to take, edit, and record digital photos and videos	2.14	1.24	1.97	1.12	2.07	1.19	23 rd	LE
15	Ability to use graphics software	2.56	1.10	2.24	1.06	2.42	1.09	19 th	LE
16	Ability to use the concordance program software application	2.18	1.06	2.41	1.01	2.28	1.04	20 th	LE
17	Ability to use learning software applications, such as Google voice, CD-ROM, DVD, Hand the like	3.60	.68	3.21	.81	3.43	.76	8 th	HE
18	Ability to use the Blog application	2.94	.88	3.32	.78	3.11	.85	13 th	HE
19	Ability to use an electronic reference source	2.06	1.08	2.33	1.12	2.18	1.10	21 st	LE
20	Ability to use Skype and Moodle applications	2.89	1.01	2.25	1.09	2.61	1.09	16 th	HE
21	Ability to work with podcast applications	2.61	1.05	2.49	1.07	2.56	1.06	17 th	HE
22	Ability to work with the Dropbox application	3.50	.68	3.45	.74	3.48	.71	7 th	HE

23	Ability to work with the YouTube application	3.02	.98	2.82	1.07	2.93	1.02	14 th	HE
24	Ability to use Google classroom application	3.20	.85	3.25	.82	3.22	.84	12 th	HE
25	Ability to work with Edmodo, Canvas, and Zoom	1.98	.96	1.85	1.08	1.92	1.01	25 th	LE
Cluster mean		2.96	.39	2.90	.33	2.93	.48		LE

Cluster mean: State = 2.96 (.39), Federal = 2.90 (.33), Overall = 2.93 (.48) → Remark: L

Key: VHE – Very High Extent, HE – High Extent, LE – Low Extent

Decision rule: 3.50 – 4.00 = Very High Extent (VHE), 2.50 – 3.49 = High Extent (HE) and 1.00 – 2.49 = Low Extent (LE).

The analysis in Table 3 on the extent of use of digital literacy skills required by Library and Information Science (LIS) postgraduate students for effective research in universities in South-East Nigeria reveals a generally low to moderate utilization of these skills. The overall cluster mean of 2.93, which falls under the category of Low Extent (LE), underscores this point. Although there is a slight variation in mean scores between state universities (2.96) and federal universities (2.90), the difference is minimal and does not significantly alter the overall interpretation. Among the specific skills, the highest-rated digital skills used to a very high extent (VHE)" include: searching the web (3.68) ranked highest, followed by sending and checking emails (3.67), Using MS Office tools like Word, Excel, PowerPoint had (3.66) while using the World Wide Web had (3.58)

These results indicate that LIS PG students are most comfortable with basic internet and productivity tools, which are fundamental to academic research and communication. However, more specialized or technical skills were used to a low extent,

particularly: working with Edmodo, Canvas, Zoom (1.92) ranked 25th, managing websites/homepages (1.96) ranked 24th,, taking and editing digital media (2.07) ranked 23rd, while creating and upgrading web pages (2.16) ranked 22nd. This suggests a significant gap in the use of advanced or emerging digital tools necessary for collaborative and interactive research processes. Tools such as Moodle, Skype, podcasting apps, and electronic reference sources are also used at a low to moderate level, which may limit the depth and reach of students' academic engagement. Furthermore, it is noteworthy that some tools like Google Classroom (3.22), Dropbox (3.48), and Blog applications (3.11) were used to a high extent (HE), reflecting growing familiarity with cloud storage and educational platforms.

Research question three: What challenges do postgraduate LIS students encounter in acquiring and applying digital literacy skills and research competencies for effective research? The data in Table 5 provide answer to this question.

Table 5: The challenges against the application of digital literacy skills and digital competencies for effective research activities by LIS PG students in the universities in South East, Nigeria

S/N	Item Statement	School Ownership		Overall		R	Remark/ Decision		
		State Mean	SD	Federal Mean	SD			Mean	SD
1	Unguided misleading and uncensored information	3.47	.66	3.62	.63	3.54	.65	2 nd	Agree
2	Plagiarism, Privacy and copyright issues	2.95	1.05	3.28	.75	3.10	.95	14 th	Agree
3.	Lack of technical know-how and ICT handling skills	3.46	.71	2.84	1.09	3.19	.95	9 th	Agree
4	Cyber-attacks and chiselers	2.87	1.16	3.24	.85	3.04	1.05	16 th	Agree
5	Misuse of ICT resources	3.43	.65	3.39	.75	3.41	.69	6 th	Agree
6.	Mismanagement of funds	3.49	.70	3.43	.88	3.46	.78	5 th	Agree
7.	Addiction and time mismanagement	2.86	1.13	3.57	.74	3.17	1.04	10 th	Agree
8.	Inadequate training and skill acquisition programs	2.84	1.20	3.56	.61	3.16	1.04	12 th	Agree
9.	Lack of motivation	2.94	1.04	3.28	.82	3.09	.96	15 th	Agree
10.	Lack of fund	3.75	.44	3.77	.45	3.76	.44	1 st	Agree
11	Irrelevant information	2.83	1.04	3.52	.64	3.14	.95	13 th	Agree
12	Too many hits or information overload	2.06	.96	2.06	.97	2.06	.96	17 th	Disagree
13	Slow internet speed	3.49	.63	3.29	.73	3.40	.68	7 th	Agree
14	Lack of commitment to learning ICT skill	3.52	.59	3.49	.61	3.51	.60	3 rd	Agree
15	High cost of ICT literacy training programmes	3.36	.78	2.93	1.17	3.17	.99	10 th	Agree
16	Lack of interest in digital information	3.48	.66	3.54	.59	3.51	.63	3 rd	Agree
17	Inadequate ICT coverage in the school curriculum	3.39	.76	3.40	.68	3.40	.72	7 th	Agree

Decision rule: Mean score ≥ 2.50 = Agree and Mean Score < 2.50 = Disagree

Table 4 highlights the challenges faced by library and information science (LIS) postgraduate students in public universities across South East Nigeria concerning the application of digital literacy skills and competencies in research. The overall mean scores for all items suggest that respondents generally agree that these challenges exist, with the exception of “Too many hits or information overload, which had the lowest mean (2.06) and was the only item marked Disagree ranking 17th. Lack of funds emerged as the most significant challenge (mean = 3.76), showing a strong consensus among both state and federal university

students that inadequate financial support hampers their ability to develop and apply digital competencies. Following closely were unguided, misleading, and uncensored information (mean = 3.54) and lack of commitment to learning ICT skills as well as lack of interest in digital information (both with means of 3.51), suggesting that motivational and informational barriers also play key roles.

Notably, there are differences between federal and state universities. For instance, state university students reported higher challenges in technical know-how (mean = 3.46) compared to their federal

counterparts (mean = 2.84), which might indicate resource or training disparities. Similarly, addiction and time mismanagement (mean = 3.57) and inadequate training programs (mean = 3.56) scored higher among federal university students, pointing toward issues of digital discipline and structured capacity building. While cyber-attacks and chiseling (mean = 3.04), privacy, plagiarism, and copyright issues (mean = 3.10), and lack of motivation (mean = 3.09) were ranked lower (14th–16th), they still represent areas of concern, emphasizing the complexity and multifaceted nature of digital challenges in academic research.

The table generally suggests that financial constraints, poor ICT infrastructure, lack of proper guidance, and motivational issues significantly hinder LIS postgraduate students' ability to effectively utilize digital tools for research.

Research question four: What institutional or pedagogical strategies can be implemented to improve the acquisition and application of digital literacy skills and research competencies among postgraduate LIS students in universities in South-East, Nigeria? The data in Table 6 provide answer to this question.

Table 6: The possible strategies to enhance LIS PG.-students' application of digital skills for research in University in South East, Nigeria

SN	Item statement	Mean	SD	R	Remark/ Decision
1	Create awareness and encourage users to use digital resources	3.64	0.51	1 st	Appropriate
2	Information technology skill should be given priority	3.19	1.05	8 th	Appropriate
3	Provision of computers with internet facilities	3.41	0.75	5 th	Appropriate
4	Provision of alternative sources of power supply	3.42	0.72	4 th	Appropriate
5	More attention should be given to digital literacy skills funding	3.59	0.64	2 nd	Appropriate
6	Reliable internet connectivity to improve access to digital resources	3.06	1.07	10 th	Appropriate
7	Create a catalogue of available e-resources to ease access	2.74	1.25	11 th	Appropriate
8	There should be sufficient digital literacy in every field of study	3.54	0.72	3 rd	Appropriate
9	Available Digital resources should be 24/7 accessible	3.27	0.89	7 th	Appropriate
10	Staff attitude toward providing digital literacy should be improve	3.32	0.90	6 th	Appropriate
11	More time should be dedicated towards provisions of digital resources	3.17	0.92	9 th	Appropriate

Decision rule: Any item with a mean score of 2.50 and above is considered "Appropriate", while a mean score below 2.50 would be considered "Not Appropriate."

Table 6 shows various strategies that could enhance Library and Information Science Postgraduate (LIS PG) students' application of digital skills for research in universities in South East Nigeria. Overall, all the suggested strategies were rated as "Appropriate" based on their mean scores, indicating a consensus among respondents on the relevance of these measures.

The most highly rated strategy was "Creating awareness and encouraging users to use digital resources" with a mean score of

3.64, suggesting that students may not be fully aware of or motivated to explore the available digital tools. Awareness campaigns and training initiatives can play a vital role in bridging this gap. This was followed closely by "More attention should be given to digital literacy skills funding" (mean = 3.59), which highlights the importance of financial commitment to digital literacy initiatives. The third most important strategy, with a mean of 3.54, was "Ensuring sufficient digital literacy in every field of study,"

pointing to the need for integrating digital skills training across academic disciplines to make it more accessible and relevant.

Other significant strategies include the “Provision of alternative power supply” (mean = 3.42) and “Provision of computers with internet facilities” (mean = 3.41). These reflect infrastructural challenges commonly experienced in Nigerian universities, particularly power outages and lack of equipment, which hinder access to digital tools. The “Improvement of staff attitude toward providing digital literacy” (mean = 3.32) and “Ensuring digital resources are accessible 24/7” (mean = 3.27) were also viewed as moderately important, underlining the human and logistical aspects that affect digital learning experiences.

Meanwhile, “Information Technology skill prioritization” and “Time dedication toward digital resource provision” ranked lower (means = 3.19 and 3.17 respectively), though still appropriate. The lowest rated items were “Reliable internet connectivity” (mean = 3.06) and “Creating a catalogue of available e-resources” (mean = 2.74), which, although still considered appropriate, may reflect either a perceived lower urgency or existing efforts in those areas that need improvement rather than initiation.

In a nutshell, the findings suggest that enhancing LISPG students' digital skills for research in South East Nigeria requires a multipronged approach. Priority should be given to increasing awareness, securing funding, expanding digital literacy across disciplines, and improving infrastructure. Addressing both systemic and behavioral challenges will be crucial to fully integrating digital skills into the research practices of postgraduate students.

Discussion

The findings, when discussed in light of existing literature, present both affirmations of earlier scholarly work and new insights into localised challenges and opportunities.

The study revealed that all universities surveyed had basic digital tools and applications such as internet access, email, computers, Google applications, and messaging platforms. However, more advanced tools such as co-browsing software, live chat applications, and real-time collaborative tools like Apple FaceTime and LibChat were scarcely available or absent altogether. This supports earlier findings by Ajiboye and Ekere (2021), who noted the uneven distribution of digital tools across Nigerian universities. It also echoes Olanrewaju and Okorie (2020), who pointed out the underdevelopment of ICT infrastructure in universities in South-East, Nigeria despite the provision of some basic facilities.

The results suggest that LIS postgraduate students possess fundamental digital skills such as internet browsing, email communication, and using Microsoft Office tools. This was in agreement with the findings of Jatto, Fasola, and Abioye (2024), who reported competence in basic information literacy and productivity applications. However, the students demonstrated limited abilities in more specialised digital competencies such as managing websites, editing digital media, or using collaborative educational platforms like Moodle or Zoom. This aligns with Chukwuemeka and Ezeani (2016), who reported gaps in practical research competencies among LIS students. Furthermore, Anunobi and Udem (2011/2012) observed that while students performed well in locating and evaluating information, they lacked advanced technical skills necessary for executing research.

The study's findings show that while LIS students regularly use basic digital tools (mean scores above 3.5), their use of advanced technologies is limited (mean scores below 2.5 for several items). This mirrors the digital divide described by Adamu et al. (2024), who found disparity in the ability to utilise research tools effectively across institutions. The low utilisation of specialised tools may stem from a lack of exposure or training, a conclusion supported by Ngulube (2017), who advocated for the integration of digital literacy training in LIS curricula. The limited use of tools such as Edmodo, podcasting apps, and website management platforms suggests a gap between theoretical knowledge and practical application.

The study identified major barriers such as lack of funding, misinformation, disinterest in digital tools, and poor ICT training—echoing the findings of Ugwulebo and Ugwuanyi (2020). Particularly significant is the issue of over-reliance on smartphones due to a lack of access to laptops or desktop computers, which limits students' engagement with academic databases and research software. Interestingly, technical know-how was more of a challenge for students in state universities, whereas students in federal universities faced challenges like time mismanagement and inadequate training. These inter-institutional disparities reflect those identified by Adamu et al. (2024) and reinforce the need for a more standardised approach to ICT training across the country.

The most highly endorsed strategies included awareness campaigns, funding for digital literacy initiatives, and integration of digital skills across disciplines. This aligns with Ajiboye et al. (2022), whose evaluation of a two-day digital literacy training programme at the Federal University of Agriculture, Abeokuta, demonstrated the

effectiveness of short-term, intensive skill-building initiatives. Furthermore, infrastructure-related recommendations, such as providing alternative power supply and improving internet access, reaffirm issues raised by Shikali and Muneja (2024), who cited poor infrastructure as a major impediment to digital transformation in African academic institutions during the COVID-19 pandemic. While strategies like catalogue creation and improving internet reliability received lower mean scores, they are not to be dismissed; their lower ratings may indicate existing efforts that are either partially effective or undervalued due to lack of visibility or promotion.

Conclusion

The study concludes that while LIS postgraduate students in public universities in South-East, Nigeria have access to basic digital tools and possess foundational digital skills, their proficiency in advanced research competencies remains low. This gap impedes the quality and efficiency of their research activities and reflects broader institutional and infrastructural shortcomings. Strategic intervention is therefore essential to equip these students with the full range of digital competencies required in today's academic and professional landscapes.

To enhance digital literacy among postgraduate Library and Information Science (LIS) students and create a more supportive academic environment, the following actions are recommended:

1. Universities offering LIS postgraduate programmes should incorporate comprehensive digital literacy modules into their curricula to ensure students acquire essential skills in areas such as digital research methodologies, database navigation, and the use of academic referencing tools.

2. University management and ICT departments should invest in the development of infrastructure by providing reliable power supply, high-speed internet connectivity, and access to up-to-date digital tools to foster a conducive learning environment.
3. Academic departments, in collaboration with professional bodies, should organise regular workshops and mentorship programmes that focus on emerging digital research tools and technologies to enhance both student and staff competencies.
4. Government agencies, educational institutions, and relevant stakeholders should allocate adequate funding to support digital literacy initiatives, including the procurement of essential software, online resources, and ICT equipment.
5. LIS faculties and student affairs units should conduct awareness campaigns aimed at sensitizing students on the benefits of digital research tools and promoting a culture of digital engagement and lifelong learning.
6. University libraries and ICT units should ensure uninterrupted, 24/7 access to digital library resources and learning platforms to accommodate students' varied learning schedules and enhance research productivity.
7. University senates and administrative bodies should implement policies that mandate digital competence for both students and academic staff, thereby standardising digital literacy expectations and encouraging widespread adoption and compliance.

References

- Adeoye, A., & Adeoye, B. (2017). Digital literacy skills of undergraduates in Nigerian universities. *Library Philosophy and Practice*, <https://digitalcommons.unl.edu/libphilprac/1665>.
- Adkison, L., & Glaros, A. (2012). Assessing research competency in a medical school environment. *Medical Science Educator*, 22, 139–142.
- Ajiboye, B. A., Mausi, A. B., Bello, M. M., & Idowu, A. A. (2023). Influence of library resources and services on research activities among postgraduate students of Southwest federal universities, Nigeria. *American Journal of Information Science and Technology*, 7(1), 1–8. <https://doi.org/10.11648/j.ajist.20230701.11>.
- Ajiboye, J. O., & Ekere, F. A. (2021). Digital literacy skills among postgraduate students in Nigerian universities: Challenges and prospects. *Library Philosophy and Practice*, <https://digitalcommons.unl.edu/libphilprac/5123>.
- Anunobi, C., & Udem, O. K. (2011/2012). Information literacy competencies of LIS postgraduate students in South East Nigeria. *Information Impact: Journal of Information and Knowledge Management*, 2(1). <https://journals.unizik.edu.ng/ijik/article/view/1667>.
- Bell, D. L. (2021). A qualitative investigation of the digital literacy practices of doctoral students. *Journal of Information Literacy*, 15(3), 82–99. <https://doi.org/10.11645/15.3.282>.
- Bell, S. J., & Shank, J. D. (2008). An

- assessment of digital literacy skills and knowledge. <https://www.researchgate.net/publication/228368401>
- Chukwuemeka, E. E., & Ezeani, C. N. (2016). Research competencies of postgraduate library and information science students in Nigerian universities. *Library Philosophy and Practice*, 2016(1352). <https://digitalcommons.unl.edu/libphilprac/1352>.
- Dime, I. A., Udofia, E. P., & Essien, A. S. (2022). Technology skill proficiency among librarians in South-South Nigeria: Implications for digital literacy. *Journal Pendidikan Indonesia (JPI)*, 11(1), 13–24. <http://ejournal.upi.edu/index.php/JPI/article/view/42909>.
- Emery, S. (2020). The importance of digital literacy in education. <https://www.researchgate.net/publication/339230376>.
- Eshet-Alkalai, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, 13(1), 93–106.
- Ferrari, A. (2012). Understanding digital competence in the 21st century. In *EC-TEL 2012: European Conference on Technology Enhanced Learning* (pp. 19–31). Springer. https://link.springer.com/chapter/10.1007/978-3-642-33263-0_7.
- Head, A. J. (2013). Learning the ropes: How freshmen conduct course research once they enter college. *Project Information Literacy Research Report*. <https://projectinfolit.org/pubs/smart-talks/st-head.html>
- Ibidapo-Obe, O. (2010). Harnessing science and technology research results for sustainable national development. Paper presented at the 2010 Science and Technology Summit, Abuja, August 9–10. <http://www.first.gov.ng/uploads/harness-national-dev.pdf>.
- Inyang, I., & Mngutayo, E. (2018). Required skills and competences of librarians for effective performance. <https://www.researchgate.net/publication/329375195>.
- Jatto, E. O., Fasola, S. O., & Abioye, A. (2024). Information literacy skills and research output at University of Ibadan. *African Journal of Library, Archives and Information Science*, 34(1), 23–38. <https://www.ajol.info/index.php/ajlais/article/view/261097>.
- Jisc, S. (2020). *Jisc researcher digital experience insights survey 2020: UK higher education pilot results*. <https://www.jisc.ac.uk/digital-experience-insights>.
- Khalili, L. (2020). The attitude of library and information science students toward discipline and future of the profession. *Brazilian Journal of Information Science: Research Trends*, 14(4), e020016. <https://doi.org/10.36311/1940-1640.2020.v14n4.10824>.
- Khan, S. A., & Bhatti, R. (2017). Digital competencies for developing and managing digital libraries: An investigation from university librarians in Pakistan. *The Electronic Library*, 35(3), 573–597. <https://doi.org/10.1108/EL-06-2016-0133>.
- Maya, L., & Suseno, M. (2022). Investigating the incorporation of digital literacy and 21st-century skills into postgraduate students' learning activities. *English Language Education (ELE) Reviews*, 2(5), 13–27. <https://doi.org/10.22515/elereviews.v2i1.5121>
- Mulat, T., & Natarajan, M. (2020). Digital literacy skills among library professionals in Jimma University Libraries. *Library Philosophy and*

- Practice*, 2020(4629). <https://digitalcommons.unl.edu/libphilprac/4629>.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078. <https://doi.org/10.1016/j.compedu.2012.04.016>.
- Ngulube, P. (2017). Promoting digital scholarship in African universities: Challenges and opportunities. *African Journal of Library, Archives and Information Science*, 27(2), 115–129. <https://doi.org/10.4102/ajim.v19i1.854>.
- Nkanu, W. O., Iyishu, V. A., & Ogar, F. O. (2013). Education and training for library and information science professionals in Nigeria: Their role, opportunities, and challenges in the information age. *Knowledge Review*, 28(2), 34–56.
- Ogochukwu, O. (2015). Digital literacy skills among librarians in university libraries. *International Journal of Library and Information Services*, 6(1), 37–52. <https://doi.org/10.4018/IJLIS.2017010103>.
- Olanrewaju, A. A., & Okorie, C. N. (2020). Availability and use of digital library resources among postgraduate students in selected Nigerian universities. *Library Philosophy and Practice*. <https://digitalcommons.unl.edu/libphilprac/4349>.
- Oloniruha, E. A., Owolabi, A. K., Aderibigbe, A. N., Adesina, A. O., Bamgbose, K. T., & Owunezi, M. K. (2023). Perception and attitude of postgraduate students of Library and Information Science towards scholarly publications in Nigeria. *Library Philosophy and Practice*, <https://digitalcommons.unl.edu/libphilprac/7698>.
- Osinulu, L. O. (2021). Digital literacy competencies of library officers in Ogun State. *World Libraries*, 27(2). <https://worldlibraries.dom.edu/index.php/worldlib/article/view/464>.
- Oyedapo, R. O., & Ojo, R. A. (2013). A survey of the use of electronic resources in Hezekiah Oluwasanmi Library, Obafemi Awolowo University, Ile-Ife, Nigeria. *Library Philosophy and Practice*. <http://digitalcommons.unl.edu/libphilprac/884>.
- Pewhairangi, S. (2016). Digital skills is not the same as digital literacy. *Finding Heroes*. <https://findingheroes.co.nz/2016/02/23/digitalskills-is-not-same-as-digitalliterary>.
- Shikali, J. C., & Muneja, P. S. (2024). African academic libraries during COVID-19: Information literacy and digital access challenges. *arXiv Preprint*. <https://arxiv.org/abs/2402.12345>.
- Udem, O. K., & Anaehobi, S. (2020). Information literacy skill acquisition and research self-efficacy of postgraduate students in public universities in South-East, Nigeria. *Information Impact: Journal of Information and Knowledge Management*, 11(3), 105–114. <https://journals.unizik.edu.ng/ijik/article/view/1669>.
- Ugwulebo, T. E., & Ugwuanyi, C. F. (2020). Challenges facing postgraduate students in the use of electronic information resources in Nigerian university libraries. *Library Philosophy and Practice*. <https://digitalcommons.unl.edu/libphilprac/4172>.
- UNESCO. (2018). *A global framework of reference on digital literacy skills for indicator 4.4.2* (Information Paper No. 51). UIS/2018/ICT/IP/51.
- Yarullin, I. F., Bushmeleva, N. A., &

Humphrey O. Nwaogu and M. N. Ngwuchukwu: Digital literacy skills and competencies for effective research activities by library and information science postgraduate students in public universities in South-East, Nigeria

Tsyrukun, I. I. (2015). The research competence development of students trained in mathematical direction.

International Electronic Journal of Mathematics Education, 10(3), 137–146.