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DIGITAL LIBRARY AS SMART KNOWLEDGE HUBS: A SURVEY AMONG DOCTORAL STUDENTS IN NIGERIA

BY

Azeez Adebamgbola **ADEOYE, Ph.D[1] &** Dr. Pius Olatunji **OLAOJO, Ph.D[2]**

Senior Librarian, Federal University of Health Sciences, Ila-Orangun, Nigeria[1], Professor, Department of Library, Archival and Information Studies, University of Ibadan, Nigeria[2].

azeez.adeoye@fuhsi.edu.ng, adeoyeazeezphd@gmail.com[1]; po.olaojo@ui.edu.ng[2]
Google Scholar: KIFTwUkAAAAJ
ORCID: https://orcid.org/0000-0003-4507-9835

Abstract

Purpose*: The use of digital library resources (DLRs) has become indispensable for doctoral education because these resources provide timely access to scholarly information required for research, publication, and academic advancement. Despite increasing investments in digital library infrastructure, evidence suggests that utilisation of DLRs among doctoral students in Nigerian public universities remains suboptimal. This study investigated the use of digital library resources among doctoral students in eight public universities in Southwestern Nigeria.*

Design/Methodology/Approach: *Daft and Lengel, Media Richness Theory served as the framework, while the survey design of the correlational type was adopted. The eight conventional public universities offering doctoral programmes in southwestern Nigeria: Adekunle Ajasin University, Akungba-Akoko, Ondo State; Ekiti State University, Ado-Ekiti, Ekiti State, Lagos State University, Ojo, Lagos State; University of Ibadan, Ibadan, Oyo State; Obafemi Awolowo University, Ile-Ife, Osun State; Olabisi Onabanjo University, Ago-Iwoye, Ogun State; Osun State University, Osogbo, Osun State; and University of Lagos, Akoka, Lagos State were enumerated with a total of 7,091. Three faculties that offered disciplined specific programmes and two departments each from the faculties were purposively selected - Eight hundred and forty-one doctoral students (Arts: English:286 and History:77, Science: Chemistry:208 and Microbiology:105 and Social Sciences: Economics:106 and Political Science:59). Thus, a total of 841 doctoral students drawn through purposive sampling participated in the study. The instruments used were Use of Digital Library Resources Scale (α=0.87) scale. The data were analysed using descriptive statistics and Pearson Product Moment Correlation and Multiple regression at 0.05 level of significance.*

Finding: *The findings showed that electronic journals ($\bar{x}$ = 3.97) and e-books ($\bar{x}$ = 3.64) were the most frequently utilised digital resources, whereas library website content ($\bar{x}$ = 2.83) and institutional repositories ($\bar{x}$ = 2.80) recorded relatively low usage. Doctoral students primarily used digital library resources for journal article writing ($\bar{x}$ = 3.49) and preparing conference, seminar, and workshop presentations ($\bar{x}$ = 3.40), highlighting their central role in scholarly communication and research productivity. However, slow internet bandwidth ($\bar{x}$ = 2.97) and information overload during online searching ($\bar{x}$ = 2.75) emerged as the major barriers to effective utilisation.*

Implication*: Overall, the study demonstrates that while doctoral students frequently rely on e-journals and e-books, institutional digital platforms, particularly library websites and institutional repositories, remain underutilised.*

Originality/Value: *These findings underscore the need for universities and academic libraries to strengthen internet infrastructure, improve access to digital collections, enhance institutional repository visibility, and provide targeted information literacy support to improve the effective use of digital library resources among doctoral students.*

Keywords: Digital library resources, Doctoral students, in Public universities, Southwestern Nigeria.

Paper Type: Empirical research

INTRODUCTION

Digital Library Resources (DLRs) have become indispensable in doctoral education by providing timely access to scholarly information that supports research, teaching, and knowledge

creation. Their emergence, driven by advances in Information and Communication Technology (ICT), has transformed information storage, retrieval, and dissemination beyond the limitations of traditional print and non-print resources. DLRs encompass a wide range of electronic resources, including e-journals, e-books, full-text databases, institutional repositories, digital archives, Online Public Access Catalogues (OPACs), multimedia resources, government portals, and subscription databases such as Medline, EBSCOhost, and Research4Life. Digital libraries as Smart knowledge hubs are web-based or digital platforms designed to facilitate the storage, management, distribution, and sharing of knowledge within and across organizations. These hubs function as centralized workspaces integrating multiple essential tools, such as note-taking, reminders, learning modules, and communication forums, into unified dashboards to streamline digital activities (Gargade et al., 2026; Fauzi et al., 2025). The literature consistently highlights several advantages of DLRs, including rapid access to current information, advanced search capabilities, remote accessibility, simultaneous multi-user access, multimedia functionality, and efficient storage and retrieval of information (Kunjam et al., 2020; ; Uwandu, 2022; Yette & Adhe, 2023; Mani, 2023). These features enable doctoral students to conduct comprehensive literature searches, improve research productivity, and overcome geographical and time constraints. Consequently, digital resources have become the preferred information source for many researchers due to their flexibility, convenience, and ability to support independent scholarly inquiry. Despite these benefits, empirical studies indicate that the utilisation of digital library resources among postgraduate students in Nigeria remains below expectations (Edesiri, 2019; Okogwu, 2019; Mole & Edewor, 2020; Uwandu, 2022). This underutilisation is particularly concerning given the substantial financial and infrastructural investments universities have made in acquiring and maintaining digital collections (Odunewu et al., 2022; Sheikhshoaei et al., 2021). The literature therefore suggests that improving awareness, accessibility, and effective utilisation of digital library resources remains a critical priority for enhancing doctoral research productivity and maximising returns on institutional investments in digital information infrastructure..

The literature conceptualises the use of digital library resources (DLRs) among doctoral students in terms of frequency of use, purpose of use, and challenges affecting utilization (Adeoye, 2017). As intensive consumers of scholarly information, doctoral students are expected to rely extensively on digital library resources for literature reviews, data collection, thesis writing, scholarly publishing, and other research-related activities. However, evidence suggests that the utilisation of these resources remains below expectations despite substantial institutional investments in digital library infrastructure (Law et al., 2019; Sileshi, 2022; Kamble & Wagh, 2025). This gap between availability and actual use has become a growing concern within higher education. Previous studies indicate that doctoral students primarily use digital library resources for research activities, including developing research proposals, writing theses, journal articles, book chapters, and conference, seminar, and workshop presentations, as well as for personal academic development (Song & Song, 2017). Similarly, Shibin (2020) reported that over 90% of research scholars used digital library resources mainly to support their research activities, highlighting their central role in doctoral education and scholarly productivity.

Despite their recognised value, several barriers continue to hinder effective utilisation of digital library resources. These challenges include inadequate user training, poor ICT infrastructure, slow internet connectivity, information overload, limited technical expertise, financial constraints associated with database subscriptions, data security concerns, inadequate automation, copyright issues, and the absence of comprehensive institutional digital library policies (Lusigi, 2019; Oseghale, 2023). Such constraints reduce access to, and effective use of, digital scholarly resources. The literature further suggests that inadequate utilisation of digital library resources has important academic implications. Limited engagement with these resources may contribute to research avoidance, prolonged doctoral completion, lower research productivity, weaker literature reviews, reliance on outdated or less authoritative information sources, and reduced scholarly visibility. At a broader level, persistent underutilisation of digital library resources may adversely affect institutional research performance and national research output. These findings underscore the need for universities to address technological, infrastructural, and user-related barriers in order to maximise the benefits of digital library resources for

doctoral research and academic development.

Objectives of the Study

The general objective is to examine the use of digital library resources by doctoral students in public universities in Southwestern Nigeria. The specific objectives are to:

1. identify the frequency of use of digital library resources by doctoral students in public universities in Southwestern Nigeria;
2. determine the purpose of use of digital library resources by doctoral students in public universities in Southwestern Nigeria;
3. identify the challenges of use of digital library resources by doctoral students in public universities in Southwestern Nigeria;

Review of Related Literature

Use of digital library resources by postgraduate students

The emergence of Information and Communication Technology (ICT) has transformed traditional libraries into digital libraries, reshaping information service delivery and expanding access to scholarly resources (Adeoye, et al., 2025). Digital libraries provide organised collections of multimedia and scholarly content, including text, graphics, audio, video, and digitised cultural and scientific materials, thereby supporting teaching, learning, and research across geographical boundaries (Xie et al., 2020). The rapid expansion of internet technologies has further accelerated the transition from print-based collections to digital information systems capable of meeting the growing information needs of researchers and postgraduate students (Liu, 2019). Digital library resources comprise institutional repositories, digital libraries, subscription databases, and vendor-hosted electronic resources, which collectively facilitate access to scholarly information through local and remote platforms (Abimajee, 2025; Beyene, 2019). These resources offer significant advantages, including remote and simultaneous access, advanced search capabilities, multimedia support, efficient storage, rapid retrieval, and integration with related information sources, making them indispensable for academic research (Cen, 2023; Abimajee, 2025; Dongardive, 2020). Consequently, digital libraries have become central to teaching, research, and scholarly communication in higher education institutions (Wang, 2020).

The literature further emphasises that ICT has enhanced global dissemination of information by enabling libraries to extend services beyond physical spaces through local and international information networks (Dongardive, 2020). This has improved information service delivery by providing faster and broader access to

scholarly resources (Popoola & Olajide, 2021). However, accessibility remains a critical determinant of utilisation. While digital resources may be available, their effective use depends largely on ease of access, infrastructure, and user competence. Limited access has been associated with poor academic performance, frustration, reduced research productivity, and low utilisation of library resources (Abimajee, 2025; Onuoha et al., 2020). Similarly, studies indicate that users are more likely to utilise information resources that are readily accessible and require minimal effort to retrieve (Popoola & Olajide, 2021; Singh & Asif, 2019). These findings highlight the importance of improving both access to and usability of digital library resources to maximise their benefits for postgraduate research.

Forms of digital library resources used by postgraduate students

The literature indicates that postgraduate students utilise a wide range of digital library resources to support their academic and research activities. Abimajee, (2025) and Uwandu (2022) reported that commonly used resources include internet resources, e-journals, online databases, electronic databases, e-books, e-newspapers, e-conference proceedings, Online Public Access Catalogues (OPACs), CD-ROM databases, e-magazines, and electronic theses and dissertations. Among these, internet resources, e-journals, online databases, and electronic databases recorded the highest levels of utilisation, demonstrating their importance in postgraduate research. Studies also show that access to these resources occurs through various digital devices, including computers, smartphones, and tablets (O'Reilly, 2020). However, the preferred access locations vary across institutions. Shibin (2020) found that most postgraduate researchers accessed electronic resources through departmental libraries, followed by home, central computing facilities, and central libraries. In contrast, Dongardive (2020) reported that academic staff predominantly accessed electronic resources from their departmental offices rather than library facilities. These findings suggest that while a broad range of digital library resources are available, patterns of access differ depending on institutional infrastructure, user preferences, and the availability of remote access services. Overall, the literature highlights e-journals, e-books, online databases, and internet resources as the most frequently utilised digital resources among postgraduate students.

Frequency of digital library resource use by postgraduate students

Popoola and Olajide (2021) found that the major library information resources used by the students in private universities in Southwest Nigeria are: Internet facilities and Computers, which are the most used after books followed by other library resources such as CD-ROM, OPAC.

According to Dongardive (2020), the majority of 34.07% of the respondents used digital resources two to three times a week, 21.26% and 16.11% respondents were used the resources, once in a week and once in a month respectively. It was also found that 8.15% and 8.54% of the interviewees were visiting digital library resources sites every day and occasionally, respectively. The least 3.10% and 0.97% respondents were marked for, two to three days per week and never used e-resources, respectively. According to Hamzat and Mabawonku (2018), the result of the frequency of use of digital library showed that respondents from Covenant University had the highest mean of 3.3816 in the use of the digital library on daily basis and followed by Afe Babalola University (x =3.21; STD =0.33). In terms of frequency of use of the digital library on weekly basis, Covenant University recorded the highest mean ($\bar{x}$ = 3.69; STD =0.67) among the private universities. The researchers further revealed that the result on the use of the digital libraries on a semester basis showed that respondents from Elizade University had the highest mean of 2.34 and a standard deviation of 1.07. Respondents from Afe Babalola claimed to be using digital library once in a session with the highest mean of 1.09 while respondents with a mean score of 0.01 from Bells University of Technology claimed not to have accessed digital library before. Federal University Oye had the highest mean score of 3.55 and a standard deviation of 0 .53 on daily use. Respondents from the University of Lagos recorded the highest mean on weekly use ($\bar{x}$ = 3.33; STD =0.57) followed by the Federal University of Agriculture Abeokuta with the highest mean on semester usage ($\bar{x}$ = 2.63; STD = .58), the Federal University of Technology Akure with mean score 0.93 on a session use while respondents from University of Lagos with mean score 0.12 claimed not to have used the digital library before.

Purpose of use of digital library resources by postgraduate students

According to Shibin (2020) observed that researchers are preferring electronic resources for many reasons; fast access to information, time-saving, updated information etc. and this was empirically proven by examining the purpose behind the researchers use of e-resources using the Nalanda digital library, the most rated reasons are arranged in order of degrees: Fast Access, Time saving, Easy to locate, Provides desired information, Up-to-datedness, Provides unique and better information, Reliability. the researcher further found the intention of research scholars using the digital library resources: the results show that the majority of researchers are using the digital library for

their research operations, followed by academic purpose, information update, teaching activities and note preparation. i.e., the majority of researchers is definitely using the Nalanda digital library for their research purposes. According to Dongardive (2018) It was discovered that there were various purposes of using digital information resources among the Mekelle University teaching community. The study showed that the majority 64.46% and 26.69% teaching community were using digital resources for preparing teaching notes and for getting access to particular subject information respectively. The least 12.62% and 5.53% of teaching faculty were using digital resources for ongoing research work and curriculum design respectively. Bomhold (2018) indicated that users always use the academic digital library to download papers, borrow books online, etc. and PCs can satisfy this need more than mobile devices.

Challenges to use of digital library resources by postgraduate students

The literature identifies numerous barriers that hinder postgraduate students' effective utilisation of digital library resources despite their growing availability. Common challenges include restricted off-campus access, information overload, inadequate user guidance and training, and poor search formulation skills (Kamble & Wagh, 2025; Shibin, 2020). These findings underscore the need for user-centred digital library systems that provide seamless access and improved usability (Holley, 2026: O'Reilly, 2020). Infrastructure and institutional constraints remain significant impediments, particularly in developing countries. Studies have reported inadequate funding, unreliable electricity supply, insufficient computer facilities, slow internet connectivity, low bandwidth, and the high cost of database subscriptions as major obstacles to accessing electronic resources (Mole & Edewor, 2020). Similarly, Lusigi (2019) identified financial limitations, inadequate digital skills, and the absence of institutional strategies as key barriers to digital library development in African universities, while Owusu-Ansah et al. (2018) noted that many digital library projects struggle with financial sustainability. Beyond infrastructure, technological and policy-related challenges also affect effective utilisation. Abdul Rahman and Mohezar (2020) highlighted budget constraints, intellectual property issues, inadequate digitisation of analogue collections, lack of institutional policies, bandwidth limitations, absence of standardised digital library frameworks, and inappropriate software selection as critical challenges. Likewise, Dongardive (2020) reported that users frequently

encountered unavailable electronic resources, limited competence in using digital resources, and concerns about the continuity and permanence of electronic content. Earlier, Haliso (2011) identified outdated ICT infrastructure, inadequate staff training, poor remuneration, and excessive dependence on foreign funding as persistent obstacles to digital library development in Africa.

Despite these challenges, some studies report encouraging levels of awareness and accessibility. Akinola et al. (2020) found that postgraduate students generally demonstrated above-average awareness of electronic journals and considered them readily accessible, although actual usage varied considerably. Similarly, Joel et al. (2020) reported high availability and substantial use of electronic resources, including e-journals, e-books, online databases, CD-ROMs, internet resources, and e-catalogues, among postgraduate students in federal universities in North-East Nigeria. Overall, the literature suggests that although digital library resources are increasingly available, their effective utilisation continues to be constrained by infrastructural, technological, financial, and user-related factors that require coordinated institutional interventions.

Theoretical framework

A theory is a framework of hypotheses that underpins one or more hypotheses. Theories are used in this study to justify some relationships that exist among the variables and to highlights some non-obvious variables in the study (Oyedokun, 2020). This study is anchored on the Media Richness Theory (MRT) of Daft and Lengel in 1984,

Media Richness Theory

The Media Richness Theory (MRT), proposed by Daft and Lengel (1984), explains that communication media differ in their capacity to convey information and reduce uncertainty. The theory posits that communication effectiveness depends on the alignment between the complexity of a task and the richness of the communication medium. Rich media provide immediate feedback, multiple communication cues, language variety, and personal interaction, making them suitable for ambiguous and complex tasks, whereas lean media are more appropriate for routine information exchange. Within academic environments, MRT has been widely applied to understand information sharing and knowledge acquisition through digital platforms. Digital library resources, including e-journals, e-books, multimedia resources, institutional repositories, and online collaborative platforms, vary in

their level of media richness. While text-based resources effectively support scholarly communication, multimedia resources and interactive platforms enhance engagement, comprehension, and collaborative learning by providing richer communication experiences. Consequently, the effectiveness of digital library resources depends not only on their availability but also on their ability to meet users' information needs and facilitate meaningful interaction. In the context of this study, Media Richness Theory explains how the characteristics of digital library resources influence doctoral students' utilisation of these resources. The theory suggests that digital library platforms offering richer communication features and easier access to quality information are more likely to promote effective information use and support successful doctoral research. Therefore, MRT provides an appropriate theoretical foundation for examining the use of digital library resources among doctoral students in public universities.

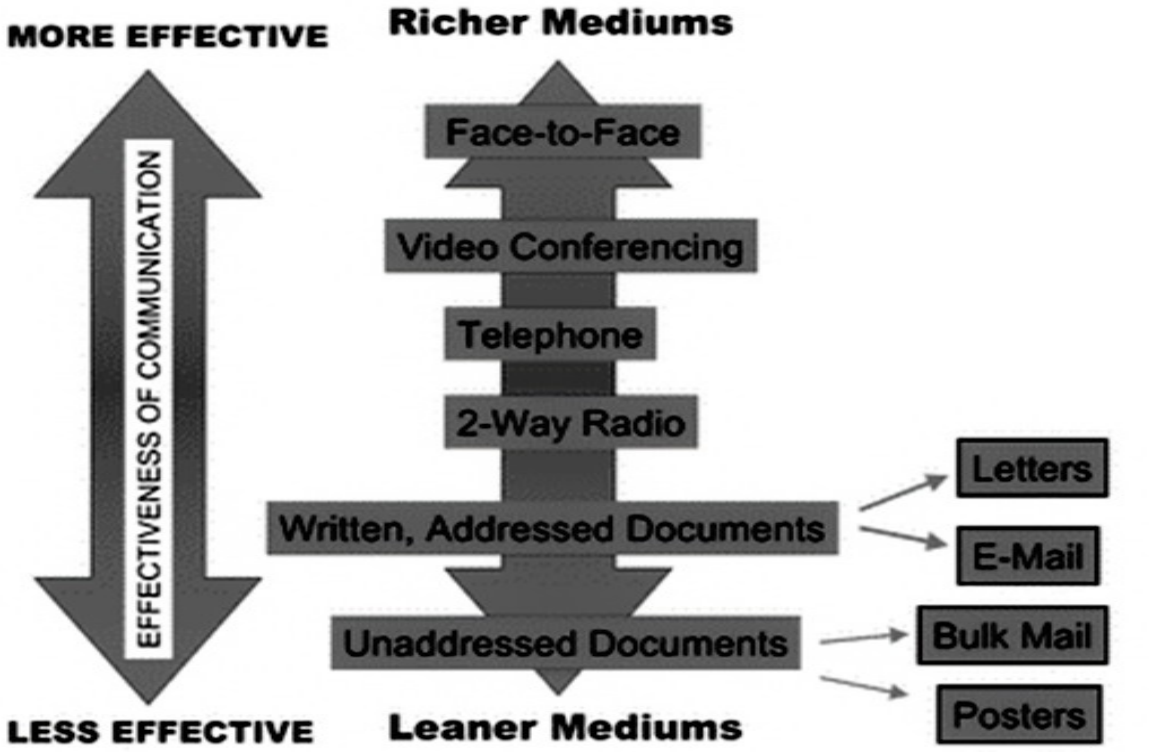


Figure 1: Media richness theoretical model

Source: Daft and Lengel, 1984

METHODOLOGY

A descriptive correlational survey design was employed to examine the relationships among the study variables without manipulating them (Creswell & Creswell, 2018). The study targeted 7,091 doctoral

students enrolled in accredited doctoral programmes across 12 public universities in Southwestern Nigeria. Using a multistage sampling technique, eight conventional public universities were purposively selected, followed by three faculties (Sciences, Humanities/Arts, and Social Sciences) and six departments. A total enumeration of eligible doctoral students produced a sample of 841 respondents.

Table 1 Population of the study

S/N0	UNIVERSITY	ACRONYM	YEAR OF ESTB.	OWNER SHIP	NO OF DOCTORAL STUDENTS
i	Adekunle Ajasin University, Akungba-Akoko. Ondo	AAUA	1999	State	73
ii	Ekiti State University, Ado-Ekiti, Ekiti State.	EKSU	1982	State	75
iii	Federal University of Agriculture, Abeokuta, Ogun State.	FUNAAB	1988	Federal	45
iv	Federal University of Technology Akure, Ondo State.	FUTA	1981	Federal	21
v	Ladoke Akintola University of Technology, Ogbomoso, Oyo State.	LAUTECH	1990	State	75
vi	Lagos State University, Lagos State.	LASU	1983	State	235
vii	Obafemi Awolowo University, Ile-Ife, Osun State.	OAU	1962	Federal	1724
viii	Olabisi Onabanjo University. Ago-Iwoye, Ogun.	OOU	1982	State	203
ix	Osun State University, Osun State.	UNIOSUN	2006	State	173
x	Tai Solarin University of Education, Ijagun, Ogun State.	TASUED	2005	State	83
xi	University of Ibadan, Ibadan, Oyo State.	U.I	1948	Federal	2348
xii	University of Lagos, Akoka, Lagos State.	UNILAG	1962	Federal	2036
	12 Public Universities				**7,091**

Source: Academic Planning Units of the Universities, 2025

Data were collected using a structured questionnaire comprising demographic information and the Use of Digital Library Resources Scale, adapted from Shibin (2020). The instrument measured three dimensions: frequency of use, purpose of use, and challenges of using digital library resources. Face validity was established through expert review, while reliability was assessed through a pilot study involving 30 doctoral students at the University of Ilorin. The overall reliability coefficient for the instrument was Cronbach's alpha = 0.878, with subscale coefficients ranging from 0.711 to 0.899, indicating acceptable to good internal

consistency (George & Mallery, 2003; Nunnally, 1978).

Table 2 Sample size

S/No	University	Science		Social Sciences		Humanities /Art		Total
		Chem	MicroB	Pol. Sci	Econ	Eng.	Hist.	
1	AAUA	2	3	2	3	5	2	17
2	EKSU	3	2	2	5	7	2	21
3	LASU	8	5	4	7	10	3	37
4	OAU	45	14	11	18	72	10	170
5	OOU	9	4	3	6	9	5	35
6	UNIOSUN	5	4	3	5	8	2	27
7	U.I	76	44	24	38	97	32	311
8	UNILAG	61	29	10	24	78	21	223
	Total							**841**

Sources: University Websites, Academic Planning Units 2026

Key: Chem. -Chemistry
Econ. - Economics
Eng. - English
Hist. - History
Micro.B. -Microbiology
Pol.Sci -Political Science

Copies of questionnaires were administered over a three-month period with the assistance of trained research assistants who adhered to established research ethics and data management procedures. Data were analysed using SPSS version 22. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to answer the research questions,. Out of the 841 copies of questionnaires distributed, 817 (97.15%) were returned, and 785 (93.34%) were valid for analysis, providing a high response rate suitable for statistical inference as validated by the study is higher than the submission of Evans, Peterson and Demark-Wahnefried (2004) in Dulle and Minish-Majanja and Cloete (2010) that 60% is acceptable standard for most research. Therefore, the result of the study could represent majority opinion of doctoral students in southwestern Nigeria.

Table 3.3 Response rate of respondents

S/No	University	Distributed N (%)	Returned N (%)	Usable N (%)
1	Adekunle Ajasin University (AAUA) Akungba-Akoko. Ondo	17	17	17
2	Ekiti State University (EKSU) Ado-Ekiti, Ekiti State.	21	19	19
3	Lagos State University, Lagos State. (LASU). Ojo, Lagos State.	37	37	37
4	Obafemi Awolowo University (OAU) Ile-Ife, Osun State.	170	165	163
5	Olabisi Onabanjo University. (OOU) Ago-Iwoye, Ogun.	35	31	31
6	Osun State University, Osun State. (OSU)	27	25	23
7	University of Ibadan, Ibadan, Oyo State U.I	311	303	290
8	University of Lagos, Akoka, Lagos State. (UNILAG), Akoka Lagos State	223	219	211
	Total	**841 (100)**	**817 (97.15)**	**785 (93.34)**

Source: Field work

RESULTS

This section presents the analysis of the research questions using frequency count, percentage, mean, standard deviation and test of norms.

Research question one: what is the frequency of use of digital library resources by doctoral students in public universities in Southwestern Nigeria?

To ascertain the respondents' response on the frequency of use of digital library resources, the doctoral students in public universities in Southwestern Nigeria were instructed to indicate their frequency of use of the resources with items that were developed as contained in the scale that was developed to measure the construct (Table 4).

Table 4 Frequency of use of digital library resources by doctoral students in public universities in Southwestern Nigeria

S/NO	Item	*Daily* N (%)	*Weekly* N (%)	*Twice a month* N (%)	*Monthly* N (%)	*Never* N (%)	MEAN $\bar{x}$	Std. Dev.	Remark
1	e-Manuscripts/e-Special collections	125 (15.9)	255 (32.5)	100 (12.7)	130 (16.6)	175 (22.3)	3.07	1.407	Agree
2	e-Projects/e-Theses/e-Dissertation	90 (11.5)	290 (36.9)	125 (15.9)	190 (24.2)	90 (11.5)	3.21	1.185	Agree
3	e-Reference materials such as Encyclopaedia, Dictionary	130 (16.6)	200 (25.5)	165 (21.0)	195 (24.8)	95 (12.1)	3.13	1.263	Agree
4	e-Newspapers, e-Magazines	185 (23.6)	185 (23.6)	160 (20.4)	130 (16.6)	125 (15.9)	3.18	1.410	Agree
5	e-Books	245	235	100	145	60 (7.6)	3.64	1.253	Agree

		(31.2)	(29.9)	(12.7)	(18.5)				
6	e-Institutional repository	90 (11.5)	180 (22.9)	125 (15.9)	195 (24.8)	195 (24.8)	2.80	1.343	Disagree
7	Library website content	120 (15.3)	155 (19.7)	170 (21.7)	160 (20.4)	180 (22.9)	2.83	1.384	Disagree
8	Library Wireless Fidelity (Wi-Fi)	130 (16.6)	150 (19.1)	105 (13.4)	150 (19.1)	250 (31.8)	2.75	1.484	Disagree
9	Online Public Access Catalog (OPAC)	105 (13.4)	150 (19.1)	140 (17.8)	170 (21.7)	220 (28.0)	2.72	1.396	Disagree
10	e-Journals	325 (41.4)	255 (32.5)	105 (13.4)	60 (7.6)	40 (5.1)	3.97	1.146	Agree
11	e-Databases	180 (22.9)	230 (29.3)	175 (22.3)	95 (12.1)	105 (13.4)	3.36	1.318	Agree

Decision criterion: A mean score of 3.00 and above indicates agreement, while a mean score below 3.00 indicates disagreement, the scale is coded from 1 (Never) to 5 (Daily).

Table 4 on the frequency of use of digital library resources in public universities in Southwestern Nigeria reveals that majority of the respondents use e-Journals daily ($\bar{x}$ =3.97; Std. Dev. = .1.484), followed by e-books daily ($\bar{x}$=3.64; Std. Dev. = .1.253). whereas, respondent use e-Databases weekly (x=3.36; Std. Dev. = 1.318) and also majority of the respondent use e-Projects/e-Theses/e-Dissertation weekly ($\bar{x}$=3.21; Std. Dev. = 1.185). however, the least used library digital library resources are Library website content were never used by ($\bar{x}$=2.83; Std. Dev. = 1.384), follow by e-Institutional repository was never used by respondents ($\bar{x}$=2.80; Std. Dev. = 1.343). Likewise, the substantial number of respondents never use Library Wireless Fidelity (Wi-Fi) ($\bar{x}$=2.75; Std. Dev. = 1.484) and lastly, the majority of the respondents never used Online Public Access Catalogue (OPAC) ($\bar{x}$=2.72; Std. Dev. = 1.396).

Research question two: what is the purpose of use of digital library resources by doctoral students in public universities in Southwestern Nigeria?

For the purpose of ascertaining the respondents' response on the purpose of use of digital library resources, the doctoral students in public universities in Southwestern Nigeria were instructed to indicate their agreement or disagreement with items that were developed as contained in the scale that was developed to measure the construct. The results were presented in Table 5.

Table 5: Purpose of use of digital library resources by doctoral students in public university in Southwestern Nigeria

Purpose of use of digital library resources

S/NO	Item	*Strongly Agree* N (%)	*Agree* N (%)	*Disagree* N (%)	*Strongly Disagree* N (%)	MEAN $\bar{x}$	Std. Dev	Decision
1	I use Digital library resources in searching for my thesis topic/title.	380 (48.4)	225 (28.7)	80 (10.2)	100 (12.7)	3.13	1.040	Accepted
2	I use Digital library resources in preparing for conference/Seminar/ workshop presentations.	450 (57.3)	250 (31.8)	35 (4.5)	50 (6.4)	3.40	.844	Accepted
3	I use Digital library resources for sourcing information for my journal article writing.	515 (65.6)	185 (23.6)	40 (5.1)	45 (5.7)	3.49	.835	Accepted
4	I use Digital library resources to prepare my thesis draft.	385 (49.0)	290 (36.9)	50 (6.4)	60 (7.6)	3.27	.886	Accepted
5	I use Digital library resources for personal development.	460 (58.6)	210 (26.8)	60 (7.6)	55 (7.0)	3.37	.898	Accepted
6	I use Digital library resources to develop my thesis proposal.	390 (49.7)	270 (34.4)	75 (9.6)	50 (6.4)	3.27	.879	Accepted

Decision rule for research: Any item with a mean score of 2.50 or above is accepted, while any item with a mean score below 2.50 is rejected, the response options are coded from 1 (Strongly Disagree) to 4 (Strongly Agree).

The Table 5 indicates the items on purpose of use of digital library resources use are significant as majority of the respondents agreed that they use digital library resources for sourcing information for their journal article writing ($\bar{x}$=3.49; Std. Dev. =.835), while they a substantial respondents who also agreed that they use digital library resources in preparing for conference/Seminar/ workshop presentations ($\bar{x}$=3.40; Std. Dev. =.844) and followed by the respondents who use digital library resources for personal development ($\bar{x}$=3.37; Std. Dev. =.898). though the least mean score on purpose of use of digital library resources was in searching for thesis topic/title ($\bar{x}$=3.13; Std. Dev. =.1.040).

Research question three: what are the challenges of use of digital library resources by doctoral students in public universities in Southwestern Nigeria?

With the aim of determining the respondents' response on challenges of use of digital library resources, the doctoral students in public universities in Southwestern Nigeria were instructed to indicate their agreement or disagreement with items that were developed as contained in the scale that was developed to measure the construct. The results were presented in Table 6.

Table 7: Challenges of use of digital library resources by doctoral students in public university in Southwestern Nigeria

Challenges of use of digital library resources								
S/NO	**Item**	***Strongly Agree*** **N (%)**	***Agree*** **N (%)**	***Disagree*** **N (%)**	***Strongly Disagree*** **N (%)**	**MEAN $\bar{x}$**	**Std. Dev**	**Decision**
1	Rapid obsolete of digital library resource software	100 (12.7)	300 (38.2)	275 (35.0)	110 (14.0)	2.50	.887	Accepted
2	Slow internet bandwidth to download digital library resource	255 (32.5)	315 (40.1)	150 (19.1)	65 (8.3)	2.97	.920	Accepted
3	Compatibility issue with mobile devices	145 (18.5)	285 (36.3)	265 (33.8)	90 (11.5)	2.62	.914	Accepted
4	Differences in the formats of digital library resources (PDF, Doc, HTML, Jpeg, epud)	175 (22.3)	280 (35.7)	235 (29.9)	95 (12.1)	2.68	.952	Accepted
5	Too many returns from search in digital library	190 (24.2)	285 (36.3)	235 (29.9)	75 (9.6)	2.75	.929	Accepted
6	Inadequate use of ICON (GUI, graphic) to represent command	90 (11.5)	230 (29.3)	315 (40.1)	150 (19.1)	2.33	.913	Rejected
7	The difference interface design of digital library	105 (13.4)	315 (40.1)	270 (34.4)	95 (12.1)	2.55	.871	Accepted
8	Complex Digital library resources language instruction	120 (15.3)	200 (25.5)	215 (27.4)	250 (31.8)	2.24	1.062	Rejected
9	my inadequate digital literacy skills affect my use of Digital library resources	115 (14.6)	185 (23.6)	185 (23.6)	300 (38.2)	2.15	1.088	Rejected

Decision rule for research: Any item with a mean score of 2.50 or above is accepted, while any item with a mean score below 2.50 is rejected, the response options are coded from 1 (Strongly Disagree) to 4 (Strongly Agree).

Table 7 reveals the challenges faced in the use of digital library resources by doctoral students in public universities in Southwestern Nigeria. A good number of the respondent agreed that slow internet bandwidth to download digital library resource was a major challenge ($\bar{x}$=2.97; std dev. =.920), followed by too many returns from search in digital library ($\bar{x}$ =2.75; std dev. =.929), also part of the challenges in use of digital library resources was that differences in the formats of digital library resources (PDF, Doc, HTML, Jpeg, epud) ($\bar{x}$=2.68; std dev. =.952). Furthermore, the respondents agreed that compatibility issue with mobile devices is a challenge ($\bar{x}$=2.62; std dev. =.914) alongside with rapid obsolete of digital library resource software ($\bar{x}$=2.50; std dev. =.887). However, the other challenges that were considered mild were inadequate use of ICON (GUI, graphic) to represent command ($\bar{x}$=2.33; std dev. =.913), in addition, the respondent strongly disagreed that they feel anxious when seeking information on digital library ($\bar{x}$=2.24; std dev. =1.062) and lastly ($\bar{x}$=2.15; std dev. =1.088) was the

respondent strongly disagreed that their inadequate digital literacy skills affect their use of digital library resources.

DISCUSSION OF FINDINGS

Frequency of use of digital library resources by doctoral students in public universities in Southwestern Nigeria

The findings indicate that doctoral students in public universities in Southwestern Nigeria frequently use digital library resources, particularly e-journals and e-books, which emerged as the most regularly accessed resources. Weekly use of electronic databases and electronic theses/dissertations further demonstrates the importance of scholarly digital resources in supporting doctoral research. These findings are consistent with earlier studies reporting high utilisation of e-journals, e-books, and other electronic resources among postgraduate students (Uwandu, 2022; Shibin, 2020; Joel et al., 2020). Similarly, Leonard (2017) observed that the portability and accessibility of e-books enhanced their adoption among postgraduate students. However, the study also revealed comparatively low utilisation of library website content, institutional repositories, library Wi-Fi, and the Online Public Access Catalogue (OPAC). This pattern contrasts with the findings of Sejane (2017), who reported lower use of e-journals and electronic databases in academic libraries in Lesotho. The underutilisation of institutional repositories and library-based digital services may reflect inadequate awareness, limited information literacy, or insufficient user training. Overall, the findings suggest that while doctoral students rely heavily on core scholarly electronic resources, greater efforts are needed to promote awareness and effective use of institution-specific digital library services..

Purpose of use of digital library resources by doctoral students in public universities in Southwestern Nigeria

The findings revealed that doctoral students primarily use digital library resources for journal article writing, preparation for conferences, seminars, and workshops, and personal development. These findings indicate that digital library resources are perceived as essential tools for supporting scholarly communication, research productivity, and professional development. The prominence of journal article writing as the principal purpose highlights the central role of digital resources in facilitating research and publication activities among doctoral students. The findings are consistent with previous studies, which reported that postgraduate students predominantly utilise digital library resources for research, thesis preparation, academic writing, conference presentations, and professional development (Sarman et al.,

2018; Oghenetega, 2013; Song & Song, 2017; Biradar et al., 2017). However, the study also found that doctoral students rarely used digital library resources for identifying thesis topics or research titles, suggesting limited awareness of the potential of these resources during the initial stages of the research process. This underscores the need for information literacy programmes that promote the effective use of digital library resources throughout the entire doctoral research lifecycle, from topic selection to research dissemination.

Challenges of use of digital library resources by doctoral students in public universities in Southwestern Nigeria

The findings revealed that although doctoral students generally perceived the challenges associated with using digital library resources as manageable, several barriers significantly affected effective utilisation. The most prominent challenge was slow internet bandwidth, followed by information overload from search results, differences in digital resource formats, compatibility issues with mobile devices, and the rapid obsolescence of digital library software. These challenges impede timely access to and efficient use of digital scholarly resources. The findings are consistent with previous studies identifying slow internet connectivity, bandwidth limitations, and digital platform design as major constraints to effective digital library use (Khan & Ahmed, 2013; Sejane, 2017; Mole & Edewor, 2020; O'Reilly, 2020; Anyaoku et al., 2019; Kalisdha & Suresh, 2017; Lusigi, 2019; Abdul Rahman & Mohezar, 2020; Dongardive, 2020). Additional concerns, including inadequate graphical user interfaces, information-seeking anxiety, and insufficient digital literacy skills, were reported but perceived as less severe. Overall, the findings suggest that improving internet infrastructure, enhancing the usability and compatibility of digital library platforms, and strengthening users' digital literacy through awareness and training programmes would substantially improve the utilisation of digital library resources among doctoral students.

CONCLUSION

In the initial conception, through reading and observation of the usage of digital library resources, it was discovered that the rate of utilisation among doctoral students was low. The existing literature, predating the empirical investigation of this study, supported this assertion. However, empirical investigation revealed that doctoral students in public universities in Southwestern Nigeria frequently employ e-journals and e-books in their research, yet they rarely utilise the library website, OPAC, and e-institutional

repository. Additionally, the purposes for using digital library resources included journal article writing, preparation for conference/seminar/workshop presentations, and personal development. However, they neglected the use of digital library resources for searching thesis topics/titles. Furthermore, in the use of digital library resources, the doctoral students highlighted challenges such as slow internet bandwidth for downloading, excessive returns from searches in the digital library environment, differences in formats of digital library resources, compatibility issues with mobile devices, and the rapid obsolescence of digital library resource software.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made:

1. University libraries should organise regular user education programmes to improve doctoral students' awareness and utilisation of digital library resources, particularly OPAC, institutional repositories, library Wi-Fi, and artificial intelligence tools.
2. Postgraduate schools, research supervisors, and librarians should integrate digital information literacy training into doctoral orientation, research methodology courses, and postgraduate seminars.
4. University management should strengthen digital infrastructure by improving internet connectivity, adopting mobile-responsive platforms, and ensuring regular software maintenance and upgrades.
5. Academic librarians, database vendors, and system developers should improve digital library usability through simplified interfaces, enhanced search functionalities, appropriate integration of artificial intelligence and machine learning tools, and advanced search skills training.

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