Digital skills, access, and ease-of-use of open source library management software among university librarians in north-central Nigeria

Abubakar Aliyu Ango
Ibrahim Badamasi Babangida University, Nigeria
aaaliyu@ibbu.edu.ng
ORCID 0000-0003-4606-0511

Abstract

Rationale of Study – The study assessed digital skills, access, and ease of use of open management software among university librarians in North-Central Nigeria.

Methodology – Employing a descriptive survey research design, the study covered a population of 301 librarians and utilised the total enumeration sampling technique. Data collection involved a structured questionnaire. Analysis methods such as frequency counts, mean values, and standard deviation calculations were used to answer the research questions, setting 2.50 as the criterion mean.

Findings – The findings established that university libraries use open-source library management software with high ease of use, that librarians in university libraries in North-Central Nigeria possess high digital skills, and that they have high access to open-source library management software.

Implications – The paper recommended that library management needs enhanced training programs tailored to equip librarians with advanced digital skills and the ability to curate digital collections effectively through seminars, workshops, and conferences. Furthermore, librarians, library associations, and stakeholders should advocate for increased library funding, emphasising the critical role that modern library technologies like OSLMS play in enhancing education and research. Additionally, there is a need to continue upgrading the hardware and software to perform tasks effectively, safely, and efficiently, engaging error tolerance and making it easy to use.

Originality – The study was original research conducted on digital skills, access and ease of use of open-source library management software among university libraries in North-Central Nigeria.

Keywords

Integrated Library Systems, Software Adoption, Usability, Open Source Library Management Software (OSLMS), Academic Libraries, Librarianship in Nigeria

1 Introduction

As integral academic units, university libraries play a significant role in supporting teaching, learning, and research endeavours by providing information resources in various formats. Their mandate includes acquiring, processing, organising, disseminating, and providing access to information across diverse fields of human knowledge (Onah et al., 2020). University libraries are often likened to "lighthouses of information dissemination," serving as central hubs for exploring vast information resources (Godwin, 2021).

Open Source Library Management Software (OSLMS) has emerged as a preferred option for libraries due to its accessibility, flexibility, and interoperability with other applications. Unlike proprietary systems, OSLMS allows users to access, modify, and redistribute the source code freely (Randhawa, 2018). Its adoption provides libraries with cost-effective solutions and greater control over their operational environments (Tella et al., 2021). Integrated Library Systems (ILS) based on open-source software, such as OSLMS, have become prevalent in library automation. These systems, including modules for acquisitions, circulation, cataloguing, and online public access catalogue (OPAC), enhance library operations and the user experience (Kohn & McCloy, 2010; Tella et al., 2021).

Adopting OSLMS in libraries, especially in developing countries like Nigeria, aims to enhance efficiency and service delivery. However, challenges such as digital skills and access to technology thwart effective utilisation. Librarians require various digital skills to effectively manage library technology infrastructures and online resources. Additionally, access to reliable internet connectivity, adequate computer systems, and technical training are essential for maximising the benefits of OSLMS (Seena & Pillai, 2014; Sejane, 2017).

Despite the potential benefits, adopting OSLMS in Africa faces challenges such as inadequate infrastructure, low bandwidth, and limited technical expertise among librarians. Ensuring access to OSLMS requires addressing these technical and infrastructural barriers (Okiki & Asiru, 2011; Njoku & Ravichandran, 2017). Investigating digital skills, access, and ease of use of open-source library software in Nigerian university libraries, particularly in the North Central region, is crucial for understanding and addressing these challenges.

Open Source Library Management Software (OSLMS) allows librarians to automate their library routines, improve data accuracy, and optimise workflows. Despite its numerous benefits, many Nigerian university libraries still rely on manual practices, particularly in the North-Central region. Insufficient access to OSLMS and inadequate digital skills among library staff are the likely reasons for this lack of adoption. Consequently, there is a need

for an empirical study to investigate the impact of digital skills and access on the ease of OSLMS usage by librarians in North-Central Nigeria. To achieve the foregoing objectives, the following research questions were raised to guide the study:

a) What digital skills do librarians possess regarding the ease of use of open-source library management software in university libraries?

b) To what extent do librarians access open-source library management software in university libraries?

c) What is the ease of use of open-source software library management by librarians working in university libraries?

2 Literature review

Digital or Information and Communication Technology (ICT) is seen as the combination of computer and telecommunication technology. At the same time, the capacity to acquire new knowledge and improve existing abilities is referred to as skills (Tetteh, 2019). Digital skills are considered necessary for OSLMS to perform routine professional work in libraries. Digital skill enables librarians to utilise digital information resources at work successfully. This includes using computer and telecommunication technology to perform routine professional tasks, specifically to perform automated activities and provide ICT-based services (Ango & Ogbomo, 2024).

Digital skills include a variety of components, including typing skills, intellectual prowess, creativity, knowledge building and evaluation, and effective use of digital media. When a reader is exposed to print and digital literature, various brain functions are engaged across a continuous spectrum. According to Paul et al. (2017), these intellectual activities sum up to digital literacy include (a) finding and using digital content – which means the ability of a user to be able to use and find the needed resources on the system used, (b) producing digital content - which means the ability of users being able to produce or reproduce content, and capable of modifying or manipulating digital content when required, and (c) sharing digital content – defining the ability of users being capable to share, store communicate or transfer information on the system used. Librarians with digital skills will be able to interact with the library management systems, either open-source or closed-source, and to provide the numerous information services rendered by libraries on those platforms.

According to Seena and Pillai (2014), essential digital skills for librarians include metadata creation, Photoshop, installation and management of library software, institutional repository creation, library consortium management, library networking, barcode and radio-frequency identification (RFID) technology, and website design. Mastery of these skills is crucial for librarians to oversee library technology infrastructures effectively, utilise open-source library management software, and manage online resources. Librarians also require these digital skills to make informed decisions regarding technology adoption, as Izuagbe et al. (2019) emphasised. Hence, librarians need to possess digital competencies, encompassing resource sharing, digital preservation and repositories, utilisation of social networking platforms, internet search capabilities, instant messaging proficiency, blogging skills, and other digital-oriented activities.

Access to OSLMS, to a large extent, means gaining entry to use OSLMS. This is because when open-source library management software is available with limited access, the purpose for which it was acquired will be defeated. Access is a general term used to describe the degree to which resources, services, or product is used by as many people as possible. One can interpret it as the capacity to utilise OSLMS with minimal or no strain. Accessibility to OSLMS could be achieved where there is reliable internet access, an adequate power supply, the availability of functional computer systems, and the technical know-how of librarians and users of the OSLMS in the library (Sejane, 2017).

Johnson et al. (2012) and Sejane (2017) defined access as the practical delivery of instructions and methods concerning e-resources, ensuring the adequacy of internet connections and hardware and software technology, and providing librarians with guidance on effectively using these library materials. The provision of electronic resources can manifest through diverse mediums, including Hyper-Text Markup Language (HTML), Portable Document Format (PDF) files, and via different download or Inter-Library Loan (ILL) channels. The methods of accessing electronic materials, including in-library connections, proxy servers, link servers, and virtual access, ensure users can utilise the electronic information to which they are entitled (Amollo, 2011; Sejane, 2017).

The Internet is a global network of interconnected telecommunication networks, enabling the interaction of linked information systems and their users. It achieves this by managing its traffic through a unified system of addressing, identifying, naming and numbering protocols and procedures outlined by Internet standards (Russian Federation, 2012; Makori, 2015). The Internet is the most instrumental and potent tool in advancing

librarians' access to and utilisation of OSLMS. Even though OSLMS are accessible and offer educational advantages, several factors impede their efficient utilisation in Africa. Studies indicate that these include insufficient infrastructure, limited bandwidth, deficient search capabilities, underfunding of universities, expensive information technology equipment, fluctuating foreign exchange rates, and inadequate telecommunication infrastructures (Okiki & Asiru, 2011; Sejane, 2017).

Arif and Mahmood (2012) highlighted the necessity of having a sufficient number of computers with appropriate specifications as enabling factors crucial for successfully implementing modern Web 2.0 products like web-based OSLMS. Thompson and Pwadura (2014) emphasised the importance of ample computer supply for efficient OSLMS utilisation. Adeleke (2017) also identified the cost and the availability of suitable hardware and software as essential prerequisites for the successful deployment of OSLMS. When implementing an OSLMS with e-book functionality, it becomes imperative for hardware components, particularly servers, to possess larger storage capacities to facilitate quick and seamless access to the OSLMS. Additionally, verifying the compatibility of hardware peripherals, such as barcode scanners, with the designated software is critical before initiating the OSLMS project. Failure to ensure compatibility could lead to frustration among library staff, impeding access to and utilisation of the system. As a result, the availability of appropriate hardware is a critical enabling condition for ensuring the effective and sustainable use of an OSLMS.

Increasing technological advancement threatens long-standing corporations, firms, and organisations worldwide, resulting in fierce competition to secure, retain, and better serve customers. This presents opportunities for new service options. Leading companies now try to leverage the development of information technology to improve their services. Lai (2016) stated that how quickly customers adopt new technologies depends on various variables, including the accessibility of the technology, consumer comfort, consumer demand, and user security, which all revolve around the "ease of use" of these technologies.

Ease-of-use is an essential concept that refers to how easily users interact with products. It is a common concept used to address the simplicity and convenience with which a certain system or software can be engaged and interacted. In their study, Camilleri and Camilleri (2019) stated that ease-of-use is the term used to describe users' perspectives on how much a system or software is free of effort when used. Furthermore, when users discover that the new technology introduced is challenging to comprehend and interact

with, it is pretty likely that they will reject the technology or system. Users consider a system or new software not easy to use if they consider it difficult, tiresome, or time-consuming. Moreover, they will not be effective and efficient when utilising it because they might be uncomfortable, wary, or even afraid of the new system. This shows how crucial ease of use is when developing software that consumers will interact with.

Open-source software like Koha represents a robust and promising option for integrated library systems (ILS) worldwide. It encompasses various functions crucial for library management, including payroll, expenses, purchases, and, most significantly, tracking the media borrowed by patrons (Tetteh, 2019). According to Reddy and Kumar (2013) and Tetteh (2019), open-source software is characterised by its user-friendly interface for staff and patrons, facilitating smooth operations and management. It offers intuitive navigation and grants extensive permissions to users and staff accounts. Furthermore, the supportive community, accessible through wikis, forums, and listservs, efficiently addresses users' concerns at a reduced cost. The open-source software development adheres to open standards, enhancing adaptability and interoperability, further streamlining operations and management for users and staff.

Libraries leverage library management software for a multitude of functions, including book and serial control, classification and cataloguing, reference services, circulation services, interlibrary loan, document delivery services, electronic content management, email and chat assistance, bibliographic services, photocopy services, and more. These capabilities facilitate rapid information access for users and extend benefits to remote libraries (Bashorun et al., 2021). As highlighted by Bashorun et al. (2021), the myriad advantages offered by library management software have led to its recognition as Integrated Library Software (ILS) within the library management domain.

3 Methodology

The study employed a descriptive research design, specifically a descriptive survey design, chosen for its ability to collect detailed data that reflects the characteristics of a larger population. This design enabled a structured questionnaire to systematically gather quantitative data on the study constructs. The research targeted a population of 301 librarians from federal and state universities in North-Central Nigeria, using a total enumeration (census) sampling method to ensure comprehensive data collection. Despite OSLMS being an established technology, there is an urgent need to study its use in North-Central Nigeria due to the region's digital divide, variable adoption rates, evolving academic

needs, and unique socioeconomic and cultural factors that affect technology utilisation in university libraries. A self-developed questionnaire was used as the primary instrument and divided into three sections: Section A focused on digital skills, Section B on access, and Section C on the ease of use of Open Source Library Management Software (OSLMS). The questionnaire utilised a Likert scale with numerical values: 4 = Very High (VH), 3 = High (H), 2 = Low (L), and 1 = Very Low (VL). The researcher and trained research assistants distributed the questionnaires to respondents over six weeks to facilitate data collection. The instrument's reliability was confirmed through Cronbach's alpha, yielding a coefficient of 0.81, indicating satisfactory internal consistency. Data analysis was conducted using descriptive statistics, including frequency counts, percentages, means, and standard deviations, with the Statistical Package for Social Sciences (SPSS) software. A mean score below 2.50 was considered negative, while one above 2.50 was considered positive. The research adhered to stringent ethical guidelines, securing approval from the institution and obtaining full informed consent from all participants while strictly maintaining confidentiality and anonymity. Of 301 distributed questionnaires, 290 were returned, resulting in a high response rate of 96%.

4 Findings of the study

The study's findings have been presented hereunder according to the three specific research questions that guided the study.

Research Question 1: What digital skills do librarians possess regarding the ease of use of open-source library management software in university libraries in North-Central Nigeria?

Table 1: Librarians' level of possession of digital skills

Statements	Very High	High	Low	Very Low	Mean	Std.
I am proficient in all Microsoft Office applications.	182	100	5	3	3.59	.58
I can plan and create appropriate queries and search terms or combinations of keywords or concepts.	154	113	11	12	3.41	.75
I have database search skills	163	104	15	8	3.46	.72
I can manage and design databases	129	130	17	14	3.29	.78
I know how to locate information in e-resources.	183	102	3	2	3.61	.55
I can use open-source software	178	99	8	5	3.55	.64

I understand the terminologies used in open-source library management software.	125	129	19	17	3.25	.82
I have the capability of sending and receiving emails	171	107	12	0	3.55	.58
Skills in using computers, the Internet and communication networks to handle	128	132	17	13	3.29	.77
I can store information on devices such as flash drive and diskette	166	108	10	6	3.50	.67
I have Metadata development skills	103	148	24	15	3.17	.79
I can access online resources using open-source library management software.	163	116	6	5	3.51	.63
I have library website development skills	108	150	22	10	3.23	.73
I can create different file formats (PDF, gif, jpeg, and bitmap)	92	174	18	6	3.21	.65
I know how to download files/resources from open-source library management software.	157	117	11	5	3.47	.66
I can use Boolean operations (OR, AND, NOT).	160	114	11	5	3.48	.66
I know how to use the author/title or subject search for electronic catalogue (OPAC) search	201	86	2	1	3.68	.50
I can use different search engines such as Google, Yahoo, Google Scholar, and Alta Vista.	194	90	3	3	3.64	.56
I know data security by keeping a backup of digital contents	134	141	10	5	3.39	.64
I can apply new technologies to library services	174	108	6	2	3.57	.57
I have knowledge of network and system security	100	145	24	21	3.12	.84
I have competencies in building digital collections	134	128	21	7	3.34	.72
I can use cloud computing in the library	122	132	30	6	3.28	.73
I can work with integrated library management systems	172	106	6	6	3.53	.65
Aggregate Mean					**3.42**	**.67**
Criterion Mean					**2.50**	

Table 1 indicates that librarians' skills in using open-source library management software are high. This is because the average mean of 3.42 (std. = .67) is greater than the criterion mean of 2.50. Thus, a conclusion can be drawn that librarians in North-Central Nigeria have a high level of digital skills.

Research Question 2: To what extent do librarians access open-source library management software in university libraries in North-Central Nigeria?

Table 2: Extent to which librarians access open-source library management software

Access to OSLMS	Very High	High	Low	Very Low	Mean	Std
Availability of computer hardware and software	173	96	11	10	3.49	.73
Password	178	97	6	9	3.53	.69
Availability of open-source library management software	184	91	10	5	3.57	.65
Availability of networking infrastructure and facilities	155	109	17	9	3.41	.74
Availability of reliable power supply	153	115	13	9	3.42	.72
Operational retrieval skill of librarians	180	94	8	8	3.54	.69
Awareness of the concepts of OSLMS for library management software	177	90	13	10	3.50	.74
Access is made available at the mercy of the institutional policies	192	79	10	9	3.57	.71
Availability of Internet services	204	75	9	2	3.66	.57
High-Capacity server machine	184	94	11	1	3.59	.58
Dedicated Bandwidth	184	93	10	3	3.58	.61
Aggregate Mean					**3.53**	**.68**
Criterion Mean					**2.50**	

Table 2 shows that with an aggregate mean of 3.53(Std.= .68) greater than the criterion mean of 2.50, it can be concluded that the extent to which librarians access OSLMS in university libraries in North-Central Nigeria is high. The majority of the respondents appear to feel that librarians have access to OSLMS with the aid of the availability of Internet services, high-capacity server machines, dedicated bandwidth, availability of open source library management software, availability of institutional policies, operational digital

skills of librarians, passwords, awareness of the concepts of OSLMS for library management software, availability of computer hardware and software, availability of reliable power supply, and availability of networking infrastructure and facilities. Overall, the aggregated average score of 3.53 reveals that librarians have high access to open-source library management software.

Research Question 3: What is the ease of use of open-source software library management by librarians in university libraries in North-Central Nigeria?

Table 3: Ease-of-use of open-source library management software

Statements	Very High	High	Low	Very Low	Mean	Std.
It is easy to use the cataloguing module for cataloguing library information resources	147	112	18	13	3.36	.79
It is easy to search for books and library materials	143	107	23	17	3.30	.85
It is easy to import/export data	141	144	3	2	3.46	.56
It is easy to order for books and library materials	166	107	10	7	3.49	.68
It is easy to receive new arrivals in the library	143	125	13	9	3.39	.72
It is easy to keep track of the materials purchased	151	117	14	8	3.42	.71
It is easy to index library materials	100	150	21	19	3.14	.81
It is easy to use the circulation module for charging and discharging information resources	159	92	20	19	3.35	.87
It is easy to use the patron module to register library patrons	135	128	15	12	3.33	.76
It is easy to charge overdue	160	116	9	5	3.49	.65
It is easy to access the Web-based OPAC system	159	114	12	5	3.47	.66
It is easy to use the OPAC module to search and retrieve information	186	84	12	8	3.54	.71

It is easy to generate and print barcodes/accession numbers	156	105	15	14	3.39	.80
It is easy to use the circulation module to prepare circulation reports/library stock management	183	92	10	5	3.56	.65
It is easy to Email and/or text patron's overdue and other notices	156	103	17	14	3.38	.80
It is easy for serial control and management	129	112	20	19	3.24	.85
It is easy to use the administration module to prepare reports on book processing and service provision	162	114	8	6	3.49	.66
It is easy for reference services	97	135	34	24	3.05	.88
It is easy for inter-library loan	78	144	40	28	2.94	.89
It is easy for database backup	140	126	16	8	3.37	.72
Aggregate Mean					**3.36**	**.75**
Criterion Mean					**2.50**	

From Table 3, the aggregate mean score of 3.36 is greater than the criterion mean of 2.50; hence, it is concluded that OSLMS is very easy to use in North-Central Universities' libraries.

5 Discussion of findings

One of the findings revealed that librarians in North-Central Nigeria exhibit high digital skills in using open-source library management software (OSLMS). This proficiency suggests that changes in their digital knowledge of OSLMS can directly impact their software usage. This finding resonates with Tiemo's (2019) observation on the high level of digital technology skills among library personnel in Nigerian academic libraries. Additionally, Baro et al. (2019) confirmed that librarians in university libraries across Africa exhibit high digital skills. Librarians reported high proficiency in various digital skills, including database searches, document uploads to online platforms, social media usage, email communication, digital library development, technology integration in library

services, and file format creation, highlighting their adeptness in utilising open-source software.

The results indicate that librarians in North-Central Nigeria have high access to open-source library management software (OSLMS). This access encompasses various components such as Internet services, server machines, bandwidth, OSLMS itself, institutional policies, operational digital skills of librarians, passwords, awareness of OSLMS concepts, hardware and software, reliable power supply, and networking infrastructure and facilities. This finding aligns with the Ango and Akporhonor (2024) study, which found that librarians' access to OSLMS in university libraries in North-Central Nigeria is notably high. The study indicates that librarians in this region have substantial access to these digital systems, which are essential for managing library resources, supporting academic research, and enhancing information retrieval processes. This implies that university libraries in North-Central Nigeria are well-equipped with OSLMS, enabling librarians to effectively perform their roles and contribute to the academic community through efficient management and dissemination of scholarly information. Additionally, it supports the observations of Stieninger and Nedbal (2014), who emphasised the technical requirements, including computers, network connectivity, bandwidth, and system accessories, needed to facilitate access to OSLMS. These findings posited the importance of providing comprehensive support services to ensure the effective and efficient utilisation of OSLMS.

Another significant finding indicates that the ease of use of OSLMS in university libraries across North-Central Nigeria is notably high. This finding aligns with the observations of Lubua (2019), who emphasised that the ease of use of open-source library management systems is high due to their development process, which incorporates input from the library professionals who use them., aligning with the perspective of Oyovwe-Tinuoye and Omosekejimi's (2022) on the increased usability, stability, and acceptability of OSLMS in academic libraries. Additionally, the study's results are supported by Ango and Ogbomo (2024), who stated that there is a high ease-of-use of Open Source Library Management Software (OSLMS) in university libraries in North-Central Nigeria. Furthermore, the findings align with Oyovwe-Tinuoye and Omosekejimi's (2022) assertion regarding the advantages of utilising Integrated Library Systems (ILS) in libraries, including simplicity, increased engagement, efficient data management, security, scalability, mobile accessibility, dynamic reporting, error prevention, innovation, and cost-effectiveness.

6 Conclusion

The study investigated digital skills, access, and ease of use of OSLMS among university librarians in North-Central Nigeria. It found that university librarians possess high digital skills, enabling them to utilise OSLMS effectively. Additionally, they have ample access to OSLMS, primarily utilising platforms such as KOHA, Evergreen, and NewGenLIb for various library services, including circulation, acquisition, and cataloguing systems. Librarians reported high ease of use with OSLMS, with their digital skills and access significantly influencing this ease of use. Therefore, the study concludes that university librarians in North-Central Nigeria have high digital skills and access to and ease of use of open-source library management software.

7 Recommendations

The proposed recommendations are based on the study's findings:

- Despite high levels of digital skills, librarians should engage in continuous professional development. Regular training programs, workshops, and seminars on the latest advancements in digital technologies and OSLMS should be organised. This will help librarians stay updated on new features and best practices, ensuring they maintain their high level of proficiency.

- Libraries should regularly update their software and hardware to maintain ease of use and efficiency. Keeping up with the latest versions of OSLMS and ensuring that the hardware meets the required specifications will reduce technical issues and improve the overall user experience.

- Although ease of use is currently high, there is always room for improvement in making systems more intuitive and accessible. Libraries should continue refining their digital tools' design and interface based on user-centred design principles to cater to diverse user needs, including those with disabilities.

References

Adeleke, O. (2017). *An Investigation of the extent of automation of public libraries in South West Nigeria.* (Unpublished PhD dissertation) University of KwaZulu-Natal, South Africa.

Amollo, B. A. (2011, November 14–18). *Digitisation for libraries in Kenya.* Paper presented at the 2nd International Conference on African Digital Libraries and Archives (ICADLA-2), University of Witwatersrand, Johannesburg, South Africa. https://wiredspace.wits.ac.za/server/api/core/bitstreams/ce9f4a09-abfa-45be-aba9-21ae56dee2cd/content

Ango, A. A., & Akporhonor, B. A. (2024). Access and ease of use of open source library management software by librarians in university libraries in North-Central Nigeria. *Communicate: Journal of Library and Information Science, 26*(1), 139 – 148. https://www.cjolis.org/index.php/cjolis/article/view/82

Ango, A. A., & Ogbomo, M. O. (2024). Librarian's digital skills and ease-of-use of open source library management software in North-Central Nigerian libraries. *UNIJOS Journal of Contemporary Studies in Education (UJOSCE), 1*(2), 279 – 288.

Arif, M., & Mahmood, K. (2012). The changing role of librarians in the digital world: Adoption of Web 2.0 technologies by Pakistani librarians. *The Electronic Library*, *30*(4), 469-479.

Baro, E. E., Obaro, O. G., & Aduba, E. D. (2019). An assessment of digital literacy skills and knowledge-based competencies among librarians working in university libraries in Africa. *Digital Library Perspectives, 35*(3/4), 172–192.

Bashorun, M. T., Ajani, Y. A., & Idogun-Omogbai, E. K. (2021). Adoption and use of library management software by Professional librarians in selected university libraries in Nigeria: Using adapted Technology Acceptance Model. *FUDMA Journal of Educational Foundations (FUJEF), 4*(1), 156–169.

Camilleri, A. C., & Camilleri, M. A. (2019). The Students' Perceived Use, Ease-of-use and Enjoyment of Educational Games at Home and at School. *13th Annual International Technology, Education and Development Conference. Valencia, Spain (March 2019). International Academy of Technology, Education and Development (IATED).*

Godwin, M. E. (2021). Application of Internet services for effective service delivery in university libraries in Plateau State, Nigeria. *International Journal of Research and Innovation in Social Science (IJRISS), 5*(2), 445–450. https://rsisinternational.org/journals/ijriss/Digital-Library/volume-5-issue-2/445-450.pdf

Izuagbe, R., Nurudeen, A. I., Lilofa, O. O., Olajumoke, R. O., Nwanne, M. N., Promise, I. I., & Odaro, O. (2019). Effect of perceived ease-of-use on librarians' e-skills: Basis for library technology acceptance intention. *Library and Information Science Research.*

Johnson, S., Evensen, O. G., Gelgand, J., Lammers, G., Sipe, L., & Zilper, N. (2012). *Key issues for e-resources collection development: a guide for libraries.* The Hage Netherlands: IFLA.

Kohn, K., & McCloy, E. (2010). Phased migration to Koha: Our library's experience. *Journal of Web Librarianship, pp. 4*, 427–434.

Lai, P. C. (2016). Design and Security impact on consumers' intention to use single platform E-payment. *Interdisciplinary Information Sciences*, *22*(1), 111–122.

Lubua, E. W. (2019). Addressing students' poor performance through blended learning. *The Information Technologist, 16*(1), 137–147.

Makori, E. O. (2015). Micro factors influencing use of electronic information resources among postgraduate students in institutions of higher learning in Kenya. *Library Hi Tech News, 32*(1), 18-21.

Njoku, I. S., & Ravichandran, R. (2017). Use of open source technology for effective academic library services in Nigeria. *Library Philosophy and Practice (e-journal), 1686.* https://digitalcommons.unl.edu/libphilprac/1686

Okiki, O. C., & Asiru, S. M. (2011). Use of electronic information sources by postgraduate students in Nigeria: influencing factors. *Library Philosophy and Practice (e-journal).* http://www.digitalcommons.unl.edu/libphilprac/500

Onah, J. C., Adayi, I. O., Okonkwo, E. A., & Onyebuchi, G. U. (2020). Information retrieval skills as it correlates to undergraduate use of library information resources at a Nigerian university. Library Philosophy and Practice (e-journal), 4586. https://digitalcommons. unl.edu/libphilprac/4586

Oyovwe-Tinuoye, G. O., & Omosekejimi, A. F. (2022). User perception of the use of library softwares for service delivery in federal university libraries in Niger Delta, Nigeria. Library Philosophy and Practice (e-journal). 6856. https://digitalcommons.unl.edu/libphilprac/6856

Paul, M. C., Spires, H., & Kerkhoff, S. (2017). Digital Literacy for the 21st Century. *Encyclopaedia of Information Science and Technology.*

Randhawa, S. (2018). *Open source software and libraries.* http://eprints.rclis.org/13172/1/ Open_Source_Software_and_Libraries.pdf

Reddy, R. T., & Kumar, K. (2013). Open source software's and their impact on library and information centre: An overview. *International Journal of Library and Information Science, 5*(4), 90–96. DOI: 10.5897/IJLIS12.038

Russian Federation. (2012). *World Conference on International Telecommunications (WCIT)* held in Dubai, United Arab Emirates, 3-14 December. Document *27*(1) (e-journal). http://www.itu/en/wcit-12/pages/itrs.aspx

Seena, S. T., & Pillai, S. K. G. (2014). A study of ICT skills among library professionals in the Kerala university library system. *Journal of Library and Information Studies, 61*(2), 132-141. http://nopr.niscair.res.in/handle/123456789/29034

Sejane, L. (2017). *Access to and use of electronic information resources in the academic libraries of the Lesotho Library Consortium.* (Unpublished PhD Thesis) University of KwaZulu-Natal, Pietermaritzburg, South Africa.

Stieninger, M., & Nedbal, D. (2014). *Diffusion and acceptance of cloud computing in SMEs: towards a valence model of relevant factors.* In Proceedings of the 47th Hawaii International Conference on System Sciences (3307-3316). IEEE.

Tella, A., Edwaed, I., Akanbi-Ademolake, H. B., & Akande, S. O. (2021). Perception, use and effectiveness of open source library systems by academic librarians in selected tertiary institutions in Kwara State, Nigeria. *The Journal of Academic Librarianship, 47*(2), 1-11.

Tetteh, C. F. (2019). *Use of open sources software in academic libraries in Ghana: A case study of Sam Jonah Library, University of Cape Coast.* (Unpublished M. A. Thesis). Sam Jonah Library, University of Cape Coast, South Africa.

Thompson, E. S., & Pwadura, J. (2014). Library automation at the University for Development Studies: Challenges and prospects. *New Review of Academic Librarianship*, *20*(1), 66-77.

Tiemo, P. A. (2019). Digital technology training among library personnel for effective management of online resources and services in Federal University. *International Journal of Applied Technologies in Library and Information Management 5*(1), 82–93.