Librarians' Technology Literacy Skills with the Use of Electronic Information Resources for Research Activities in University Libraries: A Correlational Study

Nse Emmanuel Akwang [a*] and Inemesit Udom Udoh [a]

[a] *University Library, Akwa Ibom State University, Ikot Akpaden, Nigeria.*

Authors' contributions

This work was carried out in collaboration between both authors. Author IUU designed the study and wrote the first draft. Author NEA managed literature search and analysis of the study. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

This study examines the correlation between librarians' technology literacy skills as with the use of electronic information resources for research activities in university libraries. The study adopted a correlational research design, with a population of eighty-four (84) librarians, comprising ten (10) University Librarians, and 74 Heads of Divisions/Units from ten (10) public university libraries in South-East Nigeria. A full population survey was conducted in this study. Two (2) sets of researcher-administered questionnaire with a 4-point rating scale for the independent and correlating dependent variable were used to elicit data for the study. The instruments were

_____

Corresponding author: Email: nseakwang@aksu.edu.ng;

subjected to face validation, and tested for reliability coefficient using Cronbach's alpha reliability formula. The pre-test analysis yielded a reliability coefficient of 0.94 for the independent variables and 0.91 for the corresponding dependent variables. From the distribution of the questionnaire to the 84 respondents, a response rate of 90% representing 74 copies were successfully completed and collated for the analysis. The data collected were analysed using Pearson's Product Moment Correlation Coefficient (PPMCC) to answer the research questions while Simple Regression Statistics were used to test the null hypotheses at 0.05 level of significance. The study revealed that while librarians' online search skills had strong positive significant relationships with the use of electronic information resources for research activities in public university libraries in South-East, Nigeria, Web 2.0 and librarians' online collaboration skills had a weak relationship. Thus, the study recommended that management of public universities should provide more funds to university libraries to facilitate subscription to more electronic information resources, internet services, and other associated facilities for enhanced research activities, while librarians should take advantage of online collaboration training opportunities to acquire and/or improve on their research skills.

1. INTRODUCTION

University libraries occupy a very prominent position in the life of any university system across the globe. They characteristically exist to promote teaching, learning, research and intellectual development by providing relevant information resources, including electronic information resources for their teeming and knowledge-hungering users. The university libraries as strategic players in the attainment of the vision, mission and objectives of the universities are manned by librarians, who are responsible for the day-to-day functioning of the university libraries. Librarians are considered as the bibliographical officers and drivers of the vision and mission of the university libraries [1]. They carry out professional and intellectual responsibilities for the realization of the goals of their institutions and fulfillment of the educational, recreational, socio-cultural, and research needs of library patrons. Therefore, to effectively function as the drivers of the vision and mission of the modern-day university libraries, librarians are expected to possess high level of knowledge, skills, and competencies including sound technology literacy skills suitable for contemporary library practices and environment.

Accordingly, technology literacy skills refer to a set of skills for use in technologies such as word processing, presentation programmes, spreadsheets, conducting basic operation of computers, electronic mail systems, use of social media, use of smart phones, cloud computing as well as in using the Internet for conducting search and sharing information [2]. Similarly, technology literacy skills are considered as the practical knowledge, abilities, competencies, attitudes and behaviours to use in technological devices such as computers, smart phones, tablets, Internet and other digital tools [3,4,5]. Technology literacy skill is conceived in this study as a set of abilities and aptitude possess by librarians to deploy technological devices in accessing and using electronic information resources for research activities such as identifying research problem, creating research questions, formulating hypotheses, reviewing literature, collecting data, analysing data using various data analysis software like SPSS, Excel, Tableau, Python, Minitab, Stata, Google Analytics, etc., as well as interpret research results, make inferences and communicate research findings across digital research platforms and communities. Technology literacy skills are crucial for everyday life and work due to the pervasiveness of technology in every area of human endeavours. Such skills are particularly paramount in the use of electronic information resources for research activities.

Electronic information resources are invaluable counterparts of print-based information resources that facilitate the satisfaction of information, research, educational and recreational needs of users [6]. Electronic information resources could be described as all computer-based information resources such as e-books, e-journals, e-theses, e-dissertations, e-newspapers, e-magazines, e-conference proceedings, e-dictionaries, e-encyclopaedias, online databases (like HINARI, AGORA, ARDI, GOALI, ProQuest, JSTOR, Ebscohost, MEDLINE databases, etc.), CD-ROMs, and other information resources available and accessible via electronic or digital means [7,8,9]. Electronic information resources could

also be Internet-based obtained through search engines, library blogs, digital libraries, institutional repositories, or organized offline resources collected and preserved by university libraries for users. These types of information resources are easily accessible without much impediments to geographical location or time. They also provide access to current and up-to-date information, which are very useful in actualizing research activities in the universities.

Meanwhile, research activities are important responsibilities that involve enquiring into some unknown phenomena with the aim of discovering something new or validating an existing body of ideas or theories. According to Law Insider [10], research activities refer to a systematic investigation of phenomena or relationships among variables, guided by existing theory in any field and executed within a rigorous methodological design, such that the results are generalizable and have the potential to yield new knowledge about the causes and prevention of problems, as well as the development of effective services. Research activities help in discovering facts, establishing or revising theories, or developing plan of actions based on the revealed facts. Research activities particularly help librarians in gaining insights and understanding, developing innovative solutions to challenging personal and professional issues, improving professional practices and quality intellectual decision making [11]. Research activities are predominantly information-driven, which could be derived from electronic information resources, and in turn depends greatly on the level of technology literacy skills of the librarians.

From the above perspectives, technology literacy skills facilitate easy access and use of electronic information resources for effective research activities in university libraries. This implies that librarians should be technology literate in order to be able to perform their demanding and fast evolving professional and intellectual duties effectively, efficiently and competently. It further implies that technologically literate and skilled librarians can demonstrate their erudition and scholarship in the use of electronic information resources for quality research activities in order to maximize their contributions to knowledge. Therefore, based on this background, this study examined librarians' technology literacy skills as correlate to use of electronic information resources in research activities in public university libraries in South-East Nigeria.

1.1 Statement of the Problem

Research is the basis through which new discoveries, solutions, techniques and theories are made following conscious and meticulous investigations into an identified problem in academic, business, economic, cultural, religious and socio-political situations. Effective research activities are unequivocally information-driven which imply the use of available information resources, especially electronic resources. As a matter of fact, in the present age of information explosion and technological advancement, access to and use of electronic resources have greatly influenced research landscape, making it interesting, rewarding, and less tasking. Librarians are expected to avail themselves of the provisions of electronic resources to engage in research activities for service efficiency, promotion, grant winning, image building, personal and institutional ranking, among others. It behooves on librarians to conduct quality researches and make findings that will provide dependable solutions to problems and generate new knowledge in a bid to address personal and professional concerns. Nevertheless, in spite of the foregoing, it is observed that librarians do not conduct enough research which is evidenced in the low publication output when compared with other academic staff in the universities. This may be attributed to, among other factors, librarians' poor technology literacy skills, which impinged the use of electronic information resources and other essential elements of research activities. Based on this backdrop, this study sets out to investigate librarians' technology literacy skills as correlate to use of electronic information resources in research activities in public university libraries in South-East Nigeria.

1.2 Research Objectives

This study aimed to investigate librarians' technology literacy skills as correlate to use of electronic information resources in research activities in public university libraries in South-East Nigeria. The specific objectives were, to:

i. Determine the correlation between librarians' online search skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria.
ii. Examine the correlation between librarians' Web 2.0 skills and use of electronic information resources for research

activities in public university libraries in South-East, Nigeria.

iii. Assess the correlation between librarians' online collaboration skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria.

1.3 Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance.

$H0_1$: There is no significant relationship between librarians' online search skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria.

$H0_2$: There is no significant relationship between librarians' Web 2.0 skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria.

$H0_3$: There is no significant relationship between librarians' online collaboration skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Clarification

This section succinctly x-rayed relevant key concepts and constructs such as technology literacy skills, use of electronic information resources, research activities, librarians' online search skills, librarians' Web 2.0 skills and librarians' online collaboration skills.

2.1.1 Technology literacy skills

Technology literacy skills can be broadly considered as interrelated competencies and abilities necessary in adopting and applying technological tools in personal, work or academic engagements. Studies show that technology literacy skills are analogous to and embedded in other forms of emerging literacy skills such as digital literacy skills, Internet literacy skills, ICT literacy skills, computer literacy skills, media literacy skills, and multimedia literacy skills [3,4,12,13,14]. According to IFLA [4], technology literacy skills refer to the abilities and capacities to harness the potentials of digital tools. It is a 21st century skill set that encompass the awareness, attitude, proficiency and capability of individuals to fitly and effectively use technological tools in the identification, access, management, integration, evaluation, analysis and synthesis of electronic resources and to create new knowledge, media expressions, and communicate such knowledge and expressions with others within a technologically regulated environment [15]. Technology literacy skills are typically very vital for research activities of librarians. It helps in enhancing information retrieval, research reference management, funding application, data management plan, data storage and long term preservation, as well as publication of research findings [16]. These critical skill sets have the potentials of enabling librarians to function effectively and efficiently in gathering, retrieving, using and sharing research information within a technology-driven domain for enhanced research activities. It can facilitate librarians' ability to make informed decisions, construct new knowledge and effectively communicate research findings using various digital media for enhanced knowledge transfer. Technology literacy skills can particularly help librarians to confidently and effectively use various research data and information management tools such as data repositories, DataCite, ResearchGate, ResearchID, Academia.edu, Google Scholar, Digital Object Identifier (DOI), Open Researcher and Contributor ID (ORCID), etc., in enhancing research sharing activities across institutions and geographical boundaries.

2.1.2 Use of electronic information resources

Electronic information resources refer to information bearing materials that provide access to users in a digital or an electronic format [17]. Udoh et al. [18] defined electronic information resources as all information resources that are induced by the advancement in Information and Communication Technology (ICT), which are generated, stored, disseminated and accessible electronically via computers or Internet mediated devices. Electronic information resources are unique and characteristically different from print-based information resources due to the method of access, retrieval and computer technology required for use. There are varieties of electronic information resources such as e-books, e-journal, e-project reports, e-theses and e-dissertations, e-newspapers, e-magazines, CD-ROM databases, e-indexes, digital reference materials (e-dictionaries, e-encyclopaedias, e-maps, etc.), online databases (e.g. AGORA, HINARI, EBSCOHOST, AJOL, OARE, TEEAL, REPEC, ARDI, GOALI, DOAJ, JSTOR,

ProQuest, etc.), visual materials, digital film or video, search engines for full text collections, and many other online or digital documents [6,19,20]. Electronic information resources have become predominant in university libraries across the world, especially as e-libraries are now considered as one of the outstanding standard requirements and regulatory measures for determining digital exploits of universities. In this wise, the use of electronic information resources for various academic activities including research activities has been greatly encouraged. Use of electronic information resources is the actual application or deployment of electronic information resources by information users, including librarians to meet specific information needs. Omotayo as cited in Nwankwo et al. [21]; as well as Udoh et al. [20] posited that use of electronic information resources refers to the ability of information users to adopt and adapt new technologies to achieve defined purposes or set goals. Effective use of electronic information resources is paramount for engaging in successful research activities and eventual attainment of quality research output by librarians in public university libraries. It saves time and facilitates cross-border information access anytime anywhere. It also enhances easy and seamless access to up-to-date information for research activities.

2.1.3 Research activities

Research is defined as a carefully purposeful search in a quest to solving an identified problem or creating new knowledge [22]. Research is considered as an inquiry into the unknown, a scientific approach to solving problems and an empirical investigation into issues that have educational and informational implications [11]. Research activities refer to various activities or processes that result in the creation of new knowledge and/or the use of existing knowledge in a new and creative way to generate new concepts, methodologies and understandings [23]. Research activities essentially entail various processes, steps and responsibilities in conducting research from conceptualization to communication or dissemination of research findings via various publications or presentations media. Research activities typically occupy critical position in any university system since research is one of the core mandates of universities as a means of generating and sharing knowledge. Anyim [19] states that librarians engage in research activities to discover, rediscover, identify, validate and solve

a particular problem through a systematic, logical, scientific and painstaking enquiry using available electronic information resources. This position was affirmed by Shapoval [24] who remarked that research activities are aimed at developing researchers' analytical skills using logical means of cognition (analysis, synthesis, comparison, generalization, analogy, definition and separation of concepts, etc., considering elements of research competencies. This therefore clarifies the fact that engaging in research activities enable librarians to inquire and scrutinize a problem in order to find a sustainable solution, or make an original intellectual and creative contribution to knowledge. Research activities also help librarians to develop innovative and proactive solutions to general challenges, while enhancing their personal and professional growth.

2.1.4 Librarians' online search skills

These are set of skills or proficiency used in constructing precise and vivid search queries by librarians for specific research information. Kurt and Emiroğlu [25] conceived online search skills as significant ability to easily and rapidly access and retrieve accurate and reliable information for various information management processes such as generation, analysis, evaluation and decision-making. Online search skills involve the ability to use Boolean operators, phrase searching, proximity search, fuzzy search, stemming, truncation searches, and wildcard searches [26]. These set of skills enhance the manipulation of multiple search systems, exploration of popular search engines, use of basic search function, construction of multiple search queries, multi-tasking reformulation, parallel reformulation and recurrent reformulation. Librarians' online search skills are essential abilities in searching, uploading and downloading, as well as understanding how the Internet works in transferring electronic information resources for use in research activities.

2.1.5 Librarians' web 2.0 skills

Wood as cited in Oyovwe-Tinuoye et al. [27] defined Web 2.0 as associated with web applications that facilitate participatory information sharing, interoperability, user-centered design, and collaboration on the World Wide Web. Web 2.0 skills refer to the abilities, competencies and confidence to successfully create, share and use electronic information resources for research activities. Akwang [28]

described Web 2.0 proficiency or ability as a necessary skill that is capable of helping librarians in the acquisition, creation, processing, storage, dissemination, sharing or publishing of information. Web 2.0 skills embed the potentials for more interactive and powerful environments in which librarians create, produce, edit, and evaluate electronic information resources for seamless research activities. Web 2.0 skills facilitate librarians' ability to create and share research information using diverse general and academic social media platforms such as Facebook, LinkedIn, Academia.com, GoogleScholar, Instagram, MySpace, Wikis, Blog, Wordpress, Podcasts, YouTube, Flickr, social bookmarking services, WhatsApp, Twitter, etc. Web 2.0 skills are very crucial for enhanced research productivity. This underpins the positions of Mutula [29]; as well as Tyagi [30] who remarked that librarians who are ready for the knowledge economy needs Web 2.0 skills to be highly mobile, adaptable, reflective, exploratory, entrepreneurial, and creative. These skill sets can equip librarians in handling Web 2.0 tools to incorporate personalized, scalable and customized systems for effective, more productive and timely use of electronic information resources for research activities.

2.1.6 Librarians' online collaboration skills

Librarians' online collaboration skills refer to those abilities, attitudes or competencies required by librarians to work in a digital environment for the purpose of sharing research tasks and information across multiple levels to meet set research goals. Umar and Temboge [31] defined online collaboration skills as an integral part of research activities enhancing the possibility of connecting knowledge domains, nurturing innovation, and enriching the scholarly community. Similarly, Amadi et al. [32] opined that online collaboration skills provide the opportunity for researchers to partner, share or fine-tune thoughts, ideas and purposes, while developing strategies and tactics for multi-dimensional thinking towards achieving common and uniform research practices. Online collaboration skills equip librarians with the ability to seamlessly marshal the vast array of electronic information resources for successful research engagements. These interrelated competencies enable librarians to generate ideas, build teams, collect data, solve problems, communicate information, and make effective decisions. It also helps librarians to discover, assess, and synthesize electronic information

resources effectively, while extending their expertise to other researchers, actively identifying specialized databases, providing guidance on literature searches, and supporting the rigorous process of systematic reviews to achieve research objective.

2.2 Review of Empirical Studies

The following vital empirical studies were reviewed to back-up this present study. Umar and Temboge [31] examined the role of collaboration skills in shaping research productivity among librarians at the National Open University of Nigeria (NOUN). The study revealed a moderate level of collaboration skills and research productivity among librarians. It indicated that collaborative skills of librarians have a significant positive influence on their research productivity in writing book chapters, books, journal articles and conference papers. The study recommended that librarians should attend workshops and conferences geared towards improving collaboration skills and research productivity.

Similarly, Khedri [33] investigated the role of Web 2.0 technologies in empowering librarians in university libraries in Iran. The study revealed a statistically significant positive relationship between the use of Web 2.0 technologies and the empowerment of librarians in enhancing independence and freedom of work, professional development and progress, self-control, job satisfaction, and responsibility. It also showed that the use of Web 2.0 technologies has a statistically significant positive relationship with the librarians' level of education and participation in training instructional courses on Web 2.0 and academic libraries.

Oseghale [34] also explored the level of digital information literacy (DIL) skills and use of electronic resources by humanities graduate students at Kenneth Dike Library, University of Ibadan, Nigeria. The study revealed that humanities graduate students at the University of Ibadan possessed high level of digital information literacy skills in respect of digital devices usage, web-based tasks, information finding and evaluation, but low in the utilization of electronic resources. It identified inadequate knowledge of available e-resources, irregular internet access, inadequate training on e-resources utilization, etc., as the main challenges encountered by graduate students in the use of e-resources. The study recommended that active steps such as

regular training on digital information literacy skills should be taken to increase e-resources awareness and use in the university.

In another related study, Abubakar [17] examined the use of electronic information resources and research output of librarians in Ahmadu Bello University, Zaria. The study revealed that there was high level of electronic information resources use by librarians but low record of research output when compared with other academic staff. It showed that librarians published mostly in hardcopy journals, book chapters, co-authored textbooks and conference/seminar/workshop papers. The study indicated that librarians have access to electronic information resources but did not maximize these resources for their research work. It recommended that librarians' routine tasks should be minimized so that they can have time to embark on research activities using the electronic information resources.

Akwang [35] investigated the use of academic social networking sites (ASNSs) by professional librarians in public universities in Akwa Ibom State, Nigeria. The study revealed that professional librarians are familiar with many academic social media networking sites (ASNSs). They mostly use Google Scholar, ResearchGate, Academia.com, and LinkedIn to enhance their academic activities, especially in sharing their research publications within the scholarly community. The study showed that the frequency of visits to the ASNSs by professional librarians is low. It recommended that academic librarians should be upskilled and provided with opportunities for training to enhance effective use of ASNSs in the public universities.

Akwang [28] also studied librarians' perceptions and adoption of Web 2.0 technologies in academic libraries in Akwa Ibom State, Nigeria. The study revealed that although majority of librarians perceived Web 2.0 technologies as useful to enhance their job performance and that Web tools are clear and easy to understand, there was a low level of Web 2.0 technologies adoption across the libraries investigated. The study identified the major constraints to adoption of Web 2.0 technologies in academic libraries to include high cost of technologies, budget constraints, and inadequate training of librarians to acquire requisite skills, etc. It recommended that adequate funding, staff training and re-training should be given priority consideration in the libraries.

More so, Udoh et al. [18] examined digital literacy skills of LIS students on the utilization of electronic information resources in two federal universities in Nigeria. The study revealed that the electronic information resources available for use in the universities include e-books, Internet search engines, e-research reports, online databases, e-journals, CD-ROM databases, etc. It indicated that necessary digital literacy skills for use of e-resources include Internet surfing skills, social networking/social media skills, basic computer operations skills, electronic search and retrieval skills. The study identified epileptic electricity supply, poor internet services, inadequate digital facilities, etc., as the factors militating against digital literacy skills acquisition in the universities.

Igbokwe et al. [36] equally investigated the determinants of the quality of research outputs by librarians in selected university libraries in South East Nigeria. The study revealed that the librarians' research skills, editors' level of editorial competency and mentor-mentee relationships of librarians are determining factors in relation to the quality of research outputs by librarians. It showed that inability to adopt appropriate research methods leads to poor quality research, while possessing the right research skills lead to producing quality research by librarians. The study revealed that lack of appropriate research knowledge and poor information search and retrieval skills are inhibitors to the production of quality research outputs in public university libraries.

Moreover, Hiremath and Bankapur [37] assessed the awareness and proficiency in digital literacy skills among librarians of first grade degree colleges of Bagalkot District, India with respect to age group. The study revealed that the librarians under investigation have a high significance value of digital technology proficiency in using software, hardware, operating system, MS Office, application software, library automation software, web publishing software, citation software, digital library software, and plagiarism software. The study revealed that the librarians under investigations had no constraints in acquiring digital literacy skills, as they have acquired enough training in the software and hardware, thus becoming proficient enough in using the software and hardware to provide electronic information sources and services.

Oyovwe-Tinuoye et al. [27] also explored usage of Web 2.0 tools by academic librarians in university libraries in South-South Nigeria. The

study revealed that librarians are aware of Facebooks, WhatsApp, Blogs, Wikis, YouTube, and unaware of RSS Feeds, Bookmarking, and Podcast. It indicated that the academic librarians usually use Web 2.0 tools mainly for online reference services, marketing of library services, collaborating with colleagues/friends and current awareness services. The study showed their knowledge of Web 2.0 tools as limited. The study identified poor internet connectivity and unreliable power supply as major challenges facing librarians in the South-south region of Nigeria in the use of Web 2.0 tools. It recommended regular training and provision of alternative power supply in university libraries to enhance librarian's skills in the use of ICT and Web 2.0 tools.

Furthermore, Bhardwaj [38] investigated research activities of Library and Information Science professionals in Indian higher educational institutions in relation to competencies, support and engagements. The study revealed that majority of the librarians engaged in various research activities such as reading research literature, and research-based articles. It showed that majority of the librarians preferred disseminating research papers in conference proceedings, and publishing papers in refereed journals. It also indicated that they undertook theoretical approach, and survey method in conducting research. The study found that lack of funding support, time constraints, and problems in data collection are the major constraints in carrying out research.

Although it was clearly discovered that there are some related studies on the concepts of digital literacy skills and electronic information resources, none was conducted on librarians' technology literacy skills and use of electronic information resources for research activities in public universities in South-East Nigeria. Hence, this present study was intended to fill the gap.

3. METHODOLOGY

The study adopted a correlational research design. The population of the study was eighty-four (84) librarians, comprising 10 university librarians, and 74 heads of divisions/units from ten (10) public university libraries in South-East Nigeria. Five (5) of the public university libraries were federal government owned while the other five (5) were state government owned. There was no sampling for this study since the entire study population was quite small and manageable. The researchers adopted a full population survey whereby the 84 librarians were used for the study. The researchers combined two (2) sets of researcher-administered questionnaire to elicit data for the study. The instruments were developed with closed-ended questions using 4-point rating scale and contained a total of thirty-two (32) items each. The instruments were titled, "Librarians' Technology Literacy Skills Questionnaire (LTLSQ) and Use of Electronic Information Resources for Research Activities Questionnaire (UEIRRAQ)", for the independent and dependent variables respectively. Both instruments were subjected to face and content validation to ascertain their appropriateness and suitability for the research objectives. The researchers also adopted Cronbach's alpha method to measure the reliability of LTLSQ and UEIRRAQ by conducting a pilot test of the instruments on the University Librarians and five (5) Heads of Divisions/Units each from University of Uyo library, Uyo (a federal university) and Akwa Ibom State University library, Ikot Akpaden (a state university).These librarians were not part of the main study and their responses were analysed using Cronbach's alpha reliability index formula, which yielded a reliability coefficient of 0.94 for the independent variables and 0.91 for the corresponding dependent variables. These were high enough to measure the intended outcomes with consistency. Out of the 84 copies of the questionnaires distributed to the librarians in their offices, 74 copies representing about 90% response rate were completed and returned with valid information. The number of librarians, copies of the questionnaire distributed and response rates across the 10 public university libraries were computed and presented in Table 1 using simple percentage. Answers to the research questions were analyzed quantitatively using Pearson's Product Moment Correlation Coefficient (PPMCC) while simple regression statistics was used to test the corresponding hypotheses at 0.05 level of significance. The interpretation of "r" was guided by a range of benchmarks such as 0.80 and above = Very High; 0.60 - 0.80 = High; 0.40 – 0.60 = Medium; 0.20 – 0.40 = Low; and 0.00 – 0.20 = Very Low. The decision rule held that the null hypothesis (H_0) is rejected if the p-value is less than 0.05, or otherwise accepted.

4. RESULTS AND DISCUSSION

The analyses and results were based on the responses of the 74 librarians who completed

and returned copies of their questionnaires as shown in Table 1. All the copies returned were useful for the analysis.

Data on Table 1 showed the number of librarians, copies of questionnaire distributed and response rates across the 10 public university libraries in South-East Nigeria investigated. It indicated that University of Nigeria, Nsukka (UNN) Library, Enugu State, had 16.22% response rate; followed by Federal University of Technology, Owerri (FUTO) Library, Owerri, Imo State, with 14.86%;and Michael Okpara University of Agriculture Umudike (MOUAU) Library, Abia State, with 12.16% response rate. It also showed that Nnamdi Azikiwe University, Awka, Library, Anambra State; Enugu State University of Science and Technology (ESUT) Library, Enugu State; Imo State University (IMSU) Library, Owerri, had 9.46% response rate, each, while Alex Ekwueme Federal University, Ndufu-Alike, Library, Ebonyi State, had 8.12% response rate. The result further revealed that Abia State University (ABSU) Library; Chukwuemeka Odumegwu Ojukwu University (formerly known as Anambra State University) Library; and Ebonyi State University (EBSU) Library each had 6.76% response rate. This result represented the level of participation of the librarians from the public university libraries in the study.

RQ 1: What is the correlation between librarians' online search skills and use of electronic information resources for research activities in public university libraries?

Data in Table 2 revealed that there was a medium extent of correlation between librarians' online search skills and use of electronic information resources for research activities in public university libraries. This was indicated by the correlation coefficient ($r = 0.546$), which was positive and falls within the coefficient limit of $\pm 0.40 – 0.60$. The coefficient of determination ($r^2 = 0.298$) indicated that 30% of the variance observed in the use of electronic information resources for research activities in public university libraries was accounted for by librarians' online search skills. The result implies that librarians' online search skills to a positive level correlates with use of electronic information resources for research activities in the public university libraries in South-East Nigeria.

H₀ 1: There is no significant relationship between librarians' online search skills and use of

electronic information resources for research activities in public university libraries in South-East, Nigeria.

The result in Table 2 showed a p-value 0.000 which is less than alpha value of 0.05. Since the p-value of 0.000 is less than the alpha value of 0.05, the null hypothesis of a no significant relationship between librarians' online search skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria, was rejected and the alternative hypothesis accepted. Therefore, there is a strong positive significant relationship between librarians' online search skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria. This finding affirms Hiremath and Bankapur [37], which revealed that online search skills of librarians have significance value in using web publishing software, citation software, digital library software, and plagiarism software. It also aligns with a study conducted by Kurt and Emiroğlu [25], which found online search skills as significant abilities for easy access and retrieval of reliable information for various research information management processes such as analysis, evaluation and decision-making.

RQ 2: What is the correlation between librarians' Web 2.0 skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria?

Data in Table 3 revealed that there was a low degree of correlation between librarians' Web 2.0 skills and use of electronic information resources for research activities in public university libraries. This was indicated by correlation coefficient of 0.204 ($r = 0.204$), which is positive and within the coefficient limit of $\pm 0.20 – 0.40$. The coefficient of determination ($r^2 = 0.042$) indicates that 42% of the variance observed in the use of electronic information resources for research activities in public university libraries was accounted for by librarians' Web 2.0 skills. This indicated that librarians' Web 2.0 skills is low but reflects positive extent correlates with the use of electronic information resources for research activities in public university libraries in South-East Nigeria.

H₀ 2: There is no significant relationship between librarians' Web 2.0 skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria.

Table 1. Questionnaire Distribution and Response Rate by Institutions

S/N	University Libraries	UL	HoD	Total	QD	QR	%
1	Alex Ekwueme Federal University, Ndufu-Alike, Library	1	7	8	8	6	8.12
2	Federal University of Technology, Owerri (FUTO) Library	1	12	13	13	11	14.86
3	Michael Okpara University of Agriculture Umudike (MOUAU) Library	1	8	9	9	9	12.16
4	Nnamdi Azikiwe University, Awka, Library	1	7	8	8	7	9.46
5	University of Nigeria, Nsukka (UNN) Library	1	13	14	14	12	16.22
6	Abia State University (ABSU) Library	1	5	6	6	5	6.76
7	Chukwuemeka Odumegwu Ojukwu University Library	1	5	6	6	5	6.76
8	Ebonyi State University (EBSU) Library	1	5	6	6	5	6.76
9	Enugu State University of Science and Technology (ESUT) Library	1	6	7	7	7	9.46
10	Imo State University (IMSU) Library	1	6	7	7	7	9.46
	Total	**10**	**74**	**84**	**84**	**74**	**100**

Keys: UL = University Librarian, HoD = Head of Division, QD = Questionnaire Distributed, and QR = Questionnaire Retrieved

Table 2. PPMC Coefficient between Librarians' Online Search Skills and Use of Electronic Information Resources for Research Activities in Public University Libraries

		LOSSs	UEIRRAs	P-Value	Sig
LOSSs	Pearson's Correlation Sig. (2tailed)	1	0.546	0.000	0.05
	N	74	74		
UEIRRAs	Pearson's Correlation Sig. (2tailed)	0.546	1		
	R^2	0.298			
	N	74	74		

LOSSs = Librarians' Online Search Skills
UEIRRAs = Use of Electronic Information Resources for Research Activities
N = Number of Observations
R = Correlation Coefficient
R^2 = Coefficient of Determination

Table 3. PPMC Coefficient between Librarians' Web 2.0 Skills and Use of Electronic Information Resources for Research Activities in Public University Libraries in South-East, Nigeria

		LW2.0Ss	UEIRRAs	P-Value	Sig
LW2.0Ss	Pearson's Correlation Sig. (2tailed)	1	0.204	0.081	0.05
	N	74	74		
UEIRRAs	Pearson's Correlation Sig. (2tailed)	0.204	1		
	R^2	0.042			
	N	74	74		

LW2.0Ss = Librarians' Web 2.0 Skills
UEIRRAs = Use of Electronic Information Resources for Research Activities
N = Number of Observations
R = Correlation Coefficient
R^2 = Coefficient of Determination

Table 4. PPMC Coefficient between Librarians' Online Collaboration Skills and Use of Electronic Information Resources for Research Activities in Public University Libraries in South-East, Nigeria

		LOCSs	UEIRRASs	P-Value	Sig
LOCSs	Pearson's Correlation Sig. (2tailed)	1	0.088	0.458	0.05
	N	74	74		
UEIRRAs	Pearson's Correlation Sig. (2tailed)	0.088	1		
	R^2	0.008			
	N	74	74		

LOCSs = Librarians' Online Collaboration Skills
UEIRRAs = Use of Electronic Information Resources for Research Activities
N = Number of Observations
R = Correlation Coefficient
R^2 = Coefficient of Determination

The result in Table 3, showed a p-value of 0.081 which is numerically significantly greater than alpha value of 0.05. Thus, since the p-value of 0.081 is significantly greater than the alpha value of 0.05, the null hypothesis of a no statistical significant relationship between librarians' Web 2.0 skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria, was accepted. This implies that there is no statistically significant relationship between librarians' Web 2.0 skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria. This finding disagrees with Khedri [33], which revealed a statistically significant positive relationship between the use of Web 2.0 technologies and the empowerment of librarians in enhancing independence and freedom of work, professional development and progress, self-control, job satisfaction, and responsibility. However, it partially agrees with Akwang [35] as well as Oyovwe-Tinuoye et al. [27], which indicated that though librarians have the knowledge to use Web 2.0 technologies including Academic Social Networking Sites

(ASNSs) such as Blogs, YouTube, Wikis, Google Scholar, ResearchGate, Academia.com, and LinkedIn in enhancing their academic activities, but their knowledge of Web 2.0 tools was low. This result indicates a weak association between librarians' Web 2.0 skills and use of electronic information resources for research activities in public university libraries.

RQ 3: What is the correlation between librarians' online collaboration skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria?

Data in Table 4 revealed that there was a very low extent of correlation between librarians' online collaboration skills and use of electronic information for research activities in public university libraries. This was indicated by the correlation coefficient (r = 0.088), which is positive and falls within the coefficient limit of ± 0.00 – 0.20. The coefficient of determination (r^2= 0.008) indicates that 0.8% of the variance observed in the use of electronic information resources for research activities in the public university libraries was accounted for by

librarians' online collaboration skills. This result implies that librarians' online collaboration skills to a very low degree correlates with electronic information services provision in the public university libraries in South-East Nigeria.

H$_0$ 3: There is significant relationship between librarians' online collaboration skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria.

The result in Table 4, revealed a p-value of 0.458 which is numerically greater than alpha value of 0.05 but not statistically a strong evidence to reject the null hypothesis. Since the p-value of 0.458 is not considered statistically significant against the alpha value of 0.05, the null hypothesis of no significant relationship between librarians' online collaboration skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria, was accepted. This implies that there was a weak but positive relationship between librarians' online collaboration skills and use of electronic information resources for research activities in public university libraries in South-East, Nigeria. This finding partially corroborates a study by Umar and Temboge [31], which found that collaborative skills of librarians have a significant positive influence on their research productivity in writing book chapters, books, journal articles and conference papers.

5. CONCLUSION

Librarians' technology literacy skills are critical competencies with strong implications on the use of electronic information resources for research activities. Technology literacy skills greatly impact access, retrieval, evaluation and use of electronic information resources thereby shaping the entire lifecycle of research activities. In this study, it was discovered that librarians' online search skills had strong positive significant relationships with the use of electronic information resources for research activities in the public university libraries in South-East Nigeria. It was also found that Web 2.0 skills and librarians' online collaboration skills had a weak but positive relationship with the use of electronic information resources for research activities in public university libraries in public university libraries in South-East, Nigeria. The study therefore, concluded that librarians' technology literacy skills in the areas of online search skills has greater correlation with the use of electronic information resources for research activities than Web 2.0 and online collaboration skills in public university libraries in South-East Nigeria.

6. RECOMMENDATIONS

As discovered from the findings of the study, librarians' technology literacy skills are indispensable in enhancing effective use of electronic information resources for research activities. Consequently, the following recommendations were made to improve the acquisition of technology literacy skills by librarians for use of electronic information resources in research activities:

i. Management of public universities should provide alternative power sources and more funds to university libraries to facilitate subscription to electronic information resources, internet services, and other associated facilities for enhanced research activities.
ii. Management of public university libraries should ensure the training and retraining of librarians on emerging technology skills and competencies including artificial intelligence skills in order to enable them use evolving technology devices and changing research techniques and approaches.
iii. Librarians should take advantage of online collaboration training opportunities in order to acquire and/or improve their online collaboration skills.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

ACKNOWLEDGEMENT

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Arua, U, Udoh, IU. Administration and management of Nigerian university

libraries. In: N. O. Nnadozie, C. P. Uzuegbu, M. C. Nwosu, K. N. Igwe& J. O. Akidi (Eds.), University librarianship: Issues and perspectives, A Festschrift in Honour of Professor Raphael U. Ononogbo. Lagos: Zeh Communications; 2019.

2. Smith, CL. Technology literacy skills needed in further education and/or work: A Delphi study of high school graduates' perspectives. University of South Florida Tampa Graduate Theses and Dissertations; 2015.
Available:https://digitalcommons.usf.edu/etd/5776

3. Emiri, OT. Digital literacy skills among Librarians in university libraries in the 21st century in Edo and Delta States, Nigeria. International Journal of Scientific & Technology Research. 2015; 4(8).
Available: www.Ijstr.org

4. International Federation of Library Associations and Institutions [IFLA] Media and information literacy for all: Libraries and the 2019 global MIL week; 2019.
Available:https://blogs.ifla.org/faife/2019/10/24/167/

5. Julia, J, Isrokatun, I. Technology literacy and student practice: Lecturing critical evaluation skills. International Journal of Learning, Teaching and Educational Research. 2019;18(9):114-130.
Available:https://doi.org/10.26803/ijlter.18.9.6

6. Mensa, CP, Udoh, IU, Osiebe, PO. Systematic analysis of adoption of innovative technologies in the provision of electronic information services in public university libraries in Akwa Ibom State, Nigeria. Library Philosophy and Practice (e-journal). 2023;8080.
Available:https://digitalcommons.unl.edu/libphilprac/8080

7. Iroaganachi, MA. Izuagbe, R. A comparative analysis of the impact of electronic information resources use towards research productivity of academic staff in Nigerian universities. Library Philosophy and Practice (e-journal). 2018;1702.
Available:https://digitalcommons.unl.edu/libphilprac/1702

8. Mallikarjuna, Padmamma, S. Use of electronic information resources and services by the faculty members of first grade colleges affiliated to Davanagere University: A literature review. International

Journal of Library and Information Studies. 2020; 10(3), 200-206.
Available:http://www.ijlis.org

9. Odunewu, AO, Aluko-Arowolo, TK. Information literacy, computer competence and use of electronic resources by Olabisi Onabanjo Faculty members. Journal of Information Engineering and Applications. 2018;8(4).
Available:www.iiste.org

10. Law Insider. Research activity definition; 2024.
Available:https://www.lawinsider.com/dictionary/research-activity

11. Akwang, NE, Chimah, JN. (2021). Research data management (RDM) in the fourth industrial revolution (4IR) era: The case for academic libraries. In Handbook of research on information and records management in the fourth industrial revolution; 2021.
Available:https://doi:10.4018/978-1-7998-7740-0.ch002

12. Anjaiah, M. Digital information literacy among research scholars and students' community at Dravidian University, Kuppam-Andra Pradesh (India): An exploratory study. IOSR Journal of Humanities and Social Science (IOSR-JHSS). 2016;21(9):01-08.
Available: www.iosrjournals.org.

13. Becker BW. Information literacy in the digital age: Myths and principles of digital literacy. School of Information Student Research Journal. 2018;7(2).
Available:http://scholarworks.sjsu.edu/slissrj/vol7/iss2/2

14. Udoh, IU, Okafor, VN. Information literacy and digital literacy skills of 21st century library and information sciences professionals. In N. Singh & S. Singh (Eds.), Smart libraries and information management in digital environment,11. Delhi: B.R. Publishing Corporation; 2022.

15. Bitri, CE, Akkaya, MA. A comparative study of electronic information literacy levels of researchers: Instances from the Universities of Kastamonu and ÇankırıKaratekin in Turkey. International Conference on Social Sciences and Humanities, Changing the World: Challenges, Opportunities and Responsibilities (ICSSH2017). 2018;1(2):134-148.
Available: http://dergipark.gov.tr/by

16. Lockhart, J, Leiß, C. Librarians' skills for e-research support – joint project at TU

München and CPUT. Proceedings of the IATUL Conferences. 2015;Paper 2. Available:https://docs.lib.purdue.edu/iatul/2015/lil/2

17. Abubakar, AH. Use of electronic information resources and research output of librarians in Ahmadu Bello University, Zaria. FUDMA International Journal of Library Science and Information Management. 2022;1(2):1-8.

18. Udoh, IU, Ekpenyong, GE, Olowookere, O. Digital literacy skills of undergraduate students of library and information science on the utilization of electronic information resources in two federal universities in Nigeria. Library Philosophy and Practice (e-journal). 2020;4269. Available:https://digitalcommons.unl.edu/libphilprac/4269

19. Anyim, WO. Electronic information resources for learning and research activities among undergraduate students in the university library. Journal of Computer Science and Technology Studies (JCSTS). 2020; 1(1), 28-35. Available: www.jcsts.one

20. Udoh, IU., Akwang, NE, Chukwueke, C. University undergraduates' awareness and utilization of electronic databases in university libraries in AkwaIbom State, Nigeria. Library Philosophy and Practice (e-journal). 2023;8076. Available:https://digitalcommons.unl.edu/libphilprac/8076

21. Nwankwo, EP. Relationship between information literacy skills and use of library resources by postgraduate Library and Information Science students in Anambra State, Nigeria. International Journal of Scientific and Management Research. 2023; 6(07), 31-49. Available:http://doi.org/10.37502/IJSMR.2023.6703

22. Ternenge, TS, Kashimana, F. Availability, accessibility and use of electronic information resources for research by students in Francis Sulemanu Idachaba Library University of Agriculture, Makurdi. Library Philosophy and Practice (e-journal). 2019;2352. Available:https://digitalcommons.unl.edu/libphilprac/2352

23. University of Southern Queensland. Research activities; 2022. Available:https://policy.usq.edu.au/documents/142142PL

24. Shapoval, SA. Development of a research competence model (ISC). Researcher. 2019;3:76-108.

25. Kurt, AA, Emiroglu, BG. Analysis of students' online information searching strategies, exposure to internet information pollution and cognitive absorption levels based on various variables. Malaysian Online Journal of Educational Technology. 2018;6(1). Available: www.mojet.net

26. Eke, HN, Omekwu, CO, Agbo, J. Internet search strategies employed by library andinformation science students of University of Nigeria, for research. Library Philosophy and Practice (e-journal). 2014;1194. Available:http://digitalcommons.unl.edu/libphilprac/1194

27. Oyovwe-Tinuoye, GO, Krubu, DE, Ijiekhuamhen, OP. Usage of Web 2.0 tools by academic librarians: A case study of university libraries in South-South Nigeria. Library Philosophy and Practice (e-journal). 2017;1643. Available:https://digitalcommons.unl.edu/libphilprac/1643

28. Akwang, NE. A study of librarians' perceptions and adoption of Web 2.0 technologies in academic libraries in Akwa Ibom State, Nigeria. The Journal of Academic Librarianship. 2021;47(2): 102299. Available:https://doi.org/10.1016/j.acalib.2020.102299

29. Mutula, SM. Ethical dimension of the information society: implications for Africa. In: D. Ocholla, J. Britz, R. Capurro & C. Bester (Eds.), Information Ethics in Africa: Cross-Cutting Themes. Pretoria: AC; 2013. Available:https://www.researchgate.net/publication/342707988.

30. Tyagi, S. Adoption of Web 2.0 technology in higher education: A case study ofuniversities in National Capital Region, India. International Journal of Education andDevelopment using Information and Communication Technology (IJEDICT). 2012;8(2):28-43.

31. Umar, MY, Temboge, A. Evaluating the role of collaboration skills in shaping research productivity among librarians at the National Open University of Nigeria (NOUN). International Journal of Library and Information Technology (IJLIT). 2024;6:126-134.

32. Amadi, EC, Udoh, IU, Ukpong, CA. Factoring in collaboration for quality services delivery in contemporary libraries. In F. E. Etim, I. I. Ekoja & F. A. Onifade (Eds.), Contemporary practices for sustainable library and information services: A Festschrift in Honour of Professor Ahiaoma Ibegwam. CELIMAT Publishers; 2024.

33. Khedri, H. The role of Web 2.0 technologies in empowering librarians: The case study of university libraries in Iran. Library Philosophy and Practice (e-journal). 2023;7724.
Available:https://digitalcommons.unl.edu/lib philprac/7724

34. Oseghale, O. Digital information literacy skills and use of electronic resources by humanities graduate students at Kenneth Dike Library, University of Ibadan, Nigeria. Digital Library Perspectives. 2023;39(2):181-204.
Available:https://doi.org/10.1108/DLP-09-2022-0071

35. Akwang NE. A study on the use of academic social networking sites (ASNS) by professional librarians in public universities in Akwa Ibom State, Nigeria.

Library Philosophy and Practice (e-journal). 2022;6962.
Available:https://digitalcommons.unl.edu/lib philprac/6962

36. Igbokwe, JC, Benson, OV, Enem, FN. Determinants of the quality of research outputs by librarians in selected university libraries in South East Nigeria. Information Impact: Journal of Information and Knowledge Management. 2019;10(1).
Available:https://dx.doi.org/10.4314/iijikm.v 10i1.1

37. Hiremath SS, Bankapur VM. Awareness and proficiency in digital literacy skills among librarians of first grade degree colleges of Bagalkot District with respect to age group. International Journal of Librarianship and Administration. 2019;10(1):11-18.
Available:http://www.ripublication.com

38. Bhardwaj, RK. Research activities of Library and Information Science professionals in Indian higher educational institutions: Competencies, support and engagements. DESIDOC Journal of Library & Information Technology. 2017;37(1):30-37.
Available:https://doi:10.14429/djlit.37.1.106 72

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/121575