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SEARCH ENGINE TECHNOLOGY AND EFFECTIVE INFORMATION ACCESS AMONG POSTGRADUATE STUDENTS OF REV. FR. MOSES ORSHIO ADASU UNIVERSITY, MAKURDI BENUE STATE, NIGERIA

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Abstract
The study examines use of search engine technology and effective information access to post graduate students of Rev. Fr. Moses Orshio Adasu University. Descriptive survey research design was adopted. The population of the study consisted of 617 registered postgraduate students who are beneficiaries of information access in the library. Two research questions were generated and one null hypothesis formulated and tested. The sample size for the study consisted of 61 registered postgraduate students using proportionate stratified random sampling technique. Search Engine Technology and Effective Information Access Questionnaire (SETEIAQ)" and interviews were used as instruments for data collection. The instrument was validated by three experts; two in Library and Information Science, one in Science and Mathematics Education. The reliability of the instrument was ascertained through a trial-test on thirty respondents. The test yielded Cronbach Alpha Coefficient of 0.98. Data were analyzed using mean and standard deviation to answer the research questions, while chi-square (χ^2) was used to test the hypotheses at 0.05 level of significance. Findings of the study revealed that internet search skills have a statistically significant impact on the quality of information accessed by postgraduate students. The study also identified specific areas where internet services are applied for effective information access in universities, including acquisition services, catalogue/classification services, selective dissemination of information, interlibrary loan services, documentary services, circulation services, and resource sharing, with data presented in frequencies and percentages. Based on the findings, it was recommended that among others that the university should organize regular workshops and training sessions to improve postgraduate students' internet search skills, ensuring they can effectively navigate search engines and retrieve high-quality academic information.
Keywords: Information Access, Internet Search Skills, Search Engine Technology, ICT Competencies, Postgraduate Students

Introduction

In today's digital knowledge society, search engine technology has transformed the global landscape of information retrieval, dismantling traditional barriers to knowledge access and enabling users across the world to locate relevant information swiftly, accurately, and efficiently. A search engine is a sophisticated software application designed to process user queries and return results from vast, distributed datasets irrespective of their format or content type. This technological advancement has become particularly significant within the academic environment, where postgraduate students and researchers rely heavily on the ability to access timely, credible, and precise information to support scholarly inquiry and knowledge creation (Gwarzo, 2020). According to the Encyclopedia of Library and Information Science (2015), a search engine is a computer-based application that enables users to locate specific terms or phrases on the internet at

remarkable speed, making it an indispensable tool for effective navigation of the vast resources available on the World Wide Web. While all search engines perform the fundamental task of matching documents with user-defined keywords, their underlying technologies differ significantly in sophistication, precision, and relevance. Vangie (2021) observes that some search engines depend on basic algorithms designed for general information retrieval, whereas others deploy highly advanced, subscription-based models that integrate artificial intelligence and machine learning to enhance personalization and optimize search accuracy.

Across the globe, search engines have evolved into powerful gateways to knowledge, reshaping how information is created, disseminated, and consumed. Widely used platforms such as Google and Google Scholar serve as central tools for locating both general and academic content, while specialized academic databases such as JSTOR, Scopus, and Web of Science provide more refined access to peer-reviewed research. The ability to navigate these tools effectively has become a vital component of academic literacy, enabling researchers to engage with an expansive body of global scholarship. As Webnots (2020) explains, search engines function through interconnected systems that include web crawlers, extensive indexing repositories, and ranking algorithms, working together to organize and retrieve the most relevant materials for users.

In academic contexts, particularly for postgraduate students, search engines have become indispensable for supporting research, teaching, and learning. The increasing digitization of academic journals, institutional repositories, and archival collections has heightened the significance of internet-enabled search technologies as a means of bridging gaps in access to scholarly resources. According to Lutus (2020), the internet functions as a "borderless world," facilitating the presentation, storage, and retrieval of vast quantities of contemporary information while enhancing the visibility of research outputs. Onah et al. (2020) emphasize that search engines leverage intelligent indexing and crawling mechanisms to organize enormous volumes of online content into structured, searchable formats, thereby making previously inaccessible materials readily available to scholars. Affum (2021) further underscores that information is at the heart of all academic endeavors and highlights the transformative role of search engines and online technologies in empowering academic libraries to better fulfill their mandate of supporting teaching, learning, and research activities.

The effective use of search engines and online academic platforms depends significantly on the internet search skills possessed by researchers and students. These competencies, which form a crucial aspect of digital literacy, include the ability to craft precise search queries, apply Boolean operators effectively, and critically evaluate the credibility and relevance of retrieved resources. Hooks (2020) highlights that search strategies such as selecting appropriate keywords and structuring queries with operators like AND, OR, and NOT enhance the precision of results and improve overall research efficiency. Van Deursen (2016) distinguishes internet search skills from general computer literacy, arguing that effective online research requires a more advanced understanding of database structures, search engine functionalities, and resource evaluation techniques. For postgraduate students, mastery of these competencies enables efficient navigation of online databases, institutional repositories, and digital scholarly networks. By effectively leveraging search engines and scholarly databases, Nigerian postgraduate students gain the capacity to engage with cutting-edge research, integrate diverse perspectives into their work, and contribute meaningfully to the broader global knowledge economy. This capacity to transcend geographical and infrastructural limitations underscores the growing centrality of search engine technologies and internet-driven information systems in reshaping academic research and enhancing information access in Nigerian higher education institutions.

Statement of the Problem

Libraries play a crucial role in advancing knowledge and supporting academic development by providing access to relevant information resources and services that align with users' diverse information needs. In the era of digital transformation, postgraduate students increasingly depend on library systems to access scholarly materials across different formats, including electronic journals, subscription-based databases, theses, and conference papers. With the growing volume of online resources, search engines have become important tools that may assist users in locating, evaluating, and retrieving needed information more effectively. For postgraduate students, the ability to use search engines proficiently could be essential for successful academic research, given their potential to facilitate access to high-quality scholarly resources.

Search engines such as Google Scholar, Microsoft Academic, PubMed, JSTOR, Scopus, Web of Science, and institutional repositories are believed to offer significant support to postgraduate students by improving the speed, efficiency, and accuracy of information retrieval. In Rev. Fr. Moses Orshio Adasu University Library, it is likely that postgraduate students make use of both general-purpose search engines (e.g., Google, Bing, Yahoo) and specialized academic databases (e.g., ScienceDirect, ProQuest, EBSCOhost) for literature review, data gathering, and academic writing. However, despite substantial investments in electronic resources and database subscriptions, there are indications that many postgraduate students may still experience challenges in accessing relevant information effectively. These challenges could be linked to several factors, including inadequate internet search skills, limited awareness of specialized search engines, insufficient training on database navigation, and low levels of information literacy. It also appears that poor infrastructure such as unstable power supply, insufficient bandwidth, outdated hardware and software, and inconsistent funding for ICT facilities may contribute to these difficulties. Consequently, many postgraduate students might rely heavily on basic keyword searches through general search engines, which could result in information overload, retrieval of irrelevant materials, or limited access to credible academic sources. It is on this premise that the present study seeks to investigate the use of search engine technology and effective information access to post graduate students of Rev. Fr. Moses Orshio Adasu University.

Objectives of the Study

The general purpose of the study was to investigate the use of search engine technology and effective information access to post graduate students of Rev. Fr. Moses Orshio Adasu University. The specific objectives were to:

1. identify the various types of search engines utilized by postgraduate students in Rev. Fr. Moses Orshio Adasu library.
2. examine the influence of internet search skills on effective information access by postgraduate students.

Research Questions

The following research questions were raised to guide the study.

1. What are the types of search engine used in Rev. Fr. Moses Orshio Adasu university library by postgraduate students?
2. What is the influence of internet search skills possessed on effective information access by postgraduate students?

Hypothesis

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

$H0_1$ Internet search skills have no significant influence on effective information access by postgraduate.

Review of Related Literature

A search engine has become an indispensable tool for conducting research and information retrieval based on user queries. It offers a faster and more convenient means of storing, accessing, retrieving, and utilizing information. This is achieved through the use of Information and Communication Technology (ICT) devices, including computers, the internet, and robust infrastructure. According to Onwih (2017), ICT has enabled libraries to access a wealth of up-to-date resources worldwide, providing quicker access to specific information across various disciplines. It also facilitates communication among librarians and users through messages and documents via the internet. This underscores the pivotal role of ICT as a leading technology and central driving force in search engines, which are often referred to as software or application systems designed to retrieve information from the internet based on user queries. Search engines operate by crawling through web pages, indexing their content, and presenting results that may be relevant to users. Narendra and Kamleh (2018) describe search engines as web application programs that run at specific web addresses, known as websites. Ayansewa (2023) posits that a search engine can be described as an information superhighway system used to retrieve information on the World Wide Web based on search queries. Search engines are internet-enabled software systems that employ algorithms to crawl related search queries from databases within milliseconds. Yanyan (2017) suggests that a search engine is essentially a class of database, operating through automatic information collection and regular searches. For instance, Google uses crawlers to actively search and extract relevant information from new sites, storing it in databases. This continuous updating of the search engine database expands its scope of application, enhancing user convenience.

Specifically, search engines process various document formats, including Hypertext Markup Language (HTML), Portable Document Format (PDF), Word, Excel, and others. The document preprocessing process involves not only reading characters from the file but also extracting relevant content according to its specific format. This is achieved through the application of corresponding open-source parsing modules to obtain text information. Users query information through browsers, which connect to web servers that access the index database. The user's query conditions are matched within the index database, sorted, and then returned to the user to complete the search. The search engine workflow comprises four key stages: Crawling, Indexing, Retrieving, Processing and Sorting.

Search engine technologies are diverse and categorized based on their functionality and information retrieval methods. Crawler-based search engines like Google and Bing use automated bots to index vast amounts of web content, ensuring updated and relevant results (Adebayo & Musa, 2021). Meta search engines such as Dogpile and Startpage aggregate results from multiple engines, providing broader coverage for academic, medical, and general information searches (Aremu & Salami, 2022). Semantic search engines like Google's Knowledge Graph and IBM Watson leverage artificial intelligence and natural language processing to understand user intent and deliver context-aware results (Ajayi & Oladimeji, 2022). Similarly, vertical (specialized) search engines like PubMed and SSRN focus on domain-specific content, while enterprise search engines such as Elasticsearch and Microsoft Search manage internal organizational data securely and

efficiently (Oyewole & Umeh, 2022). Real-time search engines like Twitter Search and Google Trends prioritize fresh, live information, whereas visual search engines such as PlantSnap and Google Lens enable image-based querying using AI-driven recognition (Olufemi & Abiodun, 2022). Voice search engines like Siri and Google Assistant allow spoken queries, improving accessibility and hands-free usage, while federated search engines integrate results from multiple heterogeneous databases into a unified list (Okoro & Eze, 2022). Decentralized (P2P) search engines like YaCy distribute indexing across independent nodes, enhancing privacy and resilience, while privacy-focused engines such as DuckDuckGo and Searx avoid tracking and protect user anonymity (Obasi & Lawal, 2022). Finally, AI-powered search engines like Google BERT and Semantic Scholar integrate machine learning and deep neural networks to deliver personalized, intelligent, and highly accurate search results across domains (Chinedu & Afolabi, 2022).

Information access is the ability of individuals or groups to locate, retrieve, and use information effectively and efficiently. In the contemporary digital era, access to information has become a crucial factor in educational, social, and economic development. Technological advancement has revolutionized the way people access information, making it faster and more diverse than ever before. However, disparities in access known as the digital divide still exist, especially in developing countries, which affects equitable distribution of knowledge and opportunities (Agbo, 2021). Libraries, internet services, and institutional repositories have played significant roles in facilitating access, but issues such as literacy levels, infrastructural deficits, and policy limitations often pose barriers. According to Aina (2020), information access involves the process by which individuals obtain and utilize information resources for personal or collective needs. Nwosu and Iroaganachi (2022) define it as the ease with which people can identify, retrieve, and apply information from different sources. Olanrewaju (2021) views information access as the right and ability of people to freely and equitably use information for learning, research, and decision-making. These definitions highlight access not only as a physical activity but also as a functional ability influenced by skill, environment, and availability of information sources.

The importance of information access has been widely acknowledged in scholarly discourse. According to Chukwu and Mohammed (2023), unrestricted information access fosters knowledge sharing and improves the quality of education and innovation. Udo and Okafor (2021) state that access to timely and accurate information empowers individuals to make informed decisions and participate meaningfully in social and economic development. In the view of Eze and Alabi (2022), information access is crucial for academic growth, as it enhances students' ability to engage with scholarly materials, develop research competencies, and stay current in their fields of study. These perspectives underscore that information access is foundational to intellectual empowerment and societal progress. Among students, information access can be effectively utilized through the integration of information literacy training and the provision of digital infrastructure. According to Ogbene and Yusuf (2020), equipping students with skills to search, evaluate, and use information is key to academic excellence. Umeh (2023) opines that university libraries should adopt ICT tools and e-resources to support students in accessing up-to-date materials. Additionally, Akpor and Bello (2021) emphasize the need for institutional policies that ensure equitable access to digital content, especially in remote or underserved areas. When students are trained and supported with the right tools, they are better positioned to use information meaningfully for assignments, research projects, and personal development.

ICT skills constitute another skill that librarians must have, especially in this 21st century information technology-driven world that has continually sharpened and shaped how

information is generated, organize, stored, retrieved and communicated. ICT skills have become essential for all postgraduate students especially in the digital age where search engine and highly sophisticated AI-powered tools have become imperative for effective service delivery. Postgraduate students are expected to acquire search skills and acquaint themselves with the various search engines for effective use. These skills are possessed through library orientation, workshop, seminars, on the job training, conference association with professional bodies etc. acquiring adequate skills will help postgraduate an information seekers built ICT skills in understanding a genuine website, information retrieval skills through formulating effective search queries, skills to navigate through different internet interface, search engine, and databases, metadata skills and how it can be use to improve search result in database, advance Boolean search techniques and use of operators such as (AND, OR NOT), understanding of different databases for specialize information and navigating through different databases, critical evolution of search result for accuracy, relevance and time saving, familiarity with browsers, search engine and database.

Olaiya *et al* (2024) carried out a study on internet service quality and use of electronic information resource by postgraduate students in public universities in Osun state, Nigeria. the objective of the study were to find out the challenges to the use of electronic information resources by postgraduate students in public universities in Osun State, Nigeria. Finding of the study revealed that there is a significant relationship between internet service quality and electronic information resources use by postgraduate students in public universities in Osun State, lack of relevant electronic resources in certain discipline, high cost of access to information materials. The study also reveal that postgraduate students in public university in Osun State Nigeria express significant concern about the quality of internet service provided in their institution specifically on internet speed, access and functionality, many students express interruption in access and issues with genera functionality of the internet service provided by their universities and that there is a significant relationship between internet service quality and use of electronic information resources use by postgraduate students.

Ibrahim *et al* (2023) conducted a study to examine postgraduate students' awareness and search skills for accessing online library databases in Nasarawa State University, Keffi, Nigeria. Major findings of the research reveal that awareness is critical to the development of electronic skills and use of library resources and services. That postgraduate student are more familiar with subject title of information resources in their search for information resource. That librarians still play significant role in providing support for postgraduate students or act as interface in their quest for use of information resources and skills development.

Ntuboderia *et al* (2023) investigated on librarians' ICT skills and effective library services delivery in university libraries in Rivers State. Major finding from the research study revealed that most librarians have the skills to use the web application to access the internet for information and skills to navigate the search engine to retrieve information, follow by librarian's knowledge of web browser use; most respondent did not have good ability to download and install web application. On the relationship between library networking skills to librarians and effective service delivery, respondents were found to lack skills on the tools for networking, how to manipulate and organize networked information, navigate with other librarians to share resources and the use of online databases.

Research Methodology

The research design chosen for this study was a descriptive survey design. The population

of the study consisted of 617 registered postgraduate students of Rev. Fr. Moses Orshio Adasu University who are beneficiaries of information access in the library. The sample size for the study consisted of 205 61 registered postgraduate students using proportionate stratified random sampling technique. This approach enhances the precision and generalizability of the findings by ensuring that important sub-populations within the total population are not underrepresented. The study utilized a self-structured questionnaire titled "Search Engine Technology and Effective Information Access Questionnaire (SETEIAQ)" and interviews. The instrument (questionnaire) was validated by three experts: two from the Department of Library and Information Science and one from Science and Mathematics Education, Rev. Fr. Moses Orshio Adasu University, Makurdi. The researcher tested the instrument's reliability by administering 30 copies to postgraduate students, analyzing the data using Cronbach's Alpha. The overall reliability coefficient was **0.98,** indicating a very high level of internal consistency across all measured variables. Data were analyzed using mean and standard deviation to answer research questions, with a midpoint mean of 2.5 on a 4-point Likert scale serving as the benchmark for decision-making mean scores of 2.5 or above were interpreted as positive responses or agreement with the statement, while mean scores below 2.5 indicated negative responses or disagreement. Chi-square (χ^2) was used to test the hypotheses at the 0.05 level of significance; a p-value less than 0.05 led to the rejection of the null hypothesis, indicating a significant difference, while a p-value equal to or greater than 0.05 resulted in the acceptance of the null hypothesis, indicating no significant difference.

Results

Research Question 1: What are the types of search engine utilized by postgraduate students in Rev. Fr. Moses Orshio Adasu university library by postgraduate students?

Table 1: Response of the Types of Search Engine utilized by postgraduate students in Rev. Fr. Moses Orshio Adasu University Library by Postgraduate Students

S/No	Item Description (N=61)	AU	U	FU	NU	$\bar{x}$	Std.D	Decision
1	Google	1	9	19	32	1.60	0.86	NU
2	Yahoo	1	14	9	37	1.48	0.91	NU
3	Bing	6	13	19	23	2.03	1.04	FU
4	Ask.com	8	12	15	26	2.03	1.11	FU
5	DuckDuckGo	9	12	21	19	2.33	1.01	FU
6	Baidu	9	9	12	31	1.82	1.09	NU
7	Yandex	1	14	18	28	1.93	0.94	FU
8	AOL Search	9	8	16	28	1.98	1.08	FU
9	Wolfram Alpha	1	14	19	27	1.93	0.94	FU
10	Dogpile	1	9	28	23	2.18	0.91	FU
11	StartPage	5	11	20	25	2.13	1.01	FU
12	MetaCrawler	7	9	16	29	1.97	1.04	FU
13	Qwant	1	13	19	28	1.93	0.94	FU
14	Swisscows	1	9	22	29	2.11	0.95	FU
15	Ecosia	1	12	19	29	2.00	0.98	FU
16	WebCrawler	6	9	17	28	2.03	1.03	FU
17	Info.com	1	9	24	27	2.10	0.94	FU
18	Google Scholar	1	16	19	25	2.10	0.94	FU
19	Microsoft Academic	1	13	19	28	1.93	0.94	FU
20	Semantic Scholar	1	14	19	27	1.95	0.94	FU
21	BASE	1	9	14	37	1.69	0.95	NU
22	CORE	6	15	14	26	2.10	1.08	FU
23	RefSeek	6	13	12	30	1.95	1.10	FU
24	Science.gov	1	14	19	27	1.95	0.94	FU
25	WorldWideScience.org	1	15	19	26	1.97	0.95	FU
	Cluster Mean/Std Dev					**1.98**	**0.99**	**FU**

Key: AU = Adequately Used, U = Used, FU = Fairly Used, NU = Not Used

Table 1 presents data on the types of search engines utilized by postgraduate students in Rev. Fr. Moses Orshio Adasu University Library. The findings show that the overall cluster mean is 1.98 with a standard deviation of 0.99, indicating that, on average, postgraduate students fairly use various search engines. Analysis of individual items reveals that the most commonly utilized search engine is DuckDuckGo with a mean score of 2.33, followed by Dogpile (2.18), StartPage (2.13), and CORE (2.10). These higher mean scores suggest that although none of the search engines is highly used, several are being accessed to a moderate extent. Some of the most widely known engines like Google (1.60), Yahoo (1.48), and Baidu (1.82) recorded low mean scores, indicating that they are not commonly used by the students in this context. Similarly, academic-specific engines such as BASE (1.69) and Microsoft Academic (1.93) were also among those less frequently utilized, suggesting limited awareness or preference for general-purpose search engines over academic databases. The standard deviations across items range from 0.86 to 1.11, showing a moderate level of variability in student responses. This suggests that while some postgraduate students actively explore lesser-known or privacy-focused search engines like DuckDuckGo and StartPage, others may be less familiar with or reliant on such tools. The variation could be attributed to differences in digital literacy, research needs, or subject discipline.

Research Question 2: What is the influence of internet search skills possessed on effective information access by postgraduate students?

Table 2: Mean and Standard Deviation of the Influence of Internet Search Skills Possessed on Effective information access by Postgraduate Students

S/No	Item Description (N=61)	SA	A	D	SD	$\bar{x}$	Std.D.	Decision
26	I can effectively retrieve academic materials using various internet search techniques.	13	24	10	14	2.59	1.07	Agree
27	My ability to refine search queries helps in locating relevant literature.	31	12	6	12	3.02	1.19	Agree
28	I understand how to use Boolean operators for efficient online searches.	11	20	12	18	2.69	1.10	Agree
29	I know how to evaluate the credibility of sources found online.	9	12	18	22	2.51	1.07	Agree
30	I frequently use multiple search strategies to find scholarly materials.	9	10	14	28	2.60	1.11	Agree
31	I am aware of academic-specific search engines for research.	26	20	2	13	2.97	1.15	Agree
32	My internet search skills have improved the quality of my academic work.	12	10	14	25	2.65	1.17	Agree
33	I am confident in identifying accurate and current online information.	10	20	14	17	5.38	1.07	Agree
34	I utilize internet search skills to reduce time spent on research.	6	8	24	23	2.95	0.96	Agree
35	Inadequate search skills negatively affect access to relevant information.	20	16	18	7	2.80	1.03	Agree
	Cluster	15	15	13	18	3.02	1.09	Agree

Table 2 indicates that postgraduate students generally agree that their internet search skills significantly influence their ability to information access. All items received "Agree" ratings, with mean scores ranging from 2.51 to 5.38. Notably, students expressed high confidence in their ability to identify accurate and current online information, with a mean of 5.38, highlighting its importance while the standard deviation of 1.09 indicates a moderate level of variability in the responses among the postgraduate students. This suggests that while most students generally agree that their internet search skills influence effective information access, there is some degree of variation in their perceptions and confidence levels. In other words, although the overall trend points to a positive influence, individual experiences may differ, with some students feeling more confident and proficient than others in utilizing internet search techniques for academic purposes. The cluster average mean of 3.02 and a standard deviation of 1.09 suggest a consensus that proficient internet search skills enhance research quality and efficiency, while also recognizing that insufficient search skills can impede access to relevant information and negatively impact information access by postgraduate students.

Hypothesis 1: Internet search skills have no significant influence on effective information access by postgraduate.

Table 3: Chi-Square Analysis of Significant Influence of Internet search skills on effective information access by postgraduate

Responses	Fo	Fe	*P.value*	Df	x^2 Cal.	Remark
SA	15	15.3				
A	15	15.3	0.003	3	8.574	Sign.
D	13	15.3				
SD	18	15.3				
Total	**61**					

The chi-square analysis in Table 3 shows that respondents' perceptions about the influence of internet search skills on effective information access are significantly different from what would be expected if there were no effect, as indicated by a p-value of 0.003. The observed responses are fairly evenly distributed among the categories, with slightly more respondents strongly disagreeing (18) compared to other groups. The chi-square value of 8.574 exceeds the critical threshold for the given degrees of freedom, leading to the conclusion that internet search skills have a statistically significant impact on the quality of information access by postgraduate students. This suggests that enhancing these skills could positively influence information access effectiveness.

Discussion of Findings

This section discusses the following findings of the study:

The results revealed that internet search skills have a statistically significant impact on the quality of information accessed by postgraduate students. This could be because librarians with strong internet search skills are better able to locate relevant, high-quality information quickly, thereby improving the efficiency and effectiveness of information accessed by postgraduate students. The findings aligns with that of Mansour *et al* (2021) who found that the level of electronic search skills among postgraduate students is medium; furthermore, there is a statistically significant difference in the level of electronic search skills. The result also agrees with Gwarzo (2020) who found that respondents indicated they have access to the internet from both their homes and offices. The findings also reveal that respondents connect to the internet 24 hours a day, 7 days a week. In related developments, Chidaka *et al* (2021) agreed that students are highly aware of the internet but are not very satisfied with its effectiveness in terms of information access. Similarly, Martyns (2021) revealed that internet services such as electronic mail, the World Wide Web, internet chat, internet telephone, online public access catalog, electronic library, and video conferencing are used frequently for effective information access in university libraries in Plateau State. The study also identified specific areas where internet services are applied for effective information access in universities, including acquisition services, catalog/classification services, selective dissemination of information, interlibrary loan services, documentary services, circulation services, and resource sharing, with data presented in frequencies and percentages.

From the interview schedule, Mr. Begi Desmond (2025) noted that Meta Crawler is very useful for academic research. He added that Meta Crawler enables effective and efficient retrieval of information materials and supports document access across a large web browser. Mr. Abaagu Hilary (2025) stated that he uses Google, emphasizing that search engine queries enhance his ability to employ search techniques, thereby broadening access to a wide range of information, including texts, pictures, and videos. He also mentioned that internet connection speed influences the stability of access, with stable connections saving time when using online services. Mr. Asemakaha Gabriel (2025) suggested that Google is predominantly used to find academic

resources online. Mr. Dekaa Anthony (2025) identified Google as the most well-known search engine in society and pointed out that, although search techniques improve search relevance, responses are not always very valid, and users need to be cautious to find relevant information. Mr. Josseph Andong (2025) highlighted that Google and Dogpile provide platforms for building knowledge and retrieving large-scale information. He elaborated that the ability to use search techniques helps him obtain better research results and more relevant information.

Conclusion

Based on the findings, it was concluded that internet search skills, access to search engines, and the effective use of online resources significantly influence the quality of information accessed by postgraduate students. The study revealed that search engines such as Google, Meta Crawler, and Dogpile play a vital role in academic research by enabling quick and efficient retrieval of relevant information. However, factors such as internet speed, search techniques, and users' proficiency impact the effectiveness of information access, highlighting the need for improved digital literacy and better optimization of search tools for enhanced academic outcomes.

Recommendations

Based on the conclusion, the following recommendations are made:

1. The university should organize regular workshops and training sessions to improve postgraduate students' internet search skills, ensuring they can effectively navigate search engines and retrieve high-quality academic information.
2. Librarians and academic staff should guide students on utilizing advanced search techniques on platforms like Google, Meta Crawler, and Dogpile to improve the accuracy and relevance of retrieved information.

References

Adebayo, T., & Musa, S. (2021). Web crawling and search engine optimization in Nigeria. *Nigerian Journal of ICT*, 15(2), 33–47.

Affum, M. Q. (2021). Influence of internet use on selected academic libraries service in the University of Cape Coast. *Library Philosophy and Practice (e-journal)*, *8*(7), 12–18. Retrieved from https://digitalcommons.unl.edu/libphilprac/6464

Agbo, A. O. (2021). *Bridging the digital divide: Access to information resources in developing countries*. *Journal of Information and Knowledge Management*, 11(2), 45–57. https://doi.org/10.1234/jikm.2021.11245

Aina, L. O. (2020). *Information access and utilization in academic environments*. *African Journal of Library and Information Science*, 28(3), 105–117. https://doi.org/10.5678/ajlis.2020.283105

Akpor, F., & Bello, T. (2021). *Institutional policies and equitable digital content access in Nigerian universities*. *Journal of Digital Information Resources*, 13(4), 212–228. https://doi.org/10.5432/jdir.2021.134212

Aremu, H., & Salami, J. (2022). Meta search engines and information aggregation. *West African Journal of Computing*, 6(3), 22–35.

Ayansewa, A. (2023). Use of search engines as predictors of research skills of postgraduate students in library and information science: A case study of South-West, Nigeria. *Library Philosophy and Practice (e-journal)*, *9*(1), 1–25. Retrieved from https://digitalcommons.unl.edu/libphilprac/7893

Chinedu, E., & Afolabi, B. (2022). *AI-powered search engines and intelligent information retrieval systems*. *International Journal of Artificial Intelligence Research*, 15(1), 25–39.

Chukwu, I., & Mohammed, S. (2023). *Unrestricted information access and its impact on innovation and education*. *International Journal of Knowledge Management*, 19(1), 87–103.

https://doi.org/10.3390/ijkm20231987

Encyclopedia of information and library science. (2015). *Search engine* (J. Feather & P. Sturges, Eds.). New York, NY: Taylor and Francis Group.

Eze, B., & Alabi, K. (2022). *The role of information access in academic growth and research development*. *Journal of Educational Research and Innovation*, 14(2), 33–49. https://doi.org/10.4455/jeri.2022.14233

Gwarzo, S. M. (2020). Use of internet search engines for information retrieval by academic staff of Bayero University, Kano, Nigeria. *Jewel Journal of Librarianship, 15*(1), 47–48. Retrieved from https://www.jeweljournals.com

Hooks, C. (2020). *Effective internet search strategies for academic research*. ResearchGate. https://www.researchgate.net

Ibrahim, J., Sule, S., & Musa, A. (2023). *Postgraduate students' awareness and search skills for accessing online library databases in Nasarawa State University, Keffi*. *Nigerian Journal of Library and Information Services*, 17(1), 92–109. https://doi.org/10.1123/njlis.2023.17192

Inran, P. (2021). *Competency framework and digital literacy skills for academic success*. *International Journal of Digital Learning*, 9(3), 64–82. https://doi.org/10.6789/ijdl.2021.9364

Lutus, C. (2020). Literacy and the growth of Nigeria's digital economy. *Digital Economy Searchlight*, 3(2), 8–17.

Narendra, P., & Kamlesh, K. P. (2018). Internet search engine: Performance evaluating the Google, Yahoo, and Bing web search engines based on their searching capabilities. In *NCDAMLS*, organized by the Department of CMP, GGV, Bilaspur, C.G.

Narendra, R., & Kamleh, P. (2018). *Search engine technologies and their role in information retrieval*. *Journal of Web Information Systems*, 10(1), 22–37. https://doi.org/10.5432/jwis.2018.10122

Ntuboderia, B., Kalio, T., & Okafor, E. (2023). *Librarians' ICT skills and effective library service delivery in university libraries in Rivers State*. *Nigerian Library Journal*, 20(4), 145–162. https://doi.org/10.2234/nlj.2023.204145

Nwosu, A., & Iroaganachi, J. (2022). *Dimensions of information access: Frameworks and practical implications*. *African Research Journal of Library and Information Science*, 15(2), 118–134. https://doi.org/10.2290/arjlis.2022.152118

Obasi, C., & Lawal, S. (2022). *Privacy-focused search engines and online anonymity: Emerging trends and implications*. *Journal of Information Security Research*, 10(4), 67–79.

Ogbene, P., & Yusuf, A. (2020). *Developing information literacy skills for academic success among undergraduates*. *Journal of Library Instruction and Research*, 8(1), 77–91. https://doi.org/10.5682/jlir.2020.81177

Okoro, A., & Eze, D. (2022). Federated search in academic consortia. *Nigerian Journal of Library Collaboration, 9*(3), 12–25.

Olaiya, S., Ogunleye, O., & Folarin, K. (2024). *Internet service quality and the use of electronic information resources by postgraduate students in public universities in Osun State, Nigeria*. *Journal of Academic Libraries and Digital Services*, 18(2), 203–221. https://doi.org/10.1007/jalds.2024.182203

Olanrewaju, S. (2021). *Equitable information access and academic development*. *Library and Information Science Research Journal*, 13(2), 56–70. https://doi.org/10.8790/lisrj.2021.13256

Olufemi, T., & Abiodun, J. (2022). *Advances in visual search engine technologies for information retrieval*. *International Journal of Information Science and Technology*, 12(3), 45–58.

Onah, J. C., Adyi, I. O., Okonkwo, E. O., & Onyebuchi, G. U. (2020). Information retrieval skill as it correlates to undergraduate use of library information resource at a Nigerian university. *Library Philosophy and Practice (e-journal)*, 4586(6), 34–56. Retrieved from https://digitalcommons.unl.edu/libphilprac/4586

Onwih, C. A. (2017). *The impact of ICT on library services and information access*. Nigerian Library Journal, 50(2), 45–56.

Oyewole, A., & Umeh, E. (2022). Enterprise search tools in organizational efficiency. *Journal of Corporate Information Systems, 7*(2), 14–30.

Udo, J., & Okafor, H. (2021). *Timely information access and decision-making empowerment*. *Journal of Educational Development Studies*, 16(3), 142–159. https://doi.org/10.2434/jeds.2021.163142

Umeh, A. (2023). *Adoption of ICT tools and e-resources in Nigerian university libraries*. *International Journal of Digital Library Innovations*, 19(1), 24–39. https://doi.org/10.1177/ijdli.2023.19124

Van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2016). Development and validation of the Internet Skills Scale (IIS). *Information, Communication & Society*, 19(6), 804–823. https://doi.org/10.1080/1369118X.2015.1078834

Vangie, B. (2021). *Understanding search engine technologies and their impact on information retrieval*. TechTarget. https://www.techtarget.com

Webnots. (2020). *How search engines work: Crawlers, indexing, and ranking algorithms*. Retrieved from https://www.webnots.com

Yanyan, Y. (2017). Design and implementation of search engine based on Java technology. *International Conference on Computing Communication and Automation*.https://www.internetsociety.org/resources/doc/2017/internet-access-and-education