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Undergraduates' Digital Literacy and Access to Information in Nigerian University Libraries: Does Subject Background Make a Difference?

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Abstract

The study attempted to find out whether undergraduates' subject background has influence on their application of digital literacy skills in accessing digital information for educational problem solving.The design of the Ex- Post Facto survey was used for the study. A37- item Questionnaire was used to collect data from a sample of 1506, which represented 5% of 30,121 undergraduates of seven federal universities in southern Nigeria, which were purposely selected for the study. The major finding of the study showed that subject background had strong influence and makes the difference in undergraduates' ability to use digital literacy skills in accessing information. The direction of the difference is that those in science-related disciplines demonstrated greater skills than those in Arts- related fields in the application of digital literacy skills for information access. The major challenge was lack of adequate education and training for developing digital literacy skills among undergraduates. It was recommended among others, that the National Universities Commission (NUC) should formulate policies that would enforce university-wide training of undergraduates, especially those in Arts/Humanities for digital literacy skills development.

Keywords: Access to Information, Digital Information, Digital Libraries, Digital Literacy, Subject background, University Libraries.

Introduction

Digital literacy is one of the key drivers of digital libraries' access to information. Technological revolution and the emergence of knowledge driven culture has resulted in transformation of the belief about what literacy means. Also the emergence of digital library model of information has made the concept of being literate evolve from having the ability to access, evaluate and understand printed texts so that digital texts available in electronic formats can be accessed, located, evaluated and used (Coiro, Knobel, Lankshear & Leu, 2008). This is the whole hub of information literacy, which has been identified as an umbrella concept covering digital literacy. The availability of digital technologies does not ensure access to information when the user does not possess the necessary skills with which to use them to harness information resources. This view aligns with the opinion held by the American Library Association (2013) when it was stated thus:

> *There's an emerging understanding in our technology-saturated culture that access to technology is just a part of the solution needed to ensure digital*

> *inclusion and empowerment. The rest of the equation is composed of improved technical capabilities and competences (p.1).*

This rightly implies that in this present information society, digital literacy is a central focus in an individual's ability to access information and to learn effectively especially in a digital environment. Defining digital literacy, Hoechsmann and DeWard (2015) describe the concept as the ability to use digital technologies, the ability to consider digital media resources objectively and the content and information and skills to build and interact using new technology. The definitions given by Fresno County Office of Education California (nd), McKenna et al 2012, Adeoye and Adeoye (2017) and Murtati'ah and Putro (2019) describes digital literacy the ability to understand and use computer technology to search, locate and access information as well as collaborate and connect with others with online security knowledge. From the above description, it is evident that digital literacy has several dimensions, which are cognitive, social and technical. Cognitively, digital literacy enables one to develop a mental understanding of the computer and its operating processes. In the social context the individual is able interact with information with the understanding of the rules guiding cyberspace and online communication while the technical aspect upon which the present study is based, has to do with the ability to apply skills in operating digital devices in an effort to access information for problem solving. Hence a working definition by the researchers describe the concept as the ability to locate, identify, access and communicate information through the application of skills of basic computer operations, word processing, online information retrieval process, use of social media, use of file formats and storage media to access, process and communicate information. These abilities upon which this study is based are central for effective manipulation of digital technology to resolve the need for information by the undergraduates who are the key digital libraries users.

The undergraduate students that are the focus of this study are individuals from the age of 16 years old who are studying to get bachelor's degree in different fields of study/human endeavor in Nigerian universities. The broad division of these fields of study includes sciences courses, technology-related courses, arts, humanities and social science courses. They are expected to pass through a minimum of four years of study for them to be regarded as quality products of their various universities. The students need crucial information to support their learning in the classroom, complete their course assignments and term papers, and write

examinations in order to excel in their various fields of study and to keep pace with their counterparts elsewhere in the world. They also require information not only for personal development but also for active participation in the world of work and societal development.

Nonetheless, numerous studies have shown that students use digital resources low (Hewitson, 2002, Ajuwon, 2003, Ojo and Akande, 2005, Mohamed, 2007 and Peking University Library, 2007 as cited in Igbo and Imo 2020) as a result of which they find it difficult to satisfy their information needs. Some studies like those of Kidd (2002), Whitner (2002) and Mahmood(2009) attributed this to some technological and human skills deficiency related students' subject background. Against this fallback, the study aims to find out whether subject of study make any difference in undergraduates' ability to apply digital literacy in access to information in Nigerian universities.

The Research Objectives

The study's goals include the following:

1. To find out the extent to which undergraduates' skill in computer operations basics based on subject background influence their access to digital information.
2. To ascertain the extent to which skill undergraduates' skill in word processing based on subject background influence their access to digital information
3. To determine the extent to which undergraduates' skill in information retrieval based on subject background influence their access to digital information
4. To examine the extent to which undergraduates' skill in the use of social media based on subject background influence their access to digital information
5. To find out the extent to which undergraduates' skill in the use of e-mail based on subject background influence their access to digital information.
6. To find out the extent to which undergraduates' skill in the use of file formats and storage devices based on subject background influence their access to digital information.
7. To identify the challenges of accessing information using expertise in digital literacy by the undergraduates based on subject background.

Hypotheses:

The study will be guided by the following hypothesis:

> **H_{01}**. There is no significant difference in the mean responses of undergraduates based on subject background on the extent to which they access digital information

Review of Literature

Digital literacy has been described in diverse ways by various authors. A general description by Martin (2005) and Leeds Metropolitan University (2011) identify a convergence of different modes of literacy in relation to digital literacy. This includes computer literacy, information literacy, media literacy, technology literacy, IT literacy, communications and collaboration, digital science and academic practice**.** The above description is constrained by placing Information literacy (the concept being broader) under the concept of digital literacy. In actual sense information literacy should be seen as an umbrella term involving digital literacy. This is because while digital literacy is concerned with the ability to access information using digital technology, information literacy is more embracing, covering the ability to access information in diverse formats including digital and non-digital formats. In fact, the argument put up by Cordell (2013) has shown that digital literacy plays a complementary role to information literacy, pointing out that the principles and skills of digital literacy include the basics of navigating digital environments that students need to excel in knowledge literacy and other areas of study.

The American Library Association (2013) and European Commission (2013) concept explicitly defines digital literacy as the ability to identify , understand, analyze, construct and communicate digital information using information and communication technologies. Some characteristics of a digital literate person have been identified from the above definition as follows:

- the ability to use different technologies to search and retrieve information accurately and efficiently, interpret search results and determine the quality of the retrieved information**;**
- connecting and interacting with friends, colleagues and the general public using skills and relevant technologies;
- making use of skills to actively participate in civil society and contribute to a vibrant, educated and involved community;

- knowing technology partnerships, lifelong learning, data privacy and proper stewardship**.**

In relation to the above descriptions, Van Deursen and Van Dijk (2009) proposed four different categories of digital skill models that could be applied in the understanding of digital literacy. These include: Operational skills (hardware and software computer operations required)**,** formal skills (capacity to understand and manage the formal nature of computer networks and web environments)**,** information skills (capacity to pick, analyze and process data using technology) and Strategic skills (capacity to use ICT to achieve goal).

Martin and Grudziecki (2006) have advanced three stages of the growth of digital literacy in relation to the above model: competence, use and transformation. Further definition by the above writers suggests that the base where basic skills are learned and attitudes are established is digital competency, which consists of awareness, skills and attitudes. At the other hand, digital usage reflects the application of digital expertise in a specific context, such as a discipline, an information domain or a professional arena. This stage is described as the central and most crucial level of digital literacy, as it is here that literacy is implemented to solve an identified issue. In addition, it is what describes one as a digitally literate person which equally brings about digital transformation, a stage where transformative change occurs, resulting to being imaginative and innovating. Figure 1 below is a reflection of the above stages of digital literacy development.

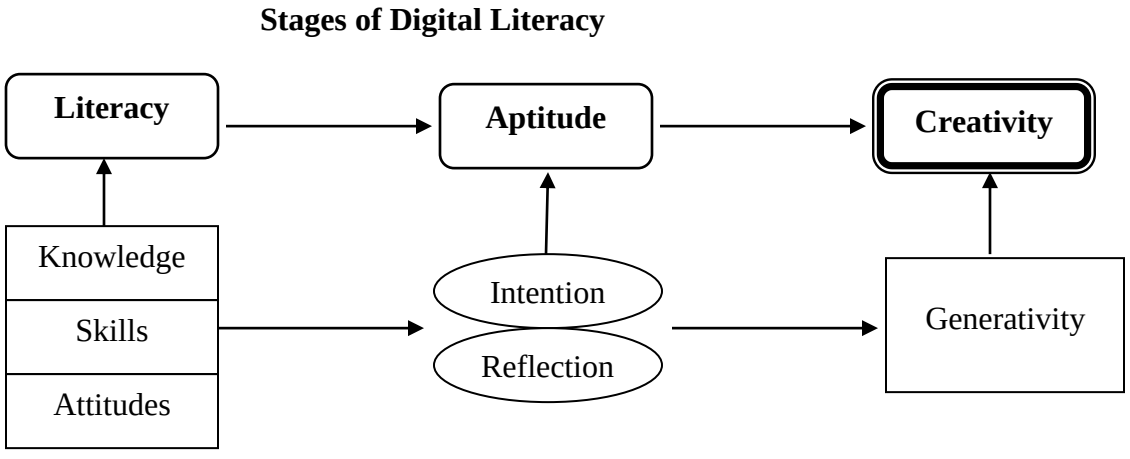

Fig 1: Adapted and modified from Murray and Perez (2014)

The above model as set out by Murray and Perez (2014) combines purpose and reflection as elements of the construct of digital literacy. Here knowledge, skills and attitudes combine here in the context of reflective self-awareness and purposeful intent to enable a computer user to attain generativity. Murray and Perez (2014) claim that generativity is the capacity to produce new skills and information that forms the basis of creativity. The literacy, aptitude, and innovation dimensions reflect progress from simple to self-awareness to creative engagement with computer technologies. Literacy encompasses knowledge, skills and attitudes; aptitude captures reflection and intension; generativity connotes the imaginative capacity. The overlay of literacy, aptitude and creativity is meant to give meaning to the complex processes by which users learn, interact with, assimilate and transfer information technology artifacts and concepts in the process of information search/retrieval.

Commenting on the process of end- user searching and the skills required, Dutton (1990) suggests that the skills needed to optimize the capacity of electronic tools include knowledge of the database layout and instructions that the searcher will insert into the machine, as well as an understanding of how the instructions are interconnected. Similarly, Borgman (1986, 1996) suggested a model of knowledge and skills needed to search for information in digital libraries, including conceptual knowledge of the method of information retrieval; semantic and syntactic knowledge of how to execute a specific query and technical skills in the execution of the query.

While explaining the individual component of the above model, Borgman argues that conceptual knowledge implies user comprehension of a specific type of spreadsheet or word processing program for digital libraries. This has to do with understanding how the problem can be evaluated, identifying priorities, splitting the problem into component pieces, surveying available sources that may contain relevant information, and creating a search plan in one or more digital libraries. It also includes the continuous assessment of the search plan towards the established goals and revising the search strategy accordingly. Commenting on the conceptual knowledge of information retrieval system, Dillon and Gabbard (1998), Priss and Old (1998) and Dillon (2000) claim that the ability to build an information space mental model has always been a key predictor of digital library search success. In terms of semantic expertise, Shneiderman (1992) argues that it is an awareness of the commands or behavior in a specific system that requires familiarity with the capabilities common to most information systems, such as keyword searching, boolean

combinations, thesauri browsing, standard sorting and display choices, hypertext features**,** etc. Borgman added that it may equally include knowledge about capabilities that may be specific to types of systems such as text, numeric, image, geographic and multiple implementation of each.

Technical skills indicate basic computer skills that Borgman (2005) described as a precondition for developing syntactic , semantic and conceptual knowledge of the search process. Technical skills needed to search any digital library include knowledge of how to use computer keyboards and pointing tools, and familiarity with conventions such as setting screen displays, and pressing "return" or "enter" after typing a button. The above author further prescribes that users should be conversant with the adoption/ operation of interface design guidelines common to application technologies and operating systems, including ability to perform such operations as opening and closing windows, pulling down menus, cutting, copying and pasting text or objects, and knowledge of where to point and click and what, where and when to type. Similarly, Ozoemelam (2009) identifies knowledge and skills which a student requires in other to make use of digital libraries in accessing information. These include: knowledge of database structures; skills in the use of computer; working in interactive platforms eg, video conferencing, BBS, LISTSERVE, Chat room etc, formulating search queries, online navigation techniques, use of electronic library tools, eg, CD - ROM, OPAC, subject gateways, working in network environment, using internet telephony, computer systems/application software eg, MS Windows, XP, LINUX,MS Office, etc; and being conversant with electronic file formats eg, PDF,JPEG, MPEG, HTML, etc. Also, Shabana, Saleem and Batcha (2014) have outlined the competencies related to digital literacy to include computer knowledge and security, word processing, presentations, operating systems, internet and information retrieval, e-mail, database management and web page. In summary, digital literacy skills have been grouped by Fresno County Office of Education, California (nd) into three major categories thus:

- Demonstration of computer usage skills as well as understanding the hardware, software and networking principles that underlie it. This covers computer basic operations, word processing and desktop publishing, databases , spreadsheets (tables, charts and graphs), internet, online communication and networking, multimedia and presentation tools and web authoring

- Demonstration of expertise in conscientious use of technology and awareness of ethics and safety concerns in the usage of electronic tools.
- Demonstration of the ability to use research technologies, critical thinking, problem solving / decision taking, communication, teamwork, imagination and innovation.

The foregoing indicates that ensuring the digital literacy of users is vital for success in integrating digital libraries in the information services of the present day information landscape.

Research on students' digital literacy in relation to access and use of knowledge resources and tools have been conducted by various authors. Prensky (2001) in a study of the level of proficiency of Malaysian youths in the use of digital technology for access to information finds out that the general notion of most youths today is that they are “digital natives” (a phrase which the above author used to identify young people who are quickly using technology because of their daily access to new technologies, such as computers, cell phones, video games and the Internet). Bennett, Maton and Kervin (2008) giving credence to the above findings, observed that despite this ability, a significant number do not seem to possess the required skills of digital natives (especially with regard to effectively performing tasks in a knowledge-based society with digital information and multimodal meanings**.** This could be linked to a situation of non exposure of the youths to a more meaningful ICT training that would enable them to maximize the potentials of using those technologies for accessing information for problem solving.

Other studies by Tan, Nga and Saw (2010) and Abidin, Pour-mohammadi, Varasingam & Lean (2014) studied young people's online habits and reading / writing behaviors by observing the social networking sites that the youths frequently engage in. It was revealed that the youth find the Internet to be an important source of information and the amount of knowledge they are interested in is vast knowledge from entertainment and social networking sites such as Facebook, twitters and blogs. Rather than reading as an academic practice they were more geared towards social networking practices. They seldom access more serious digital content, such as e-books, e-newspapers or e-magazines. The foregoing indicates that youths lack the orientation and skills of using the digital technology to access educational information and they conceive the digital technologies much as a means of entertainment rather than a source of facts. There is then the

need for re-orientation of the youths towards the use of digital technologies for education which is one of the issues which the study proposes to address.

With respect to students' academic activities in institutions of learning there is the burning need for them to possess digital literacy skills which will give them access to knowledge that will enhance their optimal performance academically. A study by Sharma, Razak and Noor (2012) indicate that students have weak web search skills, finding it hard to locate relevant information that they needed. In addition, the students did not thoroughly analyze the digital content sites; they could not determine the integrity, validity, reliability or currency of digital content sources. They only superficially understood the details, without understanding the intent or point of view of the digital material. Consequently they did not detect latent prejudices and beliefs. The above findings are similar to the findings made by Shopova (2014) which shows that even though students were able to interact with computers and the internet, they lack the ability to use these tools to search, retrieve, arrange, interpret, assess and use information for practical decision-making and problem-solving. The study also concluded that many of the young people who come to university may not have the skills needed to perform tasks using digital technology. They are excellent at using social networking, email, internet browsing, turning up as involved gamers and participants in virtual communities, but their experience and expertise in the learning process are still shallow for the successful use of modern technology. In another survey, by sharing the findings of a digital literacy assessment provided to students enrolled in a seminar course at a regional university in the United States, Murray and Perez (2014) supported digital literacy. The results indicate that 72 percent of the respondents failed in the evaluation, which led the researchers to conclude that experience does not provide equal understanding about the everyday engagement with digital technology among students. It was proposed that systematic approaches be established to meet the youngest students and ensure that college graduates join the new workforce armed with valuable technology skills that would allow them to access information for problem solving.

Nonetheless, a number of studies have shown some differences in undergraduates' ability to apply digital literacy skills in relation to subject background. Mahmood (2009) discovered that a higher percentage of university students in science-related courses have higher information and computer technology usage skills than those in humanities. Similarly, Whitmire (2002) revealed

in a study that undergraduates from life sciences disciplines were found to participate in more knowledge gathering behaviors including the use of ICT to seek for information more than those in non-science disciplines. In a study of faculty members on electronic journal usage, Kidd (2002) found that faculty members and other science professionals are the most active and heavy consumers of digital library services more than their non-science counterparts. It could be argued that the nature of work in science related disciplines require the use of ICT equipment more than that of science disciplines As a result, the science students are more familiar with machine use. As a result, the science students are more familiar with machine use. However, the realities of the present knowledge based economy require every individual, irrespective of field of human to possess the ability to appropriate information for both personal and societal survival. In a comparative analysis on the use of ICT by secondary school teachers of science and non-science subjects in Tanzania, Gilbert, Ismail and Manyilizu (2015) showed that no substantial gap existed in the use of ICT by teachers because both groups were exposed to similar setting of ICT training during their education. The foregoing implies that both science and non science students require equal opportunity for ICT orientation/training to bridge the existing gap between the two groups. This situation has implications for the library because in this present dispensation, access to information is a necessity for optimum performance in any venture, more especially in education and training irrespective of areas of specialty.

Several factors were identified as challenges posed by digital incompetence in access to information by users generally. Van Dijk and Hacker (2003) listed four kinds of these challenges. Those include mental access, material access, skills access and usage access. According to the authors, mental access challenge includes a lack of basic digital knowledge triggered by lack of interest, computer anxiety and new technology's unattractiveness. The problem of material access is expressed by the lack of computers and network connections while the problem of skills access is as a result of shortage of digital knowledge due to insufficient user-friendliness and inadequate education or social support. The difficulty of usage, on the other hand, is due to the lack of sufficient usage incentives available to users. Further stressing the difficulties from the user's capacity perspective, Luther (2000) described the following problems of difficulty in obtaining knowledge using electronic tools: cognitive skills (learning styles, perceptive abilities); individual variance (education, age, gender, experience);

subject/ field of study and environment (home, office, institution). Also Ozoemelam (2009) found abundance of information, inability to filter search results, delay in downloading information and lack of search capabilities, difficulties in navigating and inaccessibility of some websites. Similarly, Fezaa (2013), Roas and Lamas (2012) identified lack of improved knowledge of ICT, low digital and information literacy. A research carried out by Ukwoma et al . (2016) reported a lack of digital literacy growth programs and standards among the challenges of application of digital literacy skills by students in information handling.

A consideration of the literature reviewed in this study have shown that majority of the literature reviewed with particular reference to the influence of subject background on digital literacy acquisition by students were based on studies conducted outside Nigeria. A study of this nature is required to provide a clear picture of the situation in Nigeria. Therefore, this thesis seeks to fill the void.

Methodology

The study was carried out using ex-post facto research method. The population was made up of 50,132 registered undergraduates of 13 southern Nigerian federal universities undergraduates that have digital library environment that can afford students who do not have their own personal computers, the opportunity to engage in information search using the resources and infrastructures of the library. The multi-stage sampling technique was used to select a sample of 1,506 enrolled undergraduates representing 5 % of the total number of 30,121 graduates from seven universities in Southern Nigeria, purposely selected for this study. These universities include the University of Nigeria, Nsukka (UNN), Nnamdi Azikiwe University Awka (NAU), University of Calabar (UNICAL), University of Port-Harcourt (UNIPORT), University of Uyo (UNIUYO), University of Benin (UNIBEN) and Obafemi Awolowo University (OAU). The criteria for identifying the seven universities that made up the sample of the study was based on two basic yardsticks: universities that have functional digital libraries (universities that were using digital library platform to serve users) as at 2018/2019 session and those that offer courses in the three broad areas of research comprising of Arts/Humanities, Science/Technology and Social Science. The use of a baseline of 5% to assess the sample size of the undergraduates is

consistent with the recommendation proposed by Uzoagulu (2011), which prescribes that the minimum sample size of 5% would be acceptable for a population of up to 10,000. A 37-item questionnaire entitled "Digital Literacy and Access to Information Questionnaire (DLAIQ)" was the key instrument used for data collection. The questionnaire was tested using 20 undergraduates at Ahmadu Bello University in Nigeria's north-central geopolitical region. The instrument's internal accuracy showed an overall reliability of 0.93, suggesting that it was accurate for the test. The data collecting exercise lasted four weeks. The researcher worked with seven research assistants, one from each of the universities involved in the study. They helped in the questionnaire distribution and collection. The researcher briefed these workers on the method of circulating and reviewing the completed questionnaire in order to ensure a high percentage of returns and the instrument's usability for data analysis. The data obtained for the respective research questions were analyzed using mean and standard deviation and ANOVA analysis was used to test the null hypothesis stated at 0.05 level of significance. Out of the 1,506 copies of the questionnaire distributed, 1,375 (90%) were returned, of which 1,274 (85%) were found useful for the analysis.

Results

This section presents the analysis and results of the study. The presentation is arranged according to the research questions and the formulated hypothesis to direct the analysis. The analysis and results are presented as follows:

Table 1: Mean and standard deviation of the extent to which undergraduates' computer basic operation skills based on subject background influence their access to digital information

S/N	Computer operation basics Skills	Soc. Sciences		Arts/Hum.		SCi./Tech.		Grand	Grand	Rmk
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
	Ability to:									
1	Turn on a computer	2.90	1.12	2.00	1.09	3.01	1.15	2.63	1.12	A
2	Use a pointing device.	2.85	1.08	2.23	1.10	3.02	1.16	2.70	1.11	A
3	Understand the functions of the basic file menu commands, e.g new, open, close, save, print.	2.82	1.08	2.04	1.12	3.02	1.13	2.63	1.11	A
	Overall	**2.86**	**1.09**	**2.09**	**1.10**	**3.02**	**1.15**	**2.65**	**1.11**	**A**

Key: SD=Standard deviation, RMK=Remark, A=Agree, D=Disagree

A consideration of the grand mean scores of the responses across the three fields of study as shown in table 1 above reveals that basic computer operation skills of the respondents, such as

ability to use of pointing devices (2.70), turn on a computer (2.63), and understanding of basic functions of file menu command (2.63), all have grand mean scores higher than the criterion mean of 2.50, which indicates that they make positive impact on their ability to access information generally. A close look at the individual means scores based on subject areas shows that those in Arts/Humanities possess low skills in basic computer operations with mean scores (2.00, 2.23 and 2.04 respectively) across all the items which are below 2.50 which is the criterion mean.

Table 2: Mean and standard deviation of the extent to which undergraduates' word processing skills based on subject background influence their access to digital information

S/N	Word Processing Skills	Soc. Sciences		Arts/Hum.		Sci./Tech.		Grand	Grand	Rmk
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
	Ability to:									
4	Use word processing applications.	2.70	1.09	2.45	0.83	2.93	1.11	2.69	1.01	A
5	Save a document.	2.70	1.09	1.94	1.06	3.00	1.13	2.55	1.09	A
6	Copy a document.	2.70	1.10	2.02	1.17	2.95	1.14	2.56	1.14	A
7	Paste texts in a document.	2.66	1.09	1.93	1.13	2.97	1.12	2.52	1.11	A
8	Insert images and graphics in a document.	2.67	1.05	2.00	0.89	2.83	1.14	2.50	1.03	A
	Overall Score	**2.69**	**1.08**	**2.07**	**1.02**	**2.94**	**1.13**	**2.56**	**1.08**	**A**

Key: SD=Standard deviation, RMK=Remark, A=Agree, D=Disagree

With respect to the use of skills in word processing, data in Table 2 above shows that generally, the respondents can apply word processing skills in access to digital information. This is evident in the grand mean scores of the individual items all above 2.50. However, a critical consideration of the above shows some discrepancy in the responses when considered from the subject point of view. While respondents in Social Science and Science/ Science/Technology can demonstrate positive skills in word processing with overall mean scores of 2.69 and 2.94 respectively, those in Arts/Humanities possess low skills in this area with overall score of 2.07.

Table 3: Mean and standard deviation of the extent to which undergraduates' information retrieval skills based on subject background influence their access to digital information.

S/N	Information Retrieval Skills	Soc. Sciences		Arts/Hum.		Sci./Tech.		Grand	Grand	Rmk
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
9	Use technology to search for information	2.65	1.09	2.05	1.10	2.93	1.10	2.54	1.10	A
10	Retrieve information for academic purposes.	2.66	1.06	1.44	0.79	2.84	1.11	2.31	0.99	D

11	Use databases to search for information	2.59	1.04	1.91	1.01	2.81	1.04	2.44	1.03	D
12	Organize retrieved information in a a coherent manner	2.55	0.99	2.01	1.13	2.68	1.04	2.41	1.05	D
13	Acknowledge authors whose works are consulted in a research process effectively.	2.61	1.01	1.92	1.09	2.76	1.05	2.43	1.05	D
	Overall Score	**2.62**	**1.05**	**1.93**	**1.03**	**2.82**	**1.08**	**2.45**	**1.05**	

Key: SD=Standard deviation, RMK=Remark, A=Agree, D=Disagree

Evidence from the above table 3, as shown in the individual grand mean scores reveals that the respondents have skills in the use of technology to search for information (2.54). They cannot use databases to search for information (2.44), effectively acknowledge authors whose works were consulted (2.43), organize retrieved information (2.41) and retrieve information (2.31). However, this inability is mainly peculiar to respondents in Arts/humanities. Respondents in Sciences and Social Sciences indicated ability to apply these skills in accessing digital information with overall scores of 2.62 and 2.82 respectively.

Table 4: Mean and standard deviation of the extent to which digital undergraduates' skills in the use of social media based on subject background influence their access to digital information

S/N	Social Media Skills	Soc. Sciences		Arts/Hum.		SCi./Tech.		Grand	Grand	Rmk
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
14	Use twitter to access information	2.37	1.10	2.00	0.93	2.38	1.15	2.25	1.06	D
15	Use face book to access information	2.52	1.09	2.20	1.09	2.67	1.18	2.47	1.12	D
16	Use blogs to access information	2.43	1.07	2.42	1.12	2.50	1.13	2.45	1.11	D
17	Perform web search using web browsers relevant search engines like google, yahoo etc.	2.69	1.17	2.57	1.08	3.00	1.17	2.75	1.14	A
	Overall Score	**2.50**	**1.12**	**2.30**	**1.06**	**2.64**	**1.16**	**2.48**	**1.11**	**D**

Key: SD=Standard deviation, RMK=Remark, A=Agree, D=Disagree

Evidence from the data in Table 4 above shows that skills in social media generally have low impact with grand means score of 2.48 across the subject fields, except in the area of performing search using web browsers and relevant search engines like Google and Yahoo which have a grand mean score of 2.75. Though the overall mean scores of respondents in Social Sciences and Science/technology show a positive response of 2.50 and 2.64 respectively, yet the respective individual item scores show negative responses in the use of twitter (2.37 for both) and use of blogs (2.47 for Social Sciences).

Table 5: Mean and standard deviation of the extent to which undergraduates' E-mail skills based on subject background influence their access to digital information

S/N	E-mail Skills	Soc. Sciences		Arts/Hum.		SCi./Tech.		Grand	Grand SD	Rmk
		Mean	SD	Mean	SD	Mean	SD	Mean		
18	Open an e-mail to access information	2.58	1.12	2.22	1.09	2.85	1.15	2.45	1.12	D
19	Send an e-mail	2.55	1.13	2.03	1.10	2.79	1.17	2.45	1.13	D
20	Reply an e-mail	2.53	1.12	1.43	0.79	2.76	1.16	2.24	1.02	D
21	Forward an e-mail	2.53	1.12	1.9	1.06	2.76	1.14	2.42	1.11	D
	Overall Total	**2.54**	**1.12**	**2.27**	**1.01**	**2.79**	**1.16**	**2.39**	**1.10**	**D**

Key: SD=Standard deviation, RMK=Remark, A=Agree, D=Disagree

Evidence from the grand mean scores of the items related to application of e-mail skills in access to digital information as seen in Table 5 above, indicates a low impact of these skills across all the subject areas with grand mean score of 2.39. A comparative analysis of the scores by individual subject shows that respondents in Social Sciences and Science/technology have e-mail skills that make more positive impact on access to information as shown in their individual overall mean scores of 2.54 and 2.79 respectively.

Table 6: Mean and standard deviation of the extent to which undergraduates' Skills in the Use of File Formats and Storage Media based on subject background influence their access to digital information

S/N	**Use of file formats and storage media**	Soc. Sciences		Arts/Hum.		Sci./Tech.		Grand	Grand	Rmk
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
22	Download information using different electronic formats such as PDF, JPEG, MPEG, HTML	2.51	1.15	2.02	1.18	2.76	1.15	2.43	1.16	D
23	Send information using different electronic formats such as PDF, JPEG, MPEG, HTML	2.44	1.10	1.92	1.12	2.67	1.11	2.41	1.11	D
24	Use storage media such as CDs, DVDs, flash drives for storing information	2.46	1.13	2.02	0.94	2.77	1.13	2.42	1.07	D
	Overall	**2.47**	**1.13**	**1.99**	**1.08**	**2.73**	**1.13**	**2.42**	**0.11**	**D**

Key: SD=Standard deviation, RMK=Remark, A=Agree, D=Disagree

Data in table 6 show a general low impact of skills in the use of file formats and storage media to access information with overall grand mean of 2.42. When considered from the point of individual subject areas, the overall mean scores of 2.73 for Science/Technology, 2.47 for Social Science and 1.99 for Arts/Humanities show that respondents in Science/Technology possess better skills in the use of file formats and storage media more than their counterparts in the other two subject fields.

Table 7: Mean and Standard Deviation of the Challenges of applying digital literacy skills by undergraduates based on subject background to Access digital Information.

S/N	ITEMS	Soc. Sciences		Arts/Hum.		Sci./Tech		Grand	Grand	Rmk
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
25	Lack of elementary digital experience	2.36	1.05	2.78	1.06	2.40	0.96	2.51	1.02	A
26	Lack of interest	2.90	0.94	2.52	1.16	2.70	0.94	2.71	1.01	A
27	Computer anxiety or technophobia	2.52	1.03	2.88	1.01	2.56	1.04	2.65	1.03	A
28	Lack of personal computers	2.60	1.06	3.12	0.90	2.96	0.99	2.89	0.98	A
29	Lack of network connection	3.03	0.96	2.50	1.09	2.84	1.02	2.79	1.02	A
30	Lack of user friendly system interface	3.03	1.04	2.68	0.69	2.96	0.99	2.89	0.91	A
31	Low digital and information literacy skills	2.88	1.00	2.54	1.09	2.58	1.01	2.67	1.03	A
32	Inadequate education for development of digital skills	2.90	0.90	2.98	0.92	2.83	0.10	2.90	0.64	A
33	Individual variance such as subject of study, gender, experience and environment	3.00	0.91	2.61	1.11	2.79	0.98	2.80	1.00	A
34	Lack of improved knowledge of ICT	2.40	0.88	2.84	0.98	2.43	1.03	2.56	0.96	A
35	Lack of search skills	3.05	0.94	2.64	1.04	2.85	1.01	2.85	1.00	A
36	Lack of significant usage opportunities available for users to utilize digital technologies	2.43	0.98	2.83	1.11	2.44	1.02	2.57	1.04	A
37	Computer technology not easily accessible to users most times	3.08	0.91	2.63	1.04	2.88	1.95	2.86	1.30	A
	Overall	**2.78**	**0.97**	**2.73**	**1.02**	**2.71**	**1.00**	**2.74**	**1.00**	**A**

Evidence from Table 7 above shows the respondents across the different subject areas agree that all the items constitute challenges to applying digital literacy skills to access digital information. As indication in the grand means scores of individual items, the most serious challenge is inadequate education for development of digital skills (2.90). This is followed by lack of personal computers and user friendly system interfaces (2.89 respectively), regular inaccessibility of computer technology to users (2.86), lack of search skills (2.85) and individual variances (2.80). The least challenge is lack of lack of elementary digital experience.

Hypothesis: There is no significant difference in the mean responses of undergraduates by field of study on the influence of digital literacy on their access to information in the digital libraries.

Table 8: ANOVA Analysis of Difference in the Mean Responses of Undergraduates by Field of Study on the influence Digital Literacy on their Access to Information in the Digital Libraries.

S/N	ITEM	Portioning	SS	Df	MS	F	Sig	Rmk
1	Turn on a computer	Between groups	267.375	2	133.687	107.066	.000	
		Within groups	1587.031	1271	1.249			S
		Total	1854.406	1273				
2	Use a pointing device such as mouse.	Between groups	137.701	2	68.850	56.296	.000	
		Within groups	1554.450	1271	1.223			
		Total	1692.151	1273				S
3	Understand the functions of the basic file menu commands, e.g new, open, close, save, print.	Between groups	212.117	2	106.058	86.632	.000	
		Within groups	1556.009	1271	1.224			S
		Total	1768.126	1273				
4	Use word processing.	Between groups	505.646	2	252.823	245.024	.000	
		Within groups	1311.457	1271	1.032			
		Total	1817.103	1273				S
5	Save a document.	Between groups	219.528	2	109.764	92.369	.000	

		Within groups	1510.357	1271	1.188			S
		Total	1729.885	1273				
6	Copy a document.	Between groups	180.868	2	90.434	70.973	.000	
		Within groups	1619.510	1271	1.274			S
		Total	1800.378	1273				
7	Paste texts in a document.	Between groups	218.83	2	109.291	88.145	.000	
		Within groups	1575.917	1271	1.240			S
		Total	1794.500	1273				
8	Insert images and graphics in a document.	Between groups	156.515	2	78.257	74.342	.000	
		Within groups	1337.947	1271	1.053			S
		Total	1494.462	1273				
9	Use computers to search for information	Between groups	156.800	2	78.400	64.843	.000	
		Within groups	1536.738	1271	1.209			S
		Total	1693.538	1273				
10	Retrieve information.	Between groups	475.129	2	237.564	240.662	.000	
		Within groups	1254.640	1271	.987			S
		Total	1729.768	1273				
11	Use databases to search for information	Between groups	172.292	2	86.146	80.900	.000	
		Within groups	1353.419	1271	1.065			S
		Total	1525.711	1273				
12	Organize retrieved information	Between groups	101.331	2	50.666	46.061	.000	
		Within groups	1398.053	1271	1.100			S
		Total	1499.385	1273				
13	Acknowledge authors whose works are consulted in a research process.	Between groups	162.037	2	81.019	74.157	.000	
		Within groups	1388.613	1271	1.093			S
		Total	1550.651	1273				
14	Use twitter to access information	Between groups	38.476	2	19.238	17.020	.000	
		Within groups	1436.649	1271	1.130			S
		Total	1475.125	1273				
15	Use face book to access information	Between groups	43.133	2	21.567	17.338	.000	
		Within groups	1580.992	1271	1.244			S
		Total	1624.126	1273				
16	Use blogs to access information	Between groups	1.476	2	0.738	.607	.545	
		Within groups	1545.067	1271	1.216			NS
		Total	1546.543	1273				
17	Perform web search using web browsers relevant search engines like google, yahoo etc	Between groups	213.599	2	106.800	82.008	.000	
		Within groups	1655.240	1271	1.302			S
		Total	1868.839	1273				
18	Open an e-mail to access information	Between groups	74.835	2	37.418	30.019	.000	
		Within groups	1584.280	1271	1.246			S
		Total	1659.115	1273				
19	Send an e-mail	Between groups	115.533	2	57.767	45.224	.000	
		Within groups	1622.239	1270	1.277			S
		Total	1737.772	1272				
20	Reply an e-mail	Between groups	405.818	2	202.909	189.713	.000	
		Within groups	1359.409	1271	1.070			S
		Total	1765.228	1273				
21	Forward an e-mail	Between groups	134.991	2	67.496	55.388	.000	S
		Within groups	1548.848	1271	1.219			
		Total	1683.840	1273				
22	Download information using different electronic formats such as PDF, JPEG, MPEG, HTML.	Between groups	107.443	2	53.722	40.104	.000	
		Within groups	1702.567	1271	1.340			S
		Total	1810.010	1273				
23	Send information using different electronic formats such as PDF, JPEG, MPEG, HTML.	Between groups	115.579	2	57.789	46.865	.000	S
		Within groups	1567.275	1271	1.233			
		Total	1682.854	1273				
24	Use storage media such as CDs, DVDs, flash drives for storing information.	Between groups	105.012	2	52.506	45.577	.000	S
		Within groups	1464.222	1271	1.152			
		Total	1569.235	1273				

The result presented in table 8 above shows the ANOVA analysis of the hypothesis covering items 1-24. It can be observed from the table that the probability value is less than the level of significance of 0.05($p>0.05$) in 23 out of 24 items, which indicates significant difference in the mean responses of the respondents in Social Sciences, Arts/Humanities and Science/Technology based on those items. On the other hand, only one item, use of blogs to access information, has probability value greater than 0.05 level of significance ($P<0.05$). As

such the null hypothesis of no significant difference in the mean responses of undergraduates based on field study on the extent to which undergraduates' digital literacy enhances their access to information is rejected on 23 items and accepted on only one item.

Discussion of Findings

The extent to which the undergraduates can apply the skills in basic computer operation and word processing are generally high. Their ability to use these skills could be linked to their daily exposure to digital technologies like the internet. This aligns with the views of Presky (2001) and Benett, Maton and Kervin (2008) who state that students as digital natives, can easily use technology due to their constant exposure to digital technologies like computers, mobile phones, video games and the internet.

The findings show that the undergraduates can use technology to search for information but they could neither use databases nor effectively retrieve and organize information for problem solving. This corroborates the findings of Sharma, Razak and Noor (2012) and Shopova (2014) which revealed that young people lack competence in using technologies to retrieve, organize, analyze and communicate information and use it for specific decision- making and problem solving.

The impact of social media skills is found to be generally low. This is irrespective of the fact that the undergraduates can make use of search engines like google, yahoo, etc and specifically those in Science and Technology can access information using twitter, facebook and blogs. These abilities could be linked to their daily exposure to digital technologies through which they engage in social networking only for entertainment purposes. This corresponds to the findings of Tan, Nga and saw (2010) and Abidin, et al (2014) who investigated the online activities of youths and find out that they frequently use social media to engage in social networking only for entertainment rather than as a an academic activity, adding that they rarely access serious digital contents like e-books, e-journals or e-magazines.

The findings on the impact of skills in the use of e-mail for access to information indicate that on a general note these skills have low impact on undergraduates' access to digital information. It is observed that most undergraduates are mandated to have e-mail accounts starting form the

process of JAMB registration and during admission in universities. They make reference to e-mail accounts only when they want to check results or when lecturers demand that they send in assignments through e-mails.

The grand mean scores of the items on impact of skills in the use of file formats and storage media indicated a general low impact on access to information. It is obvious that acquisition of these skills would help the undergraduates also in the process communicating information which is vital in the process of use of information. Lack of these skills as revealed by the findings justifies the finding on low retrieval of information and which corroborates the findings of Sharma, Razak and Noor (2012) and Shopova (2014) which revealed that young people lack competence in using technologies to retrieve, organize, analyze and communicate information.

The greatest challenge hindering the application of digital literacy by undergraduates in information access was inadequate education for development of digital literacy. This corroborates the findings of Van Dijk and Hacker (2003) and Ukwoma et al (2016) who in different studies identified inadequate education, social support and lack of development of digital literacy programs and standards respectively. The above finding implies that undergraduates, irrespective of their subject of study should be provided with an enabling environment to acquire digital literacy skills. Findings have equally brought to limelight the fact that undergraduates in sciences have better skills due to the nature of their fields of study. This has some implications to the libraries, especially in the area of planning and implementation of training programs to users for development of skills in application of technology to information access.

The null hypothesis of no significant difference in the mean responses of undergraduates based on field of study was rejected at 0.05 level of significance. Hence the alternate hypothesis of significant difference was accepted. Evidence from the data in Table 8 clearly shows a contrasting difference in the responses of undergraduates in the three fields of study. The direction of the difference is that respondents in Social Sciences and Science/ Technology are more skillful than those in Arts/Humanities. It is evident from the hypothesis that subject of study determines undergraduates' level of digital skills and general application of technology. This agrees with the findings of Mahmood (2009), Whitmire (2002) and Kid (2002) that

undergraduates in sciences generally have high knowledge and skills in the use of technologies than those in non-science fields.

Conclusion

The study has tried to examine the impact of digital literacy on undergraduates' access to digital information based on their subject background. The study emphasizes on finding the extent to which the subjects were able to practically demonstrate skills in basic computer operations, word processing, information retrieval and the use of different file formats and storage media in accessing and communicating information in a digital mode.

The conclusion to be drawn from the study is that undergraduates in sciences especially those in Science/ Technology have greater digital literacy skills that impact positively in their ability to access digital information than those in arts-related disciplines. This is evident in word processing applications, retrieving of information, use of social media, application of e-mail, use of different file formats and storage media. Though it is revealed that all the categories of the respondents have the ability to work with the computers and the internet but they generally lack skills in using technology to retrieve, organize, store and communicate information for educational decision making and problem solving. The major factor that poses as hindrance to undergraduates' application of digital literacy is lack/inadequate education, training programs and enabling environment to develop their skills in accessing information for educational problem solving.

Recommendations

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

- The National Universities Commission should formulate policies that would make training in digital literacy an important aspect of learning to ensure that Nigerian university graduates, irrespective of field of study are equipped with information handling skills which they can apply in the world of work.

- The management of libraries should engage in organizing university-wide educational programs for training of undergraduates in every field of study to equip them with the relevant skills required for effective use of digital technology to access information for problem solving.

- Specifically, training programs on the use of ICT to access and communicate information should be organized by libraries, targeting undergraduates in the field of Arts/Humanities to up-grade their digital skills

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