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Librarians' Knowledge and Use of Web Applications for Effective Services in Academic Libraries in Anambra State, Nigeria

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Abstract

This paper aims at assessing what librarians in academic libraries in Anambra state know about web applications and how they utilise them. Descriptive survey design was adopted for the study which involved 120 librarians and library staff in four academic libraries. Four research questions and two hypotheses guided the study. The two instruments used were validated by two senior lecturers in the Department of Library and Information Science and one expert in measurement and Evaluation. The reliability of the WAKT (Web Application Knowledge Test) was calculated using the Kuder-Richarchson K-20 formula with reliability coefficient of 0.98; while Cronbach Alpha was used to calculate the reliability coefficient of WAUQ (Web Applications Use Questionnaire) with coefficient 0.75, 0.82, 0.84 for section A, B, C respectively. Percentages, frequencies and mean ratings were used to answer the research questions. T-test was used to test hypotheses at 0.05 level of significance. The major findings of the study included among others, that librarians from state institutions understood more the meaning of web applications than their counterparts in federal institutions, while the librarians from federal institutions understood more of the use process of web applications. However, the aggregate average of all the librarians is above the pass mark of 50%, but the average use of web applications in rendering library services, online delivery of tutorials is low. No significant difference was found in the mean achievement scores of librarians in federal and state institutions on their level of knowledge of web applications. The study recommended that it should be made a point of duty to conduct orientations at least annually for librarians on how helpful web applications can support their duties and tasks, research and academic work.

Keywords

Web, Web Application, Web Application Knowledge; Academic Libraries; Anambra State

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Introduction

Academic libraries as one of the various types of libraries are very important components of tertiary institutions. In agreement, Santosh (2017) posited that academic libraries play key roles in disseminating knowledge by aiding teaching, learning and research activities of universities. In view of these definitions, Mingba (2011) stated that no institution can lay claim to academic excellence without a good library to back up its teaching, research and public service mandates. In recognition of the importance of library to the quality assurance of tertiary institutions, Santosh (2017) stated that academic libraries across the globe are going through a transition as a result of the influx of information and communication technologies.

In line with this fact, Gichora and Kwanya (2015) asserted that for the past three decades, Information and Communication Technologies' (ICTs) developments have transformed the way academic libraries and information services are accessed and consumed. Gichora and Kwanya averred that many academic library and information services are now available online to improve the quality and quantity of information service delivery. Hayes (2019) in agreement stated that the present users represent the first generations to grow up with digital technologies and are called "digital natives" (a new generation that has grown up with digital technologies). As a result, they depend more on web-based information resources and services due to the ease of accessibility and use. In response to the changing information landscape. Hangsing and Sinate (2012) stated that academic libraries are making huge efforts to meet the diversifying needs and growing expectations of the users by adopting Web applications. The evolution of Web applications since the late 1990s has affected the way people access and use information. All stakeholders in the information business sector have been tremendously affected by this development. Therefore, it is common place today to see organizations and firms in the information sectors utilize Web technologies to create access to critical information. It is no surprise to see librarians as information service delivery professionals utilize Web technologies for information delivery (Aiyebilehin & Omekwu, 2019, Quadiri & Idowu, 2016). Today, no library that intends to fulfill its mandate can do without the use of web applications, and the knowledge and utilization of these web applications seems to be critical factors for determining effectiveness of the modern library.

Web applications are computer programmes that utilize Web browsers and Web technologies to perform tasks over the internet (Mishra, 2016). Web applications are programmes that are stored on a remote server and delivered over the Internet through a browser interface. They include web1.0, Web 2.0, Web 3.0 etc. Web 1.0 refers to the first stage in the World Wide Web (WWW or the Web), which was entirely made up of Web pages connected by hyperlinks (Wadhwa, 2015). It is essentially a system of interlinked hypertext documents accessed via the Internet with very limited user participation. Web 2.0 is a second generation term that describes the user-driven, collaborative, participatory, and personalized web (Sodt & Summey, 2009). Web 2.0 applications includes: Instant Messaging, Blogs, Wikis, Really Simple Syndication (RSS), Podcasting, Tagging, Facebook, Whatsapp, Twitter, Myspace, You tube, LinkedIn, Flickr, Mashups, Delicious and streaming media (Thomas, 2017). Web 3.0 on the other hand is the combination of the features of Web 2.0 and contains a few more features such as 3D, Seamless Animation, High-definition Graphics, Audio, and Video (Anindya, 2016). These Web applications have revolutionized the way in which the information can be shared and collaborated among multiple users. Web applications are virtual reality of the library, a place where one cannot only search for books and journals but interact with community, librarians, and share knowledge and understandings with them. With this innovation, university libraries can now apply various Web applications to render effective services to users.

The utilization of Web applications by academic libraries can increase user participation and facilitate libraries' provision of better services to existing users, reach out to prospective users and ensure optimum use of available resources (Santosh, 2017). It can lead to effective service delivery because Web applications reshape how university libraries access, retrieve, store, manipulate and disseminate information to users. Similarly, the advantages of using Web applications in libraries has been demonstrated through the use of Facebook, Whatsapp, blogs, wiki, RSS, streaming media and MySpace for effective service delivery (Chu &

Nalani-Meulemans, 2008). Academic librarians can utilize Web applications when communicating with colleagues to answer users' enquiries, thus providing answers to users' enquiries more efficiently. Academic librarians can also use Facebook, Blogger, Whatsapp, 3D and High-definition Graphics, Audio, and Video to communicate with users and unexpectedly helped colleagues become closer and to personally know each other better.

In Nigeria, Academic libraries are required to utilize these Web-based applications in their operations and service delivery. They need to shift from conventional library services where mainly books and other printed text are acquired, arranged, consulted and borrowed (Odionye, 2016). Although there will always be hitches and challenges in every progressive development, conscious efforts should be made to avoid them and move with the trend of time, especially when the academic libraries have made the take-off palatable. Libraries spend huge amount of money in subscription of electronic information resources, so that users will find different and better information resources to what is available in general Google search. If the libraries have invested much money on e-resources and internet infrastructure, it is expected that those resources are fully utilized. It is on this note that the researcher investigates if librarians in both federal and state academic libraries in Anambra state are making adequate use of the web applications to provide the available resources to the patrons beyond the walls of the library by investigating their knowledge and use of the Web applications. Despite the fact that Web applications to which the library is subscribed to are up and running, they look wasted as the librarians seem not to prioritize their attention on getting acquainted to its usefulness. This however, might affect their capacities to compete favourably with their counterparts from other academic libraries when it comes to research and intellectual discussions. However, when Web applications is not utilized or inefficiently utilized, it will lead to inefficient and poor service delivery which will affect the status of academic libraries as sources of learning, education; innovation and research for social development. The implication is that students and other researchers would miss utilizing important information that could have made them better scholars. These problems to the librarians are what the findings and solutions from the present study hope to address. Though some researchers have carried out studies on Web 2.0 usage by librarians; the fact that to the best of the researcher's knowledge, this area of study (web applications knowledge and use) seems not to have been explored in academic libraries also portrays a research gap to fill. It is therefore imperative to carry out this research to find out the knowledge and use of web applications by librarians in academic libraries in Anambra State, Nigeria.

Purpose of the study

The main purpose of this study is to ascertain librarians' knowledge and use of Web applications for effective services in academic libraries in Anambra State. Specifically, this study seeks to determine:

1. The level of knowledge possessed by librarians in the use of Web applications in academic libraries in Anambra State.
2. The purpose use of Web applications by librarians in academic libraries in Anambra State.
3. The challenges with the use of Web applications by librarians.
4. Suggest strategies for implementing and addressing challenges with the use of Web applications by librarians in academic libraries in Anambra State.

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. Librarians in federal and state tertiary institutions in Anambra State will not significantly differ in their mean ratings on knowledge of Web applications for effective services.
2. There will be no significant differences in the mean ratings of librarians in federal and state tertiary institutions in Anambra State on the use of Web applications for effective services..

Review of Related Literature

Knowledge of Web Application by Librarians

Web applications have been recognized as tools for gathering knowledge of human through interaction and collaboration. As the librarian profession advances to meet the needs of its era, using Web technologies has become an indispensable tool in the work of the professional. There is no doubt that Web applications have changed and transformed access to information and communication. These dramatic changes, largely the result of rapidly evolving web applications, have impacted significantly on the knowledge requirements for librarians in this environment (Raju, 2014). The transformed landscape requires a new generation of librarians to effectively and efficiently mediate it.

Web applications are making progress in the library services and enable academic libraries to achieve their goals in a short span of time. Academic library websites are virtual presentation of tertiary institutions libraries to the world and are increasing with the passage of time to provide services to the end users via electronic tools outside the library. As the academic library services are reshaping from time to time and users to users (U2U) round the clock, the changing nature of services, information, ideas views and comments are also changing in the current scenario, the paradigm shifting from manual setup to virtual space is a big challenge for the library professionals. As modern academic libraries move into the creation of digital content and its organization and preservation through metadata creation and management to make their special collections more accessible via the web, the need for knowledge of the following technologies become critical (Choi & Rasmussen, 2009).

Web applications have placed new requirement on librarians' competencies and skills. It cannot be over emphasized that library and Information professionals need to brace up to the new trends of web technology competencies so that they can render more effective services to their library patrons in this electronic environment. If information professionals do not keep abreast of the changing technologies, they will be unable to manage the different types of information resources and cope with the ever growing information needs of the users in this digital age. However, Anunobi and Ogbonna (2012) revealed a low knowledge and use of Web2.0 applications by the librarians. In developed countries like America and UK, there are high levels of knowledge of the benefit of Web applications in providing effective library services and libraries in these countries have already been adopted and implemented (Hussain, 2018) but in developing countries Web applications are adopted in few tertiary institutions mostly because of their restricted and tight budget. Atilomau and Onuoha (2011) found that librarians are more knowledgeable of Facebook than the LinkedIn, Microblogging tools, and Twitter.

Many authors such as Abidin, Kiran and Abrizah (2013), Arif and Mahmood (2012) and Ezeani and Igwesi (2012) revealed that library professionals in developing countries have low knowledge of the existence of Web applications in library services. Oyovwe-Tinuoye, Krubu and Ijiekhuamhen (2017) revealed that librarians' knowledge of social tagging and book marking is limited. Users do not also have knowledge of the protocols involved in social communication. Knowledge is what prompts the use of technology by people as what one is not knowledgeable of, one cannot use. Eze (2016) opined that the popularity of Web applications is affecting the way that academic libraries operate. There are currently a lot of studies on the use of web 2.0 in developed countries with only a few corresponding studies on the knowledge and use of web applications by librarians in Nigeria (Oyovwe-Tinuoye, Krubu, & Ijiekhuamhen, 2017).

Use of Web Applications for Effective Services

Use refers basically to the actual library related activities for which web technologies are being applied by the librarians. Akporhonor and Olise (2015) reported that Facebook is used in some Nigerian academic libraries to promote the library through the library homepage. This way, the libraries advertise hours, locations, website information, newly acquired materials, etc on Facebook. In line with this, Burkhardt (2010) noted that libraries are now using web applications as a new platform to market their products and services. Furthermore, Khan, Ahmad and Bhatti (2012) spells out that the use of web applications such as social media for marketing of library services makes it possible for library users to be part of the process that leads to the development of

library services. Another purpose for which web applications have been used by librarians is in the area of library advocacy. With respect to advocacy, Philips (2015) reported that online platforms such as social media give librarians an easy platform to advocate for libraries, and engage with users. Sagun (2013) reported that “social media has been used for advocacy and promotion of underutilized library services in many academic libraries”. Social media has also been used by librarians to engage with their users irrespective of their location. In view of this, Dickson and Holley (2010) reported that “Online social networking provides such an avenue to reach college students in their own environments”. With this the library is positioned to save the time of the library users. Librarians have also used web applications to enhance and conduct users’ education programmes that were previously done on a face-to-face basis. Hosting orientation programmes and library education programmes on web applications have been found to result in wider reach. With the use of web applications in users’ education programmes, Walsh (2011) noted that “the message will reach a larger audience of young undergraduates if it online. Social media is touted to bring to the class-room instruction such as student engagement, collaborative learning, and developing skills for the future global workplace”. Librarians in many libraries use web technologies to facilitate effective relationships between researchers and the library (Rowlands, Nicholas, Russell, Canty & Watkinson, 2011). Librarians use web applications, especially social networks to support researchers and promote research visibility of scholars in their institutions. With web technologies it is possible for library professionals to understand the research interests of their users, as well as decipher the best approach to serve the researchers. Doing this will make academic libraries to bring on board more value to the researchers, thereby, improving the perception of the library by the researchers.

In Nigeria, Oyovwe-Tinuoye, Krubu and Ijiekhuamhen (2017) revealed that academic librarians in the South- south region of Nigeria use web 2.0 tools mainly for reference services online, marketing of library services, collaborating with colleagues/ friends and current awareness services. However, their knowledge of social tagging and book marking is limited. More so, majority of the librarians from South- south Nigeria are absolutely satisfied with the use of Web 2.0 tools in boosting their services. They further stated that Web applications usage is relatively new in universities libraries especially in developing nations of the world like Nigeria. Kelly (2008) revealed that the most popular Web application utilized by librarians are blogs, wikis, RSS, podcast, Vodcasts, social sharing services, communication tools, social networks, Folksonomy and tagging, and virtual worlds. Onuoha (2013) showed that librarians are satisfied with the use of Web applications to a large extent. Peters (2011) revealed that public libraries are using Web applications prolifically especially Social Network Sites and are using these applications for a variety of specific reasons. Although web applications are freely available for use, the frequency of use of these technologies by Nigerians varies from person to person and from place to place. Regularity of use of anything is usually determined by a number of factors. In a general sense, regularity of use refers to how often actual use of web applications take place. This is usually measured by frequency of use. According to Baro, Idiodi and Godfrey (2013), Web applications such as Flickr, RSS feeds, podcasts, social bookmarking, were among the least used. Baro, Idiodi and Godfrey’s study revealed that librarians use Web applications mostly for reference services online, library news/events, training resources, and image and video sharing. Garoufallou and Charitopoulou (2011) found that majority of the librarians indicated little use of web applications such as RSS among. Additionally, Han and Liu (2010) found that RSS is the second most popular Web 2.0 application in university libraries. As technologies are becoming more and more common in Nigerian libraries, Quadri and Idowu (2016) stated that librarians in federal universities in south western Nigeria are increasingly utilising web 2.0 tools in their libraries for information service delivery. The increase in the use of web technologies has been attributed to the rise in the awareness and knowledge of web technologies among Nigerian librarians.

Challenges in the Use of Web Applications by librarians in Academic libraries

In Nigeria, the academic libraries are said to be at a crossroads due to the fact that they are operating in an era of dwindling financial resources that are not forthcoming and thus affects the efficiency and effectiveness of their functions. The libraries especially the academic libraries have need to adapt to the environment in line

with the indications of Kumar (2009) if they are to remain relevant. Academic libraries are now expected to provide to users a range of information and communication technologies and e-resources necessary for retrieving information quickly from both immediate and remote databases, as well as creating a need for library cooperation and consortium initiatives.

While the changing nature of information resources had subjected libraries to new challenges, to date, despite the paraded development by government, inaccessible by reason of distance, resources and the availability of relevant technology still remain high among most of the institutions. Without wasting time many including librarian will blame it to ICT. However, according to the European Commission “the importance of ICT lies less in the technology itself but in its ability to create greater access to information and communication” (Cited in Elisha, 2006); which is what automation should addresses. The challenge now faced by many academic libraries is the working condition of the WWW used by academic libraries. Where academic libraries made attempt to adopt technologies for improved services, efforts has been reported in Nigeria (Womboh and Abba, 2008; Fatoki, 2005; Etim, 2006; Ani et al, 2005). However, very little success has been recorded due to poor funding; a lot still needs to be done. Why should this not be the case when considering the fact by Ifijeh (2011) citing Mordi (2008) that between 2000 and 2008, the Nigerian Federal Government allocated an average of only 9% of its budget to education? With such low funding, institutions of higher learning are handicap to operate academic libraries with first-class services. The expected are the inadequate facilities and information resources that have resulted in students using the libraries as a study space and according to a recent article by Momodu (2015), the tendency to flout library rules and regulations has become a common phenomenon amongst library users and the resulted varying degree of criminal behaviors in the use of library resources (Momodu, 2015) faced by academic libraries. According to Ojuade and Ochai (2010), funding is the major crisis facing the Nigerian academic libraries.

Despite the popularity and ease of use of Web applications, most libraries are constrained by varying factors in their quest to effectively utilize these tools. Some of the barriers to the use of web 2.0 as indicated in a study carried out by Anunobi and Ogbonna (2012) includes not being familiar with Web 2.0, restricted opportunity for use, low skills, lack of needed facilities and interest. According to Abidin, Kiran and Abrizah (2013), Arif and Mahmood (2012) and Ezeani and Igwesi (2012), hurdles confronting library professionals in the use of Web applications for effective services include: lack of knowledge on how to use these applications in libraries, unavailability of computers, lack of computer and internet facility in libraries, lack of awareness of social media use, lack of trained staff, lack of government interest and involvement, copy right issues and bandwidth problems in Nigerian libraries, lack of motivation, computer expertise, facilities and personality characteristics. Santosh (2017) pointed out that barriers to effective use of Web applications include sustainability risks, digital preservation risks, user disinterest, and accessibility issues. They also highlight the need to raise awareness and willingness to use these services to ensure success in providing enhanced service to the user. Chawner (2008) in a survey of LIS professionals in New Zealand categorized the various barriers as institutional barriers (such as firewalls, limited access to services), personal barriers (lack of time, interest and skills) and technological barriers (lack of broadband access). Chawner also identified some other barriers such as quality of information, privacy and security issues, changing information needs, and lack of staff training. Cao (2012) mentioned management buy-in, lack of awareness, lack of user participation, and lack of technology staff as some of the issues related to the use of Web applications in academic libraries and stressed on the need for

According to Idiegbeyan-ose, Okocha, Aregbesola, Owolabi, Eyiolorunshe and Yusuf (2019), challenges to adoption of Web application in library and information science include;

- a. Digital divide: most developing countries are still lacking behind in terms of ICT adoption. Most of these countries lack internet facilities that are required for web applications to function. Idiegbeyan-ose, Nkiko, Idahosa and Nwokocha (2016) cited International Telecommunication Union (ITU) and reported that the disparities in internet usage between developed and developing countries are still very large.

- b. Inadequate ICT infrastructure: Previous studies has revealed lack of reliable power, internet facilities and computers which mitigate the adoption of web applications in Africa (Muneja&Abungu 2012, Baro et al. 2013) . However with the proliferation of Smartphones in Africa, such limitations can be reduced (Okocha, 2017).
- c. Lack of Policies to Support Web Applications: There is an urgent need for the formulation of policies on web applications and continuous monitoring of these policies. Academic libraries in Africa have been plagued with lack of policies in the implementation of web 2.0 (Muneja&Abungu, 2012).
- d. Inadequate Staff Capacity: The implementation of web application is time consuming and requires adequate human capacity dedicated solely to this task (Baro et al, 2013).
- e. Lack of Adequate Skills in the use of Web Applications: Library professional require an urgent update to the required knowledge in the implementation of Web application. Research shows that in developed countries Blogs, RSS, IM are most adopted while in Africa social networks are most adopted. This is majorly due to a lack of skills.
- f. Lack of Maintenance Culture: Most developing countries lack maintenance culture. They fail to maintain the infrastructure and this lead to infrastructural challenge in so many developing countries.
- g. Corruption Issues: Corruption is one major issue in developing countries, some of the government officials and heads of organizations are corrupt, fund that are supposed to be used for the development of infrastructures are sometimes embezzle by these officials.
- h. Resistance to Change: Some professional librarians that are supposed to implement these policies in libraries in developing countries have continued to resist change, this majorly due to fear of losing careers to IT professionals. Urgency is required in the change of this ideology in Africa.

Suggested Strategies for Implementing and Addressing Challenges of Utilization of Web Applications for Effective Services

Many strategies have been proffered for implementing an addressing challenges of utilization of web application. According to Owusu-Ansah (2014), to improve the utilization of Web applications by library professionals, there is need for social media strategy, appointment of social media librarians, and continuing professional development of librarians to enable effective use of emerging technologies in academic institutions. Santosh (2017) stressed the need for training, technical support and better organizational support to promote the use of Web applications and technologies in libraries which are way behind the academic libraries in developed nations. There is also a strong need for establishment of necessary policies and practices for ensuring proper implementation of technology in the Indian library system. Tripathi and Kumar (2010) pointed out that libraries should create guidelines for using Web applications which are easily accessible to students. These guidelines should inform students about basic copyright laws and how to avoid infringement. According to Anunobi and Ogbonna (2012), highlighted strategies that can be used to addressing challenges of Web application utilization are;

- a. librarians should be encouraged to embrace the use of Web applications through capacity building by their employers;
- b. the work environment of librarians in public, school and special libraries, including academic libraries should be re-positioned by providing the needed facilities to enhance the use of Web applications;
- c. library automation and digital access should form the basis of library operations in all types of libraries – academic, public, school and special libraries in order to meet the users’ present information need; and in-house trainings, seminars and workshops on the existent and use of Web applications should be organized from time to time for librarians and library users to help themselves become familiar to the different Web 2.0 tools, their potentials and use approach.

Methodology

Descriptive survey design adopted by this study is descriptive research design. This study was carried out using questionnaire and achievement test to elicit information by librarians in order to determine their knowledge and use of Web applications. This study was carried out in academic libraries located in Anambra

State in the south-east geopolitical zone of Nigeria. The area was chosen because of their interest and value for education, enabling the researcher do a comprehensive study; and to the knowledge of the researcher, no work of such nature has been carried out in the area. The population of this study comprises 120 librarians and library officers in public tertiary institutions in Anambra State comprising 22 librarians and library officers in ChukwuemekaOdumegwuOjukwu University, Igbariam, NnamdiAzikiwe University, Awka with 55 librarians and library officers, NwaforOrizu College of Education Nsugbe with 18 and Federal College of Education (Technical), Umunze with 25 librarians and library officers. The total population of this study is manageable because it is not large. Therefore, the whole population was studied without sampling.

The data required for this research was collected with the aid of researcher's designed achievement test titled "Web applications Knowledge Test (WAKT)" and structured questionnaire titled "Web applications Use Questionnaire (WAUQ)". WAKT consisted of achievement test questions which were designed by the researchers to find out how much knowledge the librarians have acquired in respect to Web applications. WAUQ was designed to elicit information from librarians, in order to determine their use of Web applications, regularity of use of the Web applications by librarians, and challenges in the use of Web applications by the librarians. The construction of the achievement test and questionnaire was guided by the views and findings from the review of related literature. The two instruments had a total number of fifty six (56) items. WAKT was divided into section A and B. Section A, was used to collect demographic data on the subjects of the study. Section B comprised 12 achievement test questions which aimed at collecting data on librarians' previous knowledge of Web applications. WAUQ is divided into three (3) sections, namely; Sections A, B, and C. Section A, comprises 27 items that sought data concerning the use of Web applications by librarians. Section B, comprises 10 items that captures data concerning the challenges associated with the use of Web applications by librarians. Section C, comprises 7 items meant to collect data regarding the strategies for implementing and addressing the challenges associated with the use of Web applications by librarians. The drafts of the questionnaire together with the copies of the purpose of the study, the research questions and the hypotheses were subjected to validity. In calculating the reliability of the instrument, copies of the questionnaire were administered to 20 librarians from University of Nigeria Nsukka who are not part of the population of this study. The data collected were analyzed and the result to calculate the internal consistency of the Web Applications Knowledge Test (WAKT) and Web Applications Use Questionnaire (WAUQ). The reliability of the WAKT (Web Applications Knowledge Test) was calculated using the Kuder Richardson K-20 formula to get a reliability coefficient of 0.98.

$$R_t = \frac{K}{K-1} \left\{ 1 - \frac{\sum p_i q_i}{S_t^2} \right\}$$

The Cronbach Alpha was used to calculate the reliability coefficients of WAUQ (Web Applications Use Questionnaire) to get coefficients 0.75, 0.82, 0.84 for Sections A, B, C respectively. Copies of the final version questionnaire were administered by the researcher with the help of three library assistants who were adequately briefed on the purpose of the study and the modalities for administration and collection of the questionnaires. Direct delivery method was adopted to ensure high response rate.

Data obtained from the study were analyzed using descriptive and inferential statistics. Percentages, and arithmetic mean were used to analyze data obtained from the achievement test to answer research question number one for the librarians; arithmetic mean was used to answer research questions two also for the librarians, same applies to research questions three and four; while the hypotheses were tested using the Two Independent Samples T-Test for comparing the means. The pass mark for achievement test is 50 percent. This was derived by awarding ten (10) marks to each question with correct answer and the scores converted to percentages. Items to the values of 50% and above is given positive interpretation (passed). The questionnaire was weighted thus;

Strongly Agree	3.50 - 4.00
Agree	2.50 - 3.49

Disagree	2.00 – 2.49
Strongly Disagree	1.00 – 1.99

The midpoints for responses in the four-points scale is 2.50, which was calculated as follows: $4+3+2+1 = \frac{10}{4} = 2.50$. Items to the values of 2.50 and above was interpreted as “agree” while items with the values below 2.50 was interpreted as “disagree”. The hypothesis was tested with the aid of t-test at 0.05 significance level because the data is interval and only two mean groups was compared. The null hypothesis is rejected when the t-calculated is greater than the t-critical value.

Presentation and discussion of findings

The findings of the study were presented and discussed in tables with the aid of their research questions as seen below:

RQ1. What level of knowledge do librarians have in the use of Web applications?

The librarians from both federal and state institutions were required to answer questions on the achievement test to indicate the web application knowledge they possessed. The knowledge they possessed is measured based on their understanding of the meaning, the use process; and the requirements of web application?

Table 1: Librarians’ Response to Test on their Understanding of the Meaning, the Use Process, and the Requirements of Web Application

Questions	Frequency (No. of Librarians that Passed the Test)		Percentage (%) Scores
Understanding the Meaning of Web Application			
	Federal Institutions	State Institutions	
1.	72(73%)	18(82%)	
2.	58(59%)	10(45%)	
3.	25(26%)	17(77%)	
4.	65(66%)	13(59%)	
Average Percentage	55(56%)	15(68%)	62%
Understanding the Use Process of Web Application			
	Federal Institutions	State Institutions	
5.	81(83%)	19(86%)	
6.	77(79%)	11(50%)	
7.	41(42%)	9(41%)	
8.	88(90%)	18(82%)	
Average Percentage	70(73%)	14(65%)	69%
Understanding the Requirements of Web Application			
	Federal Institutions	State Institutions	
9.	67(68%)	7(32%)	
10.	92(94%)	20(91%)	
11.	56(57%)	15(68%)	
12.	70(71%)	16(73%)	
Average Percentage	71(73%)	15(68%)	71%

Table 1 shows the scores of librarians from federal and state institutions based on 12 achievement test questions (see Appendix B section B) which they were asked in order to find out their understanding of the meaning of web application, the use process of web application, and the requirements of web application. For the correct answers and each student’s score on each question (see Appendix K and Appendix L). From the results in Table 1, items 1 to 4 covers questions on understanding the meaning of web application with an

average percentage score of 56% for federal institutions and 68% state institutions. With an aggregate of 62%, librarians understand the meaning of web application. Items 5 to 8 covers questions on understanding the use process of web application; hence with an average percentage score of 73% for federal institutions and 65% for state institutions. With an aggregate of 64%, the librarians understand the use process of web application. Items 9 to 12 covers questions on understanding the requirements of web applications with an average percentage score of 73% for federal institutions and 68% for state institutions. With an aggregate of 71%, librarians understand the requirements of web applications.

The average percentage scores of librarians from federal and state institutions as measured based on understanding of the meaning of web application, the use process of web application, and the requirements of web application is presented in Figure 1 below.

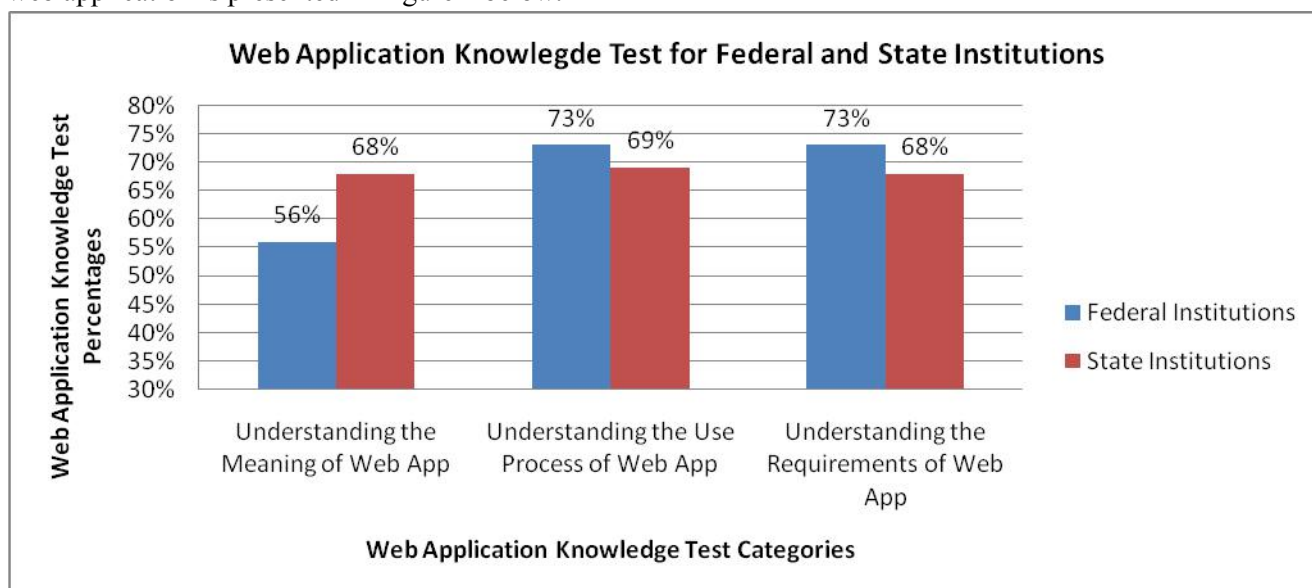


Figure 1. Bar Chart Showing Average Percentage (%) Scores of the librarians on Web Application Knowledge Test (WAKT).

From Figure 1, librarians in state institutions understood more, the meaning of web application (68%) than their federal counterpart (56%); also librarians in federal institutions understood more (73%) the use process of web application than their counterpart from the state (69%). In the test of understanding the requirements of web application, the librarians from federal institutions are more knowledgeable (73%) than their state counterpart (68%). However, the aggregate average of all the librarians' responses visible from the bar chart are all above the pass mark of 50%, hence, the librarians (federal and state institutions) are knowledgeable in the use of web application.

RQ2: What is the purpose of using web applications by librarians in academic libraries in Anambra State?

The librarians from both federal and state institutions were required to answer questions regarding their purpose of use of web applications as seen in Table 2 below.

Table 2: Librarians' Response to Questions on their Purpose of using Web Applications

Items N=120	Mean	Std. Dev.	Decision
I make use of Web applications for marketing of library services	2.96	1.17678	Agreed
I use Web applications in providing reference service online	3.33	.95409	Agreed
I use Web applications for current awareness services	3.03	.87863	Agreed
I use Web applications as a dissemination tool for newly acquired items	3.35	.79547	Agreed
I use Web applications in creating awareness among users about library services	3.50	.71007	St. Agreed
I make use of Web applications in promoting information literacy among library users	3.11	.98558	Agreed

I use Web applications to promote interaction among patrons by encouraging user feedback	2.62	1.20352	Agreed
I use Web applications to inform users on library resources	2.68	1.04506	Agreed
I use Web applications to access metadata of contents from single user interface	2.42	1.00070	Disagreed
I make use of Web applications because downloading resources from it is easy and fast	2.95	1.05201	Agreed
I use Web applications to enhance communication between librarians and library user	3.17	.98162	Agreed
I make use of Web applications because it protects proprietary information and helps in sharing wealth of knowledge	2.88	1.10144	Agreed
I use Web applications for easy evaluation and up to date library services	3.52	.82994	St. Agreed
I prefer using Web application because of the easy update of Web contents	3.36	.68349	Agreed
I prefer using Web applications because it encourages users participation in the creation of contents and services	3.54	.60663	St. Agreed
I use Web applications because it does not need extensive and advanced search skill to use	2.53	1.03659	Agreed
I render library services using Web applications	2.48	1.07658	Disagreed
I make use of Web application to render reference services online	3.55	.68415	St. Agreed
When creating awareness among users about library services I use it	3.32	.70987	Agreed
I make use of Web applications for online delivery of tutorials	2.31	1.10610	Disagreed
I support my research work through Web applications	2.33	1.10258	Disagreed
I use Web applications when providing up to date information to users on new books arrival	3.25	.93710	Agreed
I use Web applications in sharing wealth of knowledge to users	2.58	1.11267	Agreed
When creating a metadata of contents from single user interface I use it	2.72	.93650	Agreed
I update my knowledge in my field through Web applications	3.12	.98034	Agreed
Because of easy evaluation and up to date library services, I use it often	3.38	.80108	Agreed
The more I want to stay abreast of happenings in my profession through collaboration, I use it	3.15	.88546	Agreed
Valid N (listwise)	120		

As seen in Table 2 above, the librarians strongly agreed that they make use of Web application to render reference services online (3.55) as well as for easy evaluation and up to date of library services (3.52). The librarians also agreed that they use web applications because of easy evaluation and to keep up to date about library services (3.38); they also prefer using Web application because of the easy update of Web contents (3.36) and because downloading resources from it is easy and fast (2.95). Furthermore, the librarians use Web applications when providing up to date information to users on new books arrival (3.25), creating awareness among users about library services (2.50) and when marketing library services (2.96). However, the librarians disagreed with rendering library services using Web applications (2.48), and the access to metadata of contents do not come from a single user interface (2.42). They equally do not make use of Web applications for online delivery of tutorials (2.31), and do not use web applications for their research works (2.33).

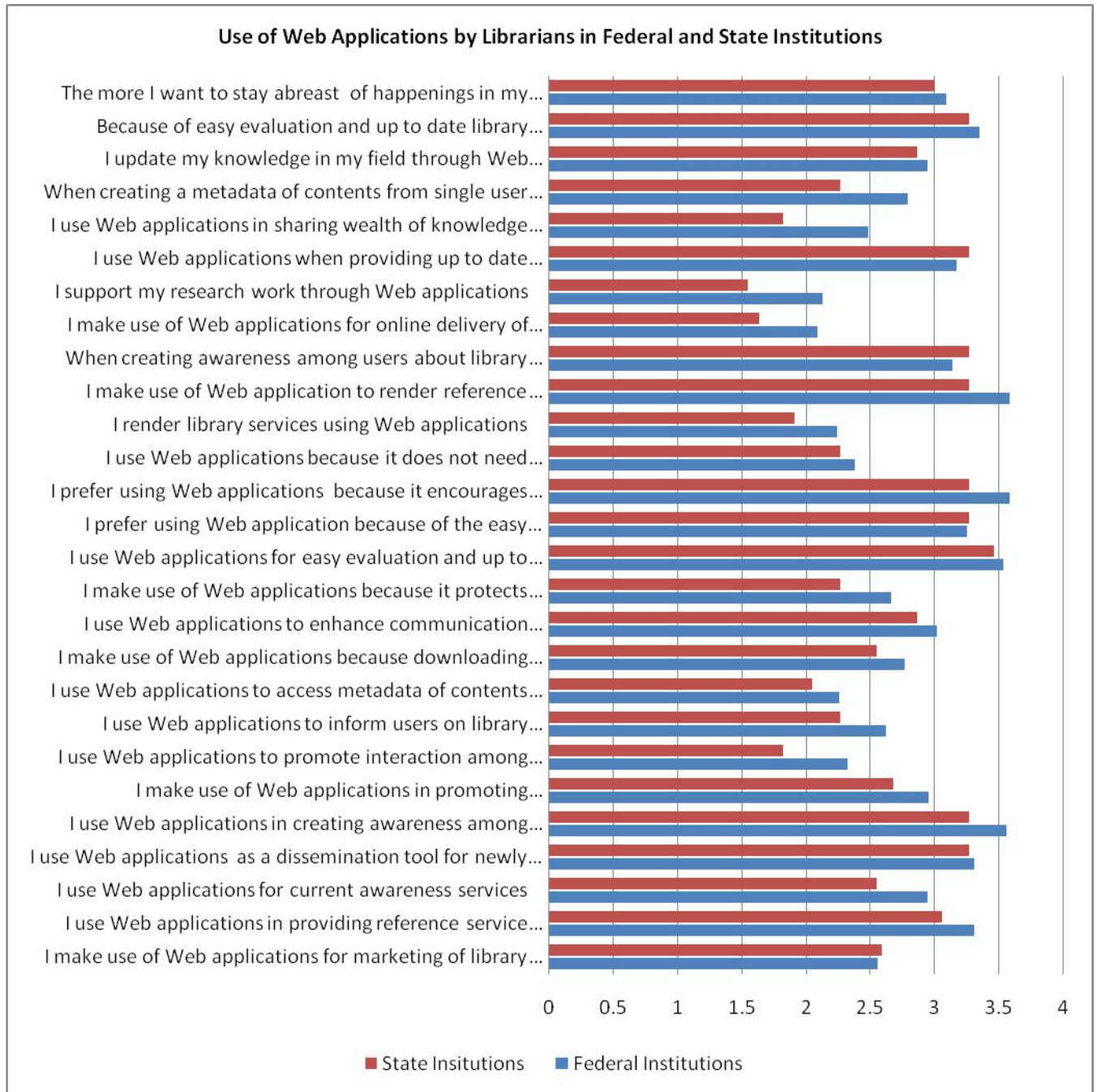


Figure 2: Bar Chart Showing Use of Web Applications for Federal and State Institutions

A deeper insight into the response scores between librarians in federal and state institutions from figure 2, revealed that the librarians in federal institutions were positive (above 2.5) in 17 items out of the 27 items that showcase the use of web applications; which coincidentally is the same as the librarians in state institutions. However, librarians in federal universities agreed more in 22 items indicating the use of web applications, while the librarians in state institutions were more only in 4 items. Subsequently, librarians in federal institutions had an average mean score of 2.89 more than their counterpart in the state at 2.65. See detailed table attached at Appendix 5.

RQ 3: What are the challenges faced by librarians in the use of Web applications?

The librarians from both federal and state institutions were required to answer questions regarding their challenges in the use of web applications as seen in Table 3 below.

Table 3: Challenges faced by Librarians in the use of Web Applications

Items	N=120	Mean	Std. Deviation	Decision
I do not have the ICT skills needed to research web applications		2.02	.99565	Disagreed
Lack of institutions support, inhibits my use of web application		2.70	1.05001	Agreed
Power outages limit the time I have to use web applications		3.58	.57486	St. Agreed
Lack of user education on access and use of relevant books online debars me from using web applications		1.89	.87731	St. Disagreed
Lack of policies to support web applications inhibits my use of it		1.88	1.03861	St. Disagreed
Internet issues in my library hinders my use of web applications		3.35	.79547	Agreed
Inadequate technical support during search affects my use of web applications		2.63	1.19476	Agreed
Privacy and security issues hinders my use of web applications		1.72	.96304	St. Disagreed
The need to filter results from web applications poses serious problem for me when I use it.		2.53	.86929	Agreed
Lack of time limits my use of web applications		2.94	1.06350	Agreed
Valid N (listwise)		120		

As seen in Table 3 above, the librarians strongly agreed that power outages limit the time they have to use web applications (3.58). They further agreed that lack of time limits my use of web applications (2.94); as well as Internet issues (2.70), inadequate technical support during search (2.63), and the problem of filtering results from web (2.53). On the other, the librarians disagreed with the fact that lack of user education on access and use of relevant books online debars them from using web applications (1.89). They strongly disagreed that lack of policies to support web applications (1.88) and privacy/ security issues hinder their use of web applications (1.72)

RQ 4: What strategies could be used to address the challenges with the use of Web applications by librarians in academic libraries in Anambra State?

The librarians from both federal and state institutions were required to answer questions regarding their proffered strategies to the use of web applications as seen in Table 4 below.

Table 4: Strategies to be used to address Challenges with the use of Web Applications

Items	N=120	Mean	Std. Deviation	Decision
I suggest Continuing professional development for librarians		3.56	.64555	St. Agreed
I suggest Provision of technical support for library professional		3.47	.63422	Agreed
I believe that Establishment of necessary policies and practices for ensuring proper implementation of Web applications		3.11	.83812	Agreed
I suggest Creating guidelines for using Web applications		3.13	.96635	Agreed
I believe that Adequate funding of digital library projects by government can ensure proper implementation of Web applications		3.60	.67860	St. Agreed
I suggest Provision of reliable power supply in all the academic libraries		3.51	.78853	St. Agreed
I suggest Provision of internet facilities and computer connection by government		3.54	.63373	St. Agreed
Valid N (listwise)				

Table 4 reveals that the librarians strongly agreed that adequate funding of digital library projects by government can ensure proper implementation of Web applications (3.60). They equally strongly agreed and suggested continuing professional development for librarians (3.56), provision of internet facilities and computer connection by government (3.54); and provision of reliable power supply in all the academic libraries (3.51) to address challenges in the use of web applications. Other suggested strategies were provision of technical support for library professional (3.47) and creation of guidelines for using Web applications (3.13).

Hypotheses

The following null hypotheses will be tested at 0.05 level of significance:

Null Hypothesis 1

There is no significant difference in the mean achievement scores of librarians in federal and state institutions in Anambra State on their level of knowledge of web applications.

Table 5: Summary of t-test Analysis on Difference in the Mean Achievement Scores of Librarians in Federal and State Institutions in Anambra State on their Level of Knowledge of Web Applications.

In table 5, the t-calculated is .005 while t-critical is 3.10. At 0.05 level of significance and 21 degree of freedom, t-calculated value is less than t-critical value. Since t-calculated value of .005 is less than t-critical value of 3.13, the null hypothesis is therefore not rejected. The researcher then concludes that there is no significant difference in the mean achievement scores of librarians in federal and state institutions on their level of knowledge of web applications in Anambra State Nigeria.

Paired Samples Test

	Paired Differences					t-critical value	df	Sig. (2-tailed) t-calculated
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Federal Institutions - State Institutions	3.18	4.76731	1.01639	1.06811	5.29553	3.130	21	.005

Null Hypothesis II

There is no significant difference in the mean ratings of librarians in federal and state tertiary institutions in Anambra State on the use of Web applications.

Table 6

Summary of t-test Analysis on Difference in the Mean Ratings of Librarians in Federal and State Institutions in Anambra State on their use of Web Applications

Paired Samples Test

	Paired Differences					t-critical value	df	Sig. (2-tailed) t-calculated
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Federal Institution - State Institution	-.0017	.00290	.00062	-.00297	-.00040	-2.723	21	.013

In table 6, the t-calculated is .013 while t-critical is -2.72. At 0.05 level of significance and 21 degree of freedom, t-calculated value is greater than t-critical value. Since t-calculated value of .013 is greater than t-critical value of -2.72, the null hypothesis is therefore rejected. The researcher then concludes that there is

significant difference in the mean ratings of librarians in federal and state institutions on their use of web applications in Anambra State Nigeria.

Discussion of Findings

Level of knowledge possessed by librarians in the use of Web applications

The librarians from state institutions understood more the meaning of web application than their counterparts in federal institutions; while the librarians from federal institutions understood more the use process of web application than librarians in state institutions. In the test on understanding the requirements of web applications, librarians in federal institutions had a better understanding than their counterparts in state institutions. The vagaries in the varying level of knowledge possessed by librarians in both federal and state institutions might be as a result of so many variables. Some institutions may be training-intensive for their staff members to be fully equipped with technologies related to their work places; some have policies guiding librarians through mandatory trainings, TETFUND and other funding supports for learning web applications which might appear in federal institutions and not in state institutions. Individual willingness to learn might also be a factor to consider when analysing varying levels of knowledge on web applications. However, the aggregate average of all the librarians' responses visible from the bar chart are all above the pass mark of 50%, hence, the librarians (in federal and state) are knowledgeable in the use of web applications; with the junior more knowledgeable.

In support of this, Achugbue, Uwaifo, & Igun, (2015) stated that librarians in university libraries in the South-South and South-West Region of Nigeria have very high knowledge of ICT hardware. Many authors such as Abidin, Kiran and Abrizah (2013), Arif and Mahmood (2012) and Ezeani and Igwesi (2012) revealed that library professionals in developing countries have low knowledge of the existence of Web applications in library services. This result of the present research equally agrees with the study by Williams (1998) on teacher librarian's knowledge on Information and Communication Technology hardware usage, which indicated that there is a significant correlation between levels of use, skills, familiarity and knowledge of Information and Communication Technology hardware (web application) in this case.

However, Anunobi and Ogbonna (2012) also revealed a low knowledge and use of Web2.0 applications by the librarians while developed countries like America and UK have high levels of knowledge of the benefit of Web applications in providing effective library services; and have already been adopted and implemented in such libraries (Hussain, 2018). Unfortunately Web applications are adopted only in few tertiary institutions mostly because of their restricted and tight budget in developing countries. Adeyinka (2009) further posited that librarians have little knowledge of ICT applications, what technologies to acquire, how to implement them, and what problems to solve. Interestingly he noted that lack of knowledge of appropriate technologies and the skills to analyze and evaluate library automation projects and their implementation will probably have affected the use of such technologies in libraries particularly in the developing countries.

Use of Web applications by librarians in academic libraries

The librarians make use of Web application to render reference services online as well as for easy evaluation and keeping up to date with library services. They equally prefer web application because updating its content is easier, as well as easier and faster to download from. Furthermore, the librarians use Web applications when providing up to date information to users on new books arrival, creating awareness among users about library services, and when marketing library services. This is possible because the web is all about real time services and events. Having taken its bearing from Ranganathan's law of saving the time of the user, no user would obviously want his/ her time wasted; while no librarian would want to waste longer time on one user, when it can all be taken care of at a mouse-click. However, the librarians do not render library services using Web applications, and do not use web applications for their research works as well as online delivery of tutorials. This is in contrast with Quadri and Idowu (2016)'s findings, who stated that librarians in federal universities in south western Nigeria are increasingly utilising web 2.0 tools in their libraries for information service delivery. This increase was attributed to the rise in the awareness and knowledge of web technologies among Nigerian librarians. Burkhardt (2010)'s findings also revealed that libraries are now using web applications as a new

platform to market their products and services. Subsequently Khan, Ahmad and Bhatti (2012) opined that the use of web applications such as social media for marketing of library services enables library users to be part of the process that improves and develops library services.

Librarians from federal institutions were generally more positive than their counterpart in state institutions in the use of web applications. This might be basically because the federal government has mapped out policies, funds, and even created expectations from staff in federal institutions; as well placed stricter technological competency benchmarks, which are in most cases used in staff appraisals in these institutions. Walsh (2011) posited that with web applications, messages will reach a larger audience of students and researchers if online. Hence Makori (2012) asserted that it is therefore imperative that Web applications opportunity be grabbed by Nigerian academic librarians to not only improve promptness, accuracy and relevance of their services but also to provide ubiquitous services and extend the range of their(library) services using the Web tools.

Challenges with the use of Web applications by librarians

The librarians strongly agreed that power outages limit the time they have to use web applications. This has been a persistent thorn in the flesh for libraries in Nigeria that even victimizes the very bests in Nigeria. A library that has not adopted a 24-hour power solution find it hard to even maintain the server for the web applications as well as supporting databases. Users coming to assess the web applications equally need power supply to sustain their gadgets. Further challenges were lack of time, Internet issues, inadequate technical support during search, and the problem of filtering results from web.

Okonedo, Azubuike and Adeyoyin (2013) in their opinion stated that no matter the popularity and ease of use of Web applications, most libraries are constrained by varying factors in their quest to effectively utilize these tools. Some challenges to the use of web applications as indicated in a study carried out by Anunobi and Ogbonna (2012) includes not being familiar with Web 2.0, restricted opportunity for use, low skills, lack of needed facilities and interest. Furthermore, Abidin, Kiran and Abrizah (2013) hurdles confronting library professionals in the use of Web applications lack of knowledge on how to use these applications in libraries, unavailability of computers, lack of computer and internet facility in libraries, lack of awareness of social media use, lack of trained staff, lack of government interest and involvement, copy right issues and bandwidth problems in Nigerian libraries, lack of motivation, computer expertise, facilities and personality characteristics. Similarly, Okonedo, Azubuike and Adeyoyin (2013) showed that the major challenges to the use of Web applications by library and information professional included low bandwidth, time constraint, inadequate training, among other factors.

On the other hand, the librarians disagreed with the fact that lack of user education on access and use of relevant books online as well as lack of policies to support web applications, and privacy/ security issues hinder their use of web applications. Some librarians might feel unsecured downloading web applications or divulging some copyrighted information resources unauthorized too. Santosh (2017) pointed out that barriers to effective use of Web applications include user disinterest and accessibility issues; while According to Idiegbeyan-ose, Okocha, Aregbesola, Owolabi, Eyiolorunshe and Yusuf (2019), challenges to adoption of Web application in library and information science include; Digital divide (most developing countries lacking behind in terms of ICT adoption), Lack of internet facilities that are required for web applications to function; Inadequate ICT infrastructure; Lack of Policies to Support Web Applications; and Inadequate Staff Capacity.

Strategies for addressing challenges with the use of Web applications by librarians

The librarians strongly agreed that adequate funding of digital library projects by government can ensure proper implementation of Web applications. Funding is always an area emphasized when proffering solution to library related issues. Developing web applications and maintaining/ running them require finances and commitment from the library management or the parent institution. The librarians further suggested continuing professional development for librarians; provision of internet facilities and computer connection by government; and provision of reliable power supply in all the academic libraries to address challenges in the use of web applications. Other suggested strategies were provision of technical support for library professional

and creation of guidelines for using Web applications. To this, Anyaoku, Orakpor and Ezejiofor (2012) rightly recommended that library administrators in Anambra State should make concerted efforts to acquire, as a matter of urgency, information technology structures that support IT skills acquisition; which can be able to embrace and optimally utilize web applications in the library. Internet is a basic information necessity, it should be provided for both users and workers in the library either free or at subsidised rate. This will improve productivity, as well increased job satisfaction. Also, Anunobi and Ogbonna (2012), highlighted strategies that can be used to address challenges of Web application utilization such as: librarians should being encouraged to embrace the use of Web applications through capacity building by their employers; repositioning librarians in public, school and special libraries, including academic libraries by providing the needed facilities to enhance the use of Web applications; and making library automation/ digital access the basis of library operations in their libraries in order to meet the users' present information need. They also recommended intermittent organization of in-house trainings, seminars and workshops on the existent and use of Web applications for librarians and library users to help themselves become familiar with the different Web 2.0 tools, their potentials and use approach.

Difference in significance between federal and state institutions in their knowledge of web applications; and in their use of web applications

The study established that there is no significant difference in the mean achievement scores of librarians in federal and state institutions on their level of knowledge of web applications in Anambra State Nigeria. This indicates that the difference in the level of knowledge on possessed by librarians in both federal and state libraries on web applications is not significant. Hence, having an understanding of the meaning, the use process, and the requirements of web applications does not differ significantly among librarians in both federal and state institutions in Anambra state. There have not been much studies probing into the difference in librarians from federal and state institutions on their use of web applications. However, Aharony (2009) in her study found out whether librarians, whose main work focuses on information, are familiar with new technological changes and innovations, and whether they make use of different Web 2.0 applications. Her findings revealed that personality characteristics as well as computer expertise, motivation, importance and capacity towards studying and integrating different applications of Web 2.0 in the future, influence librarians' use of Web 2.0. Furthermore, findings from a study by Williams (1998) on skills and knowledge of teachers of Information and Communication Technologies (TICTs), indicated that there is a significant correlation between levels of usage, skills, familiarity and knowledge of Information and Communication Technology and teachers attitudes.

The present study equally established that there is significant difference in the mean ratings of librarians in federal and state institutions on their use of web applications in Anambra State Nigeria. This indicates that the difference in the use of web applications possessed by librarians in both federal and state libraries on web applications is significant. This may arise because of the varying demands peculiar to the federal as well as the state institutions on how the web applications should be used. Aharony (2009) highlighted some characteristics which are strong enough to influence differences in librarians' use of Web 2.0 especially among federal and state institutions in this instant. They are: personality characteristics of the librarian (resistance to change, cognitive appraisal, empowerment, and extroversion or introversion); computer expertise and training strategy; motivation; importance; and the capacity to study and integrate different applications of Web 2.0 in the future. These findings are commensurate with Devaraj, Easley, and Crant's (2008) research in the aspect that it emphasizes the importance of individual differences in technology acceptance, and that library directors may look for these traits when selecting new workers. The library directors may understand that the organization (federal or state) might benefit from hiring people with positive attitudes toward technology. Furthermore, if library directors of federal or state institutions might decide to identify workers who are inclined to having negative attitudes towards technology, they can offer training programs to help them to overcome their negative inclination.

Conclusion and Recommendations

The study focused on librarians' knowledge and use of web applications for effective services in academic libraries in Anambra State. The study has established that there are variations in the level of knowledge possessed by librarians in both federal and state institutions, however from their responses they are both knowledgeable in the use of web applications. This looks positive as it creates an optimistic foundation for their use of web applications in library services. This positivity was equally reflected in their use of Web application to render reference services online as well as for easy evaluation and keeping up to date with library services. Subsequently, updating its content is easier, as well as downloading from them. Furthermore, the librarians use Web applications when providing up to date information to users on new books arrival, creating awareness among users about library services, and when marketing library services. This reflects how important and versatile web applications can be adopted in almost all ramifications of library services. Unfortunately, power outages, lack of time, Internet issues, inadequate technical support during search, and the problem of filtering results from web; create a limit to the extent they can use web applications, and a barrier to what they can achieve. Hence, funding was strongly recommended, alongside continuing professional development for librarians; provision of internet facilities and computer connection by government; and provision of reliable power supply in all the academic libraries to address challenges in the use of web applications. Furthermore the study further indicates that the difference in the level of knowledge on possessed by librarians in both federal and state libraries on web applications is not significant; and that there is significant difference in the mean ratings of librarians in federal and state institutions on their use of web applications in Anambra State Nigeria.

The following recommendations have been made based on the findings and conclusions made in this study.

- It should be made a point of duty to conduct orientations and duties at least annually to librarians on helpful web applications that can support their duties and tasks, research and academic work; this will no doubt update their knowledge on recent researches and trends in their field.
- NUC and other academic library regulating agencies should emphasize on the stability of power and internet issues in universities, as it forms one of the major challenges to the use of web applications established by the present research.
- Most times librarians complain of having busy administrative tasks as well as academic schedule to the extent that exploring these web applications becomes huge task. This can be ameliorated by reducing and redistributing librarians' workloads to ensure equity and fairness to themselves, their duties, and their research lives.

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