Awareness of and Web 3.0 Competencies Among Librarians in Universities in Osun State, Nigeria

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ABSTRACT
The study was motivated by the need to find out the level of awareness and web 3.0 competencies among librarians in universities in Osun State, Nigeria. It was observed that very little has been done to assess the influence of Web 3.0 tools on library service delivery. The descriptive survey design was adopted for the study. The total enumerative technique was used to select the respondents that constituted the study's sample. The questionnaire was employed to collect data from 78 librarians in the 8 tertiary institutions in Osun state. Data obtained from 69 duly completed copies of the questionnaire were used for analysis. From the findings, it was revealed that Web OPAC and Virtual reference services are the most available Web 3.0 tools. The findings of the study also revealed that librarians in the surveyed universities in Osun state have a high level of awareness of the listed web 3.0 tools. Likewise, the findings indicated that librarians have high competencies with ICT tools that can enable the use of Web 3.0 tools for service delivery. The findings of the study also revealed that Web 3.0 tools will improve access to information resources and also help in disseminating information to users in the library. It was concluded in the study that library and information science professionals have a positive perceptions about adopting Web 3.0 for library service delivery. The study, therefore, recommends an improved budgetary provision for university libraries to ensure capacity building among librarians and information professionals.

Keywords: Web 3.0, Librarians, Awareness, ICT Competence

INTRODUCTION
Web tools have become an increasingly important resource in many aspects of life including education, commerce, government, employment, health care, recreation, and

much more. It is widely embraced by academia, business communities, organizations, and especially librarians who recognize its great impact on information service delivery. The web is an increasingly important resource in the library. The web inventor played an active role in guiding the development of web standards and has in recent years advocated for a semantic web, such as is incorporated into Web 3.0. This is to provide users with efficient instruments to handle the abundance and variety of information available on the internet.

Although Web tools have been found very useful, nevertheless, the initial Web 1.0 had the disadvantage of being a container of static information and this information can only be read on websites but rarely allow user interaction (Cohen-Almagor, 2011). Web1.0 consists of few writers and a large number of readers which makes the network slow and starve users of valuable information resources. In recent times, due to advancements in technology, the internet began to encapsulate unlimited services, resources, objects, and devices, for effective user interfaces (Ohei & Brink, 2019; Singh, Gulati & Gulati, 2011). This brought about the next phases of Web technologies which include Web 2.0, Web 3.0, and Web. 4.0 (Kenchakkanavar, 2015; Kolawole & Mutula, 2017; Ohei & Brink, 2019). Web 3.0 is a transformational version of Web 2.0 which encompasses the next fundamental change both in how websites are created and, how people interact with them (Hussein, 2014; Chen, 2021). Web 3.0 includes transforming the Web into a database; a move towards making content accessible by multiple non-browser applications, leveraging on Artificial Intelligence (AI) technologies, the Semantic Web, the Geospatial Web, or the 3D Web (Wenborn, 2018). Some common examples include the semantic web, cloud computing, mobile devices and re-envisioning the use of established technologies such as federated search to facilitate user-generated content and collaboration, to promote and make library collections accessible online. These transformations, according to Wenborn (2018), constitute Web 3.0. In the Web 3.0 concept, the issue of website disappears and data is no longer owned but shared. Applications such as browsers, virtual worlds and the likes, which focus on context and personalisation will be reached by using vertical search. These evolving stages of Web technologies no doubt have significant roles in delivering library and information services.

In recent times, there are dramatic changes in the manner in which library and information services are delivered due to technological changes in computing, communication and data collection. At the same time, librarians are also striving to cope with these changes to meet the information need of library users (Eleni, 2016). According to Gulami and Kumar (2011), many libraries have made encouraging advancements in their electronic services by providing access to top-quality databases, downloadable audiobooks and music, instant messaging and reference services.

Currently, many libraries are implementing the use of Web 3.0 for improved library service delivery to prevent outdated service culture. Web 3.0 aids regular customer feedback, appraising and updating services. Thus, both new and existing library services should be revisited routinely to ensure that they are meeting expected goals.

Web 3.0 possesses a greater ability to record and store information, which results in the generation of more precise and helpful information for web users. Web 3.0 tools used for library service delivery are often referred to as Library 3.0. Library 3.0 is a model for a modernized form of library service that reflects a technological transition from manual to automated processes in the way services are delivered to users (Kwanya, 2014). With the application of Web 3.0, library services can be frequently updated and evaluated to meet the emerging needs of the library (Abraham, Kuriakose, & Salim, 2020). Belling et al. (2011) opined that the application of a borderless library (which is also a feature of Web 3.0) in the library will result in the expansion of the library where collections can be made readily available to library users regardless of their physical location. Web 3.0 can serve as a virtual complement to physical library spaces, and it ideally works seamlessly within established library services and collections (Bhattacharya, 2016).

Prabhu (2016) noted that users increasingly come to expect interactive online services in all spheres of life; libraries must keep pace with developments to provide relevant services in the future. It is therefore important that libraries adapt to these innovations to keep up with relevant Information and Communication Technology (ICT) needed for effective library service delivery, especially the emerging technologies. Librarians could be at risk of providing out-of-date and irrelevant services that might discourage users. However, this can be avoided by harnessing the concepts, principles, and technologies (such as Web 3.0) for rendering exemplary services to the user in the electronic world (Harris, 2016).

Problem Statement

Advancement in ICT cannot be over-emphasized as it is rapidly changing the area of growth and development (Egberongbe, 2011**).** According to Ifijeh (2010), the growth of information on the internet has made it harder for librarians and information consumers to identify and exploit information. Web 3.0 tools for library services aim to improve the availability of relevant and cost-effective information resources for high-quality education and research (Muhammad & Faiz, 2019). Despite the richness of these Web 3.0 tools and their enormous impact on library and information services as found in the developed world, Nigerian academic libraries are yet to deploy and overcome the

challenges of active participation in the tool and use of these new technologies to library services. Therefore, this study seeks to examine the level of awareness regarding Web 3.0 and competencies possessed by librarians for improved service delivery.

Research Objectives
The main objective of this study is to investigate awareness and Web 3.0 competencies among librarians in universities in Osun state. The specific objectives of the study are to:
1. find out the types of Web 3.0 tools available in the libraries understudy
2. determine the level of awareness of Web 3.0 tools among librarians
3. establish the Web 3.0 competencies possessed by librarians.

Literature Review

Academic libraries are well-known as the epicenter of information in every institution. A university without a library is, without a doubt, an incomplete citadel of learning (Tella, 2019). Libraries in developing countries are transitioning from offering information services solely through manual processes to adopting complex technologically oriented systems. With the aid of information, communication, and technology, information packaging, retrieval, and distribution has improved in this day and age. Hence, users do not necessarily have to come physically to the library to use print resources such as books, journals and magazine; but they can access these same resources in electronic form through the internet in their offices, homes, or schools. With advancements in ICT and e-publishing, online databases, such as Emerald insight, Ebscohost, TEEAL, Science Direct, Academic Search Premier, online public access catalogue (OPAC), CD-ROMs, e-journals, e-books collections on various subjects, etc., can be accessed and help overcome the usual barriers of accessibility, time and space (Prangya & Rabindra, 2013). The use of Web technologies is becoming a ubiquitous concept and there is increasing research on the concept; ranging from Web 1.0 through Web 4.0 (Kolawole, 2016; Almeida, 2017). Thus, various electronic databases are arising with the different phases of Web development.

Awareness can be termed as knowledge about particular information and manifested through a particular behavior. Awareness refers to having knowledge of something that happens or having a current understanding of a situation or topic on facts or experience. Aina (2014) in a survey on awareness, accessibility and use of electronic databases among academic staff of Babcock University found that respondents are averagely aware of nine out of thirteen databases being studied. Mahmood and Richardson (2011) affirmed that increased understanding and use of Web tools have opened new

avenues for libraries by allowing them to engage users in their activities and elicit feedback for service delivery.

Baro and Godfrey (2015) opined that there is a new logic of service delivery, a new understanding of library services and a shift in paradigm to the professional development of librarians. In addition, Tyagi (2011) in a survey on the use and awareness of electronic information sources at IIT Roorkee, India, found that users have knowledge about the availability of electronic technologies and can make maximum use for various purposes such as teaching, research. In a survey on, possible uses of Web 3.0 in websites of Libraries of Academic Institutions of Pakistan, Muhammad and Faiz (2019) found that Web 3.0 has immense advantages that are applicable in delivering library services. The study reported Web 3.0 as a progression of the current age of the web wherein personal computers and individuals are empowered to work in collaboration. Thus, Web 3.0 is seen as a semantic web that portrays things in a way which are more understandable to computers.

Awareness of Web 3.0 technologies is gaining momentum as access to academic libraries is provided with quality academic apps and mobile Websites (Torres-Pérez et al. 2016). The primary goal of libraries is to satisfy users' knowledge needs. As a result, they must be continuously aware of emerging technology and communication networks to further assist users in gaining easy access to information. They must upgrade their services so that they can provide information and services to users wherever, and however, they want it. Thus, libraries nowadays are increasingly seeking to take advantage of mobile device capabilities (Barile, 2011).

Web 3.0 is explained in different contexts. Santos (2015) acknowledges machines can work with users in the production of content and the process of decision making. Bawab (2014) acknowledged that Web 3.0 enables its users to search data from anywhere. It has become a trend that offers a wide range of solutions for browsing by incorporating data which is a key feature of Web 3.0. Data can be converted into meaningful information that can be located, evaluated and stored by programs designed to collect information based on the interaction of users with the Web.

Web 3.0, being a semantic web that gives information a well-defined meaning, allows computers, rather than humans, to generate new information (Kadyan and Singroha, 2014). Wankhede and Sonwane (2018) and Parihar (2019) opined that librarians need to equip and update themselves with the emerging technologies for providing the appropriate and up-to-date information. Web 3.0 as a transformational version of Web 2.0 provides a fundamental change both in how websites are created and, more importantly, how people interact with them. Libraries are therefore experimenting with

the use of Web technologies to benchmark their activities and optimize library resources, engage with users through social media, assess staffing patterns, and expand library services into a far better research environment (Balaji et al., 2018).

In the same vein, there appears to be a gravitational pull towards acquiring technical skills for the efficient use of newly emerging technologies (Gutsche, 2010). These skills include well-organized use of web-based resources, practical software and hardware management, and database design skills to ensure library service delivery. Even though most libraries already run on a sophisticated technological framework, users are not conversant with the new phase of web technologies and lack the required skills. Gutsche (2010) therefore suggested that librarians should not rely solely on technology but should continue making efforts to provide human-touch services at a human level.

Therefore, given the importance of information and communication technologies, different levels of technology competencies have been suggested as important for research and academic librarians. Web 3.0 however, is the third-generation of internet-based services (Ahmed, 2015), that jointly consist of what can be called an 'intelligent Web'. Several Web 3.0 tools are being used to provide library and information services in various types of libraries, academic library inclusive. Researchers such as Aiyebelehin, Makinde, Odiachi and Mbakwe (2020); Wankhede, Sonwane and Mukhyadal (2019) and Kadyan and Singroha (2014) have identified some Web 3.0 tools employed in academic libraries. They include internet-based services using semantic Web, microformats, natural language search, data-mining, machine learning, recommendation agents and artificial intelligence technologies (Bhattacharya, 2016). Salam and Sharad (2019) also identified the features of Web 3.0 as semantic web, artificial intelligence, 3D graphics and accessibility.

The potential threat of technology to librarianship compelled librarians to acquire and keep acquiring relevant technological skills. For instance, Kenefick and Werner (2012) remarked that many librarians were informed that computers would take over the librarians' role soon and that libraries might be closed due to lack of use and need. Galeon (2017) also stated that intelligent machines are taking over the jobs of library staff. Thus, the response of library and information professionals to these challenges on awareness and use of emerging technologies is important to ensure the ultimate difference in the survival of the profession. Likewise, librarians as information managers need to be fully aware of artificial intelligence management tools and the semantic web for expertise in the evolving digital environment.

Since advancement of Web 3.0 has helped a great deal in revolutionizing the internet. Thus, organisations and academic institutes utilize Web 3.0 technologies for academic and research purposes. Different institutions have gained the ability to provide efficient strategies through the use of integrated intelligent data (Muhammad & Ahmed, 2019). Bhandarkar (2014) averred that web technologies will provide features of a massive library system. This shows that users can use the electric equivalents of books and take assistance from electronic equivalents of librarians through library websites. Hence, the need for studies on librarians' awareness of Web 3.0 applications for Library services provision and the required competencies such as was done by Cox et al. (2018) on the intelligent library.

Methodology

The study employed a descriptive survey design. The population of this study is 78 professional librarians in eight (8) university libraries in Osun state. These university libraries are Adeleke University, Bowen University, Redeemer's University, Fountain University, Kings University, Oduduwa University, Osun State University, and Obafemi Awolowo University, Osun State. Total enumeration sampling techniques were employed. A questionnaire was used for the data collection while data was analyzed quantitatively using Statistical Products and Service Solution (SPSS), frequency counts, and percentages. The results are presented in tables.

Results and Discussion

The results from the data analysed are presented in tables and discussed based on the objectives of the study.

Results on Types of Web 3.0 Tools Available

Results on types of Web 3.0 tools available for library service delivery in the University Libraries surveyed are presented in table 1.

Table 1: Web 3.0 tools available in libraries

Web 3.0 tools	No	Yes
Web OPAC	7	62
	10.1%	89.9%
Ontologies	59	10
	85.5%	14.5%
Geo Tagging	57	12
	82.6%	17.4%
Virtual Reference Service	22	47
	31.9%	68.1%
Semantic Web	47	22
	68.1%	31.9%
Cloud Computing	34	35
	49.3%	50.7%
Federated Search	43	26
	62.3%	37.7%
Mobile Library Catalogues	37	32
	53.6%	46.4%
Quick Response Code (QR Code)	52	17
	75.4%	24.6%
Artificial intelligence	45	24
	65.2%	34.8%
Big Data analytics	49	20
	71.0%	29.0%

Source: Field Survey (2021)

The results in Table 1 show that the majority (89.9%) of the respondents indicated that Web OPAC is available for library service delivery and 68.1%, virtual referencing while only 31.9% and 34.8% indicated that semantic web and artificial intelligence respectively are available. On the other hand, the majority (between 71.9 - 85.5%) of the respondents indicated that Ontology, Big data analytics, Geo-tagging, semantic web and QR codes are not available for library service delivery; while virtual referencing service, federated search, mobile library catalogues and cloud computing are not available to between 50.7 - 68.1% of the respondents.

The findings of the study reveal that most of the web 3.0 tools such as ontologies, geo-tagging, semantic web, federated search, quick response codes, artificial intelligence, and big data analytics have not been adopted in the university libraries surveyed. Nevertheless, it was found that Web OPAC and virtual reference services are the Web

3.0 tools mostly available for service delivery. This finding corroborates that of Balbaid (2018) on the availability of Web OPACs in different libraries around the world. On the other hand, the federated search which can make it easier for users to have all the search results displayed in one place (Bhattacharya, 2016), has been identified as one of the tools not available to most of the librarians that responded.

Results on Level of Awareness of Web 3.0 Tools

Table 2 show results on the level of awareness of Web 3.0 tools available for library service delivery

Table 2: Level of awareness of Web 3.0 tools

	Low	Moderate	High	Very High
Web OPAC	1	11	18	39
	1.4%	15.9%	26.1%	56.5%
Ontologies	28	32	8	1
	40.6%	46.4%	11.6%	1.4%
Geo Tagging	30	27	11	1
	43.5%	39.1%	15.9%	1.4%
Virtual Reference Service	17	21	17	14
	24.6%	30.4%	24.6%	20.3%
Semantic Web	14	40	9	6
	20.3%	58.0%	13.0%	8.7%
Cloud Computing	10	32	17	10
	14.5%	46.4%	24.6%	14.5%
Federated Search	17	23	24	5
	24.6%	33.3%	34.8%	7.2%
Mobile Library Catalogues	17	26	13	13
	24.6%	37.7%	18.8%	18.8%
Quick Response Code (QR Code)	11	35	14	9
	15.9%	50.7%	20.3%	13.0%
Artificial intelligence	20	28	12	9

	29.0 %	40.6%	17.4%	13.0%
Big Data analytics	22	26	13	8
	31.9 %	37.7%	18.8%	11.6%

Source: Field Survey (2021)

The results in Table 2 reveal that about an average (56.5%) of the respondents is highly aware of Web OPAC among other Web 3.0 tools used in the library. However, the majority of the respondents are moderately aware of the following Web 3.0 tools, Ontologies (46.4%), Geo-tagging (43.5%), virtual reference service (30.4%), semantic web (58%), cloud computing (46.4%), library catalogues (37.7%), artificial intelligence (37.7%) and big data analytics (37.7%). Nevertheless, only 34.8% of the respondents are highly aware of federated search while 50.7% low level of awareness regarding QR codes as Web 3.0 tools used for library service delivery.

The study findings revealed that the majority of the librarians surveyed are aware of different types of listed Web 3.0 tools available for library service delivery. The results indicate that most of the librarians surveyed are more aware of some of these tools than the others listed. For instance, librarians were found to be moderately aware of Ontologies, semantic Web, cloud computing and QR codes and less aware of Geo tagging. However, a very high level of awareness of Web OPAC was recorded among most of the librarians surveyed. These findings corroborates that of Aiyebelehin et al (2020) who found out that awareness of librarians about Web tools is associated with the their level of awareness. Conversely, Ramzan, Asif and Ahmad (2021) stated that a significant effort (such as creating awareness through training) is needed to enhance the librarians' positivity towards the use of emerging Web tools.

Results on ICT competencies of librarians for Web 3.0 use for library service delivery

Table 3 presents results on the level of competence of librarians with ICT and Web 3.0 tools.

STATEMENT	Very High	High	Moderate	Low
I use social media to establish communication with staff and library clienteles	46 66.7%	18 26.1%	5 7.2%	0 0.0%
I can use search engines to search for information	44 63.8%	25 36.2%	0 0.0%	0 0.0%
I use Web technologies to disseminate information	44 63.8%	22 31.9%	3 4.3%	0 0.0%
I use computers to present data more clearly	41 59.4%	19 27.5%	2 2.9%	7 10.1%
I can use Web tools to undertake independent learning	27 39.1%	36 52.2%	6 8.7%	0 0.0%

Source: Field Survey (2021)

The results in Table 3 on the level of competence of librarians with ICT tools for Web 3.0 revealed that all the respondents 100% are highly competent with the use of search engines for information search. Likewise, a large proportion of the respondents (95.7%) indicated that they are highly competent with the use of Web technologies to disseminate information. 92.8% of the respondents indicated that they have a high level of competence to use social media to establish communication with staff and library users while about 88% indicated that they present data using Web 3.0 tools proficiently. 91% are highly competent with using the Web 3.0 tools they are aware of and are available to them to undertake independent learning.

These findings of the study indicate that most of the respondents are highly competent with the ICT tools that can enhance the use of Web 3.0 services for library service delivery. This finding corroborates the findings of Momoh (2018) who stated that librarians are proficient in the use of information communication technologies. Similarly, in a recent study, Khan and Parveen (2020) found that library staff has professional competencies that enable them to work in academic libraries. Khanzode

and Sarode (2016) also explain the purpose of this Web tools is to enable users to find, share and package information more easily. According to Hitendra and Yogesh (2018) Web 3.0 technologies have enabled Library 3.0 and have brought about fundamental changes in the way the information is collected and disseminated. With the recent prominence of the information profession, librarians will have to additionally learn about the related subjects along with the existing knowledge base. Khanzode and Sarode (2016) explains purpose of Web 3.0 is to enable users to find, share and package information more easily.

Conclusion

It is concluded from the study that there are numerous types of Web 3.0 tools that can be adopted for library service delivery, among which OPAC is very popular. There is also a moderate level of awareness regarding Web 3.0 tools among librarians. Furthermore, librarians possess a high level of ICT competencies that can be employed when making use of Web 3.0 tools.

Recommendations

It is therefore recommended that facilities and an enabling Web 3.0 environment be provided in the library. This will lead to increased accessibility and promote utilization of the tools by both the library staff and users. The management of the surveyed institutions should also provide adequate funding for the infrastructures that are needed for the effective implementation of Web 3.0 tools. Workshops can be organized to educate library staff on the importance of Web 3.0. Furthermore, the development of policies should be prioritized to facilitate and promote awareness, implementation, access, and use of Web 3.0 tools in academic libraries.

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