
**SEMANTIC WEB TECHNOLOGIES IN NIGERIAN UNIVERSITIES FACULTY OF LAW FOR E-LEARNING
DURINGOMICRON SARS-CoV-2 VARIANT OUTBREAK**

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ABSTRACT

The study examined the availability and utilization of semantic (3.0) web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The research area was the south-south and south-east geopolitical zones in Nigeria. Two research questions were formulated to guide the study. The survey design was adopted, and a population of 324 lecturers from the Faculty of Law at ten universities was used. A simple random sampling technique was used to select 150 lecturers for the study. A 20-item structured questionnaire used for data collection was faced validated, and a reliability coefficient was established using Cronbach's alpha statistics, which yielded a coefficient of 0.92. A frequency count was used to answer the research questions. Findings of the study revealed that technologies available and utilized in all the Universities for e-learning are worldwide web and zoom while YouTube and Skype are available in few Universities. The study further showed that Microblogging, Virtual 3D libraries, Virtual worlds and avatars, Canva, Logitech, Class dojo, Adobe Spark Video, Virtual laboratories, Real Simple Syndication Feeds, E-Class Roll, Prezi, Science-360-Video, Podcasts, Quizlet, Wikis and Virtual 3D Encyclopedia technologies were not available. Based on the findings of the study, it was recommended that Federal, State government and Universities should make available semantic web technologies for e-learning in Faculty of Law. The study further recommended regular appraisal and updating of e-learning technologies, the organization of workshops, seminars, and conferences on the integration of e-learning in the Faculty of Law, as well as connecting the universities to a stable electric grid for effective usage of the semantic technologies for e-learning.

KEYWORDS: Omicron Variant, University Law Faculty, Nigeria, Semantic Web, E-Learning.

Introduction

Nigeria is the most populous country in Africa, with an estimated 213 million inhabitants (Gloria, Jacob, Joseph, Annette, and Walt, 2021). In November 2021 according to Gloria et, al (2021), there has been cases of Severe Acute Respiratory Syndrome Corona virus type 2 (SARS-CoV-2) infection in Nigeria. Kumar, Thambiraja, Karuppanan, and Subramaniam (2021) maintained that SARS-CoV-2 is referred to the virus that caused the Corona virus disease 2019 (COVID-19) outbreak in late 2019 in Wuhan, China. In the same vein, USDM (2021) and Gloria et al. (2021) stated that the Omicron variant

of the SARS-CoV-2 was discovered in Nigeria in October 2021, Botswana on November 11, 2021, and South Africa on November 14, 2021, and was first reported to the World Health Organization (WHO) on November 24, 2021. According to USDM (2021), on November 26, 2021, the WHO Technical Advisory Group on Virus Evolution (TAG-VE) proposed that variant B.1.1.529, known as Omicron, be identified as a "Variant of Concern" (VOC). The term "VOC" for SARS-CoV-2 refers to viral variants with mutations in their spike protein receptor-binding domain (RBD) that improve binding affinity in the RBD-hACE2 complex while also causing fast dissemination in human populations (Dudas, Hong, and Potter, 2021).

SARS-CoV-2 variant has affected the lives of many individuals, negatively impacting the global economy and sources of livelihood. Containment measures such as a travel ban, restrictions on movement, and the closure of schools have untold consequences. According to UNESCO (2020), about 1513,371 university students are out of school, and 73.8% of the world's school populations have been affected by school closure. The Federal Ministry of Education in Nigeria approved the closure of schools in all learning institutions on March 19, 2020, due to the emergence of COVID-19 (Ngumbi, 2020, and Nebem, 2020). This abrupt closure led to significant disruptions in the education system in Nigeria, including learning methods, access to school-related services, parenting routines, and the crisis management capacities of the Federal and State Ministries of Education.

Education at the university level, which is responsible for training students in different professions in Nigeria, plays a significant role in the human resources development with which the country attains its level of development. In the present Omicron variant of the SARS-CoV-2 challenges facing university education, different universities have come to realize the educational benefits of utilizing the internet in the classroom as part of the learning environment (Ngumbi, 2020). Karibasappa (2020) posited that Markoff of the New York Times in 2006 envisioned the evolution of semantic web (3.0) technologies, tools, and applications (Apps), which bring aid to the educational system, bearing in mind the need for e-learning tutoring that educators may have to render to their learners.

Itinson (2020) defines Semantic Web (3.0) as the first generation of the metaverse, which comprises high-quality intelligent tutoring systems such as video, 3D simulation, virtual reality, wikis, and limitless bandwidth. Also, semantic web applications provide learners with personal settings and different options in education that enhance the feeling of immersion in the computer-generated virtual world (Dominic, Francis, and Pilomenraj, 2014). Also, Aghaei, Nematbakhsh, and Farsani (2012) stressed that Web 3.0 is a geospatial web, where location is utilized to index data that can be used for e-learning. Thus, in Web 3.0 environments, the focus is shifted to the student with self-directing and self-regulating tools (Wadhwa, 2015). On this basis, Karibasappa (2020) and UNESCO (2020) believe that the qualitative characteristics of semantic (3.0) web technologies that can be used in universities are intelligence, personalization, compatibility, and virtualization to operate on big data, related data, cloud computing, 3D visualization, and augmented reality. In the view of Han, Niu (2010) and Ilo, Nkiko, Ugwu, Ekere, Izuagbe, and Fagbohun (2021), Web 3.0 has the ability to aggregate information from multiple sources and establish semantic relationships between all available content to ensure seamless accessibility, searchability, and usability, thereby eliminating and minimizing the need for students and lecturers to sit in a traditional classroom. According to research conducted by Reich, Buttinen, Fang, Hillaire, Hirsch, Larke, and Slama (2020), in the USA, schools delivered their educational content through virtual technologies during the COVID-19 pandemic. Reich et al. (2020) further stated that the semantic web supports offline use or consumption of downloaded data, which makes it possible to use information in low bandwidth conditions as well as allow learners to interact with other devices such as tablets, smart phones, desktops, and the iPad.

Semantic Web technologies and tools used in education include semantic digital libraries, virtual 3D libraries, semantic blogs, microblogging, virtual worlds and avatars, virtual laboratories, intelligent search and learning systems, as well as Wikis, Real Simple Syndication (RSS) Feeds,

YouTube, Virtual 3D Encyclopaedia, Zoom, Skype, Podcasts, WhatsApp Gmail, Calendar, Drive, Docs, Sheets, Slides, Sites, and Vault (Han E-learning platforms, according to Ozili (2020), enable universities and educators to upload their coursework and course content for students to quarantine at home in order to participate in educational progression.

Unfortunately, Ogunde, Niyi, Abigeal, and Lydia, (2020), stated that the decision to halt the academic calendar by the Federal Government of Nigeria met unprepared facilities and technologies for e-learning. In Nigeria today, very few universities' faculties of law, which are saddled with the responsibility of training students in legal practices, take up academic activities through e-learning. Karibasappa (2020) stressed that the university system in Nigeria lacks adequate e-learning facilities and hence poorly utilizes them in teaching and learning. Udo, Abner, Victor, and Akpan (2020), Itinson (2020), and Karibasappa (2020) maintained that slide projectors, power point projectors, canvases, prezis, science-360-video, interactive whiteboards, internet services, video conferencing facilities, satellite digital libraries, interactive radio, and modern ICT facilities are not adequately available or utilized in universities in Nigeria. Therefore, the assessment of semantic web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak could better position the educational system during the pandemic.

Statement of the Problem

Globally, educational institutions woke up to the reality of the COVID-19 pandemic. The Nigeria Centre for Disease Control (NCDC) official COVID-19 figures reported 5,114,703 tested samples, 255,766 confirmed cases, 2,709 active cases, 249,914 discharged cases, and 3,143 deaths on May 10th, 2022, as well as more than 45 Omicron virus cases on April 30th, 2022 (NCDC, 2022). Globally, the use of the internet is prevalent among educational institutions during the pandemic for daily information and e-learning. Unfortunately, more than 60% of Nigerians were not connected to the internet during the pandemic. Nigerian Universities lack adequate semantic (3.0) web technologies such as semantic digital libraries, virtual 3D libraries, microblogging, virtual worlds and avatars, virtual educational laboratories, intelligent search and learning systems as well as Wikis, Real Simple Syndication (RSS) Feeds, YouTube, Virtual 3D Encyclopaedia, Facebook, Twitter, Skype, Podcasts, Vault, canva, prezis, science-360-video and hence lowly utilize them in e-learning. Hence, to determine the validity of previous research on e-learning, this research examined the availability and utilization of semantic (3.0) web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak.

Purpose of the Study

The purpose of the study was to examine:

1. The availability of semantic web technologies in Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak in Nigeria.
2. The utilization of semantic web technologies in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak in Nigeria.

Research Questions

Two research questions guided the study

1. What are the semantic web technologies available in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak?
2. To what extent is the utilization of semantic web technologies in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak?

Methodology

The study was carried out in South-South and South-East geopolitical zone in Nigeria. The choice of the area was to contribute to the improvement of availability and utilization of semantic web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The study employed a descriptive survey research design. Descriptive survey design is a design approach that aims at collecting data and describing, in a systematic manner, the characteristics, features, or facts about a given population (Nworgu, 2015).

The population of the study consisted of 324 lecturers in the Faculty of Law (Source: Field Study by Researchers, 2022) from 10 public universities, which include the University of Calabar (UNICAL), University of Uyo (UNIUYO), University of Port Harcourt (UNIPORT), Delta State University (DELSU), University of Benin (UNIBEN), Abia State University (ABSU), Imo State University (IMSU), Ebonyi State University (EBSU), University of Nigeria (UNN), and Nnamdi Azikiwe University (NAU). The sample that actually participated in the study consisted of 15 faculty of law lecturers from the 10 universities, making up 150 lecturers using a simple random sampling technique.

The instrument used for data collection was a structured questionnaire titled "Semantic Web Technologies in Nigerian Universities Faculty of Law (SWTNUFL) questionnaire." The questionnaire has three parts: Part A contains the population and sample distribution of the respondents. Part B contains twenty items.

Face validity of the instrument was ascertained by giving the draft copies of the instrument to three experts. Corrections and possible suggestions were offered by the experts after adequate scrutiny of each of the items. This was to ensure that the instrument measured the intended attributes. In order to ensure the reliability of the instrument, the researchers administered the questionnaire to 30 respondents who were not part of the study but possessed the same qualities and characteristics as those used in the study. Cronbach's alpha statistics was used to analyze the data, which yielded a reliability coefficient of 0.92. This shows the instrument was reliable for the study.

The researchers administered the instrument directly to the respondents in the Universities with the help of six research assistants who were instructed on what is required. The instrument was collected immediately after completion and yielded a 100% return rate. The collected data was analyzed using frequency counts.

Data Analysis and Discussion of Findings

Research Question 1: What are the semantic web technologies available in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak?

Table 1: Semantic Web technologies available in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak.

S/N	Semantic (3.0) Web Technologies Availability	UNICAL	UNIUYO	UNIPOR	DELSU	UNIBEN	ABSU	IMSU	EBSU	UNN	NAU
		F	F	F	F	F	F	F	F	F	F
1.	Microblogging	0	0	0	0	0	0	0	0	0	0
2.	Virtual 3D libraries	0	0	0	0	0	0	0	0	0	0
3.	Worldwide Web	1	1	1	1	1	1	1	1	1	1
4.	Virtual worlds and avatars	0	0	0	0	0	0	0	0	0	0
5.	Canva	0	0	0	0	0	0	0	0	0	0
6.	Logitech	0	0	0	0	0	0	0	0	0	0

7.	Class dojo	0	0	0	0	0	0	0	0	0	0
8.	Adobe Spark Video	0	0	0	0	0	0	0	0	0	0
9.	Virtual laboratories	0	0	0	0	0	0	0	0	0	0
10.	Real Simple Syndication Feeds	0	0	0	0	0	0	0	0	0	0
11.	Electronic Class Roll	0	0	0	0	0	0	0	0	0	0
12.	Prezi	0	0	0	0	0	0	0	0	0	0
13.	Science-360-Video	0	0	0	0	0	0	0	0	0	0
14.	Podcasts	0	0	0	0	0	0	0	0	0	0
15.	Quizlet	0	0	0	0	0	0	0	0	0	0
16.	Wikis	0	0	0	0	0	0	0	0	0	0
17.	YouTube	0	1	1	0	1	1	1	0	1	0
18.	Virtual 3D Encyclopedia	0	0	0	0	0	0	0	0	0	0
19.	Zoom	2	2	1	1	1	1	1	1	2	2
20.	Skype	1	1	1	1	1	1	1	1	1	1

Note: F = Frequency

The data presented in Table 1 indicate low availability of semantic (3.0) web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The study revealed that modern technologies available in universities for e-learning are the worldwide web, zoom, YouTube, and Skype. Also, the study revealed that Microblogging, Virtual 3D libraries, Virtual worlds and avatars, Canva, Logitech, Class Dojo, Adobe Spark Video, Virtual Laboratories, Real Simple Syndication Feeds, Electronic Class Roll, Prezi, Science-360-Video, Podcasts, Quizlet, Wikis, and Virtual 3D Encyclopedia technologies were not available in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak.

Research Question 2: To what extent is the utilization of semantic web technologies in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak?

Table 2: Semantic Web technologies utilization in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak.

S/N	Semantic (3.0) Web Technologies Utilization	UNICAL	UNIUYO	UNIORT	DELSU	UNIBEN	ABSU	IMSU	EBSU	UNN	NAU
		F	F	F	F	F	F	F	F	F	F
1.	Microblogging	0	0	0	0	0	0	0	0	0	0
2.	Virtual 3D libraries	0	0	0	0	0	0	0	0	0	0
3.	Worldwide Web	1	1	1	1	1	1	1	1	1	1
4.	Virtual worlds and avatars	0	0	0	0	0	0	0	0	0	0
5.	Canva	0	0	0	0	0	0	0	0	0	0
6.	Logitech	0	0	0	0	0	0	0	0	0	0
7.	Class dojo	0	0	0	0	0	0	0	0	0	0
8.	Adobe Spark Video	0	0	0	0	0	0	0	0	0	0
9.	Virtual laboratories	0	0	0	0	0	0	0	0	0	0
10.	Real Simple Syndication Feeds	0	0	0	0	0	0	0	0	0	0
11.	Electronic Class Roll	0	0	0	0	0	0	0	0	0	0
12.	Prezi	0	0	0	0	0	0	0	0	0	0
13.	Science-360-Video	0	0	0	0	0	0	0	0	0	0
14.	Podcasts	0	0	0	0	0	0	0	0	0	0
15.	Quizlet	0	0	0	0	0	0	0	0	0	0

16.	Wikis	0	0	0	0	0	0	0	0	0	0
17.	YouTube	0	1	1	0	0	0	0	0	1	0
18.	Virtual 3D Encyclopedia	0	0	0	0	0	0	0	0	0	0
19.	Zoom	1	2	1	1	1	1	1	1	1	1
20.	Skype	1	1	1	1	1	1	1	1	1	1

Note: F = Frequency

The data presented in Table 2 indicate low utilization of semantic (3.0) web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The study revealed that modern technologies utilized in the Universities for e-learning are worldwide web, zoom, YouTube and Skype. Also, the study revealed that Microblogging, Virtual 3D libraries, Virtual worlds and avatars, Canva, Logitech, Class dojo, Adobe Spark Video, Virtual laboratories, Real Simple Syndication Feeds, Electronic Class Roll, Prezi, Science-360-Video, Podcasts, Quizlet, Wikis and Virtual 3D Encyclopedia technologies are not utilized in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak.

Discussion of Findings of the Study

The findings of research question 1 indicate low availability of semantic (3.0) web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The study revealed that modern technologies available in all the Universities for e-learning are worldwide web, zoom, YouTube and Skype. The study further showed that Microblogging, Virtual 3D libraries, Virtual worlds and avatars, Canva, Logitech, Class Dojo, Adobe Spark Video, Virtual Laboratories, Real Simple Syndication Feeds, Electronic Class Roll, Prezi, Science-360-Video, Podcasts, Quizlet, Wikis, and Virtual 3D Encyclopedia technologies were not available in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The findings of this study is in agreement with studies conducted by Karibasappa (2020) and Itinson (2020), who stated that the educational system in Nigeria lacks adequate e-learning facilities.

The findings of research question 2 indicate low utilization of semantic (3.0) web technologies in Nigerian universities' faculties of law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The study revealed that the modern technologies utilized in all the universities for e-learning are the worldwide web, zoom, YouTube, and Skype. The study further showed that Microblogging, Virtual 3D libraries, Virtual worlds and avatars, Canva, Logitech, Class Dojo, Adobe Spark Video, Virtual Laboratories, Real Simple Syndication Feeds, Electronic Class Roll, Prezi, Science-360-Video, Podcasts, Quizlet, Wikis, and Virtual 3D Encyclopedia technologies were not utilized in Nigerian Universities' Faculty of Law for e-learning during the Omicron SARS-CoV-2 variant outbreak. The findings of this study is in agreement with the studies conducted by Karibasappa (2020), Itinson (2020), Udo, Abner, Victor, and Akpan (2020), which noted that only a few universities in Nigeria make use of e-learning delivery systems.

Conclusion

Globally, e-learning using the semantic Web (3.0) is seen as a catalyst that drives learning; hence, it should become an integral part of learning in Nigerian universities' faculties of law. The quest for e-learning at this period of Omicron SARS-CoV-2 variant outbreak has increased the need for adequate availability and utilization of modern technologies. Based on the findings of this study, the researchers concluded that semantic (3.0) web technologies and Apps which include Microblogging, Virtual 3D libraries, Virtual worlds and avatars, Canva, Logitech, Class dojo, Adobe Spark Video, Virtual laboratories, Real Simple Syndication Feeds, Electronic Class Roll, Prezi, Science-360-Video, Podcasts, Quizlet, Wikis, worldwide web, zoom, YouTube, Skype and Virtual 3D Encyclopedia should be

made available and utilized in Nigerian Universities Faculty of Law for e-learning during Omicron SARS-CoV-2 variant outbreak.

Recommendations

Based on the findings of this study on the availability and utilization of semantic web technologies in Nigerian universities' faculties of law for e-learning, the researchers recommended the following:

1. Federal, State government and Universities management should make available semantic web technologies and apps for e-learning.
2. Regular appraisal and upgrading of the semantic Web (3.0) technologies and apps should be carried out.
3. The federal and state governments, universities, NGOs, and agencies should organize workshops, seminars, and conferences to train lecturers on the use of semantic Web 3.0 technologies and apps for e-learning.
4. Federal, State government and universities should finance and connect all Universities Faculty of Law to stable electric grid for effective utilization of semantic (3.0) web technologies and Apps for e-learning.
5. Nigerian Universities Commission (NUC) should emphasize the integration of e-learning in faculties of law to aid an effective educational process during and after the Omicron SARS-CoV-2 variant outbreak.

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