

Introduction

The role of librarians has certainly evolved over the years. Their responsibilities have moved beyond acquiring and curating collections of books and other resources to becoming custodians of knowledge and data in this era of digitalization.

Iyengar (2025), aver that this reflects broader societal changes, including the rise of digital media and the growing need for digital literacy. Librarians have become educators, digital innovators, community builders, and advocates for Information accessibility. Iyengar further said that traditionally librarians were seen primarily as keepers of books responsible for organizing, preserving and providing access to physical collections. While this aspect of their job remains important, the advent of the internet and digital resources has shifted the focus of librarianship from mere custodianship to curation and guidance.

According to Chisenga (2000), librarians are becoming more technologically literate and getting involved in the organization of information on electronic networks. Chisenga further states that this evolution had let to a shift from traditional roles of librarians such as information keepers to consultants, instructors and advisors on how to use information on electronic networks.

Librarians however, has prepared themselves to effectively undertake their duties and responsibilities in the wake of technological transformation. According to Musarurwa et.al (2016) librarians have embarked on a number of initiatives and activities in response to technological change, librarians are participating in staff training and development, staff

exchange programmes, open source software and many others in order to fit in to the current trends of technology to carry out their duties effectively.

Web 4.0 also known as the 4th generation revolution focuses on advanced artificial intelligence, machine learning algorithms and decentralized architectures to create a more intelligent and interconnected environment (Rafalski, 2024). Web 4.0 applications emphasize collaboration, user-friendliness, and seamless information sharing, features like social networking, blogs, wikis and video-sharing sites are prominent (Nuzhnyi 2023).

However, libraries can only adopt and utilize the tools of web 4.0 effectively with the help of a librarian 4.0. the term librarian 4.0 is used to describe the evolution of librarian profession and takes the profession further into the future. Acharjya 2019, listed some characteristics of librarian 4.0, how they use web 4.0 tools for service provision in the library, these characteristics include;

- Artificial intelligence (AI) and Machine learning (ML): librarian 4.0 will leverage the power of AI and ML to automate routine library tasks, personalize library services and experiences, and make predictions about future library trends.
- Data science: librarian 4.0 will have advanced knowledge in data science, allowing them to use data analytics to make informed decisions about library collections, services, and programming
- Augmented Reality (AR) and Virtual Reality (VR): librarian 4.0 will incorporate AR and VR technologies to create immersive experiences for library users, such as virtual tours, educational games and interactive exhibits.

- Digital curation: librarian 4.0 will play a vital role in preserving and curating digital content, including electronic records, web archives, and social media content.
- Open Science and Open Access: librarian 4.0 will be advocates for open science and open access, working to ensure that scholarly research is freely available to all, regardless of financial barriers.

Hence, librarian 4.0 is focused on utilizing cutting-edge technologies and advanced data analysis skills to provide innovative and personalized library services that meet the evolving needs of communities.

This study tends to determine the use of web 4.0 tools in services provision by librarians in public universities in Rivers state.

Statement of the Problem

Unlike traditional roles of librarians, the evolution of the world wide web and fast change in technology has changed the way and manner people seek for information and how librarians can meet their needs in a more reliable and effective way Musarurwa et. Al (2016) in their study observed that librarians have embarked on series of activities and initiatives that can enable them fit into the new technology era to carry out services effectively and also master the use of these new technologies, however, not much is known about librarians use of web 4.0 tools in service provision in public universities in Rivers state. This gap prompted the present study.

Purpose of the study

The main objective of this study is to determine librarians use of web 4.0 tools in service provision in public universities in Rivers state. Specifically the study sought to;

1. To determine how librarians use web 4.0 tools in service provision.
2. To identify challenges associated with the use of web 4.0 by librarians in carrying out their duties.

Research question

The following research questions correlates with the specific objectives of the study.

1. How do librarians use web 4.0 tools in service provision.
2. What are the challenges associated with the use of web 4.0 tools by librarians in carrying out their duties.

Theoretical framework

This study is anchored on two theories, the Diffusion of Innovation (DOI) theory by Everette M. Rogers (1931) and the Technology Acceptance Model (TAM) by F . D . Davies (1986).

Diffusion of Innovation theory describes how new technology and other advancements spread throughout societies and cultures, from introduction to widespread adoption. The diffusion of innovation theory was developed in part by integrating previous sociological theories of behavioral change. This theory can be related to librarians use of web 4.0 as it explain how librarians adopt and implement web 4.0 technologies.

Technology Acceptance Model TAM by Davies (1989) explains how people accept and use new technologies. Davies (1989) opines that a user's perception of a technology's

usefulness and ease of use influence their attitude towards using it. Technology acceptance model has been one of the most influential models of technology acceptance, with two primary factors influencing an individuals intention to use new technologies . TAM can be used to describe librarians' acceptance and utilization of web 4.0 tools in carrying out service provision duties.

This theories was adopted for this study because it describes how librarians accepts and use web 4.0 tools in service provision in university libraries. Librarians should be open minded to accept and use new technologies as the world is still changing and innovations are taking place.

Methodology

The research design employed for this study is the descriptive survey method. This design was chosen owing to spread and population of librarians. The population of this study consists of university librarians drawn from three (3) public universities in Rivers State. The universities includes Rivers state university, University of Port Harcourt and Ignatius Ajuru University of Education. The sample of the study comprised of 314 Librarians of the various universities using Yaro Yamane formula for sample size determination. The instrument used in collecting data for this study is the questionnaire titled “ Librarians Use of web 4.0 Tools in Service Delivery (LUWTSD)”. The questionnaire consisted of two sections, section A has to do with demographic information, while section B consist of two questions as derived from the objectives of the study. In developing the instrument, a four likert rating scale was used where the respondents responded with Strongly Agreed (SA) , Agreed (A),

Disagreed (D) and Strongly Disagreed (SD) to the items on the questionnaire. The instrument for data collection was validated by the supervisor and one expert from the faculty of Education, Rivers state university. A reliability coefficient of 0.85, 0.79 and 0.91 was ascertained using cronbach alpha method. Descriptive statistics such as frequency, percentages and mean distribution was used to analyze research questions, the Statistical Package for the Social Science (SPSS) was used for the analysis.

Data presentation, Analysis and Discussion

The researcher and two research assistants administered a total number of three hundred and fourteen (314) questionnaire to respondent in the selected universities (Rivers State University, University of Port Harcourt and Ignatius Ajuru University of Education) out of which 300 questionnaire were completed and retrieved. The analysis was based on the number of questionnaire completed and retrieved. The table below shows the response rate of questionnaires administered.

Table 1: distribution of questionnaire

Questionnaire	Frequency	Percentage
Distributed	314	100%
Retrieved	300	80%
Not retrieved	14	20%

Source: field survey, 2025

Table 1 shows that 80% of sample size was used for this study.

Table 2: Distribution of Respondent by Institutions.

Institutions	Frequency	Percentage
Rivers state university library	100	34%
University of Port Harcourt library	105	38%
Ignatius Ajuru University library	95	28%
Total	300	100%

Source: field data 2025

Table 2 above indicates that majority (38%) of the respondent are from university of Port Harcourt central library, followed by Rivers state university central library (34%) and Ignatius Ajuru university of education central library (28%).

Research Question 1: How do librarians use web 4.0 tools in service provision in public universities in Rivers State?

Table3: librarians use of web 4.0 tools in service provision in public universities in Rivers State.

Items	N	X	SD	Decision

Machine learning algorithms	300	3.56	1.271	Agreed
Artificial intelligence	300	3.52	1.103	Agreed
Semantic web technologies	300	3.20	1.082	Agreed
Open science and Open access	300	3.89	1.098	Agreed
Knowledge graphs	300	3.69	1.328	Agreed
Augmented reality	300	3.15	1.171	Agreed
Data science	300	3.20	1.354	Agreed
Grand mean /SD		3.46	1.201	

Source: field data 2025

Table 3 above shows how librarians use different web 4.0 tools in service provision in university libraries in Rivers state. Result from the analysis indicates that the respondents agreed that machine learning ($M=3.56$, $SD=1.271$), Artificial intelligence ($M=3.52$, $SD=1.103$), semantic web technologies ($M=3.20$, $SD=1.082$), Open science and Open data ($M=3.89$, $SD=1.098$) are used by librarians other tools used are knowledge graphs ($M=3.69$, $SD=1.328$), Augmented reality ($M=3.15$, $SD=1.171$) and Data science ($M=3.20$, $SD=1.354$). Therefore it can be said that librarians uses web 4.0 tools in the library for service provision .

Research Question 2: What are the challenges associated with the use of web 4.0 tolls by librarians in carrying out their duties in universities in Rivers state.

Table 4: the challenges associated with using web 4.0 tools in service provision .