

ARTIFICIAL INTELLIGENCE AND USER INTERFACE APPLICATION IN LIBRARY SERVICE DELIVERY BY ACADEMIC LIBRARIANS IN FEDERAL UNIVERSITY, LAFIA

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Abstract

The rapid advancement of Artificial Intelligence (AI) technologies has significantly influenced modern librarianship and information service delivery. Libraries, once defined by physical collections and manual cataloguing systems, have evolved into intelligent digital ecosystems that harness AI applications for improved efficiency, accessibility, and user engagement. This study examines the role of AI and user interface technologies in enhancing library service delivery, focusing on how tools such as chatbots, machine learning, natural language processing, and robotics transform information access, cataloguing, indexing, and user interaction. The study further explores the benefits, challenges, and implications of adopting AI in Nigerian libraries, with emphasis on Federal University of Lafia Library. The paper concludes that integrating AI into library systems enhances operational efficiency, broadens access, and fosters personalized user experiences, although issues such as inadequate funding, lack of technical expertise, and resistance to change hinder effective adoption.

Keywords: Artificial Intelligence, User Interface, Library Service Delivery, Machine Learning, Chatbots, Robotics, Federal University of Lafia Library.

Introduction

In the past, library automation and digitization were just the two components that expanded the library system and services; however, recent years have shown tremendous advancements in library services delivery and the role of Artificial Intelligence (AI) in this has remained remarkable. Human beings are born with innate abilities to perceive, think, reason and act, which develops and improves overtime because of many factors which

include age, exposure, education etc. Thus, inventing and developing machines that perceive, think and behave like humans is the crux of artificial intelligence (Oname and Nmecha (2020).

Artificial Intelligence in machines not only gives such devices the ability to learn but they are also configured to improve with use to perform functions better without being explicitly programmed because they are built to recognize and imbibe patterns efficiently on much higher scales than humans (According to Ex Libris (2019). Examples of AI in computers to include; speech recognition, natural language processing, machine learning, deep learning, robotics etc.

Artificial intelligence is used in many areas such as medicine, military, business, education, gaming, libraries, among others. However, this paper will be limited to librarianship, as it would be looking at, the level of awareness of AI tools among academic librarians in Federal University of Lafia and the extent of application AI in the delivery of library services. Therefore, unless, libraries and information centres begin to take advantage and creatively innovate their information delivery services to align with this new trend, they may face obsolescence or go into total extinction. Ajakaye (2022) corroborated this by stating that, organisations and institutions must adapt to evolving technologies to suit their end-user demands in the twenty-first century, which is an era of rapid transition and technological development.

Statement of The Problem

The emergence of Artificial Intelligence (AI) presents immense opportunities for transforming library operations through automation, data analytics, and intelligent user interfaces. However, despite its growing importance in global information management,

many libraries in Nigeria, including the Federal University of Lafia Library, have not fully applied or integrated AI technologies into their library service delivery systems.

Challenges such as inadequate technical know-how, insufficient funding, lack of AI experts, poor ICT infrastructure, and resistance to technological change hinder AI application in library service delivery. Consequently, these limitations affect the efficiency, accessibility, and quality of library services, as well as user satisfaction. There is therefore a pressing need to investigate how AI and user interface technologies can be effectively applied to enhance library service delivery and bridge the technological gap in Federal University of Lafia library.

Research Questions

1. What is the level of awareness and understanding of AI applications among librarians at the Federal University of Lafia Library?
2. What is the Extent of AI Application in Library Service Delivery in Federal University of Lafia?

Scope of the Study

The study is limited to the Federal University of Lafia Library in Nasarawa State, Nigeria. It focuses on the awareness and extent of application of Artificial Intelligence (AI) and user interface technologies in library service delivery.

Literature Review

Artificial intelligence (AI) can be seen as an aspect of computational science that is concerned with making machines provide answers to complicated and difficult issues in a way that humans do. In its logical approach, according to Ajakaye (2022) Artificial

Intelligence is a neural network, which is a network of artificial neurons or nodes that mimics the human biological processes of neurons. Heath (2018), also defined artificial intelligence as the technology that enables machines be to have the abilities to plan, learn, reason, solve problems, move, and be creative to some extent.

User interface on the other hand can be seen as an interactive system through which a lay user can communicate with the software, irrespective of its complexity, with little or no knowledge of it and easily exploit its capabilities. Dovetail (2023) in the same vein, defines user interface simply as the point of human-computer interaction. It enables the end user to interact with or control a device's hardware or software. Examples include; keyboard, display screen and in this case AI applications all constitute user interfaces. Intelligent user interfaces use artificial intelligence technologies and machine learning to create personalised experiences for users.

Artificial Intelligence matters to libraries because it can be used to organize and manage large collections of information. According to Murphy (2015), there are a lot of areas that AI can be applied to in the library and they include; AI tools can be used to design Expert Systems to provide reference assistance, help in management policy decision making, assist in applying cataloguing rules, determine vendor assignments in acquiring library materials among others. Similarly, Zimmet (2020) agreed to the above by stating that, some libraries use its partial application, like virtual assistance, which can be used to answer the patron.

Similarly, AI can be applied in the area of selection and acquisition of information resources. Corroborating this assertion, Romero (2018) reported that artificial intelligence systems can give suggestions based on past purchases or user interests - a strategic method to

improve acquisition of library materials and enhance the user experience via recommendations of magazines, journals, authors, books, etc.

AI can also be used as retrieval systems such as robots to facilitate information searching and retrieval from the library's collection, be it paper-based or electronic (Unagha, in Omame and Nmecha (2022)). They incorporate speech recognition into the system, enabling users to speak the word or phrase they want to search and the web search engines types it into the search box via the use of Natural Language Processing (NLP) before searching and displaying the search results.

Furthermore, robotic cranes can also store and retrieve materials for users on request from the online catalogue of stored books, (Murphy, 2015). In addition, AI can also be used as a surveillance/security tool for safeguarding data and expensive technological equipment in the library, (Ali et al, 2020).

In the light of the above, it is important to state that, the awareness of a thing is synonymous to its use, and in librarianship, academic librarians thus have varying levels of awareness of artificial intelligence (AI). Thus, Odeyemi (2019) stated that Nigerian libraries are completely aware and prepared to integrate new technologies such as robots into the library service delivery system, although some constraints, such as technophobia, preclude this possibility while they wait for emerging technology to be adopted. A study conducted by Aina and Kehinde (2020) titled "AI adoption in Nigerian academic libraries" found that the majority of librarians in Nigerian academic libraries were aware of AI technologies and their potential impact on library services, however, there as a lack of in-depth understanding and practical experience among librarians in implementing AI solutions. Furthermore, a survey conducted by the Nigerian Library Association (NLA) in 2022 also revealed that a significant

number of librarians in Nigeria Academic libraries were aware of AI technologies but had limited exposure to AI concepts and were unsure about its practical applications in library services. Odigie (2024) also found that librarians are aware of AI tools and their relevance as tools that aid research. Anyim (2021) thus posited that skill development and training in ICT is necessary for new technologies to be integrated into Nigerian libraries, as it poses a challenge to effective delivery of library services

Interestingly, AI application in academic libraries has been revolutionizing and transforming library operations and services to a whole new level and it is significantly impacting the way the academic librarians deliver library services. Thus, the extent of application of AI tools in the delivery of library services in academic libraries determines the effectiveness and efficiency of service delivery to library. Tella (2022) however reported that the application of AI tools in academic libraries is still in a very low level. This finding also agrees with the findings of Yushau and Nannim (2020) which revealed that the extent of application of AI facilities in the delivery of library services by academic librarians was low. In a study by Moustapha and Yusuf (2023) on the adoption and utilization of AI in university libraries in Kwara state Nigeria, findings indicated a limited use of AI in the library, with security scanning devices being the most common AI technology present.

However, despite the various benefits associated with the application and use of Artificial Intelligence in University library services delivery, there are some challenges facing the University library as regards its application such as financial constraints, lack of technical skills, fear of the unknown, epileptic power supply still hinder application and use of Artificial Intelligence in Federal Universities libraries.

Research Methodology

The study adopted a descriptive survey research design to examine the Application Artificial Intelligence and User Interface in Library Service Delivery Among Academic Librarians in Federal University Lafia. The population of the study consisted of all ten (10) academic librarians heading various departments in the Federal University Lafia Library. Due to the small population size, the study employed a census approach, involving all academic librarians as respondents to ensure comprehensive data coverage.

A structured questionnaire served for data collection. Data collection was carried out by the researcher through personal administration of the questionnaires, with prior authorization from the University Librarian. All ten questionnaires were completed and retrieved, resulting in a 100% response rate. Data were analyzed using descriptive statistical methods with the Statistical Package for the Social Sciences (SPSS). The results were thus, summarized in frequency tables and mean scores, with interpretations made according to pre-determined decision rules.

Results and Discussion

A total of 10 questionnaires were distributed and retrieved, representing a 100% response rate. The instrument used was a 4-point Likert scale questionnaire structured around two (2) research Questions. **Keys: SD= Strongly disagree, D= Disagree, UD= Undecided, A=Agree**

Research Question 1: What is the level of awareness and understanding of AI applications among academic librarians at the Federal University of Lafia Library?

Statement	SD	D	UD	A	Mean	SD	Decision
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I am aware of the concept of Artificial Intelligence (AI) in library services.	0	1	1	6	3.63	0.52	Agree
I understand how user interface technologies function in modern libraries.	1	2	2	3	2.88	0.83	Undecided
I have attended workshops or training sessions on AI applications in libraries.	3	3	1	1	2.00	0.76	Disagree
AI concepts such as chatbots, machine learning, and NLP are relevant to library operations.	0	1	1	6	3.36	0.52	Agree

The data in **Table 1** revealed that librarians at the Federal University Lafia demonstrate a high level of awareness and understanding of Artificial Intelligence (AI) and related technologies. The mean scores for statements such as “*I am aware of the concept of Artificial Intelligence (AI) in library services*” and “*AI concepts such as chatbots, machine learning, and Natural Language Processing (NLP) are relevant to library operations*” were above the criterion mean of 2.5, indicating strong agreement. This suggests that most respondents are not only familiar with AI but also recognize its relevance in contemporary library operations. However, the relatively lower mean in “*I have attended workshops or training sessions on AI applications in libraries*” implies that while awareness exists, formal training opportunities remain limited. This reflects a gap between theoretical awareness and practical skill acquisition, which could hinder effective implementation.

This gap thus, indicates that while librarians understand the theoretical importance of AI, their ability to apply such technologies remains underdeveloped. Therefore, there is a

pressing need for continuous professional development and institutional training programs to bridge this skill gap. This finding is in line with that of Ajakaye (2022) who noted that there is a need for training on AI among academic librarians in order to boost their awareness and understanding on the use of Artificial intelligence. Similarly, Anyim (2021) also agreed that, skill development and training in ICT is necessary for AI to be integrated into Nigerian libraries, as it poses a challenge to effective delivery of library services.

Research Question 2: What is the Extent of AI Application in Library Service Delivery in Federal University of Lafia?

Statement	SD	D	UD	A	Mean	SD	Decision
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AI tools are used in cataloguing and classification of library materials.	2	4	1	1	1.88	0.83	Disagree
The library employs chatbots or virtual assistants for user queries.	3	3	2	0	1.75	0.71	Disagree
AI enhances information retrieval and indexing accuracy.	1	2	2	3	2.88	0.83	Undecided
Robotics or automation is used for book shelving and retrieval.	4	3	1	0	1.63	0.74	Disagree

The data in Table 2 shows moderate application of AI technologies in the Federal University Lafia Library. While statements like “*AI enhances information retrieval and indexing accuracy*” and “*AI tools are used in cataloguing and classification of library materials*” recorded mean scores below 2.5, indicating disagreement, others such as “*The library employs chatbots or virtual assistants for user queries*” and “*Robotics or automation is used for book shelving and retrieval*” also had much lower means. This implies that AI usage is primarily limited to software-based functions (e.g., retrieval and indexing accuracy) rather than hardware-intensive or interactive applications like chatbots and robotics. The low standard deviations across items indicate a consistent response pattern among librarians, suggesting that all respondents experience similar operational realities.

These results thus, imply that AI adoption is largely confined to software-based back-end functions rather than interactive or hardware-driven services. This limited scope may be

attributed to funding constraints, technical expertise, or infrastructural limitations, as identified in subsequent sections. The findings also suggests that AI integration in Federal University of Lafia Library remains at an early developmental stage. This finding is line with that of ALA (2019) which maintained that the adoption and use of AI for library services by academic librarians is confined software and backend functions rather than hardware enable library services. The findings of Decker (2015) also agreed with the above findings by positing that, for effective use of AI in university libraries, the library management needs to deploy enough technological facilities in the library which include very strong Wi-Fi connectivity zone.

Recommendations

Based on the findings and conclusion of this study, the following recommendations are proposed to ensure the effective and sustainable integration of Artificial Intelligence (AI) and user interfaces in library service delivery, particularly within Nigerian academic libraries such as the Federal University of Lafia Library:

1. Library management and educational institutions should organize regular workshops, seminars, and professional development programs focused on AI technologies and their practical applications in library operations.
2. Government agencies and university administrations should allocate adequate funds for acquiring and maintaining AI-enabled tools, software, and infrastructure necessary for modern library services.
3. University management should establish clear institutional policies that ensure mandatory and responsible use of AI, ensuring that AI tools align with academic and ethical standards

4. Libraries should collaborate with computer science, ICT and data science professionals to co-develop and manage sustainable AI-driven library solutions.

Conclusion

The study revealed that while librarians in Nigerian academic institutions exhibit a high level of awareness and conceptual understanding of Artificial Intelligence (AI) and its relevance to library operations, there remains a significant gap between knowledge and practical application. Although most librarians recognize the potential of AI technologies such as chatbots, machine learning, and natural language processing, limited exposure to hands-on training and workshops has hindered their ability to implement these tools effectively.

Furthermore, the extent of AI application in library service delivery is still minimal, primarily confined to software-based operations like cataloguing and indexing. Advanced AI applications, such as chatbots and robotics for user interaction, remain largely unexplored. This indicates that AI adoption in Nigerian academic libraries is still in its formative phase, constrained by factors such as inadequate funding, insufficient technical expertise, and infrastructural limitations.

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