

Availability and Utilization of Artificial Intelligence (AI) Chatbots for Reference Services Delivery in University Libraries in Rivers State, Nigeria

Eruchi Brown Akpelu

Department of Library & Information Science, Ignatius Ajuru University of Education
eruchi.akpelu@iaue.edu.ng

Dorathy Braide CLN

Dame Patience Goodluck Jonathan Automated Library, Ignatius Ajuru University of Education
dorathy.braide@iaue.edu.ng

Afuedeli-Tamunotonye, A. Andrea

Department of Library & Information Science, Ignatius Ajuru University of Education
cassandraenye@gmail.com

Abstract

The study assessed the availability and utilization of artificial intelligence (AI) chatbots for reference services delivery in university libraries in Rivers State. A descriptive survey research design was adopted. A random sampling technique was used to select 30 respondents comprising professional and para-professional librarians from six university libraries in the State. Online Google Questionnaire was used as primary instrument for data collection, and supplemented by a systematic review of each institution's website to determine the presence or absence of functional AI chatbot features for library reference services. The Google Form link was disseminated to respondents via WhatsApp, and 24 valid responses were retrieved and analyzed using descriptive statistics. The findings revealed a low level of AI chatbot adoption, with only one out of the six university libraries having a functional AI chatbot readily available on its website for reference services. Despite this limited adoption, the study found that AI chatbots are recognized for their potential to provide 24/7 instant responses to frequently asked questions, support context-aware interactions, and manage multiple user queries simultaneously, thereby enhancing accessibility, scalability, and user experience. Furthermore, the study identified key challenges hindering AI chatbot integration, including unreliable digital infrastructure, inadequate funding and institutional support, and the absence of functional library websites. These challenges indicate poor foundational readiness for effective AI chatbot deployment. Consequently, the study recommends increased funding and stronger institutional support to facilitate the deployment of reliable digital infrastructure and functional library websites embedded with AI chatbot features to improve reference service delivery in university libraries in Rivers State.

Keywords: Artificial Intelligence (AI), AI -Chatbot, Reference Services delivery, University Libraries

Introduction

University libraries play a crucial role in supporting their parent institutions' core missions of teaching, learning, and research by providing well-organized collections of print and electronic scholarly resources, research support services, and tailored access to information for students, faculty, and researchers (Aliyu & Jibrilla, 2024). One of the core functions of these libraries is the delivery of specialized services such as reference assistance, research consultations, and access to scholarly databases, all of which facilitate academic work and knowledge creation. Traditionally, these services were delivered through face-to-face interactions at physical reference desks, as well as through telephone calls and email consultations. However, the rapid advancement of digital technologies and the evolving information-seeking behaviour of users have led to a shift towards virtual and automated modes of reference service provision (Yan, Zhao, & Mazumdar, 2023). These emerging modes of service delivery are essential for meeting the dynamic information needs of twenty-first-century learners, researchers, and faculty members who increasingly expect instant, seamless, and personalized access to information resources.

Among the emerging technologies shaping the future of reference service delivery in the digital era are artificial intelligence (AI) chatbots. AI chatbots are computer programs designed to simulate human conversation through text or voice interfaces in order to assist users with routine inquiries and navigation tasks (IBM, 2023). They are also described as automated conversational agents capable of interacting with users, answering questions, guiding searches, and performing routine reference tasks with speed and consistency (Lawrence, 2025).

Globally, university libraries have begun deploying chatbots to support reference services, including responding to frequently asked questions, assisting with database navigation, and providing basic research support (Folorunso & Kaltumi, 2025). For instance, San José State University Library in California deployed a chatbot using Google's Dialogflow platform, which significantly improved service responsiveness and extended reference service availability beyond traditional working hours (Rodriguez & Mune, 2022). In countries such as the United States and the United Kingdom, over 80% of academic libraries have integrated AI tools into their reference services, leading to improved service efficiency and higher levels of user satisfaction (Anderson, Clark, & Holmes, 2023). Similarly, in Asia, particularly in technologically advanced countries such as China and South Korea, AI-driven reference services have become the mainstream in university libraries, often integrated with institutional repositories and learning management systems (Chen, Li, & Zhang, 2024).

In Africa, the adoption of AI technologies in library services is gradually gaining momentum, although it remains constrained by challenges such as inadequate infrastructure, limited technical expertise, and insufficient funding. A study by Mavhunga and Tshuma (2023) reported that only about 38% of university libraries in Sub-Saharan Africa have experimented with AI technologies, with most implementations still at pilot stages. South Africa currently leads the continent in AI adoption within libraries, as institutions such as the University of Pretoria and Stellenbosch University have piloted chatbot systems to support digital reference services (Nkosi & Moyo, 2022). Other African countries, including Kenya and Ghana, are also beginning to introduce AI applications in libraries through partnerships with international development agencies (Abdulai, 2023).

In Nigeria, discourse on the adoption of AI in library services is still at an emerging stage. While a few forward-looking university libraries have begun exploring AI-driven solutions for reference and information services, implementation remains limited. Oladokun and Adedayo (2023) found that only about 30% of Nigerian university libraries are currently experimenting with AI tools, most of which are restricted to basic chatbots or automated cataloguing systems. The widespread adoption of AI technologies in Nigerian libraries is further hindered by challenges such as inadequate ICT infrastructure, limited funding, and a shortage of skilled personnel (Okafor & Nwankwo, 2022). Nevertheless, awareness of the transformative role of AI in modern library services is growing, and several library and information science (LIS) schools in Nigeria have begun incorporating AI-related modules into their curricula to prepare future professionals for this technological shift.

In Rivers State, Nigeria, university libraries are gradually advancing in their digital transformation efforts; however, there is limited empirical evidence on the availability and utilization of AI chatbots for reference service delivery. Understanding the current level of adoption and usage is therefore crucial for improving user support services. Consequently, this study investigates the availability and use of AI chatbots for reference services in university libraries in Rivers State. Specifically, it examines the level of adoption, the usability of AI chatbots for reference service delivery, and the challenges affecting their deployment and utilization. The findings of this study are expected to contribute to the growing body of literature on library automation and to inform policy formulation aimed at achieving sustainable and effective reference service delivery in Nigerian university libraries.

Statement of the Problem

Reference services are central to university libraries, as they connect users with relevant and credible information to support learning, teaching, and research. However, in many university libraries

in Rivers State, reference services remain largely traditional, relying on face-to-face interactions that are limited by time, staff availability, and physical location. As a result, library users often experience delays in getting research assistance, especially outside normal working hours, leading to underutilization of library resources.

Globally, the deployment of AI-chatbots for reference services has emerged as an innovative approach to improving access to information. AI chatbots provide 24/7 instant, automated responses to routine inquiries to library users irrespective of their geographical location. However, while the use of AI-chatbots for reference service in university libraries is a topic of interest for both library professionals and researchers, little is known about their deployment and used for reference service delivery, especially in university libraries in Rivers State. Though university libraries in the region are gradually embracing digital transformation initiatives, but there is inadequate empirical evidence on the extent to which AI chatbots are deployed and utilized for reference service delivery. The study therefore seeks to assess the deployment and use of AI chatbots for reference services delivery in university libraries in Rivers State to fill the knowledge gap.

Objectives of the Study

The following research objectives guided the study, these were to:

1. ascertain the current level of AI-Chatbots adoption for reference services delivery in university libraries in Rivers State.
2. determine the usability of AI Chatbots for reference services in university libraries in Rivers State
3. identify challenges impeding the adoption and use of AI-Chatbots for reference services in university libraries in Rivers State

Research Questions

The following research question guided the study:

1. What is the current level of AI-chatbots adoption for reference service delivery in university libraries in Rivers State?
2. How are AI-chatbots used for reference services delivery in university libraries in Rivers State?
3. What challenges hinder the adoption and use of AI-chatbots for reference services delivery in university libraries in Rivers State?

Review of Related Literature

Artificial Intelligence (AI) chatbots are computer programs designed to simulate conversation with users, especially over the internet. IBM (2023) defines a chatbot as computer software that mimics human communication with a user to perform specific tasks or provide information. According to

Emmanuel et al. (2025), chatbots generate text responses using large datasets and knowledge bases through machine learning and natural language processing (NLP). These chatbots, also referred to as large language model (LLM) chatbots, are increasingly found across diverse sectors such as education, e-commerce, social media, and libraries (Ehrenpreis & DeLooper, 2025). Chatbots in libraries are predominantly text-based and often integrated into library websites or digital discovery platforms to enhance user engagement and service accessibility (Yan, Zhao, & Mazumdar, 2023). They serve as virtual reference assistants capable of responding to common user queries such as locating resources, providing database access instructions, or explaining borrowing policies.

While earlier versions of chatbots operated on rule-based systems, recent advancements have incorporated AI capabilities, allowing for more natural and intelligent interactions. Chatbots powered by artificial intelligence rely on NLP and machine learning to comprehend and respond to user input in conversational form. Russell and Norvig (2022) explain that chatbots employ AI algorithms to interpret intent, understand natural language, and generate appropriate responses. The introduction of transformer-based language models such as OpenAI's GPT series has revolutionized chatbot design, making it possible for libraries to offer round-the-clock assistance and context-aware reference responses (Adetayo, 2023). According to Vashishth et al. (2024), one of the most appreciated features of chatbot services is their ability to provide 24/7 availability. Westfall (2023) further notes that chatbots significantly improve library operational efficiency by automating routine inquiries, guiding users to digital resources, and assisting with troubleshooting. However, concerns persist regarding the accuracy and reliability of AI-generated responses. Oghuvwu, Owairu and Ogbodu (2025) and Panda and Chakravarty (2022) observe that librarians remain cautious about the potential of chatbots to deliver incorrect or irrelevant information, particularly when addressing complex research queries that require expert judgment.

The categorization of chatbots depends on their functionality, level of automation, and the nature of human involvement. Chatbots generally exist as rule-based or AI-driven systems. Rule-based chatbots, also known as scripted or retrieval-based chatbots, follow pre-programmed decision trees that provide predefined responses to frequently asked questions. These are often used in libraries for routine inquiries related to catalog searches, circulation policies, or access procedures (Yan, Zhao, & Mazumdar, 2023). Their primary limitation lies in their inability to handle unanticipated or complex user questions that fall outside predefined parameters. Conversely, AI-driven chatbots employ machine learning and natural language understanding (NLU) techniques to engage in more flexible and context-aware conversations. These systems are capable of understanding user intent, learning from prior interactions, and delivering contextually relevant information (Russell & Norvig, 2022). Large Language Model (LLM)-based chatbots such as ChatGPT have introduced more advanced conversational capabilities, allowing for natural, human-like dialogue that supports deeper reference assistance (Ehrenpreis & DeLooper, 2025). Studies indicate that while libraries in technologically

advanced regions are adopting hybrid models, many libraries in developing countries, including Nigeria, still rely heavily on simpler, rule-based chatbots due to funding and technical constraints.

The integration of these tools reflects an ongoing transformation toward more user-centered and accessible digital reference services. According Nkomo & Matli (2025) who examined adoption of artificial intelligence for library services at universities in Africa, found that while awareness of AI's potential is growing, actual implementation remains limited. That most institutions are still in exploratory phases, with few practical applications such as chatbots, machine learning-based recommendation systems, and automated cataloging services in place mainly in South Africa, Nigeria, and Kenya. Similarly, Guy et al. (2023) reported that out of 106 libraries surveyed in Canada; only two had implemented chatbots for reference services. The slow pace of adoption is largely attributed to challenges such as inadequate digital infrastructure, limited technical expertise among library staff, unstable internet connectivity, and persistent funding constraints (Guy et al., 2023).

Wagwu et al. (2024) investigated the use of AI-driven chatbots for library services in transforming patrons' engagement in Nigerian University Libraries. The results revealed challenges such as infrastructure issues, resistance from librarians, lack of skilled personnel, and insufficient awareness about the benefits of AI-driven chatbots. Oghuvwu, Owairu and Ogbodu (2025) noted inadequate internet connectivity, limited server capacity, and unreliable power supply often affect the consistent operation of virtual reference tools. However, Implementing AI-driven systems require significant investment in software acquisition, customization, staff training, and maintenance. Many university libraries in Nigeria depend on constrained budgets that prioritize core operations over technological innovations. Adetayo (2023) points out, without adequate training and motivation, staff may perceive these technologies as a threat to traditional roles rather than tools for service enhancement. Russell and Norvig (2022) emphasize that AI chatbots handling user queries must ensure confidentiality and compliance with data protection laws. Users may be hesitant to interact with automated systems if they fear that their information could be stored or misused. Finally, there is the issue of language and contextual limitations. Many AI chatbots are designed primarily in English and trained on datasets that do not adequately reflect local languages, cultures, or university terminologies (Panda & Chakravarty, 2022). This reduces the relevance and accessibility of chatbot responses in diverse educational contexts.

Methodology

The study employed a descriptive survey research design to examine the availability and use of AI chatbots for reference service delivery in university libraries in Rivers State. A random sampling technique was used to select 30 respondents comprising professional and para-professional librarians from six university libraries in the State. These university libraries include: Rivers State University Central Library (6), Dame Patience Goodluck Jonathan Automated Library (8), Donald E. U. Ekong Library (8), PAMO University of Medical

Sciences Library (2), Wigwe University Library (2), and Madonna University Library, Elele (4). Online Google Questionnaire was used as primary instrument for data collection, and supplemented by a systematic review of each institution's website to determine the presence or absence of functional AI chatbot features for library reference services. The Google Form link was disseminated to 30 respondents via WhatsApp, and 24 valid responses were received and analyzed using descriptive statistics.

Results and Discussion

Research Question 1: What is the current level of adoption of AI-Chatbots for reference services delivery in university libraries in Rivers State?

Table 1: Checklist on the current level of adoption of AI-Chatbots for reference services delivery in university libraries in Rivers State

S N	University Libraries in Rivers State	How can you describe the availability of AI-chatbots for reference services delivery in your university library?		
		Readily-Available	Deployment In-View	Not-Available
1	Rivers State University (Central Library)	–	✓	–
2	Ignatius Ajuru University of Education (Dame . Patience Goodluck Jonathan Automated Library)	–	–	✓
3	University of Port Harcourt Library (Donald E. U. Ekong Library)	✓	–	–
4	PAMO University of Medical Sciences Library	–	–	✓
5	Wigwe University Library	–	✓	–
6	Madonna University Elele Campus (University Library)	–	–	✓

Table 1 presents data on the level of AI chatbots adoption for reference services across university libraries in Rivers State. Out of the six university libraries assessed, the table shows a low level of AI-chatbot adoption; with only the University of Port Harcourt (Donald E. U. Ekong Library) having AI-chatbots readily available and integrated into its website for reference services delivery. Two university libraries such as Rivers State University Central Library and Wigwe University Library indicated that AI-chatbot deployment is in view, while the remaining three libraries (Ignatius Ajuru University Library, PAMO University of Medical

Sciences Library, and Madonna University Elele Campus Library) reported no availability of AI chatbots. This indicates that AI-chatbot reference services remain largely underutilized or nonexistent in most university libraries within the state. Though, some institutions are beginning to move toward implementation.

Research Question 2: determining the usability of AI-Chatbots for reference services in university libraries in Rivers State

Table 2: How are AI-chatbots used for reference services delivery in university libraries in Rivers State (n=24)

S	ITEMS	SA	A	D	S	$\bar{x}$	Decision
N							
1	AI chatbots are used to provide users with 24/7 instant responses to frequently asked questions, ensuring continuous access to information resources.	10	1 3	1	-	3. 7	Agreed
2	AI-chabots are used to generate context-aware reference responses that are tailored to users' need	11	1 3	-	-	3. 9	Agreed
3	AI-chatbot are used to provide links to databases and bibliographic search guidance to assist patrons in locating relevant materials.	8	1 2	3	1	2. 9	Agreed
4	AI chatbots are used to enhance the scalability of reference services by handling multiple queries simultaneously, allowing librarians to concentrate on more complex or specialized user requests.	10	1 3	1	-	3. 7	Agreed
5	AI-chatbots are used to collect users' profile during interaction which enhances SDI services delivery to a particular user.	8	1 0	3	2	2. 8	Agreed
Weighted $\bar{x}$						3.4	

Key: SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree

Table 2 presents respondents' opinions of how AI-chatbots are used for reference service delivery in university libraries in Rivers State. The weighted mean score of 3.4 indicates overall agreement that AI-chatbots play a significant role in enhancing reference services. Respondents strongly agreed that AI-chatbots are used to provide 24/7 instant responses to frequently asked questions ($\bar{x} = 3.7$) and generate context-aware, personalized reference answers ($\bar{x} = 3.9$),

showing recognition of their potential to improve accessibility and user experience. The ability of chatbots to manage multiple queries simultaneously, thereby improving service scalability, was also highly rated ($\bar{x} = 3.7$). The relatively lower mean scores for providing database links and bibliographic guidance ($\bar{x} = 2.9$) and collecting user profiles to support Selective Dissemination of Information (SDI) services ($\bar{x} = 2.8$) suggest that respondents are less confident about the chatbot's capabilities in advanced reference tasks, possibly due to limited integration of AI systems with library databases and user management tools. Overall, the findings indicate strong acceptance of AI-chatbots as tools that can enhance efficiency, responsiveness, and service delivery in university library reference operations, though their advanced functionalities may still require further development and institutional support.

Research question 3: What challenges hinder the adoption and use of AI-chatbots for reference services delivery in university libraries in Rivers State?

Table 3: Challenges hindering the adoption and use of AI-chatbots for reference services delivery in university libraries in Rivers State (n=24)

S N	ITEM	SA	A	D	S D	$\bar{x}$	Decision
1	Lack of a functional university library websites to host AI-chatbots	11	1 3	1	1	3. 2	Agreed
2	Staff expertise and change resistance	6	1 2	4	2	2. 8	Agreed
3	Problems arising from epileptic power supplies, internet connectivity and other digital infrastructure	11	1 3	-	-	3. 9	Agreed
4	Unaware of AI-Chatbots capabilities in advancing reference services delivery in the digital era	9	1 2	2	2	2. 9	Agreed
5	Limited funding and institutional supports	10	1 4	-	-	3. 9	Agreed
6	The issue of data privacy, ethical concerns, language and contextual limitations	6	1 2	4	2	2. 8	Agreed
Weighted $\bar{x}$						3.2	

Key: SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree;

Table 3 presents respondents' views on the challenges hindering the adoption and use of AI-chatbots for reference service delivery in university libraries in Rivers State. The overall weighted mean of 3.2 indicates strong agreement that significant barriers exist. Among the

major challenges, respondents strongly agreed that digital infrastructure limitations, particularly unreliable electricity and poor internet connectivity, are the most critical constraints ($\bar{x} = 3.9$). Similarly, limited funding and weak institutional support were identified as major obstacles ($\bar{x} = 3.9$), showing that financial and administrative priorities remain inadequate for AI integration. The absence of functional library websites needed to host AI-chatbots also recorded a high mean score ($\bar{x} = 3.2$), signaling foundational readiness issues. Human-related factors, such as low staff expertise and resistance to technological change ($\bar{x} = 2.8$), limited awareness of AI-chatbot capabilities ($\bar{x} = 2.9$), further hinder adoption, and concerns related to data privacy, ethics, language, and contextual limitations also received notable agreement ($\bar{x} = 2.8$). Overall, the findings show that both technical and human factors, coupled with infrastructural deficiencies and inadequate funding, significantly impede the effective deployment and use of AI-chatbots in university library reference services delivery across Rivers State.

Discussion of Findings

The findings of this study reveal important insights into the availability, use, and challenges of AI-chatbots in supporting reference services across university libraries in Rivers State. First, the results show that among all the university libraries assessed, AI-chatbot availability is extremely low, with only the University of Port Harcourt (Donald E. U. Ekong Library) having AI-chatbots readily available on its website for reference services delivery. This finding is consistent with the systematic review of each institution's website conducted by the researchers to determine the presence or absence of functional AI-chatbot features for library reference services. The identified AI-chatbot in this library is known as "Virtual Librarian Chatbot" and it is powered by Ruby. Consequently, all library users were requested to use the Virtual Librarian chatbot service on the website for prompt response to their information needs (Donald Ekong Library Weekly Report, 2023). This finding indicates that most university libraries in the state have not yet embraced AI-driven reference technologies, aligning with previous studies reporting limited AI adoption in Nigerian libraries (Nkomo & Matli, 2025). Though, some university libraries are beginning to move toward implementation in the state. The slow pace of adoption of AI-chatbot is not only evident in developing countries like Nigeria but also in developed countries as Guy et al. (2023) reported that out of 106 libraries surveyed in Canada; only two had implemented AI-chatbots for reference services. However, AI-chatbot reference services remain largely underutilized or nonexistent in most university libraries within the state understudied as they still rely on traditional reference methods. The absence of these technologies limits users' access to real-time support and hinders libraries' ability to provide responsive and efficient information services online in the region.

In examining how AI-chatbots can be used for reference services, respondents demonstrated strong agreement that chatbots are capable of enhancing reference services delivery in various ways. They recognized AI-chatbots as tools that can provide 24/7 instant responses to frequently asked questions, support context-aware interactions, and handle multiple user queries simultaneously, showing recognition of their potential to improve accessibility, scalability and user experience. These findings confirm global research that positions AI-chatbots as effective solutions for improving responsiveness, accessibility, and the scalability of reference services in academic environments (Wagwu et al. (2024); Westfall (2023) However, the relatively lower agreement concerning AI-chatbots ability to collect user profiles to support SDI services and bibliographic guidance suggest that respondents are less confident about the AI-chatbot's capabilities in performing advanced reference tasks, possibly due to limited integration of AI systems with library databases and user management tools.

The analysis of challenges further highlights why AI-chatbot adoption remains limited across the region. Key impediments include unreliable digital infrastructure, particularly erratic power supply and poor internet connectivity, limited funding and institutional support, indicating that AI-based initiatives are not prioritized within many libraries. Human-centric challenges also play a significant role such as staff expertise and resistance to technological change, and low awareness of chatbot capabilities hinder implementation and use. The absence of functional library websites needed to host AI-chatbots is also signaling foundational readiness issues, it inherently limits opportunities for deploying AI-based services such as chatbots. Finally, concerns about data privacy, ethics, language and contextual limitations further complicate the adoption process, reflecting a broader anxiety surrounding AI technologies in developing contexts. These findings corroborate the observations of Wagwu et al. (2024); Oghuvwu, Owairu and Ogbodu (2025) and Panda and Chakravarty (2022), who noted that inadequate infrastructure, funding, and technical expertise are persistent obstacles to full-scale adoption of AI technologies in university environments.

Conclusion

In conclusion, the findings show that although AI-chatbots are widely recognized by librarians as valuable tools for enhancing reference services such as providing 24/7 responses, supporting context-aware interactions, and improving service scalability but actual adoption remains very limited. Only one academic library in the state currently hosts a functional chatbot, indicating a significant gap between awareness of AI-capabilities and practical implementation. The study further revealed that several barriers hinder adoption, including inadequate digital infrastructure, limited funding, lack of functional library websites, low staff expertise, resistance to technological change, and concerns about data privacy and ethical considerations. These challenges suggest that university libraries in Rivers State are still at the early stage of AI integration and require deliberate institutional strategies to move forward.

Recommendations

Based on the findings, the following recommendations are proposed:

1. **Adequate Funding and Institutional Support:** Allocation of sufficient funds and Strong university management backing to ensure the deployment of functional library websites capable of integrating AI-chatbots and other digital infrastructure such as stable internet connectivity, reliable power supply, and updated hardware/software to facilitate digital reference interactions in the library.
2. **Build Staff Capacity and Reduce Resistance to Change:** Training programs, sensitization, workshops, and continuous professional development should be provided for librarians to enhance their technical competence, confidence, and awareness of AI-chatbot capabilities in the digital era.
3. **Address Data Privacy and Ethical Issues:** Libraries and installers must establish clear policies to guide ethical use of AI-chatbot, including data protection measures, user consent procedures to build users trust, and adherence to global best practices in AI governance.

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