



Adoption of Chatbot for Reference Services in Academic Libraries in Nigeria

¹Elizabeth Titilope Babarinde, ²Victoria Olayemi Fagbemi & ³Helen Remilekun Oluleye

²Victoria Olayemi Fagbemi victoria.fagbemi@unn.edu.ng

³Helen Remilekun Oluleye remioshamo@gmail.com

^{1,2}Department of Library and Information Science, University of Nigeria, Nsukka

³College library, Kogi State College of Education (Technnical) Mopa

Corresponding Author: elizabeth.babarinde@unn.edu.ng

Abstract

The increasing integration of artificial intelligence technologies into library operations has transformed the delivery of reference services in academic libraries. Chatbots, as AI-powered conversational tools, have emerged as innovative solutions for providing timely, efficient, and user-centred reference services. The study made use of systematic review of literature which examines the adoption of chatbots in academic library reference services, highlighting their functionalities, benefits, challenges, and implications for library practice. The study made use of existing scholarly works on chatbot and its adoption in academic libraries across different countries. Findings from the reviewed literature indicate that chatbots enhance accessibility to library services by providing 24/7 assistance. The review also reveals that chatbot applications contribute to improved user satisfaction and service efficiency when effectively integrated with existing library systems. However, challenges such as limited contextual understanding, language barriers, privacy concerns, technical infrastructure requirements, and the need for continuous maintenance remain significant considerations.

Keywords: Academic library, Artificial intelligence, Chatbot, Nigeria, Reference services,

Introduction

Reference services which is a core service of librarianship, involve guiding users in locating, evaluating and properly making use of information. Reference services are personal assistance given by libraries to users who are in pursuit of information (Atanda & Uchendu, 2017). They are services designed to assist users in locating, evaluating, and utilizing information effectively. According to Olubiyo and Jamogha (2022), seeking information or knowledge about something, wanting to know something about anything or anything about something have brought about the essential provision of reference services in libraries. Traditionally, reference services were delivered through face-to-face interactions between librarians and library users. Many academic libraries, particularly in developing countries such as Nigeria, continue to rely heavily on manual reference service delivery, which is often constrained by limited service hours, inadequate staffing, delayed responses, and physical dependence on librarians' availability (Egunjobi, Ogunniyi, and

Ajakaye, 2022). These limitations of reference services frequently result in inefficient reference services characterized by long waiting times, inconsistent quality of responses, inability to handle multiple inquiries simultaneously, and limited accessibility beyond normal working hours. However, the increasing complexity of information overload, the demand for precision in referencing styles and the demand to meet users' needs in the present age have intensified the need for automated support systems, such as artificial intelligence.

Artificial Intelligence refers to computer systems and technologies designed to perform tasks that typically require human intelligence, such as learning, problem-solving, language processing, and decision-making (Orubebe, Oloniruha, & Oladokun, 2024). Within the library environment, AI has been applied in various areas, including information retrieval, cataloguing, recommendation systems, digital resource management, and user support services. The application of AI in libraries as noted

will facilitate the creation of a well programmed expert system that will improve quality of reference service, cataloguing, classification, indexing of periodicals and acquisitions as well as Natural Language Processing in Library Services (Onwubiko, 2025). Memela (2023) posited that Artificial Intelligence is emerging as a pivotal source of optimism for academic libraries in their pursuit to provide an expanded range of automated services to their clientele, given that it is one of the transformative technologies that has surfaced and is set to play a crucial role in the Fifth Industrial Revolution (5IR). It's adoption has enabled libraries to improve operational efficiency and provide innovative solutions to meet the evolving information needs of users. Studies by Rogayan 2024; Selvi and Eser, 2025 indicate that AI powered citation generators enhance accuracy, reduce manual errors, and improve efficiency in formatting references quires according to recognized styles such as APA, MLA, and Chicago reference format. Despite the benefits of use of AI, limited access to digital tools, inadequate training on AI concepts, and a lack of structured opportunities for participation hinders its effective use. Moreover, academic libraries often operate with out-dated infrastructure, making the integration of cutting-edge AI tools difficult (Adebayo & Ibrahim, 2023).

Literature Review

Academic library

Academic library is a specialised library that is affiliated with an educational institution and serves the information and research needs of students, faculty, and staff at that institution. They serve as pillars of education, knowledge creation and preservation and dissemination in higher institutions of learning (Akhter & Kumar 2024). Academic libraries play a vital role in supporting teaching, learning, and research activities in higher institutions by providing access to information resources and services that meet the diverse needs of their users. Hence, it enables the academic community access to up-to-date, relevant and needed information. The rapid advancement of information and communication technologies has significantly transformed the methods through which these services are provided, giving rise to virtual and technology-driven reference services. The digital transformation of libraries has increased users' expectations for fast, convenient, and round-the-clock access to information. Today's library users, particularly students and researchers, are accustomed to obtaining instant responses through digital platforms. Consequently, academic libraries are

increasingly adopting innovative technologies to improve service delivery and enhance user experiences (Ayinde, Ebiefung, Oladokun, 2026)..

Chatbot Applications in Academic Libraries

Chatbots are artificial intelligence-based conversational tools designed to interact with users and provide instant responses to their enquiries. A chatbot is an AI-based software that delivers services through dialogue (Chopra et al.,2016). Chatbots may be utilised for a variety of functions, including talking, entertainment, data retrieval, agent execution tasks, Q&As and conversation exercises. Chatbot is a computer program designed to have a conversation with a human being, usually over the internet (Onifade, Bisi, Dosa, and Jetawo 2026). . A chatbot is a software application that uses predefined rules or artificial intelligence techniques to simulate human conversation and provide automated responses to users' enquiries (Olasunkanmi & Adesina, 2025). Chatbots generate text responses, often via the artificial intelligence (AI) technique of training on large amounts of information, called a knowledge base.

In academic libraries, chatbots are increasingly being integrated into library websites and digital platforms to facilitate information access and improve service delivery (Onwubiko 2025). They are used to answer frequently asked questions, guide users in locating information resources, provide directions on library policies and procedures, and support virtual reference services. The growing adoption of chatbot technology reflects the need for libraries to offer timely and user-centred services in an increasingly digital academic environment. Nevertheless, Folorunsho and Sangosanya (2025) stated that in Nigeria, the conversation around AI in library services is still emerging, due to the fact that institutions that have started exploring the potential of AI-driven solutions for reference and information services, albeit on a limited scale. Also, Oyelude, (2021) pointed out that the actual adoption and utilization of AI tools in Nigerian university libraries is limited and uneven, with many institutions lacking the necessary support and readiness to fully integrate these technologies.

The use of chatbot technology offers numerous benefits for academic libraries. It improves accessibility to library services, reduces response time to users' enquiries, enhances user satisfaction, and minimizes the workload associated with repetitive reference questions (Abba, 2024). Furthermore, chatbots support remote access to library services, making them particularly useful in contemporary academic environments where online

learning and digital scholarship are increasingly common. Their integration into library systems also promotes efficiency by enabling librarians to focus on more complex information needs that require professional expertise.

The integration of digital tools into library operations has not only expanded access to information resources but has also created opportunities for libraries to offer more responsive and user-centred services. This according to Olalekan and Tunmibi (2026) indicates a positive trajectory toward more inclusive, intelligent, and service-oriented academic libraries in Nigerian institutions of learning as technology continues to evolve. Chatbot technology offers several benefits to academic libraries. As libraries evolve in response to digital transformation, the integration of chatbots into library systems presents a strategic opportunity to improve service efficiency, streamline information retrieval, and personalize user support (Lawrence & Francis, 2026). This means that Chatbots can collect relevant information for the consequent conversation with the human representative.

Through the information collected, the chatbot can automatically learn clearly what was previously interacted, what the user needs and, potential solutions for basic queries (Tubachi & Tubachi 2017). Chatbots enable round the-clock engagement, resolving service requests more efficiently, particularly without risks of potentially stressed or unfriendly human employees (Luo et al., 2019). These include improved accessibility to library services, reduced waiting time for users, enhanced user satisfaction, twenty-four-hour service availability, increased efficiency in information dissemination, and reduced workload for librarians. Kaushal and Yadav, (2022) stated that chatbots allow enhancing rather than replacing existing reference services. To the authors, the application can serve many students at any given time of the day, serve a diverse range of library patrons, and act as a triage for library staff by answering basic, and often, even repetitive questions. Chatbots also facilitate remote access to reference services, making them valuable tools for supporting distance learners and researchers. One benefit is that users will be able to have conversations in a natural and easy manner while searching for relevant information.

Adoption of chatbot applications in academic library reference services is growing in Western countries. Chatbots have become particularly notable among AI apps because they offer customers real-time support and personalised help in libraries. McPherson (2013) and Woods (2018) argue that the AI chatbots will create a conducive environment for

conversational interactions related to references. New undergraduate students will be more comfortable in searching for information and can avoid library anxiety during their research. However, Nawaz, and Saldeen,. (2020) pointed out that a chatbot has limited conversational ability as it doesn't respond to multiple queries simultaneously, and due to this limited understanding capacity of chatbots, the users may feel uncomfortable dealing with machines to get the responses for their queries. While the potential for AI to revolutionize library services is acknowledged, infrastructural limitations, lack of technical expertise, low funding, and insufficient policy frameworks often hinder widespread adoption (Ocholla, 2020) Mavhunga and Tshuma (2023) further expatiate by saying only about 38% of university libraries in Sub-Saharan Africa have experimented with AI technologies, and the implementation is often in pilot stages. This shows that adoption of AI technologies are attesting stages in developing nations.

Digital Competencies Required by Librarians

Librarians' perceptions significantly influence the adoption and utilization of emerging technologies in libraries. Positive perceptions regarding the usefulness, ease of use, and effectiveness of chatbot technology can encourage its adoption. Conversely, concerns about job displacement, technological complexity, and implementation costs may negatively affect librarians' willingness to embrace chatbot applications. This can be supported by Technology Acceptance Model (TAM) propounded by Fred Davis (1989), the main elements of the theory constitute perceived usefulness, perceived ease of use, attitude toward use, behavioural intention. This substantiate the fact that possession of digital literacy will make artificial intelligence easy to use and beneficial thereby encouraging positive attitude to its adoption.

The successful implementation of chatbot technology requires librarians to possess relevant digital competencies. Oladokun and Umar (2026) pointed out that to use chatbot technology, librarians need AI skills, which refer to the technical abilities required to operate and interact with AI systems, including knowledge of machine learning concepts, the ability to work with data, an understanding of algorithmic processes, and familiarity with AI-driven tools. The authors stated that competencies extend further to include ethical reasoning, user-centred decision making, professional adaptability, and the capability to integrate intelligent systems into service delivery. These competencies include artificial intelligence literacy, information technology skills, database management skills, digital communication

skills, and the ability to manage and evaluate chatbot performance. Continuous professional development is essential to equip librarians with the skills needed to maximize the benefits of chatbot applications in library services. This can also be buttressed by Digital Competence Framework propounded by European Commission (2013), this establish the need for information and data literacy, communication and collaboration, digital content creation and problem-solving initiatives, which are needed for successful adoption of artificial intelligence

Challenges Associated with Chatbot Applications in academic libraries

Despite the growing interest in use of Chatbot, Nigerian academic libraries continue to face significant barriers to the effective integration of AI technologies into their service frameworks. Prominent among these challenges are inadequate technological infrastructure, unstable power supply, limited internet bandwidth, low levels of technical expertise, insufficient professional training in AI-related competencies, and chronic financial constraints. In addition, institutional policy gaps, resistance to change, and limited collaboration with technology providers further impede AI implementation efforts (Safana & Fari, 2024). Also, Odigie (2024) pointed out that several factors hinder the effective application of chatbots in academic libraries. These include inadequate technological infrastructure, insufficient funding, limited technical expertise among librarians, concerns relating to data privacy and security, poor internet connectivity, and users' resistance to adopting emerging technologies.

Although chatbot technology has gained significant attention globally, its level of utilization varies across institutions and countries. In developed nations, many academic libraries have successfully implemented chatbot systems for virtual reference services. However, in developing countries, the extent of chatbot adoption remains relatively low due to infrastructural and technological challenges. (Ali, Naeem, & Bhatti, 2020). Furthermore, some chatbot systems have limitations in understanding complex or ambiguous queries, which may affect the quality of reference services provided. Issues such as inadequate technological infrastructure, insufficient digital competencies among librarians, financial constraints, concerns relating to data privacy and security, and the inability of some chatbot systems to adequately interpret complex user queries may hinder their effective utilization. Issues of job displacement, decreased human-centred services, and the reliability of AI-generated outputs also impact acceptance (Bøyum Khosrowjerdi 2025). While AI can enhance

service delivery, an over-reliance on technology may diminish the personal touch that traditional reference services provided, this is because patrons often value human interaction when seeking assistance, particularly for complex inquiries (Honghai, 2020). In many developing countries, including Nigeria, the implementation of chatbot technology in academic libraries remains relatively limited, thereby affecting the extent to which libraries can leverage its potential for enhanced reference service delivery.

Strategies for Enhancing Chatbot Applications in academic library

Effective strategies for enhancing chatbot applications include providing adequate technological infrastructure, organizing staff training programmes, allocating sufficient funding, developing institutional policies for AI adoption, and creating awareness of the benefits of chatbot technology among librarians and library users (Prakash, & Kausalya, 2025). There is need for continuous professional development, hence librarians must receive training in AI literacy, machine learning, natural language processing (NLP), and other relevant technologies to effectively implement and manage AI tools in their workflows (Oghuvbu & Okoh, 2025). The authors pointed out that collaboration between library management and information technology units can further facilitate successful implementation.

Conclusion

The literature reviewed demonstrates that chatbots have become an increasingly important innovation in the delivery of reference services in academic libraries. Studies conducted in developed countries generally indicate high levels of chatbot adoption, supported by robust technological infrastructure, adequate funding, skilled personnel, and favorable institutional policies. In contrast, evidence from developing countries, particularly Nigeria, suggests that the adoption of chatbots for reference services remains at an emerging stage. While awareness of artificial intelligence technologies among librarians is gradually increasing, actual implementation is constrained by inadequate ICT infrastructure, unstable electricity supply, insufficient funding, limited digital competencies among library personnel, poor internet connectivity, inadequate institutional support. Consequently, many Nigerian academic libraries continue to rely predominantly on conventional and human-mediated reference services, thereby limiting the opportunities presented by intelligent conversational technologies.

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