LAFIA JOURNAL OF LIBRARY AND INFORMATION SCIENCE
Volume 7, Number 1, 2025.
Available online: https://journals.fulafia.edu.ng/index.php/ljlis
ISSN: Print - 2814-0702, Online - 2814-0710
LJLIS

ADOPTION OF ARTIFICIAL INTELLIGENCE (AI) TOOLS FOR EFFECTIVE REFERENCE SERVICE DELIVERY IN ACADEMIC LIBRARIES

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Abstract
This research investigates the adoption of Artificial Intelligence (AI) tools for effective reference service delivery in academic libraries. AI technologies offer the potential to revolutionize library services by enhancing efficiency, accessibility, and user experience. This paper explores benefits of AI in libraries, role of AI in shaping reference services. The paper also examines the potential adoption of AI tools for effective reference service delivery in academic libraries. However, lack of AI expertise among librarians, resource constraints, and user acceptance hinder widespread AI adoption as challenges. The recommendations include investing in librarian training, developing a clear AI strategy, and fostering collaboration between libraries and AI researchers. By addressing these challenges and leveraging the potential of AI, academic libraries can better serve their users and remain relevant in the evolving information world.
Keywords: Artificial intelligence, Tools, Reference Services, Academic libraries.

Introduction

Artificial intelligence (AI) technologies have become globally recognized as indispensable tools for improving organizational efficiency and productivity. Suffice therefore to say that Artificial Intelligence technologies have strongly influenced the world of work in the 21st century (Adebayo, Bello, Kayode and

Yusuf, 2022). The adoption of AI in libraries refers to the integration of artificial intelligence technologies or tools into library operations and services. This can encompass a wide range of applications, including cataloguing, classification and reference services. The adoption of AI in libraries is still in its early stages, but it has the potential to revolutionize the way libraries operate and serve their communities (Isiaka, 2023).

In the library setting, the adoption of AI can improve library services and provide access to accurate information that can drive growth and development in this information age. Artificial intelligence technologies are now being used in libraries to achieve the organic integration of readers and libraries, thereby enabling effective reference service delivery in academic libraries. Academic libraries have consistently served as vital hubs of knowledge, offering essential help to students, teachers, and others by providing resources and answering questions.

In the past, reference services involved guiding or assisting users in finding the right information, answering queries, and teaching them how to use information effectively (Chen, 2021). However, as technology advances and the volume of information available grows rapidly, the traditional method of reference service falls short of meeting users' needs for quick, accurate, and personalized service. This change has led to the integration of Artificial Intelligence (AI) into academic library operations and services. AI tools, like chatbots, virtual assistants, and smart algorithms, are transforming how libraries deliver reference services by making them faster, more efficient, and easier to access (Tella, 2020).

According to Aji and Yisadoko (2024) since the 19th century, the world has witnessed an exponential growth in the number and variety of information products, sources, and services. This development has resulted in technological innovations for faster and more efficient processing, storage and organization of library and information resources. The intensive pressure on librarians to provide high-quality services to library patrons due to information overload in our present society has led to the incorporation of modern technologies. Interestingly, Artificial Intelligence (AI) is the current technology that has evolved with huge prospects and promising applications in libraries and information centres (Omame and Alex-Nmecha, 2020).

Artificial Intelligence plays a transformative role in enhancing reference services within academic libraries by making their services faster, and easier to access. AI enables personalization by analyzing how users behave, their past interactions, and what they like, so it can give answers that fit their needs better.

Artificial Intelligence also makes reference services more accessible by assisting users in many languages, letting people use services from anywhere, and providing tools like text-to-speech and screen readers making library services inclusive for diverse users, including those with disabilities (Moustapha and Yusuf, 2023). This development makes the library more effective and available to more users. Thus, there is a pressing need to examine AI tools to effectively leverage their numerous benefits for both innovative and optimal reference service provision in academic libraries.

This paper explored the adoption of AI tools for effective reference service delivery in academic libraries with a specific focus on artificial intelligence tools in reference service delivery.

Concept of Artificial Intelligence (AI)

The origin of Artificial Intelligence (AI) can be traced to John McCarthy's research in 1955, with the assumption that every aspect of learning and other forms of intelligence can be stimulated through the use of a machine (Wang, 2018). Scholars have defined the concept of Artificial Intelligence (AI). According to Benhamou and Janin (2018), AI involves a collection of technologies that enable machines to act with a very high level of intelligence similar to humans. Merriam-Webster English Dictionary (2018) states that artificial intelligence is "a part of computer science that deals with giving the ability to the machines to look as if they have natural human intelligence." These human capabilities of AI are improved through learning from experience and adaptation over time. As an aspect of computer science, AI comprises an expert system, fuzzy logic, artificial neural networks, evolutionary algorithms, case-based reasoning, image processing, natural language processing, speech recognition, and robotics (Adejo and Misau, 2021).

Artificial Intelligence (AI) technologies have become globally recognized as indispensable tools for improving organizational efficiency and productivity (Orubebe, Oloniruha and Oladokun, 2024). Suffice therefore to say that AI technologies have strongly influenced the world of work in the 21st century. In the library setting, the adoption of AI can improve library services and provide access to accurate information that can drive growth and development in this information age. Artificial intelligence technologies are now being used in libraries to achieve the organic integration of readers and libraries. With this, readers interact on the same platform, track and acquire the personalized needs and information of users so that users can access information accurately, and humanized services, at a reduced cost to rationally utilize library resources.

Benefits of Artificial Intelligence in Libraries

Artificial Intelligence (AI) is reshaping the landscape of libraries by introducing innovative solutions that enhance information management, user experiences, and library services within libraries and information centres. (Mupaikwa, 2025). The transition of library resources and services has evolved from traditional book collections to audiotapes, video collections, databases, digitized materials, and library automation, leading to the integration of artificial intelligence into library operations and services, such as reference services (Vijayakumar and Vijan, 2011). This implies that one of the motives for adopting AI technologies in academic libraries is to satisfy user needs. The benefits of artificial intelligence in libraries according to Aji and Yisadok be summarized as follows:

- Bridge in Time: Round-the-clock accessibility to information resources and services just in time.
- Bridge in Space: The space occupied by piles of books, journals, bound newspapers and other information materials have been reduced by the introduction of digitization, electronic copies and use of robotic cranes that store and retrieve books from a compact off-site storage location.
- Maximization of Efficiency: This refers to efficiency in library operations: selection and acquisition of materials, technical services, circulation services, references services, serial management etc.
- Maximization of effectiveness in the form of improved service delivery and elimination of human errors in library operations.
- Minimization of Effort: The effort expended by librarians in technical services, circulation services, references services, serial management etc. can be minimized by the use of artificial intelligence systems in libraries.
- Enhanced and immersive user experience in library services delivery.

The Role of Artificial Intelligence in Shaping Reference Services

Artificial intelligence (AI) is revolutionizing reference services in libraries, enabling more efficient and personalized support for patrons. By leveraging AI technologies such as chatbots, machine learning, and natural language processing, libraries can provide real-time assistance, personalized resource recommendations, and seamless access to vast information repositories.

Generative AI applications use deep learning algorithms that revolutionized natural language processing with the release of ChatGPT in late 2022 marking a significant milestone for information services. In turn, 2024 may prove to be a watershed moment in the evolution of reference services

(Lappalainen and Narayanan, 2024). Gone are the days of relying solely on keywords, subject headings, thesauri, indexing, ontologies, and Boolean operators to search for direct word matches (Fricke, 2024). Instead, natural language processing and semantic searches powered by AI analysis of contextual meanings using mathematical statistics have enabled generative AI tools to understand the searcher's intent and identify conceptually similar ideas, rather than merely matching specific terms and synonyms (Meakin, 2024). Users have moved from information gathering to what Zhou and Bistawi (2024) termed "knowledge application" in a "more personalized, collaborative and user-centric experience." The result is that search efficiency for users has greatly improved through "personalized content interaction experience(s) (Zhou and Bishtawi, 2024).

These innovations address diverse user needs, from simplifying complex user queries to enhancing accessibility for differently-abled users. As AI continues to evolve, its integration into reference services holds immense potential to redefine the traditional librarian-user interaction, ensuring that libraries remain indispensable hubs of knowledge in the digital age.

Adoption of Artificial Intelligence (AI) Tools for Effective Reference Service Delivery in Academic Libraries

The adoption of Artificial Intelligence (AI) tools in academic libraries offers a transformative opportunity to shift the focus and approach in delivering reference services. AI technologies continually redefine how we navigate and interact with information, providing efficient and dynamic solutions. In the library also, AI can be used to develop programs for effective reference services, good scanning of textbooks, and the identification of appropriate subject categories. Furthermore, AI technologies can assist library users on how they can locate library materials through intelligent tutoring systems and automated library services. Therefore, AI adoption and use in libraries will allow for better information processing, and at the same time, better information search that will excite both library personnel and users since there will be easier and faster access to information. Below are some of the tools in which Artificial Intelligence could be applied in reference services in academic libraries.

- **Virtual Assistants:** Libraries are deploying AI-driven virtual assistants to provide instant support to users, answer reference inquiries, assist with circulation services, and offer personalized recommendations based on user preferences.
- **Chatbots:** AI-driven tools such as chatbots provide instant support to users,

answer reference inquiries, assist with circulation services, and offer personalized recommendations based on user preferences.

- **Voice Search:** voice search can significantly enhance reference services in academic libraries by making information retrieval faster, more accessible, and user-friendly. Library clientele can ask questions naturally, and voice search systems can provide immediate responses from library databases, catalogues, and digital archives.
- **Language Translation Services:** AI-based language translation services within libraries break language barriers, making resources accessible globally. Patrons can access content in their preferred language, promoting inclusivity and diversity (Manjunatha, 2023).
- **Language Translation Services:** AI-powered language translation services in libraries help remove language barriers, making resources available to people worldwide. Library users can read and use materials in their language, encouraging fairness and variety.
- **Natural Language Processing (NLP):** NLP enhances the efficiency and effectiveness of reference services in academic libraries, making information access more user-friendly and tailored to the needs of patrons. As technology continues to evolve, the integration of NLP is likely to expand, further transforming how libraries serve their users (Jurafsky and Martin, 2021).

Challenges in Adopting Artificial Intelligence Tools in Reference Services

The adoption of artificial intelligence tools for effective service delivery in academic libraries is frequently regarded as inevitable. However, numerous challenges have made AI implementation highly complex, as highlighted by various scholars. Erubebe, Oloniruha, and Oladokun (2024) reveal that the most significant challenges fall into the following categories:

- **Lack of artificial intelligence competencies:** The adoption of artificial intelligence tools for effective library services requires highly specialized and skilled human capital. One challenge is the scarcity of librarians with the necessary AI skills and expertise in most developing countries.
- **User acceptance and job displacement**: Some librarians feel reluctant to adopt artificial intelligence powered services due to a lack of understanding or skepticism about the reliability of artificial intelligence systems. Beyond user acceptance, librarians like many other professionals, worry that AI might replace jobs within the library.
- **Resource Limitations:** The adoption of artificial intelligence (AI) tools typically demands significant financial investment. The costs associated

with AI technologies, along with the expenses for employee training and education, can be substantial. However, academic libraries, as social institutions, often lack the financial resources needed for AI implementation.

- **Lack of a clear artificial intelligence strategy:** For artificial intelligence to be successfully adopted in academic libraries, a strategic plan is essential. This plan should address libraries' attitudes toward AI, ensure sufficient funding and institutional support, and develop the technical skills of librarians (Huang et al., 2023). The existence of such a roadmap or strategy will pave the way for better AI implementation in academic libraries, leading to improved reference services.

Conclusion

The integration of artificial intelligence tools in academic libraries for reference service delivery presents significant opportunities to enhance the efficiency, accessibility, and user experience of library services. Given this, the paper has explored the adoption of Artificial Intelligence (AI) tools for effective reference service delivery in academic libraries. While AI presents significant opportunities to enhance library services, such as improved speed, accuracy, and accessibility, several challenges must be addressed. These include the need for increased AI literacy among librarians, overcoming resource limitations, and developing a clear artificial intelligence strategy.

Way Forward

Based on the synthesis of the literature, the research recommends:

- They need to invest in comprehensive training programs for librarians on artificial intelligence concepts, technologies, and applications in other to foster a culture of AI literacy and innovation among librarians.
- The development of a structured artificial intelligence competency framework for librarians. This framework would outline the essential skills and knowledge required for librarians to effectively integrate artificial intelligence tools into their services. Collaborating with educational institutions and professional bodies to create targeted training programs and certifications which could help in mitigating the skill gap.
- Valuable strategies be explored for promoting user awareness and understanding of AI applications in libraries. By conducting surveys, workshops, or orientation sessions which could help users become more familiar with artificial intelligence tools such as chatbots and virtual assistants. Addressing concerns about artificial intelligence reliability and

transparency through these campaigns could facilitate a smoother transition.

- Advocacy measures for academic libraries to promote artificial intelligence adoption. This could involve working with institution administrators, policymakers, and professional organizations to highlight the importance of artificial intelligence in advancing library services, ultimately securing institutional support and sustainable funding.
- To facilitate the seamless integration of artificial intelligence tools, collaboration between academic libraries and AI researchers or developers is essential. Libraries should be involved in artificial intelligence tool development to ensure that the systems are designed to meet their specific needs. Establishing partnerships with artificial intelligence research institutions could also help libraries stay abreast of the latest innovations and tools.

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