



Influence and Challenges of Artificial Intelligence on Academic Libraries And Information Management

Florence B., Agunsoye ^{1*} and Thomas O. Osumah ²

¹College Library, Federal College of Education, P.M.B 1026, Okene, Nigeria

²Department of Computer Science, Federal College of Education, P.M.B 1026, Okene, Nigeria

Journal of Research in Vocational and Technical Education (JORVTED), 2025, 4(1) 1-8

Publication history: Received on 14 January 2025; revised on 04 March 2025; accepted on 06 May 2025

Article DOI: <https://doi.org/10.5281/zenodo.15649365>

Abstract

Academic libraries have recently witnessed a huge transformation as a result of digitalization, and this has changed how information is accessed, organized, and interacted with by students, staff, and other users of library services. Aim of this paper reviews the influence of Artificial Intelligence (AI) applications on the operational efficiency and services of academic libraries. It revealed that AI integration into library services has a lot of benefits which include enhanced data retrieval, personalized user experiences, and the automation of routine tasks, which free up librarians to focus on more strategic initiatives. However, the adoption of AI is not without its challenges. Concerns regarding data privacy, ethical implications, and the digital divide pose significant obstacles to implementation. Additionally, professional development and training are crucial for library staff to effectively leverage AI tools. The paper therefore emphasized the need for strategic planning, ethical considerations and ongoing research to optimize the role of AI in information management.

Keywords: Artificial Intelligence, Library, Machine Learning, Natural Language Processing, Robotics.

Introduction

In most tertiary institutions, academic libraries offer wide range of resources to support teaching, learning, and research within the academic community. They provide access to essential academic materials like books, journals, databases, and digital resources. Academic libraries also serve as vital hubs for collaboration and learning, offering study areas, workshops, and educational resources (Johnson, 2020). By facilitating access to information, academic libraries contribute to the intellectual growth of the community, helping individuals stay informed about the latest research and trends in their fields (Crum, 2013; Raju & Sreenivasulu, 2016). Baker (2016) viewed academic libraries as instrumental in supporting research, learning, teaching, and fostering a culture of innovation and knowledge sharing within the academic community. The rapid advancement of digital technology has significantly changed how libraries and information science operate. These developments have brought new tools and methods for managing and sharing information in library institutions. Libraries are adapting to the digital era by employing information technology to enhance the distribution of knowledge. While the primary aim of libraries remains to provide access to information, the integration of information technology tools has revolutionized their capacity to do so effectively. Libraries are transforming from static information storehouses to interactive hubs that actively share knowledge and interact with their users.

Academic libraries are vital in supporting the educational and research objectives of their institutions. Their traditional workflows and services are designed to provide access to a variety of academic



resources, encourage research, and enhance information literacy among students and staff. Some of the popular conventional workflows and key services performed by academic libraries include:

Resource Procurement and Building Library Holdings - Academic libraries assess the requirements of students, staff, and other users via surveys, forms, and discussions. They also procure materials through buying, subscribing, and receiving donations as well as providing cataloging and organization of new resources. As part of their service, they provide both physical and digital holding platforms to store vast collections of books, periodicals, and other educational materials such as eBooks, digital journals, and multimedia resources (Farkas, 2020).

Circulation Services - Academic libraries usually admit patrons through a user registration exercise to provide personal information to access resources. They also provide a checkout process for users who borrow books and materials. Users can return or renew materials physically or virtually via established institutional library websites (Raju, & Sreenivasulu, 2016).

Reference and Information Services - Academic libraries help patrons with information inquiries through in-person consultations, phone calls, or online chats. They also provide research support, strategies and locate scholarly resources. Libraries offer workshops on research skills, database usage, citation management and information literacy, as well as provide one-on-one consultations, especially for graduate students or faculty working on complex topics (Tenopir & King, 2000).

Technology Based and User Services - As most works and activities in tertiary institutions have been digitalized, academic libraries provide access to computer networks through Wi-Fi, printing services, and training sessions for students and staff on the effective use of digital tools and library resources (McClure & Jaeger, 2015).

The conventional workflows and services of academic libraries are designed to carefully meet the diverse needs of students, faculty members, and other users within the library community in their pursuit of knowledge and research. In the past, these tasks were to the end-users, but over the years, some of these tasks have been fully or partially automated, depending on the financial strength of the academic institutions where the libraries may be domiciled.

Digital Technology Integration in Library Services

Popular information technologies used in libraries and information services include Integrated Library Systems (ILS), Digital Repositories, Content Management Systems (CMS), and Social Media Platforms. Modern library management relies on Integrated Library Systems (ILS) to streamline operations by combining various functions like cataloging, circulation, and user management into one platform. According to Brower (2019), this technology facilitates user-friendly interactions between librarians and patrons, simplifying tasks such as searching the catalog, borrowing materials, and renewing items.

Digital repositories are essential for storing and disseminating digital content like academic papers, multimedia materials and institutional theses. These repositories are typically set up by libraries to give the public access to valuable resources, facilitating the sharing of knowledge within the community. By



using cloud storage and databases, the repositories ensure that the content is stored securely and remains accessible and well-preserved for the future. Libraries benefit greatly from Content Management Systems (CMS) as they facilitate the management of digital content. These systems enable libraries to easily generate, modify and share content on their websites, ultimately improving users' ability to access pertinent information. Well-known CMS platforms like Word Press and Drupal enable libraries to uphold a structured online profile, which in turn enhances user satisfaction and the accessibility of information. Libraries have harnessed the power of social media as an effective means to disseminate information, publicize services, and engage with patrons. Utilizing platforms such as Twitter (X), Facebook, and Instagram, libraries can announce events, share resources and connect with the community. Through the strategic use of social media, libraries can broaden their reach, foster community involvement, and enhance their presence. The ever-increasing interconnectivity of computing devices and computer networks to access information from the web has made it vulnerable to cyber-attacks from time to time. Though efforts have been made to develop Artificial intelligence (AI) tools to enable cyber-security professionals to automate routine tasks and speed up the identification and handling of threats. Ramanpreet, et. al., (2023) noted that artificial intelligence is a powerful tool that can deliver advanced analytics and intelligence specifically designed to safeguard against the constantly changing landscape of cyber-attacks. AI tools can track an extensive array of cyber threats by rapidly analyzing millions of events occurring in real time. This allows it to not only identify potential risks but also to anticipate them and take proactive measures in advance, thereby enhancing overall security and resilience against a broad spectrum of cyber dangers. This paper examines the impact of artificial intelligence (AI) tools in library services workflow, the challenges posed by the integration of AI tools in libraries and information science.

Artificial Intelligence in Library Services and Management

Artificial Intelligence (AI) simulates human intelligence processes and performs these tasks via machines, particularly computing devices. Artificial intelligence (AI) is the field of study that focuses on the creation of computer systems that are capable of learning, reasoning, problem-solving, perception, and natural language processing – all functions that are traditionally only performed by intelligent people (Manjunatha, 2023). AI applications acquire information and utilize rules to make deductions based on algorithms and self-improvement. Asemi (2018) noted that AI encompasses a range of techniques, including natural language processing, machine learning, and data analytics, which enable machines to simulate human intelligence and perform tasks traditionally carried out by humans. In the past decade, the application of AI in libraries has completely changed library services by enhancing user interactions, optimizing processes, and providing valuable insights into user behavior. As a result of the huge benefits of AI adoption, most libraries now grasp these advantages and find ways to tackle ethical concerns as they adopt AI technologies more widely. In library services, AI is being used to provide personalized recommendations, simplify organization and retrieval of information, and enhance user experience. For instance, AI-powered chatbots can assist library users with questions, while machine learning algorithms can analyze user behavior and preferences to tailor services accordingly (Bello, 2023; Emumejakpor, 2024). This integration of AI in library services is seen as a major advancement that is reshaping the



traditional roles and functions of libraries. Isiaka (2023) also noted that libraries can leverage AI analytics tools to gain insights into user behavior and preferences, enabling them to make informed decisions about resource allocation and service offerings.

Potentials of Artificial Intelligence in Library Services and Management

Artificial Intelligence (AI) has transformed library operations and user interaction by improving efficiency and accuracy. Rahul (2024) stated that AI-driven tools offer capabilities such as predictive search, personalized recommendations, and automated data processing, which promise to enhance research efficiency and uncover insights that might be challenging to achieve through conventional means. It aids in search optimization, assists in collection curation, and offers personalized recommendations. AI helps with the automation of routine tasks to free up librarians for higher-level responsibilities, such as user assistance and community engagement, while chatbots and virtual assistants elevate customer service. Furthermore, AI reduces data errors and enhances knowledge discovery by studying usage patterns, thus elevating library service quality overall. Manjunatha (2023) indicated that AI-powered algorithms and systems can facilitate efficient information retrieval and management, enabling users to access relevant resources quickly and effectively. Jha (2023) opined that AI enables data-driven decision-making by analyzing vast amounts of data and providing valuable insights for collection development, resource allocation, and service improvement. Kurzweil (2022) noted that various applications of AI within libraries include collection management, cataloging, user services, data analytics, and recommendation systems. Some of the specific tasks performed by AI in libraries include: Enhancing Information Retrieval: Artificial intelligence (AI technologies) are transforming the way information is retrieved in library and information science (LIS) by improving the organization and accessibility of knowledge. This involves enhancing search algorithms through machine learning to provide more relevant results, creating personalized user experiences based on behavior analysis and recommendation systems, and using natural language processing (NLP) to facilitate intuitive queries through chatbots (Zhou, 2022). According to Rahul (2024), AI tools such as search engines and digital databases, recommendation systems, and Natural Language Processing (NLP) tools and chatbots have enhanced the research process by offering more efficient, accurate, and user-friendly methods for discovering and managing information. He noted that search engines such as Google Scholar and Microsoft Academic use sophisticated algorithms to index and retrieve scholarly information, while digital databases like JSTOR, PubMed, and IEEE Xplore incorporate AI technologies to enhance search functionality and data retrieval. AI also streamlines data management processes such as cataloging and resource discoverability, improves decision-making with insights from data analytics, and utilizes predictive analytics to tailor services to user preferences (Liu *et al.*, 2021). The incorporation of AI in LIS significantly boosts effectiveness and user satisfaction, presenting various opportunities and challenges for the future of information retrieval. According to Chung *et al.* (2021), Artificial Intelligence (AI) has the potential to transform information retrieval in libraries as these tools can now help libraries better understand user needs, personalize their services and streamline operations, ultimately creating a more efficient and engaging environment for those seeking information (Hernandez & Cebrian, 2021).



Recommendation Systems: Libraries can use AI-driven recommendation systems to suggest relevant materials based on users' past interactions and users' experience with library applications. AI is currently playing a crucial role in recommender systems in library and information science by offering tailored, situation-specific, and evolving suggestions. As libraries embrace these advancements, they can enhance user contentment and interaction, ultimately leading to a more efficient information retrieval process. Rahul (2024) stated that AI-powered recommendation systems use machine-learning algorithms to analyze user, behaviour preferences, and past searches to suggest relevant research materials. These systems are employed in various platforms, including digital libraries and online research tools.

Automating Processes: AI applications can automate routine tasks such as data entry, record-keeping, and circulation management, allowing staff to focus on more strategic initiatives (Parker *et al.*, 2023). AI-powered tools are transforming library processes by automating tasks such as cataloging, classifying, and assisting users (Tan & Kwong, 2020). These tools have significantly reduced the time needed to organize collections, with natural language processing (NLP) algorithms generating relevant metadata and identifying duplicates to enhance resource discoverability. Cai & Xu (2019) also identified that machine learning algorithms have helped to refine the organization and indexing of materials by examining data patterns for precise categorization.

Chatbots and Virtual Assistants: Many libraries have begun using AI-powered chatbots to help users find information, answer common questions, and navigate library services, thereby improving operational efficiency. Habibi & Jabbar (2020) noted that AI-driven chatbots provide continue or at all (24/7) hours user support, answering common inquiries and assisting with resource discovery, which enhances user experience and allows library staff to focus on more complex tasks.

Challenges of AI Usage in Libraries and Information Services

The use of Artificial Intelligence (AI) in libraries and information services provides many benefits, such as improved efficiency and enhanced user experiences. However, these benefits also bring challenges, including issues related to data privacy, the need for staff training, and potential bias in AI algorithms. Some of the key challenges libraries face when adopting and implementing AI technologies include:

- a) **Data Privacy and Security** - In the course of using library services, individuals are usually required to fill one form or another that contains personal data. Therefore, libraries must protect sensitive user information and comply with regulations like the General Data Protection Regulation (GDPR). Johnson & Michniewicz (2020) stated that the extensive data collection required for AI raises concerns about user consent and potential data breaches. Crawford (2021) also noted that libraries must ensure that their AI tools respect user privacy and maintain transparency about data collection and usage.
- b) **Cost of AI Implementation** - The financial investment required for AI solutions can be a great challenge especially for smaller or libraries with inadequate fund to survive. Marshall (2019) opined that some libraries may find it difficult to cope with basic costs such as technology acquisition, maintenance and training the personnel needed to utilize AI tools.



- c) *Ethical Issues* - Libraries need to ensure AI tools promote equity and inclusion for all user groups as AI algorithm tools can introduce biases if the training data reflects historical inequalities, leading to unfair recommendations.
- d) *Lack of Technology Skills and Capacity Building* - Library staff may lack the required technology skills to operate AI tools, and this can create skills gap that hinders implementation. Some libraries may not have enough funds to guarantee continuous training and professional development, which are vital to equip staff for these changes (Farkas, 2020).
- e) *User Acceptance and Trust* - User acceptance of AI is critical, as some individuals may be distrustful of systems using their data. Libraries must build trust by being transparent about AI usage and the benefits it provides.
- f) *Integration with Existing Systems* - Integrating AI with current library systems is often complex and resource-intensive. Libraries may face difficulties associated with new technologies, established workflows and training staff to use them effectively. Duncan & Akrong (2021) noted that libraries are faced with the challenge of technological issues of AI utilization as well as training staff to align with established workflows.

Conclusion

Artificial intelligence (AI) has an insightful influence on academic libraries and information management, offering great opportunities alongside significant challenges. AI technologies can boost operational efficiency, enhance user experiences, and streamline information retrieval processes, transforming the traditional routine tasks performed by human librarians.

However, the successful adoption of AI necessitates addressing crucial issues such as data privacy, ethical considerations, and ensuring equitable access to technology. Ongoing professional development and training for library staff are crucial to fully leverage the benefits of AI applications in academic libraries. Academic libraries can embrace AI effectively by focusing on strategic planning and ethical guidelines, enabling them to adapt to the changing landscape of information management and meet user needs in the digital era.

Recommendations

Integration of AI tools in library services usually involves complex challenges that comprise ethical, technical and operational issues. Providing solution to these challenges is crucial for libraries to leverage AI effectively while maintaining their commitment to privacy, equity and user engagement.



- a) There is the need for strategic planning, ethical considerations and ongoing research to optimize the role of AI in information management in library services and management.
- b) The success of any AI-driven tool depends on the quality and comprehensiveness of the data available. There is need to develop up-to-date data that will guarantee the reliability of search results and recommendations.
- c) More attention should be focused to develop AI algorithms with relevant and sufficient data that will ensure fairness and accuracy of result.
- d) An adequate budget should be made annually to implement and maintain AI-driven tools required in library institutions.
- e) Management of tertiary institutions should organize capacity building workshops for librarians annually on utilization of AI technologies in library services and management.

References

- Asemi, A. (2018). Artificial intelligence (AI) application in library systems in Iran: a taxonomy study. *Libr Philos Pract*.
- Baker, L. M. (2016). The role of academic libraries in fostering a culture of innovation and knowledge sharing in higher education. *The Journal of Academic Librarianship*, 42(5), 517-523
- Brower, A. (2019). Integrated Library Systems: Their Impact on Library Services. *_Library Technology Reports*, 55(1), 12-20.
- Bello, H. (2023). AI's Impact on Library Services: Circulation and Reference Services
- Cai, J., & Xu, L. (2019). Machine Learning for Information Classification in Library and Information Science. *Journal of Library and Information Studies*, 17(3), 24-45.
- Chung, K. Y., Kim, Y. S., & Lee, J. (2021). Artificial Intelligence in Libraries: Overview, Opportunities, and Challenges. *Library and Information Science Research*, 43(2), 101-114.
- Crawford, K. (2021). *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*. Yale University Press.
- Crum, T. (2013). Academic libraries and their role in the intellectual development of the community. *Journal of Library Administration*, 53(1), 1-12.
- Duncan, L., & Akrong, B. (2021). "Integrating Artificial Intelligence in Libraries: Challenges and Opportunities. *Journal of Library Administration*, 61(4), 405-421.



- Farkas, M. (2020). "AI and the Future of Libraries: Addressing the Skills Gap." *Library Technology Reports*, 56(7), 5-15.
- Emumejakpor, E. (2024). The Role of AI Adoption in Library Services for National Development.
- Hernández, M., & Cebrian, I. (2021). The Changing Role of the Librarian in the Age of AI: A Literature Review. *Information Research*, 26(3), 1-16.
- Habibi, A., & Jabbar, Z. (2020). Utilization of Chatbots in Academic Libraries: A Systematic Review. *The Electronic Library*, 38(5), 1182-1198.
- Isiaka, A. O. (2023). Status of AI Application in Academic Libraries: A Comparative Study.
- Jha, S.K. (2023). Application of artificial intelligence in libraries and information centers' services: prospects and challenges, *Library Hi Tech News*, 40(7), pp. 1-5, <https://doi.org/10.1108/LHTN-06-2023-0102>.
- Johnson, C. A. (2020). The role of academic libraries in accessing electronic resources: A study of perceptions and use. *College & Research Libraries*, 81(4), 511-527, <https://doi.org/10.5860/crl.81.4.511>