Artificial Intelligence in Library Education and National Development: A Qualitative Review of Librarians' Perspectives

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Abstract

Artificial Intelligence (AI) is increasingly influencing educational systems and information management practices, creating new opportunities for libraries to enhance service delivery and professional practice. This study examines the role of artificial intelligence in library education and its implications for national development through a qualitative systematic review of librarians' perspectives. Relevant literature was retrieved from major academic databases including Scopus, Web of Science, ERIC, Google Scholar, and Library and Information Science Abstracts (LISA). Following a structured screening process, forty-five studies published between 2019 and 2025 were selected for qualitative synthesis. The findings indicate that current applications of AI in library education include automated cataloguing, intelligent search and discovery systems, virtual reference services, adaptive learning technologies, and data analytics tools that support information management and teaching activities. In terms of perception, librarians generally demonstrate a positive attitude toward AI adoption, recognising its capacity to improve operational efficiency and service delivery; however, some concerns persist regarding job security, ethical implications, and technological readiness. The review also reveals that AI adoption contributes to improved research productivity, personalised learning, enhanced access to information resources, and broader knowledge dissemination, thereby supporting educational advancement and national development. Nevertheless, several challenges continue to hinder effective implementation, particularly in developing contexts, including limited technological infrastructure, financial constraints, insufficient digital competencies among library professionals, and ethical issues related to privacy and algorithmic transparency. The synthesis further highlights the need for curriculum reforms, institutional investment, and continuous professional training to support sustainable AI integration in library education.

Keywords: Artificial Intelligence, Library Education, Librarians' Perspectives, Academic Libraries, National Development

Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, reshaping not only industrial and commercial processes but also the landscape of education and information management. AI is broadly defined as the ability of machines to perform tasks that traditionally require human intelligence, including reasoning, learning, problem-solving, decision-making, and natural language understanding (Russell & Norvig, 2021; Jackson, 2019; Abulibdeh et al. 2024; Yan et al. 2024; Ajakaye, 2021)). In educational and library contexts, AI enables machines to emulate cognitive processes, providing capabilities such as intelligent resource discovery, automated cataloguing, adaptive learning, and predictive analytics (Ali et al., 2021; Echedom & Okuonghae, 2021; Markauskaite et al. 2022; Holmes., & Tuomi, 2022). These capabilities have significant implications for the efficiency, accessibility, and quality of library services, as well as for the professional development of librarians tasked with managing increasingly complex digital knowledge ecosystems.

Academic libraries serve as critical nodes in the knowledge infrastructure of nations, acting as hubs for research, learning, and information dissemination. In developing countries such as Nigeria, libraries are essential for national development because they facilitate access to reliable information, support educational initiatives, and contribute to the creation and dissemination of knowledge necessary for socio-economic advancement (Olayemi & Olayemi 2021; Zawacki-Richter, 2021). By integrating AI into library education, librarians can be equipped with advanced digital competencies, enabling them to manage digital resources more efficiently, provide personalized services to diverse user groups, and support data-driven decision-making processes that strengthen institutional performance. These improvements in library operations can, in turn, influence broader national development outcomes, including enhanced research productivity, literacy, innovation, and the overall competitiveness of knowledge-based economies.

Despite these transformative potentials, the adoption of AI in libraries particularly within developing contexts remains uneven and complex. Factors such as limited ICT infrastructure, inadequate funding, low digital literacy among library professionals, and insufficient institutional policies often impede effective integration (Okafor & Ogbomo, 2022; Ezeani & Ugwu, 2023). Moreover, the perceptions and attitudes of librarians towards AI play a critical role in determining both the pace and success of AI adoption. Positive perceptions can facilitate the implementation of AI-driven solutions, while skepticism or fear of technology displacement may hinder progress (Eiriemiokhale & Sulyman, 2023). Understanding these perspectives is therefore pivotal, as librarians are not only implementers of AI technologies but also mediators between users and digital systems, shaping the extent to which AI contributes to learning, knowledge management, and national development goals.

The integration of AI into library education can be framed through multiple theoretical lenses. Modernization Theory, for instance, posits that technological innovation is a key driver of social and economic development, suggesting that AI adoption in libraries could accelerate national progress by enhancing knowledge production and dissemination (Boateng, 2024). Additionally, constructivist and connectivist learning theories highlight how AI can facilitate active, networked, and experiential learning environments. Constructivism emphasizes the role of interaction and collaboration in knowledge construction, while connectivism highlights the importance of navigating and integrating knowledge across digital networks (Dziubaniu, 2025, Vygotsky, 1978) In libraries, AI acts as both a tool and a network node, enabling librarians and users to access,

evaluate, and apply knowledge efficiently, while also fostering continuous professional development and digital literacy.

In the Nigerian context, where academic libraries often operate under resource constraints, AI has the potential to bridge gaps in service provision, enhance information accessibility, and promote sustainable practices in knowledge management. Applications such as intelligent search engines, virtual reference systems, automated cataloguing, and AI-driven analytics not only optimize library operations but also contribute to national development by supporting education, research, and innovation (Olaseinde 2025; Cox, 2024). Nevertheless, effective deployment requires careful consideration of socio-technical factors, including institutional policies, staff capacity, ethical standards, and infrastructural readiness.

Given the growing importance of AI in both library education and national development, it is crucial to understand librarians' perspectives regarding its adoption. Such insights provide evidence of current practices, perceived benefits, challenges, and opportunities for future integration. While several studies have examined AI adoption in academic libraries globally, few have systematically explored these issues from the lens of librarians in developing contexts, particularly with a view to linking library education with national development outcomes (Echedom & Okuonghae, 2021; Zondi et al., 2024). This systematic review therefore seeks to fill this gap by synthesizing literature on librarians' perspectives of AI adoption, its applications in library education, and the broader implications for national development. By highlighting these dimensions, the study aims to inform policy formulation, professional development strategies, and practical approaches to harness AI's full potential in enhancing both library services and national knowledge capacity

Research Questions

Based on the objectives of this systematic review, the study is guided by the following research questions:

1. What are the current applications of Artificial Intelligence in library education, as reported in existing literature?
2. How do librarians perceive the role of AI in enhancing library education and professional competencies?
3. What are the reported benefits of AI adoption in libraries for national development, including research productivity, literacy, and knowledge dissemination?
4. What challenges hinder the effective implementation of AI in library education, particularly in developing contexts like Nigeria?
5. What emerging trends and recommendations can be drawn from librarians' perspectives regarding the future integration of AI in libraries

Methodology

This study employed a qualitative systematic review method to examine the integration of artificial intelligence in library education and its implications for national development. Relevant literature was retrieved from academic databases including Scopus, Web of Science, Google Scholar, ERIC, and Library and Information Science Abstracts (LISA). Search keywords included 'artificial intelligence', 'library education', 'AI in libraries', AI and national development' 'digital technologies in library services', and 'AI and information professionals'.

The review followed a structured screening process consistent with systematic review practices. Initially, 126 records were identified through database searches. After removing duplicate entries, 98 articles remained for title and abstract screening. Articles that did not focus on artificial intelligence within library environments, national development or library education were excluded. The remaining 63 studies were assessed through full-text review to determine their relevance to the objectives of the study. Following this eligibility assessment, 45 studies published between 2019 and 2025 were retained for qualitative synthesis.

The primary search terms included:

- "Artificial Intelligence" OR "AI"
- "Library education" OR "Library training" OR "Information professionals"
- "Academic libraries" OR "University libraries"
- "Librarians' perspectives" OR "Librarians' attitudes"
- "National development" OR "Socio-economic impact"

Search strings were combined systematically, for example:

("Artificial Intelligence" AND "library education" AND "librarians' perspectives")

Additionally, reference lists of included studies were hand-searched to identify further relevant articles not captured in the database searches.

Ethical Considerations

Although this study is a review of published literature, ethical considerations were observed by accurately representing all sources, avoiding plagiarism, and ensuring transparency in reporting search strategies and data synthesis.

Results and Discussion of Findings

This section presents the synthesis of findings from the studies included in the systematic review. Following the screening process described in the methodology section, 155 studies published between 2015 and 2025 were retained for analysis. These studies were retrieved from major academic databases including Scopus, Web of Science, ERIC, Taylor & Francis, JSTOR, and Google Scholar, with additional sources identified through reference tracking.

The geographical distribution of the studies indicates that research on artificial intelligence in education and library services is largely concentrated in technologically advanced regions such as China, the United States, the United Kingdom, and several European countries, while comparatively few studies originate from African contexts. This uneven distribution highlights the need for more context-specific investigations into the use of AI within library education in developing countries.

The findings are presented according to the research questions guiding this study.

1. What are the current applications of Artificial Intelligence in library education, as reported in existing literature?

The reviewed studies reveal that artificial intelligence technologies are increasingly being applied across multiple areas of library education and information service delivery. Early AI applications in libraries were primarily limited to automation of routine processes; however, more recent

developments demonstrate a transition toward intelligent systems capable of supporting learning, information retrieval, and data-driven decision making.

One of the most prominent applications identified in the literature is automated cataloguing and metadata generation. Machine learning algorithms are now capable of performing classification, indexing, and metadata tagging with a level of speed and consistency that surpasses traditional manual methods. Studies by Ali et al. (2021) and Echedom and Okuonghae (2021) observed that AI-driven cataloguing systems significantly improve the efficiency of bibliographic processing while reducing human error. Similarly, Sukula (2025), reported that automated metadata generation enhances the discoverability of digital resources in academic libraries.

Another important area of application involves intelligent search and discovery systems. Artificial intelligence technologies embedded within digital library platforms enable systems to analyse user search behaviour and recommend relevant information resources. According to Okike and Nwachukwu (2023), AI-powered discovery tools significantly improve information retrieval accuracy and user satisfaction within academic libraries. Supporting this view, Cox (2024) highlighted the growing use of predictive analytics in libraries to analyse usage patterns and guide evidence-based collection development.

The literature also points to the increasing adoption of virtual reference services powered by conversational AI technologies. Chatbots and natural language processing systems are now used to provide real-time assistance to library users. Studies by Zondi et al. (2024) and Ezeani and Ugwu (2023) found that chatbot-enabled reference services improve response time and extend library support beyond traditional working hours.

Artificial intelligence is also transforming library education programmes themselves. Adaptive learning technologies and intelligent tutoring systems are being incorporated into the training of future librarians. Chen et al. (2023) and Markauskaite et al. (2022) reported that AI-based learning platforms can analyse students' performance data and deliver personalised instructional materials. Likewise, Zhai et al. (2024) emphasised that AI-driven learning environments promote deeper engagement and help students develop critical digital competencies required in modern librarianship.

Despite these advancements, the literature highlights a clear gap in the contextual adoption of AI technologies within developing countries. Many of the reviewed studies were conducted in technologically advanced settings, leaving limited evidence regarding how these technologies can be effectively implemented in regions with infrastructural limitations.

Table 1: Major AI Applications Identified in Library Education

AI APPLICATION	DESCRIPTION	SUPPORTING STUDIES
Automated cataloguing	AI systems generate metadata and classification automatically	Ali et al. (2021); Echedom & Okuonghae (2021), Wrtel, W. (2025), Jaboob, A., Durrah, O., & Chakir, A. (2024), Gupta, et al. (2023
Intelligent search systems	Machine learning improves search accuracy and recommendations	Okike & Nwachukwu (2023); Cox (2024), Jaboob, A., Durrah, O., & Chakir, A. (2024), Markauskaite, et al. (2022), Yan, L., Greiff, S., Teuber, Z., & Gašević, D. (2024). Kumar and Sheshadri, Kn. (2019)
Chatbots / Virtual reference	AI assists users with queries in real time	Zondi et al. (2024); Ezeani & Ugwu (2023), Holmes, et al. (2024), Harisanty, et al (2023).
Adaptive learning systems	Personalized instruction in LIS education	Chen et al. (2023); Zhai et al. (2024), Abulibdeh, et al (2024), Markauskaite et al. (2022)
Data analytics tools	Analysis of user behaviors for decision making	Cox (2024), Yan et al. (2024), Holmes & Tuomi (2022), Abulibdeh et al. (2024)

2: What are librarians' perceptions toward the adoption of Artificial Intelligence? Librarians' perceptions toward artificial intelligence technologies constitute an important factor influencing their adoption in library education and practice. The reviewed studies reveal that librarians generally acknowledge the transformative potential of AI while simultaneously expressing concerns regarding its implications for professional roles and ethical practice.

Librarians' perceptions of Artificial Intelligence (AI) in academic libraries are generally positive, particularly in relation to the potential of AI to improve efficiency and enhance service delivery. Several studies report that librarians recognise AI technologies as tools that can automate repetitive and routine tasks, allowing staff to focus on more strategic and user-centered functions. For instance, Osakwe and Adeyemi (2023) observed that librarians perceive AI as a valuable resource for improving information retrieval services and reducing administrative burdens associated with routine operations. Similarly, Ali, Khan, and Ahmed (2021) found that librarians working in institutions with advanced technological infrastructure are more receptive to AI innovations, appreciating their potential to support research, learning, and library services.

Empirical research further reinforces this positive outlook. Orubebe, et al (2025) and Abayomi, et al (2021) reported that librarians acknowledge AI's ability to enhance efficiency in tasks such as metadata generation, search trend analysis, and data management. Edam-Agbor (2025) highlighted that librarians in Nigerian academic libraries demonstrate high awareness and acceptability of AI tools to improve service delivery, while Urhefe-Okotie (2025) noted that librarians' disposition toward AI adoption is largely favourable, especially when technologies help reduce manual

workload. In addition, Abdulkareem, et al (2025) and Arora, (2020) emphasised librarians' readiness to embrace smart systems and AI technologies to optimise library operations.

Overall, these findings suggest that librarians recognise AI not merely as a technological novelty but as a strategic asset that can improve operational efficiency, enhance user satisfaction, and support academic research and learning. Positive perceptions are especially strong when institutions provide adequate technological infrastructure and training, highlighting the importance of organisational support in successful AI adoption.

However, the literature also highlights notable reservations among library professionals. One frequently mentioned concern relates to the fear that automation may reduce the relevance of traditional librarianship roles. Ezeani and Ugwu (2023) noted that some librarians remain sceptical about the rapid integration of AI technologies due to uncertainty about job security and the future of professional practice.

Ethical considerations also feature prominently in librarians' perceptions of AI. Studies by Zondi et al. (2024) and Cox (2024) emphasise concerns about issues such as algorithmic bias, data privacy, and the transparency of automated decision-making systems. These concerns reflect the broader ethical debates surrounding artificial intelligence in knowledge institutions.

Another important factor influencing librarians' perceptions is digital literacy and technological competence. Librarians with strong digital skills are generally more receptive to AI technologies, whereas those with limited technical expertise may exhibit resistance or uncertainty toward adoption. This finding suggests that professional development programmes focused on AI competencies are essential for ensuring successful integration within library education and practice**.**

3: What benefits does Artificial Intelligence offer to library education and national development

The literature reviewed in this study indicates that artificial intelligence technologies offer numerous benefits for both library education and national development. These benefits extend beyond operational efficiency to include improvements in learning outcomes, research productivity, and knowledge accessibility.

One significant benefit is the enhancement of learning outcomes within library and information science education programmes. AI-driven educational technologies enable personalised learning experiences that adapt to individual student needs. Chen et al. (2023) reported that intelligent tutoring systems improve students' understanding of complex information retrieval strategies, while Zhai et al. (2022) and Moustapha and Yusuf (2023) highlighted the role of AI in promoting critical thinking and problem-solving skills.

Artificial intelligence also improves efficiency in library service delivery. Automation of routine tasks allows librarians to focus on higher-level professional activities such as research support, digital scholarship, and user education. Studies by Ali et al. (2021) and Okike and Nwachukwu (2023) demonstrate that AI technologies significantly reduce the time required for cataloguing and information retrieval processes.

In addition, AI technologies enhance access to knowledge resources, which is a critical component of national development (Giwa et al 2024; Subaveerapandiyan, et al,2023). Libraries play a vital role in supporting education, research, and innovation, and AI-enabled information systems can

expand access to scholarly materials for diverse user groups. Cox (2024) emphasised that data analytics and AI-driven discovery platforms contribute to improved research productivity within academic institutions.

From a broader perspective, these developments support national development goals such as human capital development, knowledge production, and innovation capacity. By strengthening the ability of libraries to provide timely and accurate information, AI technologies indirectly contribute to evidence-based policymaking, technological advancement, and socio-economic growth.

Table 2: Benefits of Artificial Intelligence in Library Education

BENEFIT	EXPLANATION	SUPPORTING STUDIES
Improved outcomes	Personalized instruction through learning systems	AI Chen et al. (2023); Zhai et al (2022), and Moustapha and Yusuf (2023)
Increased efficiency	Automation of routine library operations	Ali et al. (2021), Cox, et al (2019), Asemi, et al (2018), Asemi, et al. (2021).
Better Information access	Intelligent search and discovery tools	Okike &Nwachukwu (2023), Fernandez, P. (2016), Das, R.K., and Islam, M.S. (2021), Christian et al(2019).
Research Productivity	Data analytics supports academic research	Cox (2024), Subaveerapandiyan, et al,2023, Ajakaye, J.E. (2021)

4: What challenges hinder the adoption of Artificial Intelligence in library education? Despite the numerous benefits associated with artificial intelligence technologies, several challenges continue to hinder their widespread adoption within library education and practice.

A major barrier identified across the reviewed studies is inadequate technological infrastructure. Many academic institutions, particularly in developing countries, lack the advanced computing systems and reliable internet connectivity required for effective AI deployment. Okafor and Ogbomo (2022) noted that infrastructural limitations remain one of the most significant constraints affecting technology adoption in African libraries.

Financial constraints also represent an important challenge. Implementing AI technologies often requires substantial investment in hardware, software, and staff training. Ezeani and Ugwu (2023) observed that limited funding frequently prevents libraries from acquiring advanced technological systems.

Another challenge relates to skills shortages among library professionals. Many librarians have limited training in artificial intelligence, machine learning, and data analytics. Without adequate professional development opportunities, the effective integration of AI technologies becomes difficult.

Ethical concerns further complicate the adoption of AI in library environments. Issues such as privacy protection, data security, and algorithmic bias require careful consideration to ensure responsible implementation of AI systems.

Table 3: Major Challenges Affecting AI Adoption

CHALLENGE	DESCRIPTION	SUPPORTING STUDIES
Infrastructure limitations	Lack of technological facilities	Okafor & Ogbomo (2022), AI Chen et al. (2023); Zhai et al (2022), and Moustapha and Yusuf (2023), Okike &Nwachukwu (2023), Fernandez, P. (2016), Das, R.K., and Islam, M.S. (2021), Christian et al(2019).
Financial constraints	High cost of AI technologies	Ezeani & Ugwu (2023), Subaveerapandiyan, et al,2023, Ajakaye, J.E. (2021), Okike &Nwachukwu (2023), Fernandez, P. (2016), Das, R.K., and Islam, M.S. (2021), Christian et al(2019).
Skills gap	Limited AI knowledge among librarians	Ali et al. (2021), Subaveerapandiyan, et al,2023, Ajakaye, J.E. (2021), and Moustapha and Yusuf (2023)
Ethical concerns	Privacy, bias, and transparency issues	Zondi et al. (2024), Subaveerapandiyan, et al,2023, Ajakaye, J.E. (2021)

Discussion of findings

The findings of this review demonstrate that artificial intelligence is increasingly shaping the development of library education and information services. Across the 45 studies analysed, AI technologies were found to support a range of functions including automated cataloguing, intelligent search systems, data analytics, virtual reference services, and personalised learning environments. These developments indicate a gradual transition from traditional library operations toward more technologically driven service models.

One important implication of these findings is the growing need to redefine the competencies required of librarians. As AI technologies become integrated into library systems, librarians must develop skills that extend beyond conventional cataloguing and information management practices. Competencies related to digital literacy, data analysis, and the use of intelligent information systems are becoming essential within contemporary library environments. Consequently, library and information science education programmes must evolve to incorporate emerging technological knowledge and practical training in AI-enabled tools.

The findings also highlight the importance of librarians' perceptions in shaping the adoption of artificial intelligence technologies. Many of the reviewed studies suggest that librarians recognise the potential benefits of AI in improving service efficiency and enhancing access to information resources. Automation of routine tasks allows professionals to dedicate more time to higher-level activities such as research consultation, information literacy instruction, and knowledge management. However, concerns regarding job security, ethical implications, and reduced human interaction were also evident in several studies. These concerns reflect the broader uncertainties

associated with technological change and underline the need for continuous professional development that equips librarians with the skills and confidence required to work alongside emerging technologies.

Artificial intelligence also has broader implications for national development through its contribution to knowledge creation, education, and innovation. Libraries play a fundamental role in facilitating access to information, supporting academic research, and promoting lifelong learning. By improving information retrieval systems and enabling more efficient knowledge management, AI technologies strengthen the capacity of libraries to support educational institutions and research communities. In this way, the integration of AI within library education contributes indirectly to the development of human capital, which is widely recognised as a key driver of socio-economic progress.

Despite these benefits, the findings reveal notable disparities in the adoption of AI technologies across different regions. A large proportion of the studies reviewed were conducted in technologically advanced countries, particularly in Asia, Europe, and North America. In contrast, relatively few studies focused on African contexts. This imbalance suggests that research on AI in library education remains heavily concentrated in regions with stronger technological infrastructures. For many institutions in developing countries, challenges such as limited funding, inadequate digital infrastructure, and insufficient professional training continue to restrict the adoption of advanced technologies.

Addressing these challenges requires coordinated efforts at both institutional and national levels. Governments and educational institutions must recognise the strategic importance of libraries within knowledge-based societies and provide the necessary support for technological development. Investment in reliable digital infrastructure, acquisition of AI-enabled library systems, and training programmes for library professionals are essential steps toward bridging the technological gap between developed and developing regions.

Overall, the findings suggest that artificial intelligence offers significant opportunities for enhancing library education and strengthening the role of libraries within national development processes. However, the successful integration of these technologies depends on the availability of infrastructure, supportive policies, and skilled professionals. By addressing these factors, libraries can position themselves as active contributors to knowledge production, educational advancement, and innovation within modern societies

Conclusion

This review examined the role of artificial intelligence in library education and its implications for national development from librarians' perspectives. The findings indicate that AI technologies are gradually transforming library operations, teaching, and information service delivery. Tools such as automated cataloguing systems, intelligent search platforms, and virtual reference services enhance efficiency, improve access to information, and support research and learning activities. Despite these benefits, challenges such as limited infrastructure, inadequate funding, and insufficient technical skills continue to affect the adoption of AI in many developing contexts. Nevertheless, when effectively integrated, artificial intelligence can strengthen the capacity of libraries to support education, research, and knowledge development, thereby contributing to national progress.

Recommendations

Library and information science programmes should incorporate training on artificial intelligence and related digital technologies to prepare future librarians for emerging information

environments. Institutions and policymakers should also invest in technological infrastructure and provide continuous professional training to support the effective implementation of AI in libraries. In addition, ethical guidelines should guide the responsible use of AI systems to ensure that issues such as privacy, transparency, and equitable access to information are properly addressed.

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