10

LEVERAGING AI FOR SERVICE DELIVERY IN COLLEGES OF EDUCATION LIBRARIES: PROSPECTS AND CHALLENGES

BY

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ABSTRACT

Purpose: *This research investigates the growing use of artificial intelligence (AI) in libraries at colleges of education, with an emphasis on the motivations, uses, difficulties, and methods for successful integration.*

Design/Methodology/Approach: *The study reviewed academic publications, conference proceedings, and reliable reports which led to the adoption of a qualitative content analysis method. Thematic analysis of the literature was conducted in accordance with the study's objectives.*

Findings: *According to the study, automated cataloging, digital reference services, chatbots, intelligent information retrieval, automated metadata generation, recommendation systems, and predictive analytics are just a few of the uses of AI in Colleges of Education libraries that are still in their infancy. Technology development, the need for individualized services, increased operational effectiveness, and institutional digital transformation are some of the main motivators. But there are still a lot of obstacles to overcome, including insufficient finance, subpar technology infrastructure, a lack of technical know-how, opposition to change, worries about data protection, and insufficient locally applicable AI solutions.*

Practical Implication: *Investments in technology infrastructure, long-term funding, employee retraining and training, suitable data governance, and institutional policies, encouraging responsible AI implementation are all necessary for the effective use of AI. Service delivery, accessibility, efficiency, and user engagement can all be enhanced by building staff capability and creating locally applicable solutions.*

Originality/Value: *By combining its main motivators, uses, difficulties, and strategic needs into a cohesive framework, the research offers a conceptual understanding of AI adoption in Colleges of Education libraries. It places a strong emphasis on coordinated stakeholder interaction and institutional preparedness for responsible and successful AI integration.*

Keywords: *AI Adoption, Artificial Intelligence, Colleges of Education Libraries, Digital Transformation, Information Services, Library Services*

Paper type: *Conceptual*

INTRODUCTION

Artificial Intelligence (AI) has rapidly emerged as one of the most transformative technologies of the 21st century, influencing a broad spectrum of human activities ranging from healthcare and education to business, finance, and public administration. Its ability to mimic human cognitive functions such as learning, reasoning, problem-solving, and decision-

making has opened new frontiers in how services are designed, delivered, and managed (Russell & Norvig, 2021). In the field of education, AI technologies are reshaping teaching, learning, and administrative processes, thereby creating more personalized, data-driven, and efficient systems (Rawas, 2024). Among the less frequently highlighted but equally significant domains of AI integration is the library and information science sector, particularly academic libraries.

Academic libraries, is experiencing a paradigm shift due to the integration of AI technologies. As digital natives increasingly dominate the user base, traditional library services must evolve to meet changing demands. Academic libraries have traditionally served as pivotal knowledge hubs within higher education institutions, supporting teaching, learning, and research activities. However, the rapid digitization of knowledge resources, coupled with changing user behaviors and expectations, have necessitated a profound transformation in how libraries operate. The influx of digital native students and faculty members who are technology savvy has increased demand for real-time access to information, intelligent search capabilities, and more personalized services (Tenopir et al., 2020). In this evolving context, AI presents both a challenge and an opportunity for academic libraries to redefine their roles and reimagine service delivery.

AI adoption in academic libraries spans a wide range of functions, from automated cataloging and metadata creation to intelligent recommendation systems, virtual reference services, and predictive analytics for collection development and user engagement (Luo & Ghosh, 2021). Chatbots and, while machine learning algorithms are used to enhance information retrieval and user behavior analysis. These innovations not only improve operational efficiency but also elevate user satisfaction by providing tailored and contextually relevant services (Zhang & Zhao, 2022).

Despite these promising developments, the integration of AI into academic libraries is neither uniform nor without hurdles. Institutional capacity, infrastructure readiness, staff competencies, and ethical considerations all play crucial roles in shaping how AI is adopted and implemented. These factors are particularly pronounced in Colleges of Education, where libraries perform a dual role: supporting pedagogical training and fostering academic research. The specialized nature of these institutions, which focus on training future educators, means their libraries must be particularly adaptive and responsive to the specific

needs of both pre-service teachers and faculty members. Therefore, the implementation of AI in such settings requires not just technological upgrades but also strategic alignment with educational goals and user expectations (Aina, 2020).

Artificial intelligence is increasingly being used in Colleges of Education libraries to support teaching, learning, and research. However, there is growing concern that over-reliance on AI tools may reduce students' critical thinking skills, independent reasoning, and engagement with academic resources. Despite its benefits in improving service delivery and access to information, there is limited understanding of how AI affects students' intellectual development and academic integrity within these libraries. This study therefore examines the impact of AI on students' critical thinking and academic engagement in Colleges of Education libraries.

OBJECTIVES OF THE STUDY

This study aims to explore the current state of Artificial Intelligence adoption and in Colleges of Education libraries in the globe. The specific objectives are to:

1. Explore the current state of AI adoption in Colleges of Education libraries.
2. Identify the key drivers of adoption of AI technologies in Colleges of Education libraries.
3. Investigate the practical applications, use cases of AI in Colleges of Education libraries.
4. Find out the challenges associated with the implementation of AI in Colleges of Education libraries.
5. Suggest for a strategic, inclusive, and ethical approach to AI adoption in Colleges of Education libraries.

METHODOLOGY

This study adopts a qualitative content analysis approach with a global scope, focusing on AI integration in academic libraries without regional limitation. Data were sourced from four (4) databases: Scopus, Web of Science, IEEE Xplore, and Google Scholar, selected for their high-quality, peer-reviewed, and multidisciplinary coverage of AI and library science literature. A total of 40 articles published between 2019 and 2025 were reviewed. Literature search and selection were completed within a six-week period, guided by relevance, credibility, and recency criteria. The data were analyzed using thematic analysis, enabling the identification and synthesis of key themes on AI adoption, applications, drivers, and challenges in academic libraries globally.

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

The analysis of the selected studies revealed five major themes corresponding to the objectives of the study. These themes include: the current state of AI adoption in Colleges of Education libraries, the drivers of AI integration, practical applications and use cases of AI, challenges associated with AI implementation, and strategic approaches for inclusive and ethical AI integration. The findings are presented and discussed under the respective themes.

Theme One: Current State of AI Adoption in Colleges of Education Libraries

The thematic analysis revealed that the adoption of Artificial Intelligence (AI) in Colleges of Education libraries remains largely at an emerging stage. Across the reviewed studies, there is growing awareness among library administrators and information professionals regarding the transformative potential of AI technologies in enhancing service delivery. The literature consistently indicates that libraries are increasingly exploring opportunities for integrating AI into their operations in response to global technological developments and changing user expectations.

The reviewed studies show that while awareness of AI is increasing, actual implementation remains limited in many Colleges of Education libraries. Most institutions are still experimenting with basic AI applications such as automated cataloguing systems, digital reference tools, and simple chatbot services. Full-scale deployment of advanced AI systems remains relatively uncommon due to infrastructural and financial limitations. The findings suggest that many institutions are currently in the exploratory and pilot implementation phases rather than the advanced adoption stage.

The analysis further indicates that the pace of adoption varies considerably among institutions. Some libraries have demonstrated greater readiness by investing in digital infrastructure and staff development, while others continue to rely heavily on traditional library practices. This uneven pattern of adoption reflects disparities in institutional capacity, technological readiness, and availability of resources. The findings therefore suggest that although AI adoption has commenced within Colleges of Education libraries, the integration process remains gradual and developmental.

The implication of this finding is that Colleges of Education libraries are increasingly recognizing the importance of AI technologies but require additional support, strategic planning, and

infrastructural investment to move beyond experimental implementation toward comprehensive adoption.

Theme Two: Drivers of AI Integration in Colleges of Education Libraries

The analysis identified several factors driving the integration of AI technologies in Colleges of Education libraries. A dominant theme emerging from the literature is technological advancement. The increasing availability of affordable digital technologies, cloud computing services, machine learning tools, and AI-powered applications has lowered entry barriers for educational institutions seeking to modernize their library services.

Another significant driver identified is the changing expectations of library users. Students and academic staff increasingly demand personalized, efficient, and real-time access to information resources. The reviewed studies reveal that contemporary users expect intelligent search capabilities, instant responses to inquiries, customized recommendations, and seamless digital experiences comparable to those available on commercial digital platforms. Consequently, libraries are adopting AI technologies to meet these evolving expectations and remain relevant within the digital information environment.

Operational efficiency also emerged as a major motivating factor. The literature demonstrates that AI technologies enable libraries to automate repetitive and time-consuming activities such as cataloguing, classification, metadata generation, circulation management, and information retrieval. Through automation, library personnel can devote more attention to strategic activities including research support, information literacy instruction, user engagement, and collection development.

Institutional support and strategic alignment constitute another important driver. The findings indicate that AI adoption is more successful when linked to broader institutional objectives such as digital transformation, academic excellence, innovation, and e-learning development. Institutions that perceive AI as a strategic tool for improving educational outcomes are more likely to invest in its implementation.

These findings suggest that AI integration is not driven by a single factor but rather by a combination of technological opportunities, user demands, operational needs, and institutional aspirations.

Theme Three: Practical Applications and Use Cases of AI in Colleges of Education Libraries

The thematic analysis revealed a wide range of practical AI applications currently being utilized or considered within academic library environments. One of the most frequently reported applications is the use of intelligent information retrieval systems. These systems employ machine learning and natural language processing technologies to improve search accuracy, understand user intent, and provide more relevant search results.

The analysis also identified AI-powered chatbots and virtual reference assistants as prominent applications. These technologies provide immediate responses to user inquiries, offer guidance on resource utilization, assist with navigation of library collections, and support users outside regular service hours. The reviewed literature suggests that chatbot implementation has significantly improved service accessibility and responsiveness while reducing the workload of library personnel.

Another major application emerging from the analysis is automated cataloguing and metadata generation. AI technologies assist libraries in organizing information resources more efficiently by automatically generating descriptive metadata, identifying subject headings, and supporting classification activities. This reduces human error and enhances consistency in bibliographic management.

The findings further reveal growing use of recommendation systems that analyze user behavior and preferences to suggest relevant information resources. Such systems support personalized learning experiences and facilitate effective information discovery. Predictive analytics also emerged as an important application area, enabling libraries to analyze usage patterns, forecast resource demands, identify collection gaps, and support evidence-based decision-making.

The analysis demonstrates that AI applications are transforming both front-end user services and back-end library operations, contributing to improved efficiency, accessibility, and user satisfaction.

Theme Four: Challenges Associated with AI Implementation in Colleges of Education Libraries

The analysis identified several significant challenges that constrain the successful implementation of AI technologies within Colleges of Education libraries. One of the most recurring themes is inadequate funding. The reviewed studies consistently

indicate that the acquisition, deployment, and maintenance of AI technologies require substantial financial investment, which many institutions struggle to provide due to competing budgetary priorities.

Another major challenge identified is inadequate technological infrastructure. Effective AI implementation depends on reliable internet connectivity, robust digital systems, cloud computing capabilities, and technical support services. Many Colleges of Education, particularly those located in underserved areas, continue to face infrastructural deficiencies that limit the deployment of sophisticated AI solutions.

The findings also reveal resistance to change among library personnel. Some librarians express concerns regarding job displacement, increased technological complexity, and insufficient technical expertise. Such perceptions often create reluctance toward adopting AI technologies and may slow implementation efforts. The literature emphasizes that inadequate training and low AI literacy contribute significantly to this challenge.

Data privacy and ethical concerns emerged as another important theme. AI systems often require access to large volumes of user data to function effectively. Consequently, concerns regarding data protection, user privacy, transparency, algorithmic bias, and ethical accountability continue to generate apprehension among stakeholders.

In addition, the analysis identified the scarcity of localized AI solutions as a significant barrier. Many existing AI applications are developed outside the Nigerian educational context and may not adequately address local linguistic, cultural, and operational realities. This limitation reduces the effectiveness and relevance of some AI technologies within Colleges of Education libraries. These challenges highlight the need for comprehensive planning, investment, and stakeholder engagement to facilitate sustainable AI implementation.

Theme Five: Strategic, Inclusive and Ethical Approaches to AI Integration

The final theme emerging from the analysis emphasizes the importance of adopting strategic, inclusive, and ethical approaches to AI integration. The reviewed studies consistently advocate for institutional strategies that align AI initiatives with organizational goals, academic missions, and long-term development priorities. Strategic planning ensures that AI investments contribute meaningfully to educational outcomes and institutional performance.

The analysis further underscores the necessity of inclusiveness in AI implementation. Successful adoption requires the active participation of librarians, academic staff, students, information technology specialists, and institutional administrators. Stakeholder involvement promotes ownership, reduces resistance, and facilitates smoother implementation processes.

Capacity building emerged as another critical component of successful AI integration. The literature strongly recommends continuous professional development programmes aimed at improving AI literacy, technical competence, and digital skills among library personnel. Such initiatives enhance staff confidence and preparedness for technological change.

Ethical governance constitutes another central element of effective AI integration. The reviewed studies emphasize the need for clear policies addressing data protection, privacy, transparency, accountability, and responsible use of AI technologies. Ethical frameworks are essential for safeguarding user rights and maintaining trust in digital library services.

The findings also highlight the importance of strategic partnerships involving educational institutions, technology companies, government agencies, and international organizations. Such collaborations can provide access to technical expertise, financial support, and locally relevant AI solutions.

DISCUSSION OF FINDINGS

The findings of this study demonstrate that AI is gradually transforming service delivery within Colleges of Education libraries. Although adoption remains at an emerging stage, there is clear evidence of increasing institutional interest and growing recognition of AI's potential benefits. The study confirms that technological advancement, user expectations, operational efficiency, and strategic institutional goals are major catalysts for AI integration.

The findings further reveal that AI technologies have substantial potential to enhance information retrieval, automate routine operations, improve user engagement, and support evidence-based decision-making. However, realizing these benefits requires addressing persistent challenges related to funding, infrastructure, staff readiness, ethical governance, and localization of AI solutions.

The study therefore reinforces the need for deliberate, inclusive, and ethically grounded implementation strategies that

will enable Colleges of Education libraries to harness AI effectively while minimizing associated risks. The success of AI integration will ultimately depend on institutional commitment, stakeholder collaboration, continuous capacity building, and sustainable investment in digital infrastructure.

CONCLUSION

The adoption of Artificial Intelligence (AI) in Colleges of Education libraries represents a significant step toward transforming academic service delivery. This study, through a thematic analysis of literature, has illuminated both the prospects and the multifaceted challenges associated with AI adoption in this specialized educational context. There is increasing adoption of AI in library operations, but the actual implementation remains uneven, constrained by infrastructural limitations, financial constraints, and human capital deficits. AI technologies such as intelligent search systems, chatbots, and recommendation engines offer promising avenues for enhancing user experience and operational efficiency. However, their impact is contingent upon institutional readiness, strategic alignment with educational goals, and the willingness of library personnel to adapt to new technological paradigms. The study therefore concludes that Artificial Intelligence has significant potential to reshape service delivery in Colleges of Education libraries. Nevertheless, the extent to which these libraries benefit from AI technologies depends largely on their level of preparedness, availability of resources, technological capacity, and ability to address the institutional and operational challenges associated with AI adoption and integration.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed in line with the specific objectives of the study:

1.To Enhance the Current State of AI Adoption in Colleges of Education Libraries

College administrators, library management, and policymakers should develop comprehensive AI adoption frameworks that will facilitate the gradual transition from exploratory implementation to full-scale integration of AI technologies. Institutional policies should clearly articulate the role of AI in library service delivery and provide strategic direction for its implementation. Furthermore, awareness campaigns should be intensified to promote understanding of the benefits and opportunities associated with AI adoption among stakeholders.

2. To Strengthen the Drivers of AI Integration in Colleges of Education Libraries

Institutions should capitalize on the factors driving AI adoption by aligning AI initiatives with institutional goals relating to digital transformation, teaching excellence, research support, and student engagement. Library managers should continuously assess user information needs and leverage emerging technologies to provide personalized, efficient, and user-centered services. Additionally, management should create enabling environments that encourage innovation and technology-driven service delivery.

3. To Expand the Practical Applications and Use Cases of AI in Libraries

Colleges of Education libraries should invest in the deployment of practical AI applications such as intelligent discovery systems, virtual reference assistants, chatbot services, automated cataloguing tools, metadata generation systems, and predictive analytics platforms. Libraries should also collaborate with technology providers and information professionals to identify and implement AI solutions capable of improving operational efficiency, resource management, and user satisfaction.

4. To Address the Challenges Associated with AI Implementation

Government agencies, institutional administrators, and library authorities should prioritize investment in digital infrastructure, reliable internet connectivity, and AI-related technologies. Adequate funding should be allocated for the acquisition, maintenance, and upgrading of AI systems. In addition, regular training, workshops, and capacity-building programmes should be organized to enhance librarians' competencies, reduce resistance to technological change, and improve their readiness for AI implementation. Institutions should also establish robust policies for data protection, privacy, and ethical AI usage.

5. To Promote a Strategic, Inclusive, and Ethical Approach to AI Adoption

Colleges of Education libraries should adopt a strategic and participatory approach to AI implementation by involving librarians, faculty members, students, ICT professionals, and administrators in planning and decision-making processes. Institutions should develop ethical guidelines that ensure transparency, accountability, fairness, and user privacy in AI deployment. Furthermore, efforts should be made to encourage the development of localized AI solutions through partnerships

with software developers, research institutions, government agencies, and international organizations. Continuous monitoring and evaluation mechanisms should also be established to assess the effectiveness, impact, and sustainability of AI initiatives.

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