International Journal of Technology, Management and Social Sciences (IJTMSS)
[ISSN: 2583-8482]
Volume 4_Issue 2 [April-June 2026]

Role of AI Based Academic Libraries in Knowledge Management of College Students: Challenges and Opportunities

Dr. Vijay Ramrao Gaikwad

Librarian, Late Pushpadevi Patil Art's and Science College, Risod, Tal- Risod, Dist-Washim, MH, India

Abstract

Artificial Intelligence (AI) is transforming academic libraries from conventional information repositories into intelligent knowledge-management environments that support students' learning, research, and academic development. This study examines the role of AI-based academic libraries in the knowledge management of college students, with particular emphasis on emerging opportunities and implementation challenges. AI-enabled technologies such as intelligent search engines, virtual assistants, recommendation systems, automated cataloguing, natural language processing and personalized learning tools facilitate efficient knowledge acquisition, organization, retrieval, sharing, and utilization. These applications can improve access to academic resources, provide customized information services, enhance information literacy, and support evidence-based learning and research. Their adoption also involves challenges related to digital infrastructure, implementation costs, data privacy, algorithmic bias, ethical concerns, limited AI literacy, staff competencies, and unequal technological access. The study concludes that responsible integration of AI with human expertise can strengthen academic library services and create inclusive, responsive, and student-centre knowledge-management ecosystems.

Keywords: *Artificial Intelligence (AI), Academic Libraries, Knowledge Management, College Students, Digital Libraries, AI-Based Library Services, Information Retrieval, Personalized Learning, Information Literacy, Smart Libraries*

Submitted: April 30, 2026 **Revised:** May 20, 2026 **Accepted:** June 3, 2026 **Published:** June 15, 2026

DOI: 10.5281/zenodo.22067092

1. Introduction

Academic libraries are fundamental components of higher education institutions because they facilitate the acquisition, organization, preservation, dissemination, and utilization of knowledge for teaching, learning, and research. The growth of digital information has progressively changed academic libraries from predominantly print-based repositories into hybrid and technology-supported knowledge centres. Knowledge management in academic libraries extends beyond storing information; it involves identifying, organizing, sharing, and applying both explicit and tacit knowledge to improve institutional learning and information services. In the Indian academic-library context, professional education, information technology, communities of practice and knowledge-sharing mechanisms have been identified as important instruments for effective knowledge management. The strengthening knowledge-management practices has become important for enabling college students to locate, evaluate, share, and utilize academic information more efficiently (Nazim & Mukherjee, 2011). Artificial Intelligence (AI) has introduced a new dimension to the technological development of academic libraries by enabling machines and information systems to perform tasks that traditionally required elements of human intelligence. AI applications can potentially support automated classification, intelligent information

retrieval, reference services, resource organization, decision support, and interaction between libraries and users. Expert systems, AI technologies, and robotics have particularly demonstrated potential in areas such as organization, storage and retrieval of information resources, reference services, and information-desk functions. Such technologies can enable academic libraries to respond more efficiently to expanding digital collections and increasingly diverse information requirements (Ghadge & Gaikwad, 2024). For college students, AI-supported library systems can simplify information discovery and facilitate quicker access to relevant learning and research materials. The movement towards intelligent libraries represents an important development in connecting technological innovation with effective academic knowledge management (Asemi et al., 2021). The growing application of AI also provides opportunities to make academic-library services more personalized, interactive, and user-oriented. AI-enabled systems can help students navigate large volumes of digital information, identify relevant resources, and receive more responsive academic support (Gaikwad, 2021). Intelligent library services can contribute to digital transformation by integrating AI applications into information retrieval, knowledge sharing, and innovative educational services. The development of AI-based library-service frameworks consequently provides opportunities for university and college libraries to create value-added services that contribute to learning, research, and wider digital transformation in higher education (Okunlaya et al., 2022). Evidence concerning students' preparedness for AI-based library environments indicates that awareness of AI does not automatically ensure readiness for its effective use; basic computer competencies and appropriate technological infrastructure remain important requirements. The limitations such as unreliable technological facilities can restrict the accessibility and usefulness of AI applications. The successful AI integration should combine intelligent technologies with student training, librarian expertise, institutional investment, and equitable access. A balanced approach can enable academic libraries to use AI as a knowledge-management tool while maintaining their essential educational and student-support functions (Owolabi et al., 2022).

2. Background of Study

The rapid growth of digital information has significantly altered the role and functioning of academic libraries in higher education. Libraries are no longer limited to collecting and preserving books and journals; they increasingly function as knowledge-management centres that facilitate the creation, organization, sharing, retrieval, and application of academic knowledge. Effective knowledge management enables academic libraries to integrate information resources, technological infrastructure, human expertise, and learning spaces to support institutional teaching and research. A well-designed knowledge-management framework can therefore improve the ability of university libraries to coordinate knowledge resources and create collaborative learning environments (Gaikwad, 2016). Bem et al. (2016) proposed a knowledge-management framework for university libraries incorporating knowledge-management coordination, knowledge resources, and learning commons, demonstrating the importance of systematic KM practices in contemporary academic-library environments. In the Indian higher-education context, the increasing availability of electronic databases, institutional repositories, digital learning materials, internet-based resources, and communication technologies has created new possibilities for academic knowledge management. Rao (2016) found that Internet, intranet, help-desk technologies, and document-management systems were among the preferred knowledge-management tools used by university libraries in India.The emergence of Artificial Intelligence adds another dimension to the transformation of academic-library services. AI-based systems can potentially assist libraries with information retrieval, automated reference support, cataloguing, resource discovery, recommendation, classification, and management of large digital collections. Such developments are particularly important for college students who frequently encounter information overload while searching for reliable and academically relevant resources. Alajmi and Alhaji (2017) found that factors

such as a culture of trust and top-management support significantly influence attitudes toward knowledge sharing and perceived readiness for knowledge-management adoption in academic libraries. The institutional preparedness remains essential when libraries progress toward AI-enabled knowledge-management environments. A study of AI applications in library services identifies inadequate funding, librarians' attitudes, and insufficient technical skills among the barriers that can hinder effective implementation, while also recognizing AI's potential to improve library operations and information services (Vijayakumar & Sheshadri, 2022).

3. Scope and Significance of Study

The scope of the present study focuses on the role of AI-based academic libraries in the knowledge management of college students, particularly in relation to the acquisition, organization, retrieval, sharing, and effective utilization of academic information. The study covers AI-enabled applications such as intelligent information retrieval, natural language processing, machine learning, voice-search technologies, automated library operations, data processing, and personalized information services. It considers how these technologies can improve students' access to relevant academic resources while enhancing the efficiency and responsiveness of library services. Ali et al. (2020) observed that AI tools such as natural language processing, voice searching, translation systems, text data mining, and cloud-based technologies have considerable potential for application in academic-library services. The study therefore encompasses both technological applications and their contribution to student-oriented knowledge-management practices.Hervieux and Wheatley (2021) found that academic librarians recognized the potential relevance of AI but demonstrated a need for greater training concerning AI and its practical applications in libraries. In this context, academic libraries can contribute not only by providing technological resources but also by developing students' capabilities to locate, critically evaluate, manage, and responsibly use information. Johnston and Webber (2018) emphasize the strategic importance of information and digital literacy in universities and highlight the need for institution-wide approaches to developing these competencies. Consequently, the present study connects AI-based library development with students' broader knowledge-management and learning capabilities.Tóth et al. (2022) found that academic-library directors generally regarded AI as an opportunity rather than a threat and identified its potential contribution to areas including information services, digitization, education, information retrieval, and data processing. The present study provides useful insights for librarians, college administrators, policymakers, researchers, and students in developing responsible, inclusive, and student-centre AI-based academic-library systems.

4. Objective of Study

- To examine the role of Artificial Intelligence-based academic libraries in knowledge management among college students
- To identify the major AI-based tools, technologies, and services used by academic libraries for acquiring, organizing, storing, retrieving, and disseminating knowledge
- To assess the contribution of AI-based academic-library services to information accessibility, knowledge discovery, personalized learning, and academic support for college students
- To examine the role of AI-based academic libraries in improving students' information retrieval, information literacy, knowledge sharing, and effective utilization of academic resources
- To identify the major technological, financial, infrastructural, ethical, privacy, and skill-related challenges associated with the adoption of AI in academic libraries

5. Review of Literature

Omame and Alex-Nmecha (2020) examined the emerging application of Artificial Intelligence in libraries and highlighted its potential to transform conventional library operations into more intelligent and responsive services. Their study observed that AI technologies can support reference services, information retrieval, cataloguing, classification, and other routine library functions. AI-based systems can operate continuously and process large quantities of information more rapidly, thereby enabling librarians to devote greater attention to specialized user services and knowledge-support activities. At the same time, the authors highlighted limitations concerning specialized technological knowledge, infrastructure, financial resources, and professional competencies.

Das and Islam (2021) conducted a systematic review of Artificial Intelligence and Machine Learning applications in libraries by examining studies indexed in major scholarly databases, including Web of Science, Scopus, LISA, and LISTA. Their review identified a growing scholarly interest in AI and machine learning within Library and Information Science, although much of the existing research remained theoretical rather than implementation-oriented. The study indicated that AI and machine-learning techniques have considerable scope in areas such as information organization, retrieval, classification, prediction, and automated library services.

Yoon, Andrews, and Ward (2022) investigated librarians' perceptions regarding the adoption of Artificial Intelligence and related emerging technologies in public and academic libraries in North America. Based on responses from 242 librarians, the study found that academic librarians reported comparatively greater awareness and use of AI-related technologies. Approximately two-thirds of respondents believed that AI and related technologies would transform library functions, while a substantial proportion expressed interest in receiving additional technological training. The findings indicate that successful AI adoption depends not only on technological infrastructure but also on professional development and librarians' readiness to work with intelligent systems.

Duncan (2022) reviewed AI projects and explored their potential application within academic libraries, particularly in the Caribbean context. The study emphasized that Artificial Intelligence could improve efficiency, extend the reach of library services, reduce operational errors, and facilitate smoother management of routine library activities. AI-supported processes were viewed as potentially beneficial for circulation, information access, resource management, and overall service delivery. Duncan further argued that carefully implemented AI technologies could enable academic libraries to improve accuracy and productivity while responding more efficiently to users' information requirements.

Asula et al. (2022) demonstrated a practical application of Artificial Intelligence through the development of Kratt, an automatic subject-indexing tool for the National Library of Estonia. The researchers designed the system to automatically assign subject keywords to books using the Estonian Subject Thesaurus. The prototype was able to complete subject indexing considerably faster than traditional manual procedures, although the authors also acknowledged limitations concerning the quality and accuracy of generated keywords. The study demonstrates both the opportunities and challenges associated with applying AI to knowledge organization.

6. Discussion and Analysis

The integration of Artificial Intelligence into academic libraries represents an important transition from conventional information management towards intelligent knowledge-management systems. AI and machine-learning applications can strengthen knowledge organization, storage, integration, categorization, and discovery while also supporting automated services such as chatbots and advanced search tools. For college students, these capabilities can reduce the difficulties associated with

navigating rapidly expanding volumes of academic information and facilitate more systematic access to relevant knowledge. The International Federation of Library Associations and Institutions emphasizes that AI can introduce new dimensions to knowledge-management processes while improving categorization, discovery, optical character recognition, and other library functions. Thus, AI-based academic libraries can serve as technologically advanced knowledge environments rather than merely digital repositories (International Federation of Library Associations and Institutions [IFLA], 2020).AI-supported automation can also reduce the time librarians spend on repetitive operations, creating greater opportunities for professional involvement in research support, digital literacy, user education, and specialized knowledge services. Such developments can improve the overall student experience by creating library systems that are available beyond conventional operating hours. AI should primarily be viewed as a mechanism for augmenting professional library services and strengthening students' interaction with academic knowledge rather than simply replacing human-mediated services.

The Association of Research Libraries has emphasized that research libraries need explicit policies, principles, and practices concerning AI ethics because these institutions occupy an important position in the production, dissemination, and preservation of knowledge. Libraries therefore need governance frameworks that preserve user privacy, intellectual freedom, transparency, and institutional accountability while implementing intelligent technologies (Association of Research Libraries [ARL], 2019).Wojciechowska (2021) argues that implementing augmented intelligence in libraries requires careful consideration of both practical and ethical problems. This perspective is particularly relevant to college libraries because students may require contextual guidance, critical evaluation of sources, research assistance, and information-literacy support that cannot always be adequately provided through automation alone. An effective AI-based library should combine computational capabilities with librarians' professional judgements and academic expertise.

The analysis further indicates that institutional readiness is a critical factor influencing successful AI implementation. Academic libraries require appropriate digital infrastructure, financial investment, reliable databases, technical support, skilled professionals, and strategic leadership. Libraries operating with limited resources may find it difficult to acquire sophisticated AI applications or continuously update technological infrastructure. Evidence from university libraries shows that AI adoption can offer strengths and opportunities while simultaneously creating weaknesses and threats associated with implementation. A SWOT-based investigation of university libraries in Pakistan, for example, found that AI technologies were gradually entering library environments and highlighted the importance of considering institutional capabilities when introducing those (Yousuf Ali et al., 2022). The effectiveness of an AI-based academic library should ultimately be evaluated by its contribution to students' ability to acquire, organize, understand, share, and apply knowledge. AI applications can make knowledge discovery faster, but technological efficiency alone does not guarantee meaningful learning. Students require information literacy and critical-thinking skills to assess the authority, relevance, accuracy, and reliability of information obtained through intelligent systems.

7. Finding of Study

- The study reveals that Artificial Intelligence has considerable potential to transform academic libraries into intelligent knowledge-management centres. AI-based technologies can strengthen the processes of knowledge acquisition, organization, storage, retrieval, sharing, and utilization, thereby enabling college students to access academic information more efficiently.
- It is found that AI-supported services such as intelligent search systems, chatbots, recommendation systems, automated indexing, natural language processing, optical character recognition, and smart library systems can improve the speed and convenience of information

retrieval. These applications can reduce information overload and assist students in identifying resources relevant to their academic and research requirements.

- The study finds that AI-based academic libraries can contribute significantly to personalize and student-centre library services. Intelligent systems can analyse information requirements and provide more relevant recommendations, thereby improving resource discovery, accessibility, user experience, and the effective utilization of library collections.
- Another important finding is that AI can improve the operational efficiency of academic libraries by automating repetitive and time-consuming activities. Existing research indicates that AI integration can reduce human errors associated with repetitive library tasks and potentially improve service delivery. Consequently, librarians can devote greater attention to information literacy, research assistance, student guidance, and specialized knowledge services.
- The study also identifies digital and AI literacy as critical requirements for deriving maximum benefits from intelligent academic libraries. Students need appropriate technological and information-literacy competencies to search, evaluate, interpret, and ethically utilize information generated or recommended through AI-supported systems. Library orientation and practical ICT training can therefore play an important role in improving students' preparedness for AI-based library environments.
- Despite its advantages, the study finds several significant barriers to AI adoption, including inadequate funding, technological infrastructure, and shortage of AI-skilled library professionals, training requirements, implementation and maintenance costs, and institutional readiness. Research on academic libraries similarly identifies funding, limited expertise, technology procurement, and staff training as major implementation constraints.
- The study further finds that ethical and privacy concerns constitute an important challenge. AI-based library systems may create issues concerning users' personal data, algorithmic bias, transparency, accountability, intellectual freedom, and the reliability of automated recommendations. Consequently, AI implementation requires clear institutional policies and responsible data-management practices.

8. Conclusion

Artificial Intelligence is emerging as an important technological force in transforming academic libraries into intelligent, responsive, and student-centre knowledge-management environments. The study concludes that AI-based academic libraries can significantly improve the acquisition, organization, storage, retrieval, sharing, and utilization of knowledge among college students. Technologies such as intelligent search systems, chatbots, recommendation systems, automated indexing, natural language processing, and machine learning can enhance information accessibility, reduce information overload, personalize library services, and improve operational efficiency. However, successful AI adoption depends on adequate technological infrastructure, financial investment, trained library professionals, institutional readiness, and sufficient AI and information literacy among students. Issues concerning data privacy, algorithmic bias, transparency, reliability, and ethical use also require careful consideration. AI should therefore be regarded as a supportive mechanism rather than a replacement for professional librarians. A balanced integration of AI technologies with human expertise, ethical governance, and student-focused services can enable academic libraries to strengthen knowledge management and contribute effectively to higher education, research, and lifelong learning.

References:

- Alajmi, B. M., & Alhaji, T. A. (2017). Are academic libraries ready for knowledge management? *The Electronic Library, 35*(1), 137–151. https://doi.org/10.1108/EL-01-2016-0008
- Ali, M. Y., Naeem, S. B., & Bhatti, R. (2020). Artificial intelligence tools and perspectives of university librarians: An overview. *Business Information Review, 37*(3), 116–124. https://doi.org/10.1177/0266382120952016
- Asemi, A., Ko, A., & Nowkarizi, M. (2021). Intelligent libraries: A review on expert systems, artificial intelligence, and robot. *Library Hi Tech, 39*(2), 412–434. https://doi.org/10.1108/LHT-02-2020-0038
- Asula, M., Makke, J., Freienthal, L., Kuulmets, H.-A., & Sirel, R. (2022). Kratt: Developing an automatic subject indexing tool for the National Library of Estonia. *arXiv*. https://doi.org/10.48550/arXiv.2203.12998
- Association of Research Libraries. (2019). *Research library issues, 299: Ethics of artificial intelligence*. Association of Research Libraries.
- Bem, R. M. de, Coelho, C. C. de S. R., & Dandolini, G. A. (2016). Knowledge management framework to the university libraries. *Library Management, 37*(4/5), 221–236. https://doi.org/10.1108/LM-01-2016-0005
- Das, R. K., & Islam, M. S. U. (2021). Application of artificial intelligence and machine learning in libraries: A systematic review. *arXiv*. https://doi.org/10.48550/arXiv.2112.04573
- Duncan, A. S. P. (2022). The intelligent academic library: Review of AI projects & potential for Caribbean libraries. *Library Hi Tech News, 39*(5), 12–15. https://doi.org/10.1108/LHTN-01-2022-0014
- Gaikwad, S. R. (2016). Role of skill development in employability of Indian graduates. *ALIVE: Conference Proceedings, 1*(1), 33–42. Vishwakarma Publication. https://scholar.google.com/citations?view_op=view_citation&hl=en&user=KufjkiwAAAAJ&sortby=pubdate&authuser=1&citation_for_view=KufjkiwAAAAJ:9yKSN-GCB0IC
- Gaikwad, S. R. (2021). Enhancement of English communication skills for employability of college and university students. *Vidyabharati International Interdisciplinary Research Journal, 13*(1), 265–272. https://scholar.google.com/citations?view_op=view_citation&hl=en&user=KufjkiwAAAAJ&authuser=2&citation_for_view=KufjkiwAAAAJ:zYLM7Y9cAGgC
- Ghadge, S., & Gaikwad, S. R. (2024). A study on perceptions of college students towards digital libraries in Maharashtra. *Library Progress International, 44*(2), 482–492. https://bpasjournals.com/library-science/index.php/journal/article/view/1090
- Hervieux, S., & Wheatley, A. (2021). Perceptions of artificial intelligence: A survey of academic librarians in Canada and the United States. *The Journal of Academic Librarianship, 47*(1), 102270. https://doi.org/10.1016/j.acalib.2020.102270
- International Federation of Library Associations and Institutions. (2020). *IFLA statement on libraries and artificial intelligence*. IFLA.
- Johnston, N., & Webber, S. (2018). Creating a connected future through information and digital literacy: Strategic directions at The University of Queensland Library. *Journal of the Australian Library and Information Association, 67*(1), 42–54. https://doi.org/10.1080/24750158.2018.1426365
- Nazim, M., & Mukherjee, B. (2011). Implementing knowledge management in Indian academic libraries. *Journal of Knowledge Management Practice, 12*(3).

- Okunlaya, R. O., Abdullah, N. S., & Alias, R. A. (2022). Artificial intelligence (AI) library services innovative conceptual framework for the digital transformation of university education. *Library Hi Tech, 40*(6), 1869–1892. https://doi.org/10.1108/LHT-07-2021-0242
- Omame, I. M., & Alex-Nmecha, J. C. (2020). Artificial intelligence in libraries. In N. Osuigwe (Ed.), *Managing and adapting library information services for future users* (pp. 120–144). IGI Global. https://doi.org/10.4018/978-1-7998-1116-9.ch008
- Owolabi, K. A., Abayomi, A. O., Aderibigbe, N. A., Kemdi, O. M., Oluwaseun, O. A., & Okorie, C. N. (2022). Awareness and readiness of Nigerian polytechnic students towards adopting artificial intelligence in libraries. *Journal of Information and Knowledge, 59*(1), 15–24. https://doi.org/10.17821/srels/2022/v59i1/168682
- Rao, S. S. (2016). Use of knowledge management tools and techniques in academic libraries in India: A study. *Journal of Information and Knowledge, 53*(5), 367–374. https://doi.org/10.17821/srels/2016/v53i5/89051
- Tóth, M., et al. (2022). Views of academic library directors on artificial intelligence: A representative survey in Hungary. *New Review of Academic Librarianship, 28*(3). https://doi.org/10.1080/13614533.2021.1930076
- Vijayakumar, S., & Sheshadri, K. N. (2022). Use of artificial intelligence in the library services: Prospects and challenges. *Library Hi Tech News*. https://doi.org/10.1108/LHTN-11-2022-0125
- Wojciechowska, M. (2021). Augmented intelligence technology: The ethical and practical problems of its implementation in libraries. *Library Hi Tech, 39*(2), 435–447. https://doi.org/10.1108/LHT-02-2020-0043
- Yoon, J., Andrews, J. E., & Ward, H. L. (2022). Perceptions on adopting artificial intelligence and related technologies in libraries: Public and academic librarians in North America. *Library Hi Tech, 40*(6), 1893–1915. https://doi.org/10.1108/LHT-07-2021-0229
- Yousuf Ali, M., Naeem, S. B., Bhatti, R., & Richardson, J. (2022). Artificial intelligence application in university libraries of Pakistan: SWOT analysis and implications. *Global Knowledge, Memory and Communication*. https://doi.org/10.1108/GKMC-12-2021-0203