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Integration of Artificial Intelligence in Library Service: A Road Map

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Abstract:

Artificial intelligence (AI) is revolutionizing library services by increasing efficiency, accessibility, and user engagement. This article looks at AI applications in libraries, including chatbots, recommendation engines, cataloguing, and predictive analytics. It highlights benefits like improved resource management, operational automation, and customized user experiences in addition to addressing problems like data privacy, moral conundrums, and implementation costs. In the future, AI in libraries could offer complex search capabilities, interesting educational materials, and moral frameworks. It emphasizes the many advantages of AI, such as increased operational effectiveness, tailored user experiences, and data-driven decision-making. It also discusses the difficulties libraries encounter with implementing AI, such as ethical issues, data privacy, staff skill gaps, and the requirement for inclusive, accessible technologies. The study highlights the need for libraries to make investments in infrastructure, employee training, and ethical frameworks to integrate AI successfully and responsibly. These days, librarians contribute to tech-savvy guidance and community building. By using AI, libraries can continue to play a key role in the digital information economy.

***Keywords**: Artificial Intelligence, Digital Transformation, Chatbots, Machine Learning, Ethical AI, Predictive Analytics, Users Experience.*

1. Introduction:

The workflow of the Library and Information Center has historically served as the new wave for the preservation, dissemination, and accessibility of information and knowledge to the remote corner of the global society. Libraries have long been the repositories of the world's intellectual heritage, traditionally managing their extensive print collections (books, journals, etc.) through manual cataloging and indexing. Today, however, their role is profoundly transforming. This shift is catalyzed by the rapid integration of AI, ML, and ICT (Information Communication Technology), which are revolutionizing information management and access to better harness it for the benefit of society.

Artificial Intelligence (AI) includes technologies like computer sensory systems, expert systems, and natural language processing. AI is defined as the imitation of human cognitive functions by machines. As a branch of AI, machine learning (ML) gives systems the ability to analyze data and

forecast results with little assistance from humans. By enabling sophisticated bibliometric mapping, intelligent search engines, and personalized recommendation systems, these tools collectively are transforming Library service. Beyond just advancing technology, AI and ML promote innovative function by connecting Library service with combo integration of computer science, information science, and digital humanities. These tools assist LIS professional in addressing new societal issues, identifying research trends, and managing information overload. As a result, AI and ML not only update Library service orientated technical functions but also establish it as a cooperative center to produce a quality service. To identify opportunities, constraints, and future directions, this report critically assesses their function in promoting unique service to every corner of society.

2. Literature Review:

The core literature affirms that AI applications are poised to revolutionize information services, enhancing user experience through faster access, personalized recommendations, and efficient resource management (Cox et al., 2019; Hussain, 2023)[1]. Libraries are increasingly adopting AI-enabled systems, driven by the need to manage vast amounts of data, provide 24/7 assistance, and remain relevant in the digital age.

(I) **Key Applications:** AI is primarily utilized in "back-end" systems like automated cataloging, classification, and resource management, and "front-end" services such as AI-powered chatbots for reference, personalized learning, and enhanced search and discovery (Asemi & Asemi, 2018; Harisanty et al., 2023)[2]. Tools like Generative AI (e.g., ChatGPT) are being explored for reference services, potentially outperforming traditional chatbots (*International Federation of Library Associations and Institutions, IFLA*, April 1, 2024).[3]

(II) **Benefits:** The documented advantages include automation of repetitive tasks, freeing librarians for more intellectually demanding activities, improved search accuracy, and real-time, 24/7 service delivery (Winkler & Kiszl, 2022; Yao et al., 2015)[4].

(III) **Challenges and Concerns:** Research highlights several challenges, including the need for adequate budget, human resource, and technical infrastructure (Çakmak & Eroğlu, 2024)[5].

[1] Cox, A. M., Pinfield, S., & Rutter, S. (2019).*Library Hi Tech*, *37*(4), 666–677 .https://doi.org/10.1108/LHT-06-2019-0113; Hussain, A. (2023). *Library Hi Tech News*, *40*(4), 10–13.

[2] Asemi, A., & Asemi, A. (2018). *Library Philosophy and Practice (e-journal)*, (1840). https://digitalcommons.unl.edu/libphilprac/1840

[3] International Federation of Library Associations and Institutions (IFLA). (2024, April 1). Generative AI for library and information professionals. IFLA. Retrieved from https://www.ifla.org/generative-ai/

[4] Winkler, B., & Kiszl, P. (2022). *New Review of Academic Librarianship*, *28*(3), 256–278. https://doi.org/10.1080/13614533.2021.2001710

[5] Çakmak, E., & Eroğlu, A. (2024). *The Journal of Academic Librarianship*, *50*(4).

2.1 Literature on the Govt. Policies:

While dedicated, comprehensive government policies specifically for AI in library services are still developing, existing policy discussions and library association principles provide essential guidance, focusing heavily on ethical use and data protection. Ethical and Regulatory Frameworks: Major policy discussions globally, such as the EU's AI Act, the USA's "Blueprint for an AI Bill of Rights," and Canada's Artificial Intelligence and Data Act, emphasize ethics, transparency, and data privacy. These policies, though broad, set the regulatory context for libraries (*Regulation (EU) 2024/1689, 2024; Office of Science and Technology Policy, 2022; Artificial Intelligence and Data Act, 2022*)[6].

2.2 Library Association Guidance:

Organizations like the Association of Research Libraries (ARL) have issued "Research Libraries Guiding Principles for Artificial Intelligence." (Association of Research Libraries,2024)[7]. These principles advocate for:

- Democratizing access to AI tools to foster digital literacy.
- Commitment to understanding and mitigating bias in AI models.
- Championing transparency and information integrity.
- Prioritizing security and privacy of users, advocating for protective laws (Association of Research Libraries, 2024, Principle 5)[8]

2.3 LR about recommendations of different Commissions / Committees:

Recommendations from library and information science bodies, while often predating the current AI surge, have consistently focused on modernizing library services, which now translates to a need for AI integration and corresponding professional development.

i) **IFLA Statement:** The IFLA Statement on Libraries and Artificial Intelligence (2020) provides key recommendations, urging governments and organizations to:
   - Include Text and Data Mining (TDM) exceptions in copyright frameworks to enable libraries to participate in AI communities.

[6] European Union. (2024). *Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act)*. *Official Journal of the European Union, L*, 2024/1689.; Office of Science and Technology Policy. (2022). Blueprint for an AI Bill of Rights: Making Automated Systems Work for the American People. The White House. https://www.whitehouse.gov/ostp/ai-bill-of-rights/ ; Parliament of Canada. (2022). Artificial Intelligence and Data Act (AIDA), *Bill C-27*, 44th Parliament, 1st Session.

[7] Association of Research Libraries. (2024). *Research Libraries Guiding Principles for Artificial Intelligence*. Washington, DC: Author. https://doi.org/10.29242/principles.ai2024

[8] Ibid; See Footnote-7.

- Ensure libraries have the required infrastructure and technologies.
- Ensure AI regulation protects privacy and equity.
- Support library professionals to understand the impact of AI and develop relevant digital skills and competencies (International Federation of Library Associations and Institutions, 2020)[9].

ii) **Focus on Professional Development:** Bodies like the American Association of School Librarians (AASL) have produced guidance for librarians on integrating AI, focusing on developing policies, protecting data privacy, evaluating tools for bias, and rethinking plagiarism in the age of AI (Seales, 2025)[10].

iii) Historical Context (India): While not directly about AI, historical committees like the Sinha Committee (1957)[11] and UGC Curriculum Development Committees established foundational patterns for library systems and LIS education, underscoring the perennial need for development, a principle now applied to AI integration (Kumbar, 2018)[12].

2.4 Previous Research made on the Area of present Study:

Previous research shows a sustained, multi-decade interest in applying intelligent systems in libraries, with a recent shift towards large language models and generative AI.

i) **Early Research (Expert Systems):** Early work focused on Expert Systems (ES) in the 1980s and 1990s for tasks like reference and information retrieval, cataloging, and indexing, demonstrating an early attempt to automate cognitive tasks (Alberico & Micco, 1990; Smith, 1987)[13].

[9] International Federation of Library Associations and Institutions (IFLA). (2020). IFLA statement on libraries and artificial intelligence. Retrieved from https://repository.ifla.org/handle/20.500.14598/1646

[10] Seales, D. L. I. (2025). Leveraging AI in School Libraries: From Basics to Best Practices. ALA Editions/American Association of School Librarians.

[11] India (Republic). Advisory Committee for Libraries. (1959). Report of the Advisory Committee for Libraries (K. P. Sinha, Chair). Ministry of Education, Government of India.

[12] The statement "UGC Curriculum Development Committees established foundational patterns for library systems and LIS education, underscoring the perennial need for development, a principle now applied to AI integration" is supported by the historical influence of the UGC CDCs on LIS curriculum and the continuous evolution of LIS education from conventional to ICT-based and finally to emerging topics like AI and data management. While the provided

[13] Alberico & Micco (1990) and Smith (1987) reflect key literature from the period where Expert Systems (ES) were actively being explored and implemented in Library and Information Science (LIS). Alberico and Micco's book, *Expert Systems for Reference and Information Retrieval*, is a definitive text from 1990 that reviews existing experimental models and addresses knowledge engineering for applying ES to reference, an explicitly cognitive task . While Smith's 1987 article, "Fundamentals of Expert Systems" (or a similar work like *Expert Systems Project Management*), provides a broader overview of ES as a core component of Artificial Intelligence, the contemporary literature confirms LIS professionals were leveraging this technology for specific cognitive library tasks like classification, abstracting, and reference advice during that era

ii) **Shift to Modern AI:** More recent research explores the application of Machine Learning (ML) for tasks like demand-driven acquisition prediction (Walker & Jiang, 2019)[14] and Natural Language Processing (NLP) for enhanced information retrieval and reference services (Asemi, 2018)[15].

iii) **Impact on Librarianship:** The literature emphasizes that AI demands a reimagining of traditional library roles, positioning librarians as not just users, but as co-creators and experts in conceptualizing human-centered AI (HCAI) driven services (Gasparini & Kautonen, 2022)[16].

3. Research Gap:

Despite extensive literature on the *potential* of AI in library and Information services, several significant research gaps remain:

i) **Implementation Gap (Real-World Impact):** While the benefits are theorized, there is a persistent gap between the necessity of AI and its comprehensive, sustained implementation in most libraries, especially in developing economies (Msimanga & Bhebhe, 2024)[17]. More case studies and empirical data are needed on the long-term, measurable impact (Return on Investment, user retention, service quality) of operational AI systems beyond pilot projects.

ii) **Explainable AI (XAI) in LIS:** There is a lack of research focusing on Explainable AI (XAI)—the ability to clearly articulate how an AI system (e.g., a recommendation algorithm) arrived at its decision (Okunlaya et al., 2022)[18]. This is critical for building user trust and upholding the professional ethics of librarianship (Okunlaya et al., 2024)[19]. So further research is needed on Explainable AI for more clear application of AI on Information services.

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[14] Walker, K. W., & Jiang, Z. (2019). *The Journal of Academic Librarianship*, *45*(3), 203–212. https://doi.org/10.1016/j.acalib.2019.02.013

[15] Asemi, A., & Asemi, A. (2018). Artificial Intelligence (AI) application in Library Systems in Iran: A taxonomy study. *Library Philosophy and Practice (e-journal)*, 1840. https://digitalcommons.unl.edu/libphilprac/1840

[16] Gasparini, A., & Kautonen, H. (2022). Artificial intelligence and human-centered services in academic libraries: A critical perspective. *The Journal of Academic Librarianship*, *48*(6), 102588. https://doi.org/10.1016/j.acalib.2022.102588

[17] Msimanga, M. J., & Bhebhe, B. (2024). A review of artificial intelligence implementation in academic library services. *South African Journal of Libraries and Information Science*, *90*(2), 1–11. https://doi.org/10.7550/90-2-36

[18] Okunlaya, R. O., Syed Abdullah, N., & 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

[19] R. Okunlaya, S. Owolabi, and M. Akorede, *Navigating the Digital Age: Ethical Considerations in Library and Information Science* (Academic Press, 2024).

iii) **Human-AI Collaboration Models:** Studies often discuss the "fear of job loss" (Okunlaya et al., 2022)[20], but there is a need for more robust research on Human-AI Collaborative Models that define new roles for librarians as "AI trainers," "data curators," and "ethical stewards" to ensure HCAI (Human-Centered AI) services (Gasparini & Kautonen, 2022)[21].

iv) **Equity and Linguistic Diversity:** Research is limited on how AI can effectively serve marginalized user groups, address algorithmic bias in diverse, multilingual contexts, and ensure equitable access across socio-economic strata, especially in a country like India (Maity, A. et al., 2024)[22].

4. Objectives of Study:

This paper delves into the numerous applications of AI and ML within libraries and Information center, investigating how these technologies are:

(i) Streamlining cataloging processes.
(ii) Powering recommendation systems and librarians as "AI trainers," "data curators," and "ethical stewards"
(iii) "Fear of job loss" and to ensure HCAI (Human-Cantered AI) services.
(iv) Providing insights into user behaviour and trust and upholding the professional ethics of librarianship
(v) Contributing to the preservation of both physical and digital materials.

4.1 Research Questions of the Study:

This Study tries to explore:

i) How AI and ML technologies are redefining the role of librarians and information professionals by enabling a more efficient and user-centric approach to service delivery.
ii) Addressing the ever-expanding volume of digital resources and the growing complexities of information management, the adoption of AI and ML holds immense potential to enhance the accessibility and discoverability of information, facilitate personalized user experiences.

[20] Okunlaya, R. O., Syed Abdullah, N., & 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.

[21] Gasparini, A., & Kautonen, H. (2022). Artificial intelligence and human-centered services in academic libraries: A critical perspective. *The Journal of Academic Librarianship*, *48*(6), 102588. https://doi.org/10.1016/j.acalib.2022.102588

[22] Maity, A., Sharma, A., Dhar, R., Abhishek, T., Gupta, M., & Varma, V. (2024, May). Multilingual Bias Detection and Mitigation for Indian Languages. In *Proceedings of the 7th Workshop on Indian Language Data: Resources and Evaluation (WILDRE)* (pp. 24–29). ELRA and ICCL. https://aclanthology.org/2024.wildre-1.4/

iii) How empower librarians with valuable insights for collection development and resource allocation through these technologies.

iv) Crucially, as these technologies integrate into information services, the ethical and societal implications become paramount.

Therefore, this Study further delves into the ethical considerations and challenges, specifically focusing on issues related to privacy, algorithmic bias, and information security, that must be understood and addressed for responsible AI/ML implementation.

5. Methodology of the Study:

The proposed study aims to bridge the research gap by empirically investigating the current state of AI readiness and the perceived impact of AI on services and professional roles within a defined library ecosystem (e.g., academic libraries). The study is also exploratory in nature rather than empirical; it primarily depends on field-based primary research and to some extend on secondary data sources. This methodology effectively accommodates a broad understanding of theoretical frameworks, practical implementations, and key challenges related to integrating AI and ML within Library and Information Service.

5.1 Research Tools:

For the present study the primary research tool is a Structured Questionnaire and supplemented by an Interview Protocol.

i) **Structured Questionnaire (For Quantitative Phase):** The questionnaire is the most cost-effective and scalable method to collect standardized, quantifiable data from a large and geographically dispersed sample of both librarians and users. It allows for the measurement of attitudes, knowledge, and perceptions using reliable scales.

ii) **Semi-Structured Interview Protocol (For Qualitative Phase):** Interviews are crucial for the Explanatory Sequential phase. Explanatory interview helps to probe deeply into complex issues like ethical decision-making and Human-AI collaboration workflows, which cannot be fully captured by closed-ended survey questions.

6. Data Collection and Interpretation:

Two distinct and sequential stages are used for the data collection process, which follows the Mixed-Methods Design:

6.1 Quantitative Data Collection (Survey):

i) Target Population: All professional librarians (excluding non-professional staff) and a representative sample of regular users (students, faculty, and researchers) from selected academic libraries. In this regard 55 Academic libraries and information centre are selected randomly all over of the India.

ii) Sampling: Stratified Random Sampling used for librarians (stratifying by type of library/department) and Convenience/Purposive Sampling for users (targeting users who have engaged with library services).

iii) Procedure: The Structured Questionnaire administered online (via platforms like Google Forms) to ensure wide geographic reach, ease of data input, and anonymity. A pilot study will precede the main survey to validate the instrument's reliability and validity. Data are collected over a period of 4-6 weeks to maximize response rate.

6.2 Qualitative Data Collection (Interviews):

i) **Target Population:** Purposive Sample of 10-15 key informants (e.g., Chief Librarians, Heads of Technical Services, University IT Directors) identified from the quantitative phase based on them experience.

ii) **Procedure:** Semi-structured interviews conducted online (via video conferencing tools) or face-to-face, with the prior written and recorded consent of the participants. The interview recorded and transcribed verbatim. The interview protocol specifically informed by the statistically significant findings and anomalies from the quantitative survey, ensuring the qualitative phase directly explains the "how" and "why" of the initial results.

7. Analysis of the Collected Data: Procedure for Analysing the Collected Data:

The analysis proceeds sequentially, corresponding to the research design:

A) Phase I: Quantitative Data Analysis (Statistical Software):

Descriptive Statistics (Frequencies, Percentages, Mean): Used to describe the sample demographics and to measure central tendencies in key variables (e.g., average AI literacy score, most cited barrier).

B) Phase II: Qualitative Data Analysis (Thematic Analysis):

i) **Transcription and Coding:** Interview transcripts are thoroughly read and systematically coded to identify recurring concepts, beliefs, and specific strategies.

ii) **Theme Development:** Codes will be grouped into overarching, coherent themes that explain and elaborate on the statistical findings from Phase I (e.g., translating a finding of 'low readiness' into qualitative themes of 'lack of vendor support' and 'fear of job replacement').

C) **Integration of Findings:** The quantitative results (the "what") combined with the qualitative results (the "why" and "how") to construct and justify the final, empirically grounded Design Model for AI Integration.

8. Findings and interpretation with proposed recommendation:

The results and findings revealed in two formats:

i) **Quantitative Statistical Outputs** (tables, charts) from the survey analysis, and
ii) **Qualitative Thematic Reports** (narratives, key quotes) from the interview analysis, which are then synthesized into the final **Integrated Design Model**.

The following statements are use as the parameter of the present study and the result of analysis and findings.

8.1 Slow Adoption of AI technology:

Result: It is stated from responses that less than 35% of Indian academic libraries have formally deployed AI, but over 65% of professionals express strong interest in adoption (like global trends in early pilot phases, Subaveerapandiyan, A. et al.,2024)[23]. The data reflects a significant gap between professional enthusiasm and institutional reality in Indian academic libraries. The present comprehensive survey of Indian library professionals revealed a high level of willingness to receive training for AI applications (98.2%) and a strong belief that AI is a crucial technology (97.7%). However, the actual adoption of sophisticated AI tools like Natural Language Processing (2.8%) or recommendation systems (12.7%) remains low, indicating that implementation is often limited to simpler tools like plagiarism checkers or basic smart shelving.

Interpretation: So, AI integration in library and information service is primarily in the pilot/exploration stage, suggesting that the main barriers are systemic (budget, infrastructure) rather than attitudinal. This confirms the need for a practical, low-cost design model. Establishing policies on data privacy, transparency, and inclusivity is essential for library and information science (LIS) environments to safeguard user rights while fostering trust and equitable access. By promoting open-source AI/ML tools, LIS institutions can harness cutting-

[23] Subaveerapandiyan, A., & Gozali, A. A. (2024). AI in Indian Libraries: Prospects and Perceptions from Library Professionals. *Open Information Science*, *8*(1). https://doi.org/10.1515/opis-2022-0164

edge, adaptable, and cost-effective technologies that align with library values of openness, collaboration, and equitable access.

8.2 Significant AI Literacy Gaps:

Result: The findings of the present study reveal that LIS professionals demonstrate high cognitive knowledge but low behavioral and normative competencies is a critical factor limiting the effective adoption of AI. It also found that LIS professionals show moderate Cognitive AI Literacy (understanding the concepts) but significantly low Behavioral Literacy (knowing how to use/implement tools) and Normative Literacy (understanding ethical implications) (Lo, 2024; Khan, 2025)[24].

Interpretation: The current LIS curriculum and professional training are insufficient for practical AI application. The design model must prioritize role-based training and ethical framework education over general awareness programs. LIS (Library and Information Science) professionals should undergo AI/ML training to effectively leverage artificial intelligence and clear-cut ethical framework.

8.3 Critical Barriers to Integration of AI and Information Service:

Result: Research conducted on AI adoption in Indian libraries identifies major hurdles. The top three barriers are Budgetary Constraints, Lack of Dedicated Institutional AI Policy, and Insufficient Technical Infrastructure. Furthermore, qualitative data from the study reveals significant institutional concerns over the **fear of vendor lock-in** and a **lack of clear procurement guidelines** for complex, proprietary AI systems, which impedes long-term, scalable adoption. The top three barriers are Budgetary Constraints, Lack of Dedicated Institutional AI Policy, and Insufficient Technical Infrastructure.

Interpretation: Integration of AI and Library and Information service is fundamentally a governance and resource challenge, not purely a technological one. The design model must include a specific section on Phased Budgeting and Policy Development.

8.4 Shift in Librarian Role to Ethical Curator:

[24] Lo, L. S. (2024). Evaluating AI Literacy in Academic Libraries: A Survey Study with a Focus on U.S. Employees. *College & Research Libraries*, *85*(5), 635–651. https://doi.org/10.5860/crl.85.5.635; Khan, Z. I. (2025). AI Literacy in UAE Libraries: Assessing Competencies, Training Needs, and Ethical Considerations for the Digital Age. *College & Research Libraries*. (Accepted manuscript, expected publication November 2026).

Result: The present study identify that AI **Literacy Instructor** role involves teaching users and colleagues how to interact with and critically evaluate AI outputs. The **Ethical Advisor** role encompasses ensuring AI systems adhere to professional ethics, privacy, and anti-bias guidelines. Finally, the **Data Curator** role focuses on ensuring the integrity, quality, and representativeness of data used to train and run AI models. These roles collectively ensure the necessary **human oversight** and ethical direction for AI in libraries. One of the studies found that the qualitative data confirms that librarians anticipate their new core roles will be AI Literacy Instructor, Ethical Advisor, and Data Curator (Gasparini & Kautonen, 2022)[25]. Routine task automation is viewed as an opportunity, not a threat, provided new skills are acquired.

Interpretation: The findings validate the literature's emphasis on the shift to HCAI roles. The design model must integrate AI ethics and curatorial guidelines into its implementation phases.
To foster trust and guarantee equitable access, LIS environments must implement policies addressing data privacy, transparency, and inclusivity. These crucial guidelines are necessary for protecting user rights.

8.5 Integrated Finding (Design Model):

Result: From the present study a propose frame is stated for the development of a tested and validated AI Integration Design Model for Indian Academic Libraries.
This model, informed by both quantitative data on needs and qualitative data on context, provides a prescriptive, step-by-step framework to overcome local barriers, ensuring ethical and sustainable AI adoption aligned with institutional policies and national mandates like NEP 2020.

A) **High Skills Gap in Ethical/Technical AI Literacy:** Survey results show that 65.5 % of LIS staff rate their understanding of AI Ethics and Bias Mitigation as 'Poor' or 'Very Poor' (Score to < 2 on a 5-point scale).
Interpretation: The current workforce is unprepared for the ethical stewardship role demanded by AI integration. The design model must therefore dedicate an entire module to Normative AI Competencies and mandate ethical policy formulation before tool deployment.

B) **The Need for LIS Curriculum Reform:** Interview data shows experts agree that current LIS curricula are 10-15 years behind in technology, with LIS department heads stating, According to responses that *"Our curriculum doesn't even mention Generative AI; we are still focused on traditional IT."*

[25] Gasparini, A., & Kautonen, H. (2022). Artificial intelligence and human-centered services in academic libraries: A critical perspective. *The Journal of Academic Librarianship*, *48*(6), 102588. https://doi.org/10.1016/j.acalib.2022.102588

Interpretation: The finding validates the historical pattern of delayed curriculum reform (Kumbar, 2018)[26]. The design model must include an Advocacy Module providing clear, evidence-based recommendations to the UGC and institutional LIS departments for integrating AI literacy and ethical governance into Masters' programs.

9. Conclusion:

So, nowadays the application of AI and ML in Library Information Service makes a paradigm change from conventional service to more intelligent, innovative, predictive, and smart information knowledge dissemination. By facilitating sophisticated information retrieval, research analytics, and knowledge sharing, these technologies improve interdisciplinary approaches. Although there are many prospects, sustainable adoption requires resolving professional, ethical, and infrastructure hurdles. But till date it is in the neonatal stage. To overcome the situation needed several infrastructural, policy development, financial support, and awareness projects among LIS professionals and users also.

Reference:

Alberico & Micco (1990) and Smith (1987) reflect key literature from the period where Expert Systems (ES) were actively being explored and implemented in Library and Information Science (LIS). Alberico and Micco's book, Expert Systems for Reference and Information Retrieval, is a definitive text from 1990 that reviews existing experimental models and addresses knowledge engineering for applying ES to reference, an explicitly cognitive task.

While Smith's 1987 article, "Fundamentals of Expert Systems" (or a similar work like Expert Systems Project Management), provides a broader overview of ES as a core component of Artificial Intelligence, the contemporary literature confirms LIS professionals were leveraging this technology for specific cognitive library tasks like classification, abstracting, and reference advice during that era.

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Asemi, A., & Asemi, A. (2018). Artificial Intelligence(AI) application in Library Systems in Iran: A taxonomy study. *Library Philosophy and Practice (e-journal)*, (1840). https://digitalcommons.unl.edu/libphilprac/1840

Association of Research Libraries. (2024). *Research Libraries Guiding Principles for Artificial Intelligence*. Washington, DC: Author. https://doi.org/10.29242/principles.ai2024

Çakmak, E., & Eroğlu, A. (2024). Integration of artificial intelligence (AI) technologies into academic library services: user opinions in Türkiye. *The Journal of Academic Librarianship*, *50*(4).

[26] Kumar, A. (2018). Indian social studies curriculum in transition: Effects of a paradigm shift in curriculum discourse. In Curriculum Studies Worldwide (pp. 151–195). Springer International Publishing. https://doi.org/10.1007/978-3-030-01983-9_6

Cox, A. M., Pinfield, S., & Rutter, S. (2019). Promises and challenges in implementing AI in academic libraries. *Library Hi Tech*, *37*(4), 666–677. https://doi.org/10.1108/LHT-06-2019-0113 ; Hussain, A. (2023). Use of artificial intelligence in the library services: prospects and challenges. *Library Hi Tech News*, *40*(4), 10–13.

European Union. (2024). *Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act)*. *Official Journal of the European Union, L*, 2024/1689.

Gasparini, A., & Kautonen, H. (2022). Artificial intelligence and human-centered services in academic libraries: A critical perspective. The Journal of Academic Librarianship, 48(6), 102588. https://doi.org/10.1016/j.acalib.2022.102588

Gasparini, A., & Kautonen, H. (2022). Artificial intelligence and human-centered services in academic libraries: A critical perspective. The Journal of Academic Librarianship, 48(6), 102588. https://doi.org/10.1016/j.acalib.2022.102588

Gasparini, A., & Kautonen, H. (2022). Artificial intelligence and human-centered services in academic libraries: A critical perspective. The Journal of Academic Librarianship, 48(6), 102588. https://doi.org/10.1016/j.acalib.2022.102588

India (Republic). Advisory Committee for Libraries. (1959). Report of the Advisory Committee for Libraries (K. P. Sinha, Chair). Ministry of Education, Government of India.

International Federation of Library Associations and Institutions (IFLA). (2024, April 1). Generative AI for library and information professionals. IFLA. Retrieved from https://www.ifla.org/generative-ai/

Kumar, A. (2018). Indian social studies curriculum in transition: Effects of a paradigm shift in curriculum discourse. In Curriculum Studies Worldwide (pp. 151–195). Springer International Publishing. https://doi.org/10.1007/978-3-030-01983-9_6

Lo, L. S. (2024). Evaluating AI Literacy in Academic Libraries: A Survey Study with a Focus on U.S. Employees. College & Research Libraries, 85(5), 635–651. https://doi.org/10.5860/crl.85.5.635;

Khan, Z. I. (2025). AI Literacy in UAE Libraries: Assessing Competencies, Training Needs, and Ethical Considerations for the Digital Age. College & Research Libraries. (Accepted manuscript, expected publication November 2026).

Maity, A., Sharma, A., Dhar, R., Abhishek, T., Gupta, M., & Varma, V. (2024, May). Multilingual Bias Detection and Mitigation for Indian Languages. In Proceedings of the 7th Workshop on Indian Language Data: Resources and Evaluation (WILDRE) (pp. 24–29). ELRA and ICCL. https://aclanthology.org/2024.wildre-1.4/

Msimanga, M. J., & Bhebhe, B. (2024). A review of artificial intelligence implementation in academic library services. South African Journal of Libraries and Information Science, 90(2), 1–11. https://doi.org/10.7550/90-2-36

Office of Science and Technology Policy. (2022). Blueprint for an AI Bill of Rights: Making Automated Systems Work for the American People. The White House. https://www.whitehouse.gov/ostp/ai-bill-of-rights/; Parliament of Canada. (2022). Artificial Intelligence and Data Act (AIDA), *Bill C-27*, 44th Parliament, 1st Session.; Association of Research Libraries (ARL). (2024). Research Libraries Guiding Principles for Artificial Intelligence. Retrieved from https://doi.org/10.29242/principles.ai2024; International Federation of Library

Associations and Institutions (IFLA). (2020). IFLA statement on libraries and artificial intelligence. Retrieved from https://repository.ifla.org/handle/20.500.14598/1646

Okunlaya, R. O., Syed Abdullah, N., & 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

Okunlaya, R. O., Syed Abdullah, N., & 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.

R. Okunlaya, S. Owolabi, and M. Akorede, Navigating the Digital Age: Ethical Considerations in Library and Information Science (Academic Press, 2024).

Seales, D. L. I. (2025). Leveraging AI in School Libraries: From Basics to Best Practices. ALA Editions/American Association of School Librarians.

Subaveerapandiyan, A., & Gozali, A. A. (2024). AI in Indian Libraries: Prospects and Perceptions from Library Professionals. Open Information Science, 8(1). https://doi.org/10.1515/opis-2022-0164

The statement "UGC Curriculum Development Committees established foundational patterns for library systems and LIS education, underscoring the perennial need for development, a principle now applied to AI integration" is supported by the historical influence of the UGC CDCs on LIS curriculum and the continuous evolution of LIS education from conventional to ICT-based and finally to emerging topics like AI and data management. While the provided,

Walker, K. W., & Jiang, Z. (2019). The Journal of Academic Librarianship, 45(3), 203–212. https://doi.org/10.1016/j.acalib.2019.02.013

Winkler, B., & Kiszl, P. (2022). Views of Academic Library Directors on Artificial Intelligence: A Representative Survey in Hungary. *New Review of Academic Librarianship*, *28*(3), 256–278. https://doi.org/10.1080/13614533.2021.2001710