



The Quiet Revolution: Artificial Intelligence in Academic and Public Libraries — Adoption Patterns, Operational Realities, and Unresolved Tensions

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Abstract:- Libraries have consistently evolved with intellectual and technological change. The integration of artificial intelligence represents a continuation of this evolution, offering significant benefits such as automated cataloguing, enhanced resource discovery, and round-the-clock reference services. However, AI adoption must be approached critically. Libraries should carefully evaluate the quality of data, the influence of technology vendors, and the impact on professional ethics and values. Rather than embracing AI without scrutiny, institutions need a robust framework that ensures transparency, fairness, and accountability. Such an approach enables libraries to harness AI's potential while preserving their enduring commitments to equitable access, intellectual freedom, and community service.

Keywords:- Artificial Intelligence, Academic Library, Collection Development, ICT-Policy

Introduction:- Artificial intelligence is transforming libraries gradually rather than through dramatic institutional change. Chatbots, automated cataloging, algorithmic collection management, and AI-powered discovery systems are increasingly integrated into library operations, often with limited public debate or professional scrutiny. Although libraries may appear less affected than sectors such as healthcare or criminal justice, they remain vital democratic institutions dedicated to equitable access to knowledge, intellectual freedom, and user privacy. Consequently, the growing reliance on proprietary AI systems raises important questions about transparency, accountability, and ethical responsibility. Historically, libraries have adapted to technological innovations, from card catalogs to Online Public Access Catalogs (OPACs) and federated search systems. Each transition improved efficiency while introducing new challenges, including dependence on commercial vendors and opaque relevance algorithms. AI continues this pattern on a much larger scale by automating metadata creation, classification, reference services, collection analysis, and preservation tasks that previously relied on professional expertise. The adoption of AI varies significantly across library sectors. Academic libraries generally possess the technical infrastructure and financial resources to experiment with advanced AI applications, whereas public libraries often depend on vendor-supplied solutions and operate under tighter budget constraints. Despite these differences, AI offers meaningful benefits, including improved resource discovery, streamlined workflows, and expanded user services. However, these advantages are accompanied by substantial risks. Biased training data may reinforce inequalities in knowledge organization, commercial AI systems may compromise patron privacy, and increasing automation could erode librarians' professional expertise. Furthermore, unequal access to AI technologies may widen disparities between well-funded and resource-limited libraries. Addressing these challenges requires thoughtful governance, transparent evaluation, and policies that ensure AI strengthens rather than weakens libraries' enduring commitments to equitable access, intellectual freedom, privacy, and community - centered service.

A Taxonomy of AI Applications in Library Settings:- Artificial intelligence in libraries encompasses diverse technologies, from rule-based chatbots to advanced machine learning systems. Understanding these applications requires examining their specific functions, benefits, and limitations across major library operations.

Cataloging and Metadata Generation:- AI streamlines cataloging by automatically generating metadata, assigning subject headings, extracting entities, and creating bibliographic records. These capabilities reduce manual effort and improve processing speed. However, AI systems rely on historical catalog data, making them less effective for rare languages, Indigenous knowledge, and interdisciplinary materials while potentially reinforcing existing classification biases.

Discovery and Recommendation Systems:- AI enhances discovery through semantic search, relevance ranking, and personalized recommendations, enabling users to locate resources more efficiently. Despite these advantages, recommendation algorithms may reflect institutional biases, prioritize frequently used materials, and limit exposure to diverse or unexpected resources, reducing opportunities for serendipitous discovery.

Reference and Virtual Assistance:- AI-powered chatbots provide instant responses to routine questions, including library hours, renewals, and database access, extending services beyond normal operating hours. Nevertheless, they remain unsuitable for complex research inquiries because generative AI systems can produce inaccurate or misleading information, requiring librarians to supervise critical reference interactions.

Collection Development:- Predictive analytics supports acquisition and weeding decisions by analyzing circulation patterns, publication trends, and user demand. While improving efficiency and resource allocation, these systems may reinforce existing collection strengths, overlook emerging subjects, and unintentionally remove specialized or low-circulation materials important to specific communities.

Preservation and Digitization:- AI advances preservation through optical character recognition, handwritten text recognition, automated transcription, and condition assessment of fragile materials. These technologies accelerate digitization and conservation efforts, although performance depends on high-quality training data, adequate funding, and comprehensive metadata to ensure meaningful access.

Overall, AI is most effective when supporting human expertise rather than replacing professional judgment in complex library decision-making.

Adoption Patterns:- Who Is Implementing AI, and How?

Resource Divide:- Research Universities vs. Public and Small Academic Libraries

AI adoption in libraries is strongly influenced by institutional resources. Large research universities are leading AI implementation because they have greater funding, skilled technical staff, advanced digital infrastructure, and collaborations with computer science departments. These libraries can experiment with AI applications such as automated cataloging, collection analysis, and digital preservation. In contrast, public and small academic libraries often lack financial and technical capacity. Their use of AI is generally limited to features integrated into commercial library management systems, reducing their ability to monitor or customize AI tools.

Vendor-Driven Adoption:- Most libraries adopt AI through commercial vendors rather than developing systems independently. Companies such as Ex Libris, EBSCO, and Clarivate have integrated AI into discovery platforms, recommendation systems, and metadata management. While these tools improve efficiency, libraries have limited transparency regarding algorithms, data use, and decision-making processes. Open-source alternatives provide greater flexibility but require technical expertise and long-term maintenance, making them less practical for smaller institutions.

The Pilot Project Problem:- Many AI initiatives in libraries begin as pilot projects funded through grants or institutional innovation programs. Although successful pilots receive significant attention,

projects facing technical challenges or poor outcomes are rarely reported. As a result, the professional literature often overemphasizes success while providing limited evidence about implementation difficulties, scalability, and long-term sustainability.

Staff Capacity and Competency Gap:- Limited staff expertise remains a major barrier to AI adoption. Many library professionals have not received formal training in artificial intelligence, machine learning, or algorithm evaluation. Although workshops and professional development programs are expanding, they cannot fully replace comprehensive AI education within library and information science curricula.

International Variations:- AI adoption varies considerably across countries. Well-funded national libraries in Europe have implemented AI for cataloging, digitization, and preservation, while many developing countries continue to prioritize basic library infrastructure. These differences demonstrate that successful AI adoption depends on funding, policy support, technical capacity, and institutional readiness.

Unresolved Tensions and Critical Concerns:- Algorithmic Bias and the Politics of Knowledge Discovery :- AI-based discovery systems may reinforce historical biases embedded in library collections and metadata. As a result, mainstream, English-language, and dominant perspectives are often prioritized, while diverse or marginalized voices receive less visibility. Regular bias audits and inclusive datasets are essential to ensure equitable knowledge discovery.

Patron Privacy and the Surveillance Problem:- AI applications rely heavily on user data for personalization and analytics, creating tensions with libraries' long-standing commitment to patron privacy. Libraries should adopt strict data minimization, privacy impact assessments, and transparent data governance to protect user confidentiality.

The Deskilling Question:- Automation of routine cataloging and reference tasks may gradually reduce opportunities for librarians to develop professional expertise. Continuous training and balanced human involvement remain necessary to preserve critical skills.

Vendor Lock-in and Institutional Autonomy:- Dependence on proprietary AI platforms can reduce institutional independence and increase long-term operational risks. Libraries should encourage open-source solutions, transparent contracts, and maintain essential in-house expertise.

Equity of Access and the Widening Institutional Gap:- Advanced AI technologies are concentrated in well-funded libraries, widening inequalities between resource-rich and under-resourced institutions. Greater public investment, collaborative partnerships, and affordable AI solutions are needed to ensure equitable access for all libraries.

Policy and Institutional Responses :- Professional Association Guidance - Library associations provide ethical AI guidelines, but stronger implementation frameworks and accountability mechanisms are needed to ensure consistent adoption across institutions.

Institutional AI Policies:- Effective AI governance should prioritize transparency, privacy, ethics, staff development, and community needs rather than focusing solely on efficiency and automation.

Open-Source and Community-Governed AI:- Open-source AI promotes transparency, institutional autonomy, collaboration, and reduced dependence on commercial vendors while supporting sustainable innovation.

Procurement as Policy:- Libraries should establish procurement standards requiring algorithmic transparency, privacy protection, bias auditing, data ownership, and clear vendor accountability before adopting AI systems.

Public Policy and Government Support:- Governments should strengthen AI regulations, invest in digital infrastructure, and provide funding to ensure equitable AI access for all libraries.

Graduate Education and Workforce Development:- Library education programs should integrate AI literacy, data ethics, algorithmic evaluation, and digital competencies to prepare future librarians for responsible AI implementation and governance.

Conclusion:- What This Analysis Has Established:- AI in libraries includes cataloging, discovery, reference, collection management, and preservation, offering significant benefits while creating challenges related to bias, privacy, deskilling, vendor dependence, and unequal access.

What Responsible - AI Integration Would Require:- Responsible adoption should prioritize institutional values, privacy protection, bias assessment, professional skill development, and equitable access rather than focusing only on efficiency and automation.

The Deeper Stakes:- Libraries must preserve their core mission of ensuring intellectual freedom, democratic access to knowledge, privacy, and community service by keeping human values central to AI implementation and governance.

Open Questions for Future Research:- Future studies should examine AI's long-term impact on library professionals, service quality, user experiences, governance models, and equitable access across different library settings. Overall, AI should complement rather than replace librarians, with ethical governance, continuous evaluation, and collaborative policymaking ensuring that technological innovation strengthens library services while protecting professional values and public trust.

8. References

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