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THE SILENT PARTNER: ETHICAL RISKS OF INVISIBLE AI INTERVENTIONS IN ACADEMIC LIBRARY SERVICES

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ABSTRACT

This paper examines the ethical challenges posed by invisible artificial intelligence (AI) interventions in academic library services. As libraries increasingly adopt AI to enhance user experience and efficiency, concerns arise around transparency, accountability, and bias within automated decision-making. Invisible AI-embedded frameworks functioning without explicit user awareness-raises issues regarding user privacy, data security, intellectual freedom, and the integrity of library services. The study highlights how silent algorithms can influence information access, research behavior, and potentially reinforce stereotypes, threatening the neutrality and inclusivity of library spaces. Key issues addressed include informed consent, user autonomy, and the need for explainability in AI-driven systems. Drawing on a survey of institutional practices and review of existing literature, the paper identifies recurring ethical challenges and policy gaps, especially when commercial AI solutions are adopted. To address these, the paper proposes guidelines for ethical AI use in libraries, emphasizing interdisciplinary collaboration and the protection of user rights. It concludes with a call for comprehensive institutional policies, staff training, and ongoing ethical audits to ensure AI supports, rather than undermines, the core values of academic librarianship.

KEYWORDS: *Ethical risks, Invisible AI, Academic library, User privacy, Algorithmic bias*

The integration of Artificial Intelligence (AI) in academic libraries has transformed the landscape of information services by providing better user experiences and operational efficiencies. Libraries have increasingly adopted various AI technologies, including chatbots for user support, recommender systems for personalized content delivery, and automated metadata generation to streamline cataloguing processes. These innovations aim to improve accessibility and engagement, making information retrieval more intuitive and user-friendly. However, the complexity of ethical implications arising from AI systems grows alongside the increased use of such systems, particularly in terms of transparency and user awareness.

The term "invisible" AI is used to describe interventions that take place without the users' explicit knowledge, where the AI systems either make decisions or only provide recommendations based on algorithms operating behind the scenes. This lack of visibility can lead to a disconnect between users and the technology that shapes their information-seeking behaviours. The recommender system of a library may suggest resources based on user data, but the actual processes that inform these recommendations are often not understood. There are instances where users fail to comprehend the manner in which their data is being used or identify the criteria that affect the AI's recommendations, leading to concerns about autonomy and informed consent.

There is a growing concern about the impact of AI-administered systems on library operations, decision-making, and academic conduct. Not only do these covert actions raise practical issues, but they also undermine fundamental tenets of librarianship, such as impartiality, intellectual freedom, and informed consent. Despite their potential to improve efficiency, these systems can inadvertently impact user experience in biased or exclusionary ways, often without institutional oversight or ethical review.

However, by looking at the implications of invisible AI interventions, this study will emphasize the issues related to user privacy, bias, and accountability. Moreover, it will propose frameworks for enhancing transparency and fostering user trust in AI systems within academic libraries. Through this exploration, the paper seeks to contribute to the ongoing discourse on ethical AI practices, advocating for a balanced approach that prioritizes user rights while leveraging the benefits of technological advancements.

METHODOLOGY

Research Design

This study adopted a mixed-methods approach, combining a structured survey with a comprehensive review of the literature to explore the ethical risks of invisible AI interventions in academic library services. The research focused on gathering insights from library professionals about their experiences and perceptions regarding AI-driven services.

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Sampling and Respondents
Ten educational institutions were purposively selected to ensure a diverse representation of academic libraries. The survey targeted library patrons, key stakeholders including librarians and other library professionals directly involved in the management and delivery of library services.

Data Collection
A structured questionnaire was circulated electronically among the respondents at each institution. The questionnaire contained both closed and open-ended questions, designed to elicit detailed responses on the extent and nature of AI interventions in library services, awareness and understanding of AI's ethical implications, and perceived risks and challenges associated with invisible AI technologies. Participation was voluntary, and confidentiality was assured to encourage honest and comprehensive feedback.

Data Analysis
Qualitative responses were specifically dissected to capture nuanced perspectives and ethical concerns raised by the respondents. The findings were then triangulated with a review of existing literature on AI in library services to contextualize and enrich the survey results.

Ethical Considerations
The study adhered to ethical research practices, including informed consent, voluntary participation, and the protection of respondent anonymity. Data was used exclusively for academic purposes and reported in aggregate to prevent identification of individuals or institutions.

Understanding Invisible AI in Library Services
Invisible AI in academic library services refers to artificial intelligence systems that operate seamlessly in the background, often without users being consciously aware of their presence. These technologies are embedded within everyday workflows, such as search interfaces, cataloguing systems, and virtual assistance platforms, where they function autonomously to improve both efficiency and user experience. Common examples include machine learning algorithms used for automated metadata generation, recommender systems that suggest personalized resources based on user behaviour, and natural language processing (NLP) tools that enhance the precision of information retrieval.

A particularly notable impact of invisible AI is seen in curation and recommendation systems. These algorithms analyse borrowing histories, reading habits, and user preferences to generate tailored content suggestions, helping patrons efficiently discover relevant books, articles, and other resources. AI has also streamlined information retrieval, as NLP techniques and AI-powered search engines interpret user queries more accurately and return contextually relevant results.

In the domain of digital archives and preservation, AI assists with the digitization, indexing, and organization of rare or fragile materials. Technologies such as Optical Character Recognition (OCR) extract searchable text from scanned documents, while AI algorithms classify and manage digital collections more effectively. Additionally, libraries are increasingly utilizing AI-driven chatbots and virtual assistants to provide real-time support, answer queries, and guide users to appropriate resources, ensuring accessibility around the clock.

AI moreover empowers advanced text analysis and data mining, permitting libraries to extricate bits of knowledge from expansive volumes of textual data for use in research, user behaviour analysis, and collection development. Furthermore, content creation is enhanced through AI tools that automate the generation of abstracts, metadata, and summaries, freeing librarians to focus on strategic decision-making and service innovation (Jyoti, 2024).

Predictive analytics further strengthens library services by forecasting user demand and informing acquisition strategies, ensuring that collections remain aligned with evolving academic priorities and user interests.

The term "invisible" is fitting for these AI applications, as users are generally unaware of their operation. These systems are quietly embedded in familiar interfaces, making their functionality largely transparent to patrons. This invisibility allows users to benefit from improved services without needing to understand or even recognize the algorithms influencing their experience. Because these technologies integrate seamlessly with existing library processes, they support and enhance traditional services without disruption.

Ethical Risks of Invisible AI
The ethical risks of invisible AI interventions in academic library services have become a pressing concern as these technologies are increasingly integrated into library workflows. To better understand these challenges, a survey was conducted across 10 educational institutions using a structured questionnaire as the primary data collection tool. The survey gathered insights from librarians, staff, and users regarding their experiences and concerns with AI-driven systems in library settings.

Based on the survey results and a comprehensive review of the literature, several key ethical risks have been identified. Each of these risks reflects both the lived experiences of library professionals and users, as well as broader concerns highlighted by experts and scholars in the field.

The Illusion of Neutrality in Algorithmic Curation
AI-driven tools like chatbots and predictive analytics platforms are often marketed as neutral facilitators of efficiency. However, these systems are subject to biases based on their training data and design frameworks. For instance, recommendation algorithms in library catalogs may prioritize Western academic publications over Global South scholarship, reinforcing epistemic inequalities. A 2024 study of Zimbabwean university libraries found that 78% of AI-adopting institutions lacked mechanisms to audit algorithmic outputs for cultural bias, risking the marginalization of local research traditions (Tsekea & Mandoga, 2025). The ethical dilemma intensifies when AI interventions remain opaque. Patrons

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interacting with library chatbots rarely receive disclosure about data collection practices or decision-making logic. This invisibility violates core library principles of intellectual freedom by creating 'filter bubbles' that narrow research horizons without user consent.

Surveillance Capitalism in Scholarly Spaces

Commercial AI solutions frequently introduced into libraries raise critical questions about data sovereignty. Turnitin's AI plagiarism detectors, while valuable for academic integrity, operate as black boxes- analyzing student work through proprietary algorithms that libraries cannot independently scrutinize. This creates power imbalances where third-party cooperations gain unprecedented access to sensitive academic data, often without robust privacy safeguards. The University of Leeds' 2025 AI in Libraries project revealed that 63% of students were unaware that their reading habits were being analyzed by machine learning systems to optimize resource allocation. Such passive surveillance normalizes the commodification of intellectual behavior, contradicting libraries' historic role as guardians of reader confidentiality (Morgan, 2023).

Epistemic Erosion Through Automated Workflows

An automated system may prioritize efficiency over critical engagement, risking a reduction in the diversity and depth of scholarly exploration. Over-reliance on AI can erode traditional academic rigor and critical thinking.

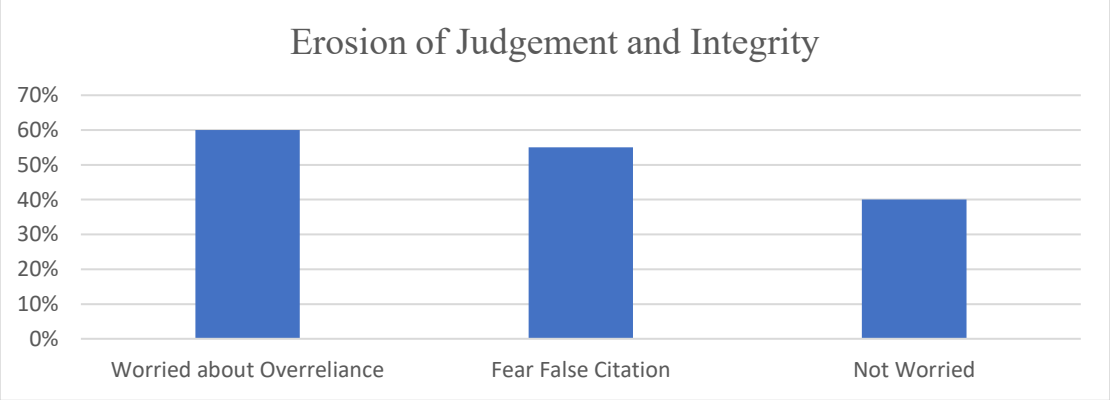

Figure 1: Erosion of Human Judgement & Academic Integrity

The figure (Fig. 1) illustrates a downward trend in both human judgment and academic integrity, as measured by survey responses. 60% of the respondents are worried about overreliance on automated workflows; 55% of them are specifically feared that AI tools could lead to false citations or academic misconduct, while 40% are not worried about the consequences of AI integration into academic library services, reflecting a faith in AI for smooth functioning of the libraries.

Systemic Bias and Discrimination

Challenges	Institutions Addressing It (%)
Bias Mitigation Tools	20
Ethical AI Training	30
Regular Algorithmic Audits	20

Table 1: Institutional Preparedness for AI Interventions

Table 1 presents the institutional measures adopted to address ethical challenges in AI, particularly those related to systematic bias and discrimination. As shown, only 20% of surveyed institutions have implemented bias mitigation tools, while 30% provide ethical AI training, and another 20% conduct regular algorithmic audits. This limited adoption is concerning, as AI systems can reinforce or amplify existing social and cultural biases, leading to discriminatory outcomes in areas such as search results, hiring, and resource allocation. Insufficient preparedness increases the risk that marginalized groups may be further disadvantaged by biased AI interventions, highlighting the urgent need for broader and more consistent institutional safeguards.

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Transparency and Informed Consent

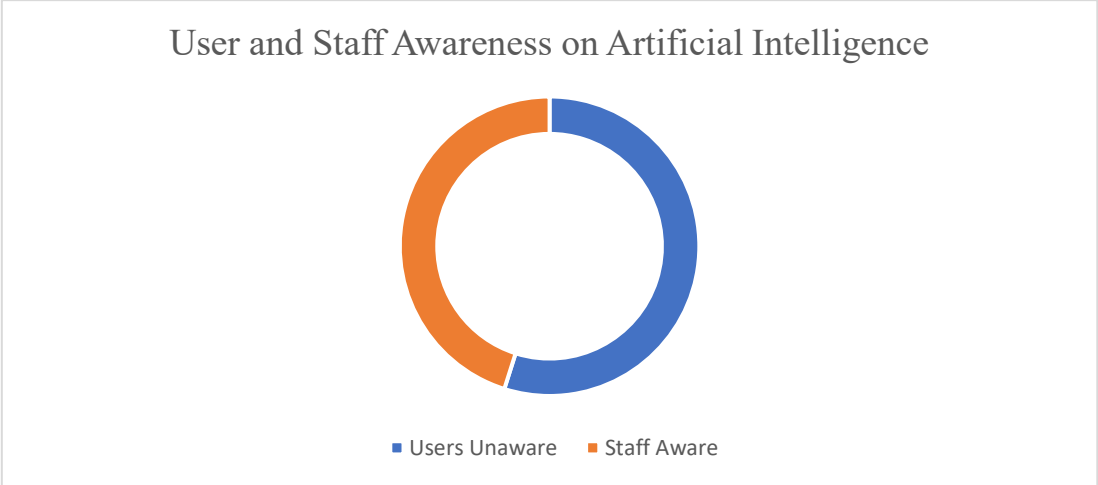

Figure 2: Awareness Gap Between Users and Staff

Figure 2 shows that 73% of users were unaware of how AI influences their information access or what data is collected, stored, or used by AI systems, while 60% of staff reported no disclosure mechanisms. This lack of transparency undermines informed consent and user autonomy.

Intellectual Freedom and Autonomy

AI-driven personalization may filter out diverse or opposing viewpoints, limiting users' exposure to new ideas and reducing the serendipity that is vital for academic discovery.

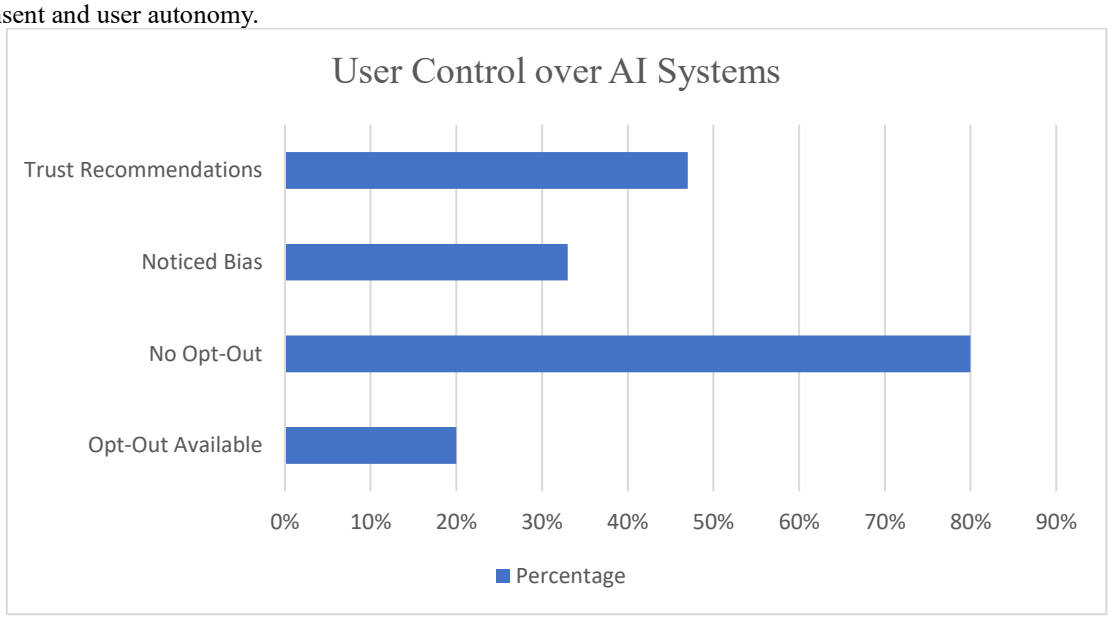

Figure 3: Impact on Intellectual Freedom and User Autonomy

Figure 3 presents an overview of the impact of intellectual freedom and user autonomy, where 48% of respondents trust AI-generated recommendations, suggesting a significant reliance on algorithmic curation, while 33% have noticed bias in these recommendations, highlighting concerns about filter bubbles and the reinforcement of existing viewpoints. 80% reported having no option to opt out of AI-driven personalization, while only 20% could opt out, indicating limited user control over their information environment. This shows how AI can shape access to information, potentially narrowing intellectual horizons and diminishing user autonomy when opt-out mechanisms are lacking.

Accountability and Responsibility

When AI makes errors or causes harm, such as by recommending misleading sources, it's often unclear who is responsible- the library, the AI vendor, or the algorithm's designer- making accountability difficult. 70% of the respondents reported low confidence in their institution's ability to troubleshoot AI errors or assign responsibility for mistakes or harms. Lack of clear governance makes it difficult to hold anyone accountable for AI-driven decisions.

Job Displacement and Deskilling

Automation of traditional tasks may reduce roles for library staff, impacting employment and professional expertise. 50% of staff expressed concern about job changes, loss of roles, or the devaluation of professional expertise due to AI automation, while others are confident about the need for human resources over technological advancement.

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From Silent to Accountable: Making AI Visible in Library Interfaces

The increasing integration of AI in academic library systems has introduced a range of "silent" interventions- AI-driven processes that operate without users' awareness. While these systems often aim to enhance efficiency, such as through automated recommendations, search result rankings, or dynamic resource filtering, their invisibility poses serious ethical challenges. These include diminished user autonomy, hidden biases in content curation, and a lack of transparency in how information is accessed or prioritized (Noble, 2018; Behnke et al., 2021).

To transition from silent influence to accountable practice, academic libraries must prioritize AI visibility within user interfaces. This involves disclosing when and how AI is at work, explaining what data it uses, and offering users meaningful insight into the logic behind AI-generated outputs (Morley et al., 2020). For example, AI-generated search results should be accompanied by brief notations indicating whether personalization, relevance scoring, or popularity metrics have been applied- and why (Binns et al., 2018).

Transparency mechanisms should not be relegated to policy documents or buried in terms of service; rather, they must be integrated directly into the interaction design. Interactive "info" buttons, plain-language explainers, and toggles that allow users to enable or disable AI-driven features can empower users to make informed decisions about their engagement with AI systems (Tsai et al., 2021).

Incorporating explainable AI (XAI) approaches also enables libraries to offer justifications for algorithmic decisions, supporting both intellectual freedom and research integrity. For instance, users should be able to understand why certain sources are recommended, which criteria were weighted, and whether alternative perspectives were suppressed- intentionally or not (Weller, 2019; Selbst & Barocas, 2018).

Ultimately, visibility is not just a technical fix but an ethical stance. By making AI operations transparent and interpretable, libraries uphold the core values of academic inquiry: openness, accountability, and trust (IFLA, 2020). This shift from invisible automation to active, user-centered design is a critical step toward building ethically responsible information environments in the age of intelligent systems.

Proposed Framework for Implementation of Ethical AI in Academic Library Services

Figure 4: Proposed Framework for Ethical AI

Foundational Principles (Why)

1. ***Transparency:*** Library professionals are responsible for ensuring transparency in AI-driven services. They provide users with clear, accessible explanations of how AI tools operate, especially in search filtering and recommendation systems.
2. ***Accountability***: It is required to oversee accountability by monitoring AI behavior, identifying potential harms, and initiating corrective actions when errors or biases are detected.
3. ***Privacy & Data Protection***: They need to ensure safeguard privacy by collecting only essential data, anonymising personal information where possible, and enabling users to provide informed, revocable consent for data use.
4. ***Fairness & Bias Mitigation***: System analyst or concerned authority should carry out regular audits of AI algorithms to detect and mitigate bias. They should work to ensure the systems promote fairness and prevent the exclusion of any user group, and adjust algorithms to reduce disparities and promote inclusivity.
5. ***Inclusivity & Accessibility:*** User interface and accessibility designers should ensure inclusivity by developing AI tools that are accessible to users of all abilities and backgrounds, including those with disabilities.

Governance & Oversight (Who)

1. ***Establish an AI Ethics Committee:*** An AI Ethics Committee, composed of Librarians, IT professionals, legal experts, and user representatives, should be established to guide and review all AI deployments within the library.
2. ***Regular Independent Audits:*** Independent auditors should be engaged to conduct periodic evaluations of AI systems, examining data handling practices, algorithmic fairness, and ethical compliance. These audits should incorporate both technical assessments and user feedback.
3. ***Context-Specific Ethical Risk Assessment:*** The AI ethics committee should conduct domain-specific risk assessments to identify discipline-based ethical concerns, particularly in content filtering or sensitive topic recommendations.
4. ***Crisis Response Protocols:*** It is necessary to develop procedures to respond to large-scale AI failures, misinformation propagation, or discrimination, including user notifications and temporary system suspension.
5. ***AI Impact Reporting:*** Libraries should publish regular reports detailing where AI systems are used, results of audits, and corrective measures taken to improve transparency and accountability.

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User Empowerment and Education (For Whom)

1. ***Consent and Control:*** System administrators need to implement user-friendly mechanisms that allow individuals to opt in to data collection, review what data is stored, and withdraw consent or delete data at any time.
2. ***Education and Training:*** Emphasis should be given on organizing workshops and developing educational resources that help both staff and users understand AI systems, their limitations, and how to critically engage with automated outputs.
3. ***AI Literacy for Users and Staff:*** Literacy modules need to be developed to help users identify algorithmic influences, interpret automated decisions, and ask informed questions.
4. ***Grievance Mechanisms:*** There should be a panel of supporting professionals to manage a grievance process, offering users a clear pathway to report negative impacts or concerns related to AI use, and ensuring that all cases are addressed fairly and transparently.

Technical and Policy Safeguards (How)

1. ***Open-Source Tools:*** Software developers need to prioritize the use of open-source AI tools that are transparent, auditable, and modifiable by the wider community to reduce the risk of hidden bias or unethical design.
2. ***Data Minimisation:*** Strict data minimization practices need to be enforced, collecting only what is necessary for AI functionality and ensuring secure handling of user information.
3. ***Human-in-the-Loop (HITL) Mechanisms:*** It is necessary to ensure human oversight in AI-driven decision-making, particularly in sensitive or high-impact contexts, such as resource recommendations or academic integrity checks.
4. ***Continuous Improvement:*** Continuous improvement efforts should be overseen by incorporating audit results and user feedback into iterative system updates and policy revisions.
5. ***Feedback-Driven Model Tuning:*** Real-time user feedback and behaviour data should be used to retain AI models, ensuring relevance, fairness, and inclusivity over time.

Stakeholder Collaboration (With Whom)

1. ***External Partnerships:*** Facilitating collaboration with external institutions such as other libraries, universities, and AI technology developers will help exchange knowledge, tools, and best practices.
2. ***Global Standards Alignment:*** It should be ensured that all AI initiatives align with international standards and regulations, including GDPR and ethical guidelines established by professional bodies like the International Federation of Library Associations and Institutions (IFLA).
3. ***Cultural and Linguistic Fairness Audits:*** Evaluation of AI systems for inclusivity across languages, dialects, and cultural frameworks, especially relevant to diverse user communities in multilingual environments.

By extending this framework with domain-specific assessments, user literacy efforts, and forward-thinking procurement policies, academic libraries can promote a proactive and ethically resilient approach to AI integration. This ensures that AI remains a visible, accountable, and beneficial partner in the pursuit of equitable knowledge access.

CONCLUSION

The incorporation of invisible AI technologies into academic library services offers significant potential for transformation, but also raises important ethical concerns. Drawing on an extensive survey and review of existing literature, this study underscores the pressing importance of ensuring transparency, accountability, and cultural awareness when implementing AI tools. To mitigate risks related to user privacy, algorithmic bias, and the erosion of intellectual freedom, academic libraries must implement clear AI transparency disclosures, restrict non-essential data sharing with third-party vendors, and establish culturally responsive AI design practices.

Empowering library professionals through ethics review boards and continuous training is essential to uphold the foundational values of librarianship. Institutional policies must ensure that AI systems serve to enhance, rather than compromise, equitable access to information. Libraries must not, *by any means*, exclude users from their right to autonomy, consent, or exposure to diverse perspectives due to opaque or biased AI mechanisms.

Addressing these challenges requires sustained collaboration among librarians, technologists, ethicists, and policymakers to co-develop AI systems that reflect shared human values. Institutional inertia must be overcome with proactive policies, ethical audits, and governance frameworks that preempt harm rather than react to it. Further research is warranted to evaluate the long-term impact of AI interventions on user behaviour, collection development, and academic integrity across diverse institutional contexts.

By prioritizing user rights and embedding ethical oversight at every stage of AI integration, academic libraries can continue to serve as inclusive, trustworthy spaces of knowledge-even in an increasingly automated world.

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Appendix A: Survey Questionnaire

Section A: Demographic Information

1. **What is your role in the academic library?**
   - ☐ Librarian
   - ☐ Library staff
   - ☐ Academic faculty
   - ☐ Student
   - ☐ Other (please specify): _____
2. **Type of institution you are affiliated with:**
   - ☐ University
   - ☐ College
   - ☐ Research Institute
   - ☐ Other: _____
3. **Years of experience in your current role:**
   - ☐ Less than 1 year
   - ☐ 1–5 years
   - ☐ 5–10 years
   - ☐ More than 10 years

Section B: Awareness and Understanding of Artificial Intelligence

4. **Are you aware of AI technologies being used in your academic library?**
   - ☐ Yes
   - ☐ No
   - ☐ Not sure
5. **If yes, which AI applications are you aware of? (Select all that apply)**
   - ☐ Chatbots/Virtual assistants
   - ☐ Recommendation systems
   - ☐ Automated cataloguing/metadata generation
   - ☐ Predictive analytics
   - ☐ AI plagiarism detection tools
   - ☐ Other: _____
6. **Do you understand how these AI systems make decisions or provide recommendations?**
   - ☐ Fully understand
   - ☐ Somewhat understand
   - ☐ Do not understand

Section C: Ethical Concerns

7. **How concerned are you about the following ethical issues related to AI in libraries?**

Ethical Concern	Not Concerned	Somewhat Concerned	Very Concerned
User privacy and data collection	☐	☐	☐
Algorithmic bias	☐	☐	☐
Lack of transparency/explainability	☐	☐	☐
Intellectual freedom and filter bubbles	☐	☐	☐
Job displacement due to automation	☐	☐	☐

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8. **Has your institution implemented any of the following safeguards?**
   - ☐ Ethical AI training for staff
   - ☐ Bias mitigation tools
   - ☐ Regular algorithmic audits
   - ☐ Transparent disclosure about AI use
   - ☐ User opt-out options
   - ☐ None of the above
9. **How confident are you in your institution's ability to handle ethical issues caused by AI?**
   - ☐ Very confident
   - ☐ Somewhat confident
   - ☐ Not confident
   - ☐ Don't know

Section D: Perceptions and Experiences

10. **What do you perceive as the biggest benefit of AI integration in academic library services?**

    _____
    _____

11. **What do you perceive as the biggest risk or ethical dilemma posed by invisible AI in libraries?**

    _____
    _____
    _____

12. **Have you ever experienced or witnessed a situation where AI affected your access to information or your research behavior? Please describe.**

    _____
    _____
    _____

13. **In your opinion, how can academic libraries make AI systems more transparent and accountable to users?**

    _____
    _____
    _____

14. **What support or training do you think library staff and users need to better engage with AI technologies ethically?**

    _____
    _____
    _____

15. **Please share any additional comments or suggestions related to the ethical use of AI in academic libraries.**

    _____
    _____
    _____

Appendix B: List of Participating Institutions

Sl. No.	Institution Name	Address
1.	Rangapara College (Autonomous)	Rangapara, Sonitpur
2.	North Lakhimpur University	Lakhimpur, Assam
3.	D.K.D. College	Dergaon, Golaghat
4.	Rabindranath Tagore University	Hojai, Assam
5.	K.C. Das Commerce College	Guwahati, Assam
6.	Manabendra Sarma Girls' College	Rangia, North Kamrup
7.	Lakhipur College	Lakhipur, Goalpara
8.	Gauhati University	Guwahati, Assam
9.	Dibrugarh University	Dibrugarh, Assam
10.	Cotton University	Guwahati, Assam

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Appendix C: List of Figures and Tables

Figure C1: Erosion of Human Judgement and Academic Integrity

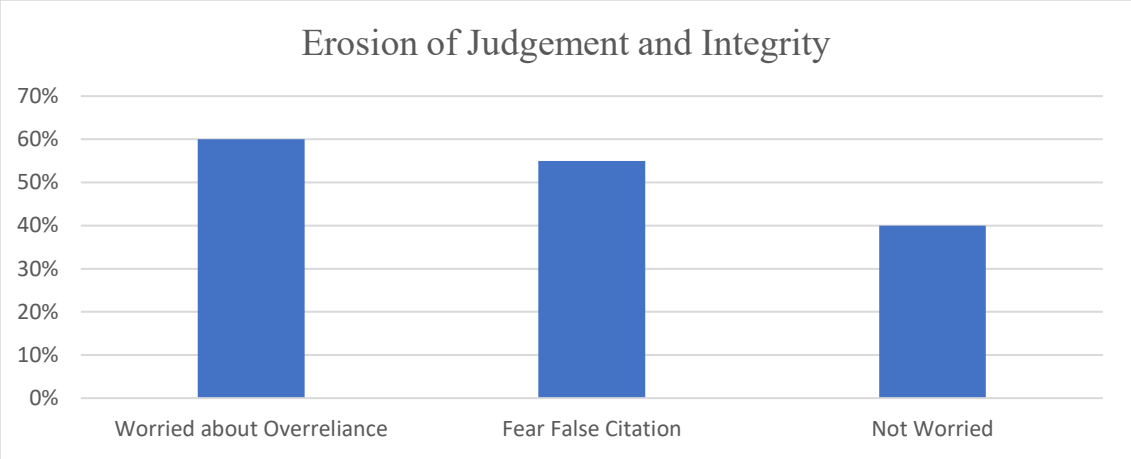

Table C1: Institutional Preparedness for Ethical AI Intervention

Challenges	Institutions Addressing It (%)
Bias Mitigation Tools	20
Ethical AI Training	30
Regular Algorithmic Audits	20

Figure C2: User and Staff Awareness on AI in Library Services

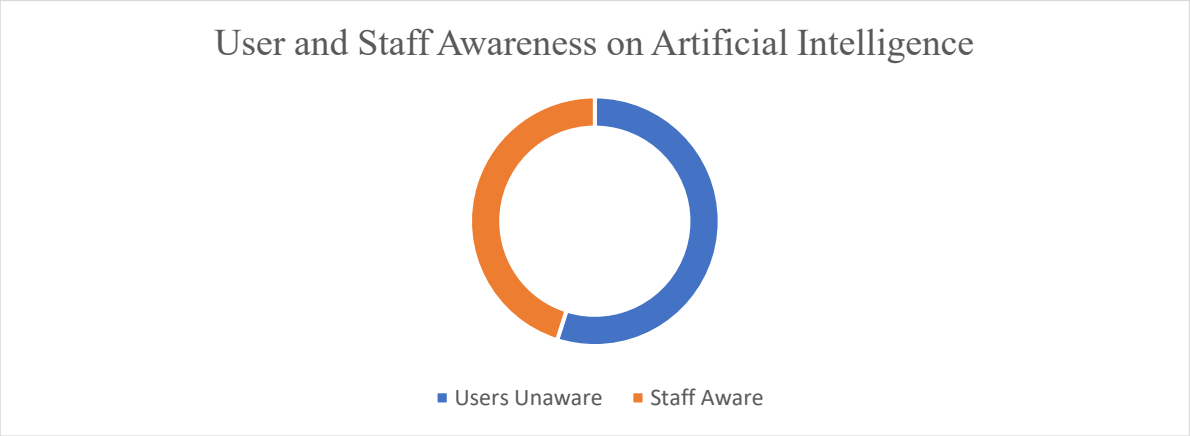

Figure C3: User Control over AI Systems

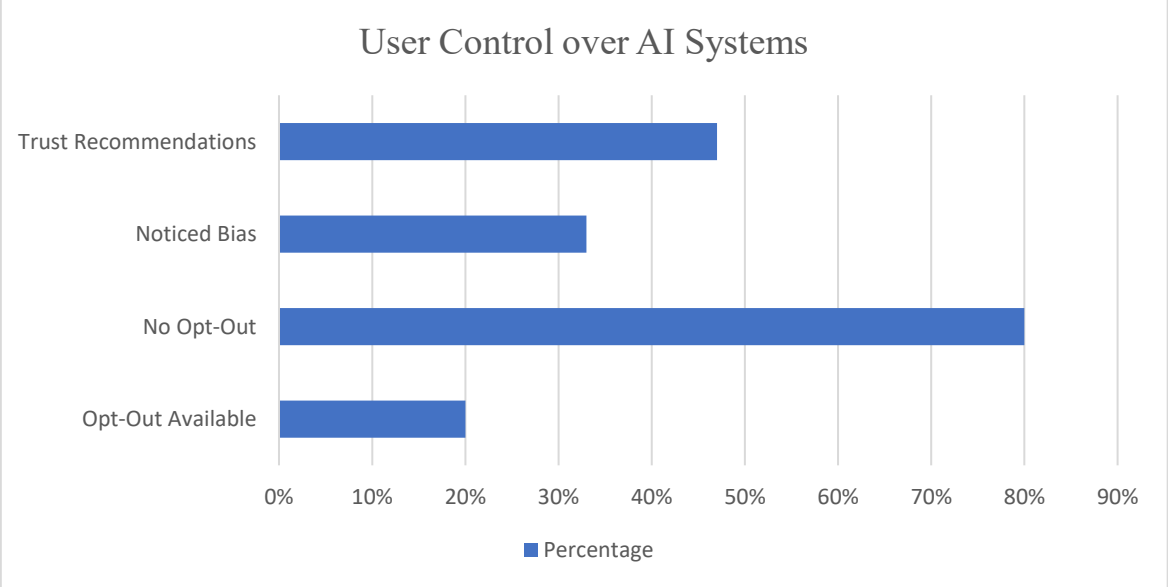

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Figure C4: Proposed Framework for Ethical AI Intervention in Academic Library Services