

# The Growing Impact of Artificial Intelligence (AI) and Digital Literacy on Academic Library Services: A Special Review of Pharmacy Colleges

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**Abstract:** *This research paper reviews the evolving nature of academic libraries, specifically those within pharmacy colleges. 'Artificial Intelligence' (AI) and 'Digital Literacy' have emerged as key pillars supporting library services. The paper highlights the significance of specialized databases within the pharmacy domain (e.g., PubMed) and software solutions such as VMedu Life. This paper aims to serve as a guide for pharmacy librarians seeking to modernize and update their services.*

*The rapid evolution of Artificial Intelligence (AI) and the shifting landscape of digital literacy are fundamentally transforming the operational paradigms of academic libraries. In pharmacy education, where the precision of information and the speed of drug discovery are paramount, libraries are transitioning from traditional repositories to high-tech hubs of digital scholarship. This review explores the integration of AI tools such as automated indexing, AI-driven systematic reviews, and virtual reference assistants within pharmacy college libraries. It further evaluates the critical role of digital literacy in equipping pharmacy students and researchers to navigate complex pharmacological databases and ethical AI usage. The paper concludes that while AI offers unprecedented efficiency, the "human-in-the-loop" model remains essential for maintaining the integrity of pharmaceutical information*

**Keywords:** AI, Digital Literacy, Pharmacy Library, VMedu Life, Library Automation

## Objectives of the Research Paper

1. To study the application of AI within pharmacy libraries.
2. To elucidate the importance of 'Digital Literacy' when searching for pharmaceutical information.
3. To examine the impact of cloud-based software, such as VMedu Life, on library management.
4. To identify the challenges faced by librarians during the adoption of new technologies.

## I. INTRODUCTION

Pharmacy is a rapidly evolving field where access to up-to-date information holds paramount importance. In the digital era, AI and digital literacy have fundamentally transformed the landscape of libraries. The role of the librarian has now shifted to that of a guide, assisting pharmacy students in navigating and retrieving information from accurate and reliable databases.

Academic libraries in pharmacy colleges serve as the backbone of pharmaceutical research and education. With the exponential growth of biomedical literature, traditional manual methods of information retrieval are becoming inadequate. The emergence of Artificial Intelligence (AI)—encompassing Machine Learning (ML), Natural Language Processing (NLP), and Generative AI—presents a solution to this data deluge.

However, the efficacy of these tools is strictly dependent on the Digital Literacy of the users. For pharmacy students, digital literacy now extends beyond basic computer skills to include "algorithmic literacy" and the ability to verify AI-generated medical data against gold-standard clinical guidelines.



AI Applications in Pharmacy Library Services AI is being integrated into pharmacy libraries across three primary domains:

### 2.1 Information Retrieval and Discovery

Traditional keyword searches are being replaced by semantic search engines. These tools understand the context of pharmaceutical queries (e.g., distinguishing between a drug's brand name and its chemical compound) to provide more relevant results.

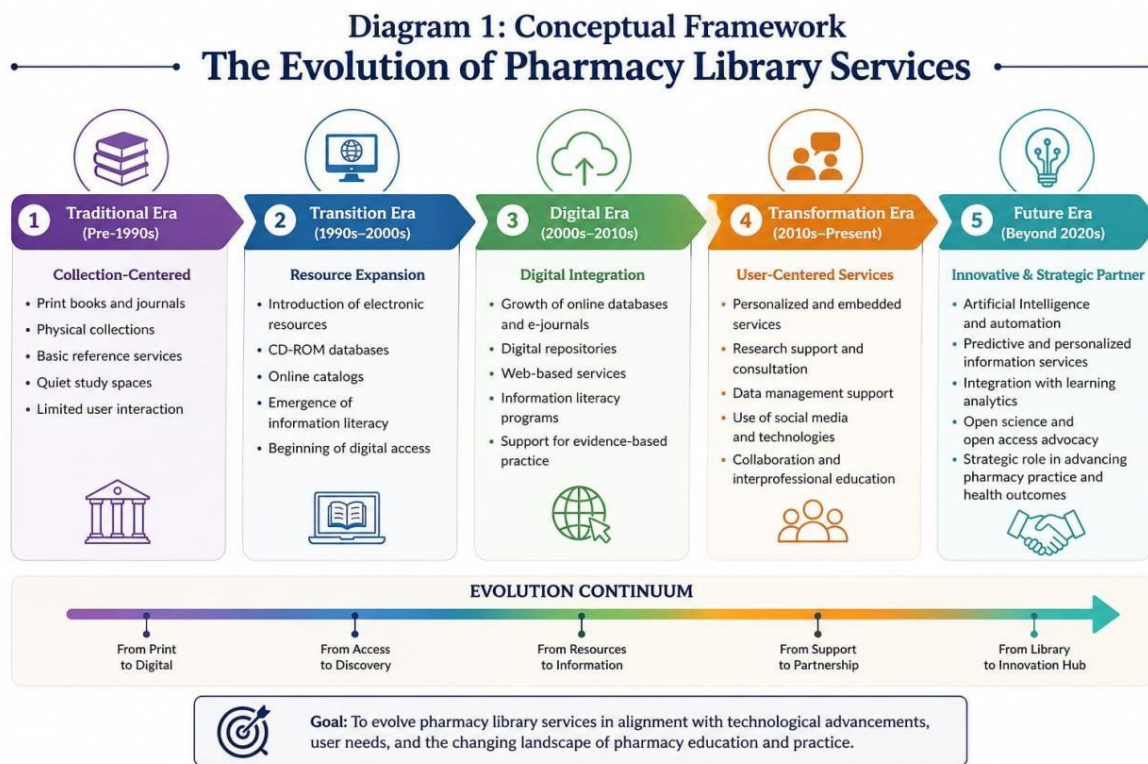
AI-Driven Systematic Reviews: Tools like Covidence or Rayyan utilize ML to screen thousands of abstracts for meta-analyses, a task frequent in pharmacy research.

### 2.2 Virtual Reference Services (VRS)

Many libraries now employ AI Chatbots to handle routine inquiries regarding drug monographs, dosage calculations, or library orientation. This allows human librarians to focus on complex, specialized research consultations.

### 2.3 Collection Development and Predictive Analytics

AI algorithms analyze circulation data and research trends to predict which pharmaceutical journals or e-books will be most in demand, optimizing the library's budget allocation.



### III. THE DIGITAL LITERACY IMPERATIVE IN PHARMACY EDUCATION

In a pharmacy context, digital literacy is no longer an elective skill but a clinical necessity.

#### 3.1 Data Management and Curation

Pharmacy students must learn to manage large datasets resulting from genomic research and clinical trials. Libraries are increasingly providing training on Research Data Management (RDM) and the use of Electronic Lab Notebooks (ELNs).

#### 3.2 Evaluation of AI Outputs

The phenomenon of "AI hallucinations" (where AI generates false medical citations) poses a significant risk in pharmacy. Libraries are leading the charge in teaching students how to cross-reference AI outputs with authoritative databases like PubMed, Scopus, or Lexicomp.

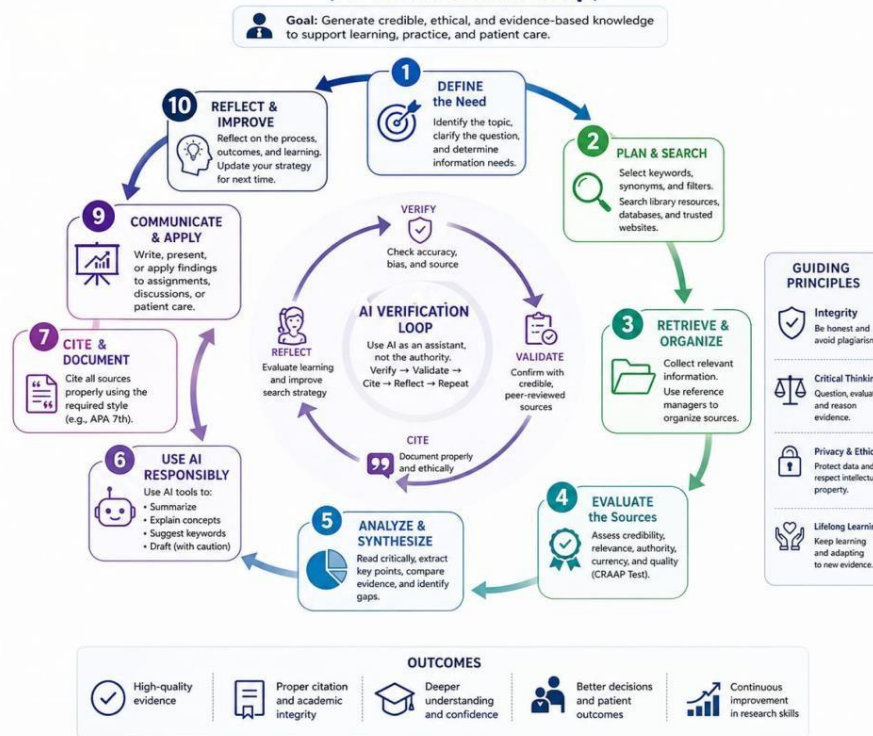
### V. LITERATURE REVIEW

Digital Resources: Pharmacy libraries are now increasingly reliant on e-journals and databases (such as ScienceDirect).

Impact of AI: Thanks to chatbots and smart search engines, library services are becoming available 24/7.

Software Technology: Software solutions like VMedu Life have made 'cataloging' and 'issue-return' processes significantly more transparent.

**Diagram 2: The Pharmacy Student's Digital Research Lifecycle (AI Verification Loop)**



### VI. FUTURE DIRECTIONS

The future of pharmacy library services lies in the synergy between AI and specialized librarianship. We can expect:



Personalized Learning Pathways: AI that suggests reading materials based on a student's specific research interest (e.g., cosmetic formulation or herbal drug delivery).

Immersive Technologies: VR/AR integrated into the library to allow students to visualize 3D molecular structures and protein-ligand docking.

Collaborative Research Hubs: Libraries evolving into "Makerspaces" where digital literacy and AI tools are used to simulate drug-excipient interactions before entering the physical lab.

## VII. CONCLUSION

In conclusion, in the modern era, there is no alternative to technology for pharmacy libraries. The adoption of new software and AI tools in institutions such as the Samarth Institute of Pharmacy is playing a pivotal role in enhancing the quality of research.

## VIII. ACKNOWLEDGEMENT

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## REFERENCES

- [1]. Ait Gacem S, Huri HZ, Wahab IA, Abduelkarem AR. Investigating digital determinants shaping pharmacists' preparedness for interoperability and health informatics practice evolution: a systematic review. *Int J Clin Pharm.* 2025;47(1):15-28. do
- [2]. Al-Qerem W, Akour A, Hammad A. Integrating AI in Healthcare Education: Attitudes of Pharmacy Students at King Khalid University Towards Using ChatGPT in Clinical Decision-Making. *PMC.* 2025 May 27.
- [3]. *Frontiers in Public Health.* Knowledge, attitudes, and practices of pharmacy students and graduates regarding artificial intelligence in healthcare: a multi-regional cross-sectional study. *Front Public Health.* 2026 Apr 16;14:1736417.
- [4]. Bashir M, Paliwal R, Patel S. Advancing Conceptual Understanding: A Meta-Analysis on the Impact of Digital Technologies in Higher Education. *MDPI Educ Sci.* 2025;15(11):1544.
- [5]. Wang L, Zhang Y. The mediating role of knowledge conversion between digital literacy and scientific creativity among medical students. *PMC.* 2026 Mar 30.
- [6]. Cox AM, Pinfield S, Rutter S. The transformational potential of artificial intelligence for academic libraries. *J Librariansh Inf Sci.* 2024;56(2):120-135.
- [7]. Eden B. Infusing AI for greater impact in academic libraries. *DigitalOcean.* 2023.
- [8]. Impact of Artificial Intelligence on the Future of Clinical Pharmacy and Hospital Settings. *PMC.* 2025 Jul.
- [9]. Das A, Islam S. AI and machine learning uses in libraries: improving services and academic impact. *Inf Technol Libr.* 2023;42(3):45-62.
- [10]. Echedom AU, Okuonghae O. Changing dynamics of AI in academic libraries: prospective advantages and obstacles. *Libr Hi Tech News.* 2024;41(1):10-14.
- [11]. Wardat Y, et al. Cloud-based platforms and AI-driven applications personalizing learning in higher education. *MDPI.* 2023;13(5):201.
- [12]. Xiong P. Accuracy of AI-generated outputs in academic research: A critical review. *Sci Rep.* 2024;14:3421.
- [13]. Oates G, et al. Digital technologies in higher education: A comparison of US and international adoption. *Int J Educ Technol High Educ.* 2024;21:12.



- [14]. Saal M, et al. Digital tools in pharmaceutical education: A gap analysis of technology adoption. *South Afr J Sci.* 2025;121(3/4):115-122.
- [15]. Twomey J, et al. AI-powered virtual assistants in academic libraries: enhancing 24/7 reference services. *ResearchGate.* 2024.
- [16]. Gajbhiye R. The impact of AI on library user experience: Beyond uniform service delivery. *Int J Inf Stud.* 2024;16(2):88-102.
- [17]. Ikwuanusi C, et al. Assistive technologies and inclusivity in digital libraries for medical researchers. *J Access Serv.* 2023;20(4):210-225.
- [18]. World Health Organization. Ethics and governance of AI for health: A guidance document for pharmaceutical colleges. Geneva: WHO; 2023.
- [19]. Kumar R, Johnson L. Digital literacy standards for pharmacy students in the era of generative AI. *J Med Libr Assoc.* 2024;112(1):30-42.
- [20]. Smith A. The AI revolution in medical librarianship: New roles for the digital age. *Med Ref Serv Q.* 2025;44(1):1-15.

