International Journal of Research in Library Science (IJRLS)

ISSN: 2455-104X

DOI: 10.26761/IJRLS.11.4.2025.1990

Volume 11, Issue 4 (October-December) 2025, Page: 221-228, Paper ID: IJRLS-1990

Influence of Emerging Digital Technologies in Transforming Academic Libraries

Prakash Rabi Das[1]; Rajat Ari[2]

Librarian, Barasat College, Kolkata, West Bengal, India[1];
Librarian, Tamralipta Mahavidyalaya, Tamluk, West Bengal, India[2]

prakashrabidas0203@gmail.com; rajatari_10@yahoo.com

ABSTRACT

This article emphasizes on emerging technology used in libraries and includes the developing library technology trend, particularly for academic libraries, as well as the necessity to rethink and re-strategize how technological advances affect their services. There are clear indicators that academic libraries need emerging technology tools to function efficiently and effectively. This essay aims to define the changing, dynamic function of academic library professionals in a digital library environment. It symbolizes the new generation's perspective, the challenges of implementing digital libraries, and a discussion of the problems that librarians encounter in academic libraries in the new digital era. Navigating Information Landscapes in the Digital Age delves into the evolution and issues that libraries face in today's digital age. It focuses on modernization of library services in the digital world, examines the influence of digital libraries, open access resources and stresses the necessity of information literacy. Further, it also investigates how emerging technologies in libraries, such as AI and virtual reality, affect user experiences and information retrieval.

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KEYWORDS: Emerging Technologies, Digital Skills, Electronic Resources Management, Academic Libraries.

1. INTRODUCTION

Library is not limited to a building where printed books are stored but evolving into an electronic portal to a growing global collection of digital content. The integration of digital technologies in academic libraries is not simply limited to digitization of existing collection or automation of routine operations but rather redefining the library's role in the digital ecosystem. In this environment one can effortlessly get access to information, learning is enriched through interactive resources and physical boundaries do not act as a limitation, enabling remote access to vast repositories of knowledge and wisdom. In order to adopt this transformation, a comprehensive approach is necessary which involves understanding user needs, adoption of appropriate digital tools and developing effective strategies for managing digital resources. With the shift towards digital platforms, the role of librarians must also change from custodians of physical materials to promoter of digital access and literacy.

2. OBJECTIVES OF THE STUDY

Objectives of the study covers the following:

- ✓ To explore the profound changes that have occurred in academic library environment with the adoption of modern digital technologies.
- ✓ To understand the role of digital technologies that contribute in improving the academic library environment.
- ✓ To find out the shift in digital technologies that enhance the academic library activities.
- ✓ To enquire the new digital technologies that have the potentials for the development of the academic libraries
- ✓ To explore the obstacles in using the modern technologies in implementing in academic libraries.

3. LITERATURE REVIEW

Ramana (2006) discusses the changing role of librarians in the dynamic web environment, highlighting the necessity for adaptability and continuous learning. Expanding on this idea Raju (2014) stresses on the requirement of specific knowledge and skills for academic libraries in order to thrive in the digital age, advocating for a transition towards more technologically driven practices. Shivakumar (2017) examines the implications of the digital era on academic libraries and their professionals, pointing to substantial changes in both operational and service approaches. In addition to this perspective, Kaur & Sharma (2018) highlights the evolving role of library professionals in the 21st century emphasizing the need for versatility and innovative thinking in their work. Moruf and Dangani (2020) review emerging technology trends in academic libraries, suggesting that embracing these technologies is crucial for academic success and relevance. Funmilayo (2020) extend the discussion to global trends and emerging technologies, indicating a worldwide shift towards innovative library services and digital inclusivity. Dongare (2022) reflects on the transformation of libraries and librarians in the digital age suggesting a progressive outlook that supports change and innovations. Pradhan and Rai (2023) explore the digital competencies required by library and information science professionals, putting digital literacy as a crucial tool for empowerment in the digital era.

4. METHODOLOGY

This study is based on the assessment and analysis of articles on current development of the topic available in digital and pertinent platforms. It comprises an intensive review of scholarly articles, reports, case study with their indication about the influence of new technologies on academic libraries.

5. DIGITAL TECHNOLOGY

Electronic data, tools, systems, which are generated, processed, stored, disseminated electronically or digitally referred as digital technology. Digital technologies enhance the library services, activities with remote access, transmission and distribution of relevant information.

5.1 Characteristics of Digital Technology

The characteristics of digital technology are as follows:

- **Binary codes:** Digital data comprises with binary codes 0s and 1s executed in digital platforms.
- **High accuracy:** the attributes of digital technology offer precise data and greater accuracy.
- **Flexibility:** Digital technology represents data accuracy, flexibility and versatile attributes for variety of works.
- **Storage and reproduction:** Digital technology enables data to be stored in a concise space that can be copied and transferred across large distances while maintaining the quality of information. This ensures efficient data management and its distribution.
- **Interactivity:** Digital technology supports interactive operations allowing users to engage with contents, applications and digital devices.
- **Connectivity:** Digital technology allows smooth communication and collaborations beyond geographical barriers with the help of well-connected networks and platforms.
- **Automation:** Routine tasks can be automated with the help of digital system which encourages productivity and efficiency in a variety of fields.

5.2 Transformation of Academic Library in Modern Scenario

In the modern age, academic libraries have gone through significant transformations aided by digital technologies and thereby evolving from traditional operations to digitally focused services.

- **Print media to multimedia:** Libraries have evolved by gradually replacing the physical collections of print materials with a variety range of multimedia or digital resources like audio, video and interactive digital contents that supports vivid learning and information consumption choices.
- **Integrated LMS to cloud-based software:** Academic libraries are providing their access and services with cloud-based platforms. Those cloud-based library systems enable the libraries to deliver user friendly, remote access and digital preservation of library collections.
- **Full-text database:** Academic libraries allow quick retrieval and in-depth information with integration of full-text database, open access documents, digital libraries, etc.
- **Reference librarian to chatbots and Intelligent search agents:** The new digital technologies like chatbots and other intelligent tools transforming the academic library environment in a continuous support, information retrieval systems with digital library environment.
- **Library websites:** Academic libraries provide vital access points through their websites that connects users to a wide range of digital resources, services and resources tools.
- **Mobile apps:** Mobile applications also offer convenient and easy access to library catalogue and various other resources.
- **Online book recommendation systems:** With the help of user data and artificial intelligence, these systems provide recommendations for appropriate titles or books and other materials, enhancing users' library experience.
- **Alerting systems with SMS and Emails:** Libraries communicate with their patrons through SMS and emails, enabling timely notifications regarding due dates, new arrivals and upcoming events so that the users remain well informed and engaged.

5.3 Advantages of Implementing Digital Technologies

Digital technologies offer plenty of advantages to strengthen accessibility and efficiency in academic library services.

- **Enhance access to information:** Academic libraries can offer a better access to its resources like e-books, journals, databases and multimedia contents with the help of digital technology.
- **Improve user experience:** The incorporation of digital technologies can improve the overall user experience in libraries.
- **Efficient resource management:** Digital technology helps to simplify library operation and resource management processes for increased efficiency and cost-effectiveness. This may include automation of daily library operations and maintaining a digital archive.
- **Facilitate collaboration and networking:** Digital technologies support collaborations and networking among users, researchers and scholars. This enables them to share the research works and other institutional repositories globally.
- **Enhance teaching and learning:** In the academic environment, teaching and learning are improved through digital technologies by providing innovative and effective educational resources and instructional tools.
- **Promotion of information literacy:** Academic libraries are very much essential among students and faculty members in fostering information literacy skills through digital technologies.
- **Adaptation to changing needs:** Digital technologies assist academic libraries to changing user needs and preferences.

6. ENHANCING LIBRARY SERVICES THROUGH MODERN DIGITAL TECHNOLOGIES

Modern digital innovation changing the operations of academic libraries, reshaping the traditional spaces into digital information center for academic activities. They perform crucial functions for academic students and researchers through remote access, virtual aids, digital collections beyond geographical limitations.

6.1 Website providers

Academic libraries assign website designer to buildup library website for users' gateways which are user friendly, easy to access, attractive, accessible to the important link of the digital resources. These platforms perform receiving feedbacks, analysis, navigating context. Some of the examples of website providers are the Webflow, GoDaddy, Edublogs, WordPress.

6.2 Scholarly search engines and general search engines

Academic library users most popularly use general search engines like Google, Bing, DuckDuckGo, etc. whereas users in academic libraries search for research purposes uses scholarly search engines and databases, like as Semantic Scholar, Google Scholar, CORE, and BASE.

6.3 Conversational AI and Chatbots services

Academic libraries improve user engagement and support services through Chatbots and Conversational AI services. These digital systems can quickly responses against the queries about library services, resource availability, and borrowing policies, which can improve the user experience on innovative service efficiency within academic libraries. Freshchat and Conversica are the examples of two Chatbots services. Conversational Artificial Intelligence use AI-powered communication technology, integrate data, machine learning (ML), and natural language processing (NLP) to detect spoken and written components, simulate human interactions, and ease chat circulation. These AI systems can also help with administrative activities like enrolment and answering any questions students may have while studying. Some of the Conversational AI platforms are Microsoft Azure Bot Service, IBM watsonx Assistant, Google Dialogflow, Oracle Digital Assistant and ChatInsight. Citation generator tools assist users and faculties in generating bibliographies in recommended style for academic work or research work. These tools can generate various citation styles like Chicago, APA and MLA. Examples of Citation Generator tools used in academic libraries are Mendeley and Zotero.

6.4 Paraphraser Tools and Grammar Checkers

Paraphraser tools and grammar checker are invaluable assets for students and researchers aiming to refine their written works. These tools provide assistances in identifying and correcting grammatical errors, improving sentence structure, and ensuring the clarity and precise in academic writing. Examples of the grammar checker and paraphraser tools are QuillBot, LanguageTool and Grammarly.

6.5 Plagiarism Checkers

Plagiarism checkers serve as essential tools for scrutinize documents against vast databases of previously done academic works, journals, books and internet sources to detect similarities. Few examples of plagiarism checker are Scribbr, ProWritingAid and DupliChecker.

6.6 Citation Generators

Citation generator tools that assist users and faculties in generating bibliographies in recommended style for academic work or research work. These tools can generate various citation styles like Chicago, APA, and MLA. Examples of Citation Generator tools used in academic libraries are Mendeley and Zotero.

6.7 Social Media Platforms

Social media platforms with its interactive features like comments and direct messaging offer a channel for real-time feedback and queries, improving user service and support. Social media integration in academic libraries services can extend their reach and impact beyond physical boundaries. Some of the social media tools that are used in academic libraries are Facebook, WhatsApp, Twitter, LinkedIn, Instagram, etc.

6.8 Electronic Resources Management

Electronic Resources Management (ERM) in academic libraries signifies the systematic organization of digital resources likewise e-books, e-journals, multimedia materials, and databases. Electronic Resources Management like

CORAL ensures that electronic collections are effectively integrated into the library framework, facilitating their easily discoverable and accessible to the library users.

6.9 Virtual Reality

Virtual Reality (VR) integration provides interactive experiences in learning and research. The VR allows users to explore complex concepts, historical sites or scientific phenomena in a visually appealing way through simulating virtual world or imaginary environments.

6.10 AR technology

Augmented Reality (AR) technology creates the physical environment by blending digital information in real-time, viewable via AR glasses, smartphones, or tablets. The AR with navigational indication and 3D maps can offer interactive tours which transform user experiences and learning outcomes in academic libraries.

6.11 Mixed Reality

Mixed reality (MR) creates a multimedia environment combining Augmented Reality (AR) or Virtual Reality (VR) elements with the physical world. It describes environments where real and virtual subjects and objects interact in real time and one can interact with both real and virtual components.

6.12 Extended Reality (XR)

Extended Reality (XR) is combination of Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR). This technology provides interactive and immersive environment to explore complex subjects for research and education. The Case Western Reserve University created the HoloAnatomy software which incorporates Microsoft's HoloLens in medical education for interactive 3D models of the human body, dissect virtual cadavers and practice surgical operations.

6.13 Robots in Library Services

Robots are presently engaged in libraries for circulation activities and shelf management, allowing them to search, locate and retrieve. The children with autism in California get assistance with robots for their learning in libraries. The Chicago Public Library collaboration with Google Chicago offer Finch Robots for in-house and checkout operation.

7. CHALLENGES FOR IMPLEMENTING EMERGING DIGITAL TECHNOLOGIES

The academic libraries must navigate a multifaceted set of challenges in implementing emerging digital technologies to successfully modernise their services, which are the following:

7.1 Digital Literacy

The library staff and patrons both have the necessary digital skills to utilize new technologies, which encompasses basic computer skills, the ability to navigate, evaluate and use digital resources.

7.2 Resistance to Change

Both library staff and patrons face resistance due to various factors like comfort with existing systems, fear of the unknown or scepticism about the benefits of new technologies.

7.3 Accessibility Concerns

Libraries experience challenges in ensuring the design and deployment of technology accessible to all users, including those with disabilities to meet accessibility standards.

7.4 Privacy and Security

The introduction of digital services in libraries present significant issues regarding user privacy and data protection. Strong security protocols are needed to be enforced by the libraries to defend the personal data and secure the digital platforms against unapproved access and security breaches.

7.5 Technical Support and Training

In order to effectively integrate new digital technologies, it is essential to provide technical support and training for both staff and users. Libraries should invest in continuous training and offer support services to sort out technical challenges and ensure an effective adaptation to digital platforms.

7.6 Digital Divide

Disparities in access to digital technologies and the internet among certain sections of the population remain a significant challenge in getting benefits from modern technologies.

7.7 Unethical Content

The educational and informational goals of libraries may be severely compromised by the use of any unethical or inappropriate content in the digital platform. This necessitates careful supervision and content management practices.

CONCLUSION

The growing digital technologies offers a strong opportunity to transform academic libraries and strengthen its role in the digital era. Despite several challenges, the crucial and decisive use of these technologies provides a number of benefits that includes greater access to information, enhanced user experience, efficient management of resources, enhanced collaboration and networking facilities. Further digital technologies also support research, teaching and learning, promotion of information literacy and assisting libraries adapt to the evolving user needs. Libraries can perform their fundamental essential roles of collecting, organising, preserving and disseminating knowledge with greater efficiency by effectively harnessing digital technologies. However, as academic libraries continue to evolve in the digital ecosystem, embracing new technologies is an important option and essential step in maintaining relevance and meeting dynamic requirements of the users.

REFERENCES

[1] Dongare, Sudesh N. “Reinventing Trends of Libraries & Librarians in Digital Landscape.” *Journal of Emerging Technologies and Innovative Research*, vol. 9, no. 5, 2022, pp. 632–39, www.jetir.orgc632.

[2] Funmilayo Racheal, Ayo-Olafare. "Global Trends and Emerging Technologies in Libraries and Information Science." *Library Philosophy and Practice*, no. 3835, Jan. 2020, pp. 1–13, https://digitalcommons.unl.edu/libphilprac/3835.

[3] Kaur, Rajwant, and A. K. Sharma. "21 St Century Library Professionals in Dynamic Role in Digital Era." *Library Progress (International)*, vol. 38, no. 1, 2018, pp. 129–39, https://doi.org/10.5958/2320-317x.2018.00013.2.

[4] Moruf, H. A., and B. U. Dangani. "Emerging Library Technology Trends In Academic Environment-An Updated Review." *Science World Journal*, vol. 15, no. 3, 2020, pp. 13–18, https://doi.org/10.47514/swj/15.03.2020.002.

[5] Nanou, Andromachi, and Dimitris Karampatzakis. "The Participation of Students with Autism in Educational Robotics: A Scoping Review." *Social Sciences*, vol. 12, no. 675, Dec. 2023, pp. 1–18, https://doi.org/10.3390/socsci 12120675.

[6] Pradhan, Sarbada, and Avijit Rai. "Digital Capability for Library and Information Science Professionals: A Narrative Discourse." *Digital Literacy: Empowering Individuals in the Digital Age* , 2023, pp. 145–53, https://www.researchgate.net/publication/374530503.

[7] Raju, J. "Knowledge and Skills for the Digital Era Academic Library." *Journal of Academic Librarianship*, vol. 40, no. 2, 2014, pp. 163–70, https://doi.org/10.1016/j.acalib.2014.02.007.

[8] Ramana, P. Venkata. "The Changing Role of Librarian in a Challenging Dynamic Web Environment." *4th International Convention CALIBER-2006*, INFLIBNET Centre, Ahmedabad, 2006, pp. 170–78.

[9] Salubi, Oghenere. "Transforming Libraries and Information Professionals for the Industry 4.0 in Developing Countries: Towards the Development of a Framework for Accelerating Change Post-Covid-19." *Alexandria: The Journal of National and International Library and Information Issues*, Aug. 2023, pp. 1–16, https://doi.org/10.1177/09557490231197971.

Shivakumar, G. T. "Impact of Digital Era on Academic Libraries: It's Play with Library Professionals." *International Journal of Library & Information Science(IJLIS)*, vol. 6, no. 4, 2017, pp. 1–7, http://iaeme.com/Home/issue/IJLIS?Volume=6&Issue=4.
