



**Knowlet:Journal of Knowledge
Management and Library Innovation**
www.knowletjournal.com

Digital Transformation and Curation in Academic Libraries: Perspectives, Practices, and Pathways

Mr. Mukund Prakash Harne

Librarian

Thakur Institute of Management Studies and Research
Mumbai, India

Mr. Devidas Kalwale

Librarian

Thakur College of Engineering and Technology (TCET)
Mumbai, India

Corresponding Author's Email ID: timsr.lib@thakureducation.org

Article Info

Keyword: Digital Libraries, Academic Libraries, Digital Preservation, Metadata Standards, Cloud Infrastructure, Digital Curation, Collection Management

Received on: 07/09/2025

Accepted on: 25/09/2025

DOI:

ABSTRACT

Academic libraries are undergoing a profound transformation from being just a quiet location filled with traditional printed books and other physical materials, to become lively spaces allowing for greater engagement and access to a larger set of information that is now digital and online. This evolution reflects the widespread digitization of higher education and the intensification of demand for seamless access, collaborative platforms, and sustainable knowledge curation. This study looks at digital transformation in academic libraries, specifically in regard to collection development, analog-to-digital migration, preservation, metadata standards, interoperability, and cloud-based systems. Using a mixed-methods framework, composed of a literature synthesis, an institutional case study, and interviews with experts, this study highlights current practices, barriers to adoption, and a conceptual framework to consider in envisioning sustainable digital curation. The findings illustrate that while advancement in the technological elements of digital transformation is important, preservation, professional competencies, and policies that support the accessible, effective, and sustainable stewardship of academic resources must also be considered and pursued.

Introduction

The academic library, traditionally defined by the breadth and depth of its physical collections, is increasingly associated with access to digital content, infrastructural advancement, and the proactive curation of resources. Digital transformation represents the application of digital tools and practices that produce a new and fundamentally different way of operating, participating and engaging in library and learning initiatives. Traditional core activities such as collection development, cataloguing, access, and preservation are all undergoing reengineering in the digital space. This paper explores the ways that academic libraries are responding to this change - exploring best practices for digital curation, migration strategies, and frameworks on

how to adopt cloud systems. To underpin our investigation, we provide a case study of the Thakur Institute of Management Studies and Research (TIMSR) as an illustrative example of the processes of digital transformation in an academic context in India, looking at their practices surrounding digital curation and how TIMSR has navigated digital transformation through cloud-based systems.

Literature Review

Digital Collection Development and Management

Digital collections stem from strategic selection, licensing, and sometimes further attention to electronic content. Johnson (2018) states that e-books, databases, and institutional repositories are designed to have

ongoing value or relevance. Digital content, in contrast to print, comes with attendant costs for ongoing licensing, attention to the technical infrastructure, and re-evaluating user needs over time. Therefore, successfully managing digital collections requires some previous experience with content providers and curation policies that have some level of flexibility.

Migration from Analogue to Digital Services

Digitization can be a part of widening access and protecting at-risk materials. Smith and Wong detail a transition process—from scanning and print materials to metadata creation to ensuring some level of quality control has been adhered to. While moving materials into a digitized platform increases access and accessibility to education online, it can be labour and resourcing-intensive and will involve investment in capital equipment, software, and professional development.

Sustainability and Digital Preservation

Digital preservation is at risk from data decay, obsolescence, and cybersecurity risk. The OAIS Reference Model (2020) provides a scaffold for making sense of long-term preservation considerations with ongoing format migration as a priority, replication, and decentralized preservation networks such as LOCKSS and CLOCKSS. Institutional plans often consider automated backups and redundancy options, which include, increasingly, blockchain methods, for sustainability of curation are exemplary.

Metadata Standards and Interoperability

Metadata is the service layer for discovery of digital objects. Standards, such as Dublin Core, MARC21, and MODS enable interoperability of access by users and institutions and organizations within the consortium. Lagoze and Van de Sompel's (2001) original thoughtful contribution indicated that low-barrier interoperability frameworks will be a cornerstone of digital preservation—and using integrations will enable seamless searching and resource discovery, although maintaining the quality and interoperability of metadata between systems remains a challenge.

Cloud Computing and Infrastructure

Cloud platforms are a scalable, secure, and economical means to manage relatively large digital assets. Harinarayana and Raju (2019) note that cloud services (e.g., Koha, DSpace, and WorldCat) provide 24/7 access, replicability, and system redundancy - especially beneficial for organizations limited by their on-site IT resources. It has also been stated that incorporating cloud-based services may extend the lifecycle of digital

tools and resources, however, this also introduces their own set of demands and a new level of control over the longevity of data.

Methodology

A mixed-methods approach underpins this study:

- Qualitative Content Analysis: The considerations of the academic literature, international guidelines, and institutional policy documents concerned with digital transformation and curation were considered for common themes and exemplary practices.
- The digital transformation case study of TIMSR (Mumbai) was evaluated as a site of empirical data collection in order to gain a better understanding of the realities for transitioning to digital in a university academic library setting.
- The informal interviews and conversation with library practitioners was intended to augment the literary findings and also verify some conceptual framework content.

Synthesized findings illuminate actionable practices, persistent obstacles, and viable pathways for future digital curation.

Findings

Digital Collection Development at TIMSR

The Learning Resource Centre (LRC) at TIMSR has developed a hybrid model; it subscribes to repositories and offers access for ease of use, while simultaneously digitizing projects, lectures, and academic papers that are researched in-house. Altogether, these resources are integrated into an academic repository and made available remotely via Knimbus and mobile apps for ease of access. The hybrid model allows both for on-campus and remote learning, enhancing library accessibility and optimizing the user experience of the library.

Migration from Analog to Digital

More than 7,000 pages, including course outlines and student sip and final research reports, have been digitized at TIMSR. This transition—while enhancing access—faces barriers including inadequate funding, infrastructural limitations, and the persistent need for technically qualified staff to oversee and maintain the digitization pipeline.

Digital Preservation Strategies

TIMSR utilizes multiple preservation methods including LOCKSS and CLOCKSS for redundancy, regular antivirus scans, and routine data backups on external media. While these methods protect the integrity of the material, the future adoption of automated, blockchain-

based archiving could increase resilience and efficiency in accessing material later.

Metadata and Interoperability

METADATA at TIMSR follows the Dublin Core guidelines, which supports the integration with Koha LMS and interoperability with the digital (Knimbus) and physical (OPAC) collections. These principles allow users to access collections through one interface and conduct a unified search. Issues with metadata quality, integration across platforms, and the ongoing online and print inventory are concerns.

Cloud-Based Infrastructure

TIMSR's adoption of cloud-based Koha LMS enables 24/7 access, offsite redundancy, and maintenance cost reduction. Partnering with Knimbus, the LRC strengthens global access to digital resources, although concerns about data privacy, vendor lock-in, and digital sovereignty persist.

Discussion

Digital transformation has become essential and ongoing challenge for academic libraries. Strong technology infrastructure, selecting standards-based metadata, and training of personnel are key components of a successful initiative. Open-source models, including Koha for integrated library system or DSpace for digital repository are essential for sustainability in tight budget circumstances.

Challenges and Best Practices

- Infrastructure: Cloud services service can reduce costs and improve scalability, but they need to consider the investment of data privacy and cybersecurity.
- Metadata Standards: Uniform, high-quality metadata and linked data protocols enhance resource interoperability across library networks.
- Capacity Building: Continuous training on emerging technologies, metadata, and curation practices is critical.
- Collaboration: Engaging with national and global digital library initiatives (e.g., NDLI, Shodhganga) amplifies resource sharing and networked discovery.
- Strategic Planning: Regular risk evaluations, policies that maintain a collection, and technological horizon scanning create resilience and agility.

Conceptual Framework: Digital transformation is based upon three pillars:

1. Technological infrastructure: Analytics technology, cloud technology, open-source technology and security technology establish instability.
2. Human Capacity: Skills of staff, in combination with ongoing professional learning and development, bolsters innovation and uncertainty.
3. Policy and Governance: Formal policies around selection, preservation, access, and privacy preserve the value of digital collections and ensure resources remain accessible in the long-term.

Conclusion

Academic libraries, such as the one at TIMSR, shows that delivering successful digital transformation requires progress along numerous fronts, including technological, human, and policy fronts. The challenge is to create robust, interoperable knowledge ecosystems that promote innovation while taking into account sustainability and inclusivity. Libraries must keep on for:

- Articulate and implement clear digital collection and preservation policies.
- Pursue cloud-based, open-source infrastructures for scalability.
- Adopt uniform metadata standards.
- Invest in capacity-building for staff.
- Explore emerging technologies such as AI-assisted cataloging and blockchain-based archiving.

Future inquiries should focus on expanding collaborative networks, leveraging AI for digital curation, and formulating robust, national frameworks for academic knowledge sustainability.

References

- Harinarayana, N. S., & Raju, N. V. (2019). *Cloud Computing for Libraries*. *DESIDOC Journal of Library & Information Technology*, 39(1), 23-28.
- Johnson, P. (2018). *Fundamentals of Collection Development and Management*. ALA Editions.
- Lagoze, C., & Van de Sompel, H. (2001). *The Open Archives Initiative: Building a low-barrier interoperability framework*. In *Proceedings of the First ACM/IEEE-CS Joint Conference on Digital Libraries* (pp. 54–62).
- OAIS Reference Model. (2020). *Consultative Committee for Space Data Systems*.
- Smith, A., & Wong, L. (2020). *Digitization in Academic Libraries: A case study approach*. *Library Management*, 41(6/7), 321–335.
- CLOCKSS. (2021). *Controlled Lots of Copies Keep Stuff Safe*.
- Odunlade, R. O., & Ojo, J. O. (2022). *Digital transformation and service delivery in academic libraries: A post Covid-19 approach*. *Lagos Journal of Information Science and Research*, 2(1), 41–65.

- Zareef, M. (2025). *Systematic literature review of digital curation services in academic libraries*. *Journal of Information Science*.
- Deepak, J.S.S.V.A.B. (2022). *Digital Curation Strategies for Information Management in Libraries*.
- "Digital Transformation in Academic Libraries." (2024). *JISC Digitization Blog*.
- "Digital Library." (2025). *TIMSR Learning Resource Centre*.