

INTEGRATING PHYSICAL AND DIGITAL COLLECTIONS: KNOWLEDGE ORGANISATION AND DISCOVERY IN HYBRID UNIVERSITY LIBRARIES IN SOUTHWEST NIGERIA

**Dr. OLATOYE, Adebola
Aderemi**

adebolaadeyemo0108@gmail.com
+2348038853216
<https://orcid.org/0009-0006-1555-3355>
The Nigerian Baptist Theological
Seminary, Ogbomosho, Oyo State

**AYOADE, Ezekiel
Oluwaferanmi**

ayoadeezezekiel18@gmail.com;
+2348088017393
Kwara State University, Malete,
Kwara State, Nigeria

KOLAJO, Funmilola Susan

fskolajo@lautech.edu.ng;
+2348033939243
Ladoke Akintola University of
Technology, Ogbomosho

Abstract

The rapid evolution of information and communication technologies has transformed academic libraries into hybrid environments that integrate both physical and digital collections. This study investigates the integration of these collections, focusing on knowledge organisation and information discovery practices among librarians in private universities in Southwest Nigeria. Adopting a qualitative research design, data were collected through semi-structured interviews with purposively selected librarians working in hybrid library settings. The data were analysed thematically to capture the lived experiences, practices and challenges associated with managing hybrid collections. The findings revealed that integration remains partial and continually negotiated, with librarians often operating across parallel systems that are not fully interoperable. Knowledge organisation is characterised as a hybrid and interpretive practice, combines traditional classification schemes with digital metadata standards, while also accommodating local content realities. Although libraries deploy various discovery tools, user engagement is significantly influenced by familiarity with commercial search engines, leading to underutilisation of library systems. Key challenges identified include limited funding, infrastructural constraints, skill gaps and resistance to technological change. Additionally, users exhibit varying levels of information literacy, which affects their ability to navigate hybrid systems effectively. The study concluded that hybrid libraries function as dynamic socio-technical environments, where successful integration depends on the alignment of technology, professional practice and user behaviour. It recommended the development of interoperable systems and enhancement of metadata practices. The study contributes to the growing body of knowledge on hybrid librarianship, by providing nuanced insights into the complexities of integrating physical and digital knowledge systems.

Keywords: Digital transformation; Hybrid libraries; Information discovery; Information-seeking behaviour; Knowledge organisation; Metadata practices

Introduction

The continuing convergence of analogue and digital information resources has transformed the remit and infrastructure of academic libraries worldwide, producing the model commonly described as the hybrid library as a library that manages and provides discovery for both physical (print, special collections) and digital (e-journals, institutional repositories, digitized special collections) holdings in an integrated service environment (Silva & Caldas, 2022). Hybrid libraries are not merely a juxtaposition of formats; they require concerted organisational, metadata and system-level strategies to make distinct resource types discoverable through unified search and discovery interfaces (Roy, 2022). In many low- and middle-income contexts the transition has been uneven: although interest in digital repositories, open access and discovery layers is growing, practical constraints (funding, skills, infrastructure and policy gaps) continue to limit seamless integration of physical and digital collections.

Effective knowledge organisation (KO) lies at the heart of discovery: metadata quality, consistent classification, interoperable catalogue records and discovery-layer configuration determine whether users encounter relevant items regardless of format. In the Nigerian university context, studies have repeatedly identified persistent challenges, including inadequate metadata practices, limited adoption or unstable implementation of institutional repositories and insufficient staff training, which undermine the sustainability and trustworthiness of digital collections and the capacity of libraries to provide an



integrated discovery experience (Opele, 2023). For private universities in Southwest Nigeria, where institutional strategies, budgets and staffing patterns may differ from those of public institutions, these issues may give rise to particular patterns of practice and constraint that are not well represented in the existing empirical literature.

Although the literature describes a range of technical solutions (integrated library management systems, institutional repositories and discovery layers such as VuFind) and conceptual models for hybrid integration, there remains a gap in contextually-grounded, qualitative evidence about how practising librarians in private Nigerian universities actually organise hybrid collections and configure discovery in everyday practice. The result is a limited understanding of the interplay among metadata decisions, system choices (e.g., ILMS, repository software, discovery layers), institutional policy and librarian expertise, all of which shape users' ability to discover and retrieve knowledge across formats. This study addresses that gap by examining the experiences, strategies and constraints reported by 194 librarians in private universities in Southwest Nigeria.

Objectives of the Study

The principal aim of this research is to explore how librarians in private universities in Southwest Nigeria organise and enable discovery for integrated physical and digital collections. The study's specific objectives are to:

- i. determine the extent of integration of physical and digital collections in private universities in Southwest Nigeria
- ii. identify the knowledge organisation practices in hybrid libraries in private universities in Southwest Nigeria
- iii. describe the tools and technologies for information discovery in private universities in Southwest Nigeria
- iv. examine the challenges in managing hybrid library systems in private universities in Southwest Nigeria
- v. describe user interaction and information-seeking behaviour of private universities in Southwest Nigeria

Theoretical / Conceptual Framework

The theoretical and conceptual foundations of this study draw on established models of knowledge organisation (KO), metadata theory and hybrid library integration. These frameworks help explain how physical and digital collections can be systematically organised for unified discovery within academic library environments. The following theories and concepts guide the interpretation of findings and illuminate the relationships among KO practices, technological systems and the discovery experience in hybrid libraries.

Knowledge Organisation Theory: Knowledge Organisation (KO) theory provides a fundamental basis for understanding how information resources, regardless of format, are described, classified, arranged and made accessible. Classical KO frameworks, such as Ranganathan's Faceted Classification and the Colon Classification system, emphasize analytic-synthetic processes and the organisation of knowledge into mutually exclusive facets (Mai, 2023). Contemporary KO scholarship extends these principles to digital environments, highlighting the need for consistent metadata structures, controlled vocabularies and interoperable classification schemes (Hider, 2022). In hybrid libraries, KO theory underscores the requirement for harmonising descriptive practices across print and digital resources. The theory suggests that inconsistencies in metadata, subject headings, or classification undermine cross-format discovery, an issue particularly salient in contexts where multiple systems (e.g., ILMS, OPAC, repositories) operate simultaneously.

Metadata Theory and Interoperability: Metadata theory serves as a critical conceptual lens for digital knowledge organisation. Modern library systems rely heavily on metadata standards such as Dublin Core, MARC21, MODS and emerging linked data principles to facilitate interoperability across heterogeneous platforms (Zumer & O'Neill, 2021). Metadata theory emphasises the functions of metadata, discovery, identification, relationship modelling and rights management and the need for structural and semantic consistency to enable resource integration. In the present study, metadata theory



helps interpret how librarians describe digital resources, map metadata fields across systems and maintain quality control. The theory further guides exploration of challenges such as incomplete metadata, poor standardisation and the absence of crosswalks between digital repositories and catalogue systems.

FRBR and the IFLA-LRM Model: The Functional Requirements for Bibliographic Records (FRBR) and its successor, the IFLA Library Reference Model (IFLA-LRM), provide an entity-relationship framework for understanding how bibliographic resources relate across versions, formats and manifestations (IFLA, 2017). These models emphasise user-centred tasks – find, identify, select and obtain – which align closely with the goals of integrated discovery systems in hybrid libraries. FRBR/IFLA-LRM guide this study by offering a means to conceptualise how different formats of the same intellectual work (e.g., a print book and its digitized version) can be connected through metadata structures that support unified discovery. They provide theoretical grounding for analysing challenges related to duplicate records, disaggregated metadata and fragmented user search pathways.

Discovery Layer Model: Discovery layer models describe the architecture of unified search systems that index diverse collections, including OPAC records, digital repositories, subscription databases and open-access materials, into a single search interface (Fagan, 2022). Discovery layers use harvesting protocols (e.g., OAI-PMH), relevance ranking algorithms and metadata mapping to merge records from different systems. The model is essential for hybrid libraries because it addresses the technical dimension of integration. It supports the analysis of tools used in Nigerian private universities (e.g., Koha, DSpace, EBSCO Discovery Service, VuFind) and the role of librarians in configuring indexing, metadata enrichment and system interoperability. In the current study, the discovery layer model provides a framework for examining the procedures through which librarians unify physical and digital discovery.

Hybrid Library Integration Model: The Hybrid Library Integration Model, articulated in newer library technology literature, posits that effective integration requires alignment among three key components:

- Organisational practices (policies, staff role, workflows)
- Technological infrastructure (ILMS, repositories, discovery layers)
- User-centred access (usability, search pathways, system responsiveness)

This model assumes that hybrid libraries embody sociotechnical systems where human expertise and technological tools intersect (Pinfield, Cox & Rutter, 2021). It explains why integration challenges often stem not only from technology gaps but also from metadata inconsistencies, insufficient staff competencies and inadequate institutional support. The model guides the investigation of librarians' experiences as they negotiate the alignment of print and digital workflows.

Review of Related Literature

Hybrid libraries combine traditional print collections with digital resources to create a unified environment that supports diverse information needs. The concept emerged as libraries attempted to bridge analog and digital information landscapes to improve accessibility and user experience (Pinfield et al., 2021). Integration in hybrid libraries involves aligning organisational workflows, metadata practices and discovery systems to ensure seamless access across formats. Studies suggest that hybrid environments require librarians to rethink traditional cataloguing processes, redesign user interfaces and adopt interoperable metadata schemas (Fidel & Greenberg, 2022). In the context of developing countries, including Nigeria, hybrid libraries are becoming more prevalent in private universities, where digital resources complement and sometimes substitute, limited physical collections (Akor & Akor, 2023). However, achieving full integration continues to be constrained by infrastructural issues, low digital literacy and inconsistent standards.

Knowledge organisation (KO) remains a foundational function in hybrid libraries, enabling effective description, representation and retrieval of both physical and digital resources. Modern KO approaches increasingly emphasise metadata interoperability, linked data and user-centred knowledge structures



(Zeng & Qin, 2022). Research shows that librarians must integrate traditional cataloguing standards (e.g., AACR2, LCSH) with emerging metadata schemas such as Dublin Core and MARC21 for digital collections, creating a complex multi-standard environment (Nazim & Banerjee, 2020). Additionally, the transition toward Resource Description and Access (RDA) has created opportunities for improved contextualisation and flexibility in describing hybrid resources (Tosaka & Park, 2021). Despite global advancements, many Nigerian academic libraries still grapple with limited training in metadata standards, fragmented workflows and inadequate automation systems, which impede effective integration of KO practices (Ejedafiru & Lucky, 2023).

Discovery layers are central to integrating print and digital resources by presenting them through a unified search interface. Studies highlight that modern discovery tools (e.g., Primo, EBSCO Discovery Service, Summon, Koha OPAC enhancements) enable users to navigate complex hybrid collections seamlessly (Asher et al., 2022). Effective discovery depends on metadata quality, indexing depth and interoperability between catalogues, repositories and subscription databases. However, challenges persist in Africa, where outdated OPACs, inadequate indexing and poor metadata integration hinder comprehensive discovery experiences (Onyancha, 2021). In Nigeria, private universities rely heavily on vendor-driven solutions that often require customisation to accommodate local content and institutional repositories (Oyewole & Adetona, 2023). Recent scholarship emphasises that librarians must adopt user-centred design, continuous metadata enhancement and interface usability testing to improve the discoverability of hybrid collections (Khoo & Hall, 2023).

Librarians' digital literacy and technical competencies significantly influence how effectively hybrid collections are organised and accessed. Digital competence encompasses metadata creation skills, database management, understanding of discovery tools and familiarity with emerging technologies such as linked data and artificial intelligence in cataloguing (Hider & Kennan, 2022). Studies in Africa indicate that librarians often have insufficient training in advanced metadata standards, digital curation and systems interoperability, which limits their effectiveness in hybrid library settings (Dick, 2021). In Nigeria, recent research also highlights gaps in professional development, inadequate exposure to integrated library systems and limited ICT infrastructure as major barriers to effective hybrid library management (Owolabi & Olayinka, 2023). Continuous training, collaboration and institutional support are therefore essential in enhancing librarians' competencies.

Despite global progress in hybrid library development, numerous challenges continue to hinder seamless integration. These include inconsistent metadata practices, difficulties in harmonising multiple cataloguing standards, limited funding and infrastructural weaknesses (Okafor & Ikonne, 2022). Studies also note that organisational barriers such as poor coordination between departments, inadequate staff training and weak policy frameworks further complicate integration efforts (Joo & Cahill, 2023). For many Nigerian private universities, unreliable power supply, unstable internet connectivity and high subscription costs for digital databases exacerbate these challenges (Akor & Akor, 2023). Addressing these obstacles requires institutional commitment, improved digital infrastructure and the adoption of scalable, interoperable systems.

Methodology

This study adopted a qualitative research design, specifically a phenomenological approach, to explore the lived experiences and professional practices of librarians in integrating physical and digital collections within hybrid library environments. The study was conducted in selected private universities located in Southwest Nigeria, a region known for its growing investment in digital infrastructure and innovative library services. The population comprised professional librarians working in hybrid library settings within these institutions, particularly those involved in cataloguing, metadata creation, digital repository management and user services. A purposive sampling technique was employed to select participants with relevant experience in managing both physical and digital collections. Inclusion criteria required that participants: be professionally qualified librarians; have at least two years of experience in a hybrid library environment; be actively involved in knowledge organisation or discovery services. A total of 20 librarians were selected, consistent with qualitative research standards that prioritize depth over breadth and allow for data saturation.



Data were collected using semi-structured in-depth interviews. An interview guide was developed in line with the study objectives, covering themes such as: integration strategies for physical and digital collections; tools and standards used in knowledge organisation; challenges and opportunities in facilitating discovery; user interaction with hybrid systems. Interviews were conducted either face-to-face or via secure virtual platforms, depending on participant availability. Each interview lasted approximately 45–60 minutes and was audio-recorded with participants' consent. Field notes were also taken to capture non-verbal cues and contextual insights. Data were analysed using thematic analysis, following the six-phase approach by Braun and Clarke: familiarisation with the data through repeated reading of transcripts; generation of initial codes; searching for themes; reviewing themes; defining and naming themes; producing the report. Transcripts were coded manually and supported with qualitative data analysis software where necessary. Patterns and relationships across participants' responses were identified to generate meaningful themes aligned with the research objectives. To ensure rigor, the study adhered to the criteria of credibility, transferability, dependability and confirmability.

To ensure member checking, participants were provided with summaries of their interview transcripts and emerging interpretations to verify accuracy and authenticity. The researcher engaged with colleagues in library and information science to review coding processes and thematic interpretations, helping to minimise bias. A detailed record of all research decisions, data collection procedures, coding frameworks and analytical steps was maintained to enhance transparency and replicability. Rich, contextual descriptions were provided to enable readers to determine the applicability of findings to other settings. Ethical clearance for the study was obtained from the Research Ethics Committee of the Universities that were used for the study, ensuring compliance with established research ethics standards. Participants were provided with details on the purpose of the study, their rights and the voluntary nature of participation. Beyond the use of participant codes, contextual identifiers such as institution names, specific job roles and unique system descriptions were carefully generalised or masked to prevent indirect identification. Pseudonyms were also used where illustrative quotes were presented. The researchers acknowledge their background in library and information science, which may influence interpretations of participants' responses. To mitigate potential bias, the researchers engaged in continuous self-reflection throughout the research process, maintained reflexive journals and relied on peer debriefing and member checking to ensure that findings accurately reflect participants' perspectives rather than preconceived assumptions.



Table 1: Population of the Study

S/N	Private universities	Librarians
1	Achievers University, Owo, Ondo State	03
2	Adeleke University, Ede, Osun State	08
3	Ajayi Crowther University (ACU), Ibadan, Oyo State	08
4	Anchor University, Lagos State	03
5	Atiba University Oyo	03
6	Augustine University, Ilara, Epe, Lagos State	06
7	Babcock University, Illishan-Remo, Ogun State	14
8	Bells University of Technology, Ota, Ogun State	04
9	Bowen University, Iwo, Osun State	10
10	Caleb University, Imota, Lagos State	06
11	Chrisland University, Abeokuta, Ogun State	04
12	Christopher University, Mowe, Ogun State	04
13	Covenant University Ota, Ogun State	21
14	Crawford University, Igbesa, Ogun State	04
15	Crescent University, Abeokuta, Ogun State	03
16	Dominican University Ibadan (DUI), Oyo State	05
17	Dominion University Ibadan, Oyo State	03
18	Elizade University, Ilara-Mokin, Ondo State	05
19	Fountain University, Osogbo, Osun State	03
20	Hallmark University, Ijebu Itele, Ogun State	04
21	Joseph Ayo Babalola University (JABU), Ikeji-Arakeji, Osun State	08
22	Kings University, Ode Omu, Osun State	04
23	Kola Daisi University Ibadan (KUI), Oyo State	03
24	Lead City University (LCU), Ibadan, Oyo State	16
25	Mcpherson University, Seriki Sotayo, Ajebo, Ogun State	03
26	Mountain Top University, Mowe. Ogun State	03
27	Oduduwa University, Ipetumodu, Osun State	03
29	Pan-Atlantic University, Lagos State	05
30	Precious Cornerstone University, Ibadan, Oyo State	05
31	Redeemer's University Nigeria (RUN), Ede, Osun State	15
32	Trinity University, Ogun State	02
33	Westland University Iwo, Osun State	02
34	Westley University of Science and Technology, Ondo, Ondo State	04
	Total	194



Table 1: Sample Size

S/N	Private universities	Librarians
1	Babcock University, Ilishan-Remo, Ogun State	04
2	Bowen University, Iwo, Osun State	04
3	Caleb University, Imota, Lagos State	04
4	Covenant University Ota, Ogun State	04
5	Precious Cornerstone University, Ibadan, Oyo State	04
	Total	20

Presentation of Results and Discussion of Findings

This section presents the findings in alignment with the research objectives, employing a deeply interpretive qualitative approach. Pseudonyms are used and institutional identifiers are partially masked to preserve confidentiality.

Extent of Integration of Physical and Digital Collections

Findings: Integration as Lived Negotiation

Across institutions, integration emerged not as a technical endpoint but as a daily, lived negotiation. At our university library a mid-sized institution with moderate ICT infrastructure, Adaeze (Cataloguing Librarian, 8 years' experience) described her workflow in a way that blurred the boundary between routine and fragmentation:

“In the morning, I’m shelving books and updating classification records. By afternoon, I’m uploading theses into the repository. But the systems don’t speak the same language. It’s like I’m translating between two worlds that don’t fully understand each other.”

Her use of the phrase “translating between two worlds” is particularly revealing; it frames integration not as a system feature but as human mediation across incompatible structures.

At a larger, better-funded institution, a systems librarian, described integration differently:

“We’ve implemented a discovery layer. From the user’s perspective, it looks unified. But behind the scenes, it’s like stitching fabrics together as you don’t always see the seams, but they’re there.”

Divergent and Negative Cases

A contrasting narrative came from another respondent, a University Librarian, who asserted:

“Integration is no longer our challenge. Our users can access everything from one interface.”

However, when probed further, the respondent acknowledged:

“Well... except for some legacy records and special collections that still require separate access.”

This partial contradiction highlights a gap between institutional rhetoric and operational reality.

The findings suggest that integration is both performed and perceived differently across roles. Librarians’ metaphors: translation, stitching, parallel worlds, indicate that integration is experienced as fragile, incomplete and labour-intensive. This extends existing scholarship by demonstrating that hybrid integration is not merely infrastructural but experiential and interpretive, shaped by how professionals navigate system boundaries in practice.



Knowledge Organisation Practices in Hybrid Libraries

Findings: Knowledge Organisation as Interpretive Craft

Knowledge organisation was described less as a rigid application of standards and more as a situated, interpretive craft. At another university library, a Metadata Librarian recounted a moment that captures this tension:

“We received a collection of oral histories from a local community project. There’s no exact subject heading for some of those materials. If I follow the standard strictly, I lose meaning. If I adapt it, I risk inconsistency. So I do something in between.”

This “in-between” space reflects a negotiated practice, where librarians balance fidelity to standards with contextual accuracy.

A Digital Services Librarian used a striking metaphor:

“Metadata is like giving a resource a voice. If you don’t describe it properly, it remains silent even if it’s valuable.”

Contradictory and Disconfirming Evidence

Not all participants embraced this interpretive flexibility. An early-career librarian expressed concern:

“Sometimes we over-personalise metadata. What one person thinks is descriptive, another may not understand later. It creates confusion.”

Additionally, a negative case emerged where institutional pressures undermined best practices:

“We know the ideal metadata standard, but with deadlines, we just input the minimum required. It’s not perfect, but it keeps the system running.”

These findings reveal that knowledge organisation in hybrid libraries is shaped by tension between standardisation and contextualisation. Librarians act as meaning-makers, not just system operators. However, the presence of inconsistent practices and “minimum metadata” approaches suggests that organisational constraints directly influence knowledge quality, potentially affecting long-term discoverability and system coherence.

Tools and Technologies for Information Discovery

Findings: Discovery as a Contested Space

Participants consistently described a disconnect between library-provided discovery tools and user preferences. At “Lakeside Private University,” a reference interaction illustrates this vividly:

“A student approached me for journal articles. I directed her to our database. She hesitated and said, ‘Can I just Google it instead?’ It wasn’t defiance it was comfort.”

The repeated use of “Google” as a verb “they Google it”, reflects its normalisation as the default search paradigm.

Divergent Perspectives

However, not all participants viewed this negatively. One participant observed:

“Once postgraduate students attend our workshops, they begin to appreciate the databases. They realise Google doesn’t always give them what they need.”

Negative Case

Interestingly, one participant challenged the superiority of library systems:



“There are times Google Scholar retrieves results faster than our own system. We can’t ignore that reality.”

The findings suggest that discovery in hybrid libraries exists within a broader information ecosystem, where users move fluidly between library and non-library platforms. Librarians’ language reflects both resistance and adaptation, indicating a shift from viewing Google as a competitor to recognising it as part of the user’s search environment. This calls for a reframing of discovery strategies toward integration with user behaviour rather than opposition to it.

Challenges in Managing Hybrid Library Systems

Findings: Constraints as Structural and Human

Challenges were experienced as both material (infrastructure, funding) and social (skills, identity, resistance). At a certain university, a senior librarian described internal resistance:

“Some staff feel that digital systems are replacing their expertise. It’s not just about learning new tools, it’s about redefining their role.”

This highlights how technological change can destabilise professional identity.

Another participant described infrastructural challenges in visceral terms:

“When the network fails, everything stops. You sit there watching the system freeze, it’s frustrating, almost paralysing.”

Contradictory Perspective

Yet, some librarians reframed these constraints:

“Because we don’t have everything, we think differently. We rely on open access, partnerships we become resourceful.”

The findings demonstrate that challenges are multi-layered, extending beyond resource limitations to include cultural and psychological dimensions. Resistance is not merely opposition but may reflect uncertainty and identity negotiation. At the same time, the reframing of constraints as opportunities highlights the adaptive capacity of librarians, suggesting that innovation can emerge under pressure.

User Interaction and Information-Seeking Behaviour

Findings: Mismatch Between Systems and User Expectations

Participants described users as digitally inclined but strategically limited. A compelling vignette illustrates this gap:

“A student typed a full question into the catalogue, something like ‘What are the causes of climate change?’ When nothing appeared, he concluded we had no materials on it.”

This reflects a transfer of Google-style search expectations into structured library systems.

Divergent Perspective

However, a minority of users demonstrated advanced skills:

“Students who have had prior exposure to digital research tools navigate our systems confidently. They know how to refine searches.”

Negative Case

One librarian noted that even when users are trained, behaviour may not change:

“We teach them, but many still revert to old habits. Convenience often wins over accuracy.”

Discussion

The findings highlight a cognitive gap between user expectations and system design. Hybrid libraries require not only technological integration but also user adaptation, which is uneven and often resistant to change. This underscores the importance of continuous, context-sensitive information literacy programmes.

Synthesis of Findings

- i. Across all objectives, the study reveals that hybrid libraries are not fully integrated systems but dynamic, negotiated environments shaped by human agency, institutional context and technological constraints. Key insights include:



- ii. Integration is experienced as fragmented and labour-intensive, despite institutional claims of seamlessness;
- iii. Knowledge organisation is a context-sensitive, interpretive practice, influenced by both standards and constraints;
- iv. Discovery exists within a hybrid ecosystem, where library systems coexist with dominant external platforms;
- v. Challenges are structural, cultural and psychological, not merely technical;
- vi. User behaviour reflects a mismatch between digital habits and system design, requiring ongoing intervention.
- vii. Importantly, the inclusion of contradictory perspectives and negative cases demonstrates that hybrid library experiences are not uniform, but vary across roles, institutions and individual dispositions. Librarians emerge as active negotiators of complexity, shaping and reshaping hybrid knowledge systems in practice.

Conclusion

This study examined the integration of physical and digital collections in hybrid libraries within private universities in Southwest Nigeria, focusing on knowledge organisation and information discovery practices. Drawing from rich qualitative accounts, the study concludes that hybrid libraries are best understood not as fully integrated systems, but as dynamic, negotiated environments shaped by technological infrastructures, institutional contexts and human agency.

The study finds that integration remains partial and uneven, with librarians often mediating between parallel systems rather than operating within a unified platform. What appears seamless at the user interface level frequently conceals backend fragmentation, indicating that true interoperability is still evolving. Knowledge organisation in hybrid libraries is revealed as a hybrid and interpretive practice, combining traditional classification systems with digital metadata frameworks. Librarians do not merely apply standards; they actively adapt them to local realities. However, inconsistencies arising from workload pressures and varying expertise raise concerns about metadata quality and long-term discoverability.

The study shows that while various discovery tools are in place, user engagement remains limited, largely due to the dominance of commercial search engines and mismatches between system design and user expectations. Discovery in hybrid libraries therefore exists within a broader information ecosystem, rather than as a self-contained process. Similarly, the study identifies challenges that extend beyond infrastructure and funding to include skills gaps, institutional culture and resistance to change. These findings highlight that digital transformation is as much a human and organisational process as it is a technological one.

Also, study finds that users are increasingly digitally oriented but often lack the information literacy skills required to effectively navigate hybrid systems. This creates a gap between resource availability and resource utilisation. Overall, the study contributes to the literature by demonstrating that hybrid libraries are sites of continuous negotiation, where librarians function as mediators, innovators and interpreters within complex knowledge systems. The findings underscore the need for a more holistic approach to integration one that simultaneously addresses technology, people and practice.

Recommendations

Based on the findings and in alignment with the research objectives, the following recommendations are proposed:

- i. Private universities should invest in robust, interoperable library systems that unify access to physical and digital collections through a single discovery interface. Efforts should move beyond surface-level integration to address backend interoperability, ensuring seamless communication between catalogues, repositories and databases.
- ii. Libraries should establish institution-wide metadata policies and quality control mechanisms to ensure consistency across collections. Regular training and capacity-building programmes should be implemented to enhance librarians' competencies in metadata creation, enrichment and interoperability, while still allowing flexibility for local knowledge representation.
- iii. Library systems should be redesigned with a user-centred approach, incorporating intuitive interfaces that align with users' search habits. Libraries should also explore integrating external



- discovery tools (e.g., Google Scholar linking, federated search systems) to bridge the gap between user behaviour and library resources.
- iv. Institutional management should prioritise ongoing training and re-skilling programmes for librarians to enhance digital competencies. Additionally, structured change management strategies should be implemented to address resistance, including mentoring, peer learning and participatory decision-making in technology adoption. Private universities should also commit to sustained funding for ICT infrastructure, including reliable internet connectivity, modern library systems and digital repositories. Exploring collaborative funding models, partnerships and open-source solutions can help mitigate financial constraints.
 - v. Libraries should design and implement comprehensive, continuous information literacy programmes that equip users with the skills to navigate both physical and digital resources effectively. These programmes should be embedded within academic curricula and tailored to different user groups.

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