

Role of Librarians in the Era of Digital Transformation

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Abstract

The digital transformation of libraries has fundamentally redefined the professional roles and responsibilities of librarians, shifting their functions from traditional custodians of print collections to dynamic facilitators of digital knowledge ecosystems. This research paper examines the evolving roles of librarians in the digital era, exploring how technological advancements, emerging information behaviours, and institutional demands shape modern librarianship. The study highlights the expanded responsibilities of librarians as information curators, digital resource managers, technology facilitators, digital literacy instructors, research data specialists, and virtual service providers. It analyzes the technological competencies required in contemporary library environments, including ICT proficiency, metadata management, digital preservation skills, and familiarity with AI and automation tools. The research paper also reviews major digital tools and platforms—such as institutional repositories, discovery systems, reference managers, virtual reference tools, and digital preservation systems—used to support and enhance library services.

Furthermore, the research paper discusses the impact of digital transformation on library services, emphasizing shifts toward hybrid service models, increased virtual learning support, real-time global access, automated workflows, and personalized user engagement. It also identifies key challenges, including technological obsolescence, cybersecurity concerns, budget constraints, licensing complexities, and digital inequality. Finally, the study explores opportunities for librarians in emerging digital roles and outlines strategic approaches for strengthening their professional relevance through continuous skill development, policy innovation, collaboration, and user-centered practices.

Keywords: - Digital Transformation, Librarianship, Digital Literacy, Information Management, E-Resources, Institutional Repositories, Metadata, Library Automation, Virtual Reference Services, Digital Preservation.

Introduction

The rapid evolution of digital technologies has fundamentally transformed the functioning of academic and research libraries worldwide. What was once a print-centered environment dominated by manual cataloguing, physical circulation, and traditional reference services has now shifted toward digital ecosystems shaped by automation, online resources, artificial intelligence, cloud computing, and data-driven workflows. According to Smith, digital transformation represents not merely the adoption of technology, but a structural shift in how libraries create, deliver, and manage information services.ⁱ This transformation has

expanded the role of libraries from being repositories of books to becoming dynamic digital knowledge hubs.

One of the most significant aspects of this transformation is the shift from traditional librarianship to technology-driven workflows. Earlier, librarians were primarily responsible for cataloguing, circulation, collection management, and in-person reference assistance. Today, their responsibilities include managing e-resources, overseeing digital repositories, teaching digital literacy, and supporting online research environments. As Johnson notes, librarians must now possess technological competencies such as metadata standards, digital preservation techniques, database management, and proficiency in library automation systems.ⁱⁱ The transition from manual to automated and web-based systems has redefined daily workflow patterns, making technological fluency essential for modern librarianship.

Simultaneously, changing information-seeking behaviours of users have accelerated digital transformation. Students and researchers increasingly prefer instant access to electronic journals, e-books, databases, and online learning resources. Mobile devices, social media, and cloud platforms are now integral to their information habits. According to Baker, digital natives expect seamless, remote, and personalized information experiences, pushing libraries to redesign services to meet these expectations.ⁱⁱⁱ As a result, librarians must adapt to new user behaviours by offering virtual reference services, online tutorials, digital literacy training, and remote support mechanisms.

In this context, the importance of redefining librarian roles in the digital era becomes crucial. Librarians are no longer gatekeepers of information but facilitators, digital educators, data managers, and technology mediators. Thomas emphasizes that librarians must embrace emerging roles such as digital curators, research data specialists, ICT trainers, and virtual service providers.^{iv} Redefining these roles ensures that libraries remain relevant, innovative, and central to academic and research environments.

Thus, the digital era demands not only technological adaptation but also a reconceptualization of librarianship itself, positioning librarians as key partners in digital scholarship and lifelong learning.

Changing Roles of Librarians in the Digital Age

- **Information Curators and Knowledge Managers**

In the digital age, librarians play a pivotal role as information curators and knowledge managers, ensuring the organized, systematic, and meaningful arrangement of digital information. Traditional cataloguing and classification have now expanded to include digital curation, metadata creation, and digital preservation. According to Gill, librarians act as curators who collect, validate, classify, and preserve digital content to ensure long-term accessibility.^v Their responsibilities include managing digital repositories, applying metadata standards such as Dublin Core, and ensuring persistent identifiers like DOIs are correctly assigned. Librarians also safeguard digital objects against technological obsolescence, ensuring that digital knowledge remains accessible across generations.

- **Digital Resource Managers**

Librarians increasingly serve as digital resource managers, overseeing e-books, e-journals, online databases, and digital subscription packages. Digital collection management requires understanding licensing terms, digital rights management (DRM), perpetual access rights, renewal negotiations, and usage analytics. Morris emphasizes that librarians are central to ensuring seamless access to digital content while navigating complex licensing agreements.^{vi} They evaluate vendor platforms, negotiate subscription costs, and ensure accessibility for all users. By managing link resolvers, authentication systems (like EZProxy), and integrated discovery services, they enable uninterrupted access to digital resources, making them essential contributors to academic and research workflows.

Technology Facilitators

As technology permeates every aspect of knowledge consumption, librarians act as technology facilitators, guiding users through digital tools, platforms, and devices. They assist in using e-readers, citation software, online archives, cloud storage, and virtual learning tools. Thomas notes that librarians play a vital role in integrating technology into daily academic processes.^{vii} They support faculty in embedding digital content into Learning Management Systems (LMS) such as Moodle, Canvas, and Blackboard. They also facilitate the adoption of digital storytelling tools, virtual labs, and multimedia learning applications. Through instructional workshops and hands-on training, librarians alleviate technological barriers, fostering digital engagement among users.

- **Digital Literacy Instructors**

Librarians have emerged as digital literacy educators, responsible for teaching information literacy, media literacy, and critical digital skills. With the rise of misinformation, fake news, and unethical information practices, librarians equip users with skills to evaluate sources, verify information, and ethically use digital tools. According to Baker, librarians are uniquely positioned to combat misinformation by teaching credibility assessment, digital ethics, citation practices, and academic integrity.^{viii} They conduct training sessions on plagiarism avoidance, referencing tools, scholarly communication, and copyright norms. Their instruction enhances students' digital competencies, contributing to improved academic performance.

Data and Research Support Specialists

The increasing importance of research data has expanded the librarian's role as data and research support specialists. They assist researchers with research data management (RDM), including data documentation, metadata creation, data storage, copyright compliance, and repository submission. Jones argues that librarians contribute to the entire research lifecycle, supporting citation management, impact metrics, bibliometrics, and altmetrics.^{ix} They help faculty identify relevant journals, comply with open access mandates, and enhance research impact through digital dissemination strategies. Their expertise ensures ethical data handling and improved scholarly visibility.

- **Virtual Service Providers**

With the growing demand for remote access, librarians act as virtual service providers, offering real-time assistance through online platforms. Remote reference services, chat-based helpdesks, video consultations, and online tutorials have become primary channels for user support. Smith explains that virtual librarianship combines empathy, technological expertise, and strong communication skills to assist users beyond physical boundaries.^x Such services expand the library's reach, ensuring continuity of learning even during institutional closures or remote-learning situations.

Technology Competencies Required by Modern Librarians

Digital transformation demands that librarians possess a strong foundation in ICT proficiency, covering hardware, software, networks, cloud computing, and digital communication tools. They must navigate online platforms, troubleshoot digital access issues, and guide users in adopting modern technologies. Johnson highlights ICT fluency as essential for modern librarianship.^{xi}

Knowledge of Integrated Library Systems (ILS)/Library Management Systems (LMS) such as Koha, Ex Libris Alma, Evergreen, and Symphony enables librarians to manage cataloguing, acquisitions, circulation, and user accounts efficiently.

Understanding metadata standards—including MARC 21, Dublin Core, RDF, MODS, and BIBFRAME—is essential for organizing both print and digital materials. Gill notes that metadata competency ensures accurate resource discovery and interoperability.^{xii}

Librarians must also be familiar with digital preservation and digitization technologies, including scanning systems, OCR tools, repository software, and preservation frameworks such as the OAIS model.

Skills in AI, machine learning, and automation tools are increasingly sought after, as libraries integrate AI-powered chatbots, automated cataloguing tools, and intelligent recommendation systems. Moreover, cybersecurity awareness and privacy management are essential due to increasing cybersecurity threats, data breaches, and user privacy concerns. Morris emphasizes that librarians must safeguard digital systems and ensure ethical management of user data.^{xiii}

Digital Tools and Platforms Used by Librarians

Modern librarians rely on a variety of digital tools and platforms to manage, preserve, and provide access to information.

Institutional repositories such as DSpace, EPrints, and Greenstone support the storage, dissemination, and preservation of scholarly outputs. According to Jones, these platforms enhance open access, improve citation visibility, and preserve research data.^{xiv}

Discovery tools, OPAC, and federated search systems—such as VuFind, Primo, and EBSCO Discovery Service—enable unified search across catalogues, databases, and digital repositories. They streamline information retrieval by providing a single search interface for all resources.

Reference management tools like Zotero, Mendeley, and EndNote support academic writing and citation management. They help users organize references, generate citations, and collaborate on research projects. Librarians train users to leverage these tools effectively.

Virtual reference tools—including chatbots, email-based services, FAQs, and video consultations via Zoom or MS Teams—widen the reach of library services. Smith emphasizes these tools as essential for remote learning ecosystems.^{xv}

Digital preservation tools such as LOCKSS, CLOCKSS, Archivematica, and Preservica ensure long-term accessibility and integrity of digital materials. These systems protect against link rot, data corruption, and technological obsolescence.

Additionally, librarians use social media and communication platforms such as Facebook, Twitter, YouTube, and Instagram to promote services, share updates, conduct outreach programs, and engage with user communities. These platforms enhance library visibility and foster stronger user relationships.

Digital Tools and Platforms Used by Librarians

The digital transformation of libraries has led to widespread use of advanced digital tools and platforms that enhance information access, preservation, and user engagement. One of the most important categories of these tools is institutional repositories, such as DSpace, EPrints, and Greenstone, which play a central role in managing and preserving scholarly content. Institutional repositories allow librarians to collect, organize, and disseminate research papers, theses, dissertations, datasets, and institutional publications. According to Jones, institutional repositories strengthen open access initiatives by providing long-term preservation and global visibility to scholarly output.^{xvi} Librarians manage metadata, user permissions, version control, and repository architecture to ensure efficient knowledge dissemination.

Another major set of tools includes discovery tools, OPAC systems, and federated search platforms. Modern discovery interfaces such as VuFind, Ex Libris Primo, and EBSCO Discovery Service integrate library catalogues, databases, and digital repositories into a unified search environment. Thomas argues that discovery tools enhance user experience by enabling simultaneous searching across multiple resources, thereby reducing information-seeking time and improving research efficiency.^{xvii} These tools require librarians to manage indexing, metadata mapping, link resolvers, and authentication systems.

Librarians also rely heavily on reference management tools, including Zotero, Mendeley, and EndNote, which help users manage citations, create bibliographies, annotate PDFs, and collaborate on research projects. Baker notes that librarians teach workshops on these tools, enabling students and researchers to improve academic writing, avoid plagiarism, and strengthen research methodologies.^{xviii}

The rise of remote learning has increased the importance of virtual reference tools, such as chatbots, email reference systems, and video consultations through platforms like Zoom and Microsoft Teams. These tools facilitate real-time communication and remote access to library support. Smith highlights that virtual reference expands the reach of library services beyond

physical walls, providing accessibility to users in remote or underserved areas.^{xix} Librarians create online guides, video tutorials, FAQs, and remote helpdesks to assist users effectively.

Additionally, digital preservation tools such as LOCKSS, CLOCKSS, Archivematica, and Preservica protect digital materials from corruption, file degradation, and technological obsolescence. Conway emphasizes that these tools ensure long-term access by maintaining multiple secure backups, performing regular integrity checks, and enabling technological migration.^{xx}

Finally, social media and communication platforms—including Facebook, Twitter, Instagram, YouTube, and LinkedIn—have become essential tools for library marketing, outreach, and community engagement. Mehta states that social media allows librarians to promote events, share updates, broadcast tutorials, and interact with users in real time.^{xxi} These platforms help libraries remain visible, relevant, and connected with diverse audiences.

Impact of Digital Transformation on Library Services

Digital transformation has had a profound impact on library services, reshaping how libraries deliver information, support learning, and engage users. One of the most notable effects is the shift from physical to hybrid and digital services. While print collections remain important, digital content—such as e-books, e-journals, databases, and multimedia resources—now forms a major part of library offerings. According to Johnson, the hybrid model offers flexibility by enabling libraries to blend traditional services with digital platforms, thus accommodating various learning preferences.^{xxii}

Digital transformation has also led to the expansion of virtual learning support. As institutions adopt online and blended learning modalities, libraries serve as academic anchors by providing remote access to digital resources. Librarians develop online learning modules, digital literacy tutorials, and virtual research assistance. Bhattacharya notes that libraries now integrate with Learning Management Systems (LMS) to supply course-specific reading lists, embedded library guides, and multimedia content directly within digital classrooms.^{xxiii}

Another major impact is providing real-time access to global information resources. Through digital platforms, users can access scholarly literature from anywhere in the world. Interlibrary loan has expanded into digital document delivery, enabling faster and more efficient access to research materials. Baker states that instant availability increases research productivity and supports diverse academic needs.^{xxiv}

Digital transformation has also led to the automation of circulation, cataloguing, and acquisition. Integrated Library Management Systems (ILMS) automate tasks such as issuing/returning books, generating reports, acquiring resources, cataloguing, and managing user accounts. This reduces workload, minimizes errors, and improves service efficiency. Thomas highlights that automation allows librarians to focus on high-level roles such as digital curation, data management, and research support.^{xxv}

Furthermore, digital tools enable increased user engagement through personalized services. Libraries use analytics to understand user behavior, tailor recommendations, and customize learning resources. Personalized dashboards, reading lists, and AI-powered

recommendations help create user-centric library experiences. Smith argues that personalization enhances satisfaction and supports continuous learning.^{xxvi}

Despite these advancements, digital transformation introduces significant challenges in maintaining digital inclusivity. Not all users possess equal digital literacy or access to devices and high-speed internet. As a result, digital gaps persist among rural populations, marginalized groups, and differently-abled users. Libraries must adopt inclusive strategies, including accessible websites, assistive technologies, alternative formats, and digital skills training. Mehta emphasizes that libraries must balance technological innovation with equitable access to prevent widening the digital divide.^{xxvii}

In conclusion, digital transformation has redefined library services by improving accessibility, efficiency, and engagement while simultaneously presenting challenges related to digital equity, technological adaptation, and user diversity. Libraries must continue innovating to meet the evolving needs of digital-age learners.

Challenges Faced by Librarians in the Digital Era

The digital era presents numerous challenges that demand continuous adaptation from librarians. One of the most significant challenges is technological obsolescence and rapid updates. Digital tools, platforms, and software evolve quickly, making it difficult for librarians to stay updated with emerging systems. Thomas notes that frequent upgrades in digital interfaces, metadata standards, and repository platforms require librarians to relearn workflows repeatedly, causing operational disruptions.^{xxviii}

Another major challenge is the need for continuous professional development (CPD). Digital librarianship requires expertise in ICT, digital preservation, AI tools, metadata schemas, copyright, and data literacy. Johnson argues that lifelong learning is no longer optional for librarians; instead, it is essential for maintaining professional relevance.^{xxix}

Cybersecurity risks and user privacy concerns also pose critical challenges. The rise of cyber threats, phishing attacks, and data breaches has made libraries vulnerable because they host sensitive user data and subscription-based digital resources. Morris stresses the need for robust security policies, encryption protocols, and ethical handling of user information.^{xxx}

Budget limitations for digital resources remain a major obstacle. Subscription costs for e-journals, databases, and e-books continue to rise each year, making it difficult for libraries to maintain diverse collections. Baker points out that financial constraints often force librarians to cancel underused resources, which may negatively impact research quality.^{xxxi}

The digital divide among users is another significant challenge. Not all users have equal access to devices, internet connectivity, or digital literacy skills. Mehta highlights that marginalized communities face barriers that hinder full participation in digital learning.^{xxxii}

Librarians also face licensing and copyright complexities. Restrictions on simultaneous users, interlibrary loan, and perpetual access rights complicate service delivery. Finally, librarians must balance traditional and digital responsibilities, often handling cataloguing, digitization, physical circulation, and virtual support simultaneously, leading to workload pressure.

Opportunities for Librarians in Digital Transformation

Despite the challenges, digital transformation creates numerous opportunities for librarians to expand their roles and impact. One major opportunity is leadership in digital knowledge management. Librarians can guide institutions in organizing digital repositories, curating metadata, integrating discovery systems, and supporting open access initiatives. Gill asserts that librarians are uniquely positioned to manage digital scholarship effectively.^{xxxiii}

A growing opportunity is the expansion of new professional roles, including data librarianship, digital archivists, scholarly communication specialists, and digital humanities facilitators. These roles allow librarians to contribute directly to research workflows, data management planning, and digital scholarship support. Jones notes that data librarianship is becoming a cornerstone of modern academic research ecosystems.^{xxxiv}

Digital transformation also facilitates innovation through AI, VR/AR, and digital storytelling. AI-powered recommendation systems, virtual reality learning environments, and interactive exhibitions enhance user engagement. Thomas highlights that such technologies enable librarians to create immersive, meaningful learning experiences.^{xxxv}

Another opportunity lies in strengthening collaboration with faculty and IT departments. Digital learning environments require integrated teamwork, where librarians co-design digital course materials, support LMS integration, and contribute to research projects. Such collaboration enhances librarians' visibility and institutional value.

Finally, librarians can increase user engagement through personalized digital services, such as customized reading lists, interactive guides, and data-driven recommendations. Smith emphasizes that personalization builds trust, retention, and learner satisfaction.^{xxxvi}

Strategies to Strengthen Librarians' Role

To address challenges and fully harness digital opportunities, academic institutions must adopt robust strategies to strengthen librarians' roles. The most important strategy is promoting continuous training and skill development. Workshops, certifications, MOOCs, and hands-on training in AI tools, metadata systems, digital literacy, and research data management are crucial. Johnson underscores that upskilling librarians ensures future-readiness.^{xxxvii}

Another essential strategy is revising curriculum in Library and Information Science (LIS). LIS programs must integrate AI, data science, digital curation, cybersecurity, coding basics, and UX design to prepare graduates for digital environments. Baker argues that curriculum modernization is key to producing digitally competent professionals.^{xxxviii}

Policy development for digital services is critical. Clear guidelines on digital preservation, copyright, remote access, privacy, and inclusive digital services enable systematic and sustainable digital operations.

Librarians also benefit from collaborative initiatives with IT units and academic departments. Joint projects, co-teaching of digital literacy courses, and interdisciplinary research enhance librarians' institutional visibility and impact.

Investing in digital infrastructure and tools—including upgraded LMS systems, repository platforms, cloud storage, AI tools, and cybersecurity systems—is essential for high-

quality digital services. Finally, librarians must adopt user-centered and evidence-based practices, using analytics, surveys, and feedback to shape responsive digital services. Smith stresses that user-driven strategies ensure the long-term relevance of library services.^{xxxix}

Conclusion

The digital transformation of libraries has profoundly reshaped the roles, responsibilities, and professional identity of librarians, marking a decisive shift from traditional custodianship to dynamic digital leadership. As this study demonstrates, the modern librarian functions not only as an information manager but also as a digital curator, technology facilitator, research support specialist, and literacy educator. The integration of ICT, AI, data analytics, virtual platforms, and digital preservation tools has expanded the scope of library services, enabling librarians to support remote learning environments, enhance resource accessibility, and promote lifelong learning. Through active engagement with institutional repositories, discovery tools, e-resource management systems, and virtual reference technologies, librarians ensure seamless access to global information landscapes and contribute meaningfully to academic and research excellence. However, the digital era also presents new challenges, including technological obsolescence, cybersecurity threats, budget limitations, licensing complexities, and the growing digital divide among users. These challenges underscore the necessity for continuous professional development, updated LIS curricula, robust digital policies, and increased institutional investment in digital infrastructure. Moreover, librarians must adopt inclusive and user-centered approaches to ensure equitable access to digital resources for all learners.

Despite these challenges, the digital landscape offers unprecedented opportunities for librarians to innovate, collaborate, and lead. Emerging roles such as data librarians, digital archivists, scholarly communication experts, and digital literacy instructors highlight the expanding relevance of librarianship in academic ecosystems. As institutions increasingly rely on digital tools for teaching, research, and administration, the librarian's role becomes central to enabling digital scholarship and fostering academic resilience. In conclusion, the future of librarianship lies in embracing digital transformation with adaptability, creativity, and visionary leadership. By strengthening their technological competencies and user-centered strategies, librarians will continue to serve as vital pillars of knowledge management, ensuring that libraries remain vibrant, inclusive, and forward-looking spaces in the digital age.

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