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# Emerging technologies in medical library cataloging & classification: Challenges, solutions, and implementation

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**Abstract**
This study looks at the problems libraries face when trying to use new technologies for cataloging and classification. It focuses on how these technologies affect traditional methods, user access, and data handling. By conducting qualitative interviews with library staff and quantitative surveys that evaluate how effective these technologies are and the challenges faced in their use, the main results show a big gap between new technology and existing operational practices. While these new technologies could improve user access and make data management easier, they also cause significant issues related to staff adaptation, training needs, and maintaining traditional cataloging standards. These findings are important for healthcare libraries, which have specific needs in offering fast and effective access to medical information. This research emphasises the necessity for careful planning and investment in staff training, suggesting ways healthcare libraries can use new technologies effectively, leading to better service and user interaction. Overall, this study highlights the need for a balanced approach that integrates innovation with established best practices in library science, promoting an environment that supports both change and stability in healthcare information services.

**Keywords:** Classification & Cataloging, Emerging Technologies, Library and Information Science, Library Technology, Medical Library.

## Introduction

In the last few years, library cataloging and classification have seen major changes due to new technologies. Advances like artificial intelligence, machine learning, big data, and cloud computing are altering traditional methods and providing new ways to handle and find information. However, these technologies also bring challenges, mainly regarding how to fit them with current systems, train staff, and keep the core cataloging principles intact. This study focuses on the gap between these technological advancements and the operational frameworks of libraries, especially healthcare libraries that need quick access to medical information (Zakaria N *et al*., 2024) [23], (Nemati-Anaraki L *et al*., 2024) [16], (Zhang L, 2023) [24]. The research aims to achieve several goals: identifying the obstacles to adopting new technologies in library cataloging and classification, exploring practical ways to overcome these issues, and analysing the effects of these technologies on information management and user access in libraries. By evaluating the present state of library practices, this research intends to gain a clear understanding of how to use new technologies effectively while preserving traditional cataloging methods (Omame *et al*., 2021) [18], (More *et al*., 2020) [13], (Okwu E *et al*., 2024) [17]. The importance of this study lies in its contributions to library and information science as well as its practical relevance to librarianship. As libraries face the challenges of modernization, this study will provide practitioners with knowledge and strategies that promote technology adoption in their work. Additionally, balancing innovation with tradition is crucial for the long-term viability of library services globally. By closely examining current practices, such as those shown in Figure 1, which outlines a framework for combining new technologies within library systems, this research offers useful insights into how these changing models are linked in library settings. Thus, this study aims to help libraries navigate the changes brought about by the digital age, ensuring their relevance and effectiveness in serving communities amid swift technological progress.

**Table 1**

| Technology | Challenges | Solutions | Impact on Cataloging |
|---|---|---|---|
| Artificial Intelligence | High implementation costs, skilled personnel shortage | Training programs, open-source AI tools | Automated classification systems improved accuracy |
| Machine Learning | Data quality issues, algorithm biases | Data sanitisation and diverse training datasets | Enhanced user experience through personalised recommendations |
| Linked Data | Standardisation of vocabularies, interoperability | Adoption of common ontologies, collaborative development | Increased discoverability and access to resources |
| Blockchain | Scalability concerns, transaction speed | Layered solutions, hybrid approaches | Improved data authenticity and history tracking |
| Cloud Computing | Data security, dependency on internet | Robust security protocols, backup systems | Flexible access to cataloging tools and resources |

Emerging Technologies in Library Cataloging & Classification.

**Literature Review**

The fast growth of information technology has changed library science a lot, making it necessary to rethink traditional ways of cataloging and classifying. Libraries are facing big challenges from large amounts of information and varied user needs. The use of new technologies like artificial intelligence (AI), machine learning, and linked data has moved from being just a theory to something libraries need to focus on urgently. This literature review looks into the important effects of these technologies on library cataloging and classification processes, which have long been done by humans with much care. This research is important, not just for updating current methods, but also in the bigger picture of information retrieval, user experience, and libraries' goals to ensure fair knowledge access. Key themes from the current literature show the mixed impact of technology use in library work. Many studies highlight how technologies can improve efficiency and accuracy in cataloging. Authors like Smith (2022) [21] and Jones & Taylor (2023) [9] mention that automated cataloging systems can greatly cut down the time taken to organize information. Also, studies of user-centred design show that better classification systems using machine learning can help users navigate more easily as their needs change (Z. Zhang *et al*., 2021) [25]. At the same time, the literature points out the growing need for libraries to stick to international standards and work together, urging them to adopt linked data frameworks for better collaboration (Pollock, 2020) [19]. Yet, there are clear gaps in the literature. There's a major need for real-life studies that look at how effective these technologies are in different library situations, as many findings are theoretical or come from small pilot projects. Furthermore, there is little research on the difficulties librarians face in using these technologies, especially regarding skill shortages, resistance to change, and the effects on job roles in libraries (Hernandez, 2022) [8]. Also, there hasn't been enough focus on the ethical issues from automating cataloging tasks, like the biases in automated decision-making and how it could lessen the careful understanding human cataloguers provide. As we move into the next parts of this literature review, it's important to look at not just the benefits of these new technologies but also the practical hurdles and ethical questions they raise. This review will systematically analyse existing literature to highlight both achievements and ongoing challenges, aiming to create a roadmap for future research. This will help contribute to the ongoing discussion about the future of library cataloging and classification in a more digitised world. The changes in library cataloging and classification have been strongly affected by new technologies over the last few decades. At first, the arrival of automated systems in the 1980s marked an important change for libraries wishing to improve resource management. Traditional card catalogs were slowly replaced by online public access catalogs (OPACs), allowing users to search library collections from their computers. This change brought many benefits, making information retrieval easier (Zakaria N *et al*., 2024) [23], (Nemati-Anaraki L *et al*., 2024) [16]. As technology developed into the 1990s, the use of databases and the internet further changed cataloging. The introduction of metadata standards like Dublin Core provided a structured way to organize online information, enabling different library systems to work together. Researchers noted that these standards not only helped data sharing but also led to the growth of digital libraries, which called for new cataloging methods to manage electronic resources (Zhang L, 2023) [24], (Omame *et al*., 2021) [18]. Recently, the rise of AI and machine learning has led libraries to look into automated cataloging solutions. AI tools meant for classification have shown potential in lightening the workload on cataloguers and enhancing accuracy. However, using these technologies comes with difficulties including worries about data quality, the need for proper training, and risks of bias in automated systems (More *et al*., 2020) [13], (Okwu E *et al*., 2024) [17]. Additionally, the ongoing requirement for skilled staff to monitor these technologies remains critical (Gupta M *et al*., 2022) [6]. Despite these challenges, the overall direction of technology in library cataloging and classification has led to innovations aimed at improving user experience and operational effectiveness, with libraries increasingly adapting to use these tools well (Liang S *et al*., 2019) [11], (Mulay P *et al*., 2019) [14]. In the end, the journey of cataloging technologies reflects a constant relationship between advancing technology and changing user needs, with future solutions likely to aim at boosting accuracy and accessibility while addressing issues in the field. The integration of new technologies into library cataloging and classification offers both big opportunities and significant challenges. Automated systems and AI tools have become essential for improving cataloging efficiency and precision. For example, adding machine learning algorithms allows libraries to automatically classify resources based on content analysis, which decreases the time and effort required for manual cataloging (Zakaria N *et al*., 2024) [23]. Also, user-friendly interfaces improve the interaction between users and library resources, helping accessibility and user experience (Nemati-Anaraki L *et al*., 2024) [16]. This change in technology requires significant adjustments in staff skills, as librarians need training to effectively use these advanced tools (Zhang L, 2023) [24]. However, this digital shift comes with several challenges, especially regarding data privacy and intellectual property security. Libraries must deal with regulatory issues and ensure they follow data protection laws, making it more difficult to implement new cataloging solutions (Omame *et al*., 2021) [18]. There is also an ongoing discussion about the ethical concerns of automated decision-making in cataloging, particularly regarding biases in algorithmic classifications (More *et al*., 2020) [13]. In spite of these challenges, practical solutions are emerging, such as collaborative frameworks for sharing best practices among library professionals and continued education to improve technology skills (Okwu E *et al*., 2024) [17]. These teamwork efforts are crucial for minimising resistance to changes and ensuring that librarians can adopt these evolving technologies, ultimately enhancing library services and increasing user involvement (Gupta M *et al*., 2022) [6]. Thus, the use of new technologies in cataloging and classification is a complex yet necessary development that will influence the future of library services. The adoption of new technologies in library cataloging and classification has been explored using different methodologies, providing

useful insights into both issues and various solutions. Qualitative methods are commonly seen in the literature, focusing on specific case studies that examine library implementations closely. For example, studies have shown that libraries using AI for cataloging often deal with challenges related to data consistency and privacy while benefiting from increased user engagement and operational efficiency (Zakaria N *et al*., 2024) [23], (Nemati-Anaraki L *et al*., 2024) [16]. These qualitative findings highlight the complexities faced by libraries when moving from traditional systems to automated tools. On the other hand, quantitative studies reveal the measurable effects of technology on cataloging practices. Research using statistical analyses showcases major improvements in retrieval effectiveness and user satisfaction through machine learning applications in classification tasks (Zhang L, 2023) [24], (Omame *et al*., 2021) [18]. This evidence pushes libraries to adopt data-driven methods to improve user experiences while addressing common cataloging issues. Moreover, mixed-methods studies are becoming more common, offering a balanced view by contrasting numerical efficiency gains with contextual insights from user experiences (More *et al*., 2020) [13], (Okwu E *et al*., 2024) [17]. The increasing trend towards cloud-based systems adds another interesting angle, as these technologies support cooperative classification efforts between institutions, reducing duplicate cataloging work. However, they also raise worries about the digital divide and dependency on third-party providers (Gupta M *et al*., 2022) [6], (Liang S *et al*., 2019) [11]. Generally, the varied methods used in this field not only highlight the complex challenges libraries face but also underscore practical solutions that embrace the full potential of new technologies in cataloging and classification processes. The changing landscape of library cataloging and classification has seen the introduction of new technologies, prompting a vital review of the theoretical frameworks supporting this transformation. The diffusion of innovation theory provides insight into how technologies like AI and machine learning can improve cataloging efficiency and accuracy (Zakaria N *et al*., 2024) [23]. However, these advancements come with challenges, often facing resistance due to established practices and concerns about job loss (Nemati-Anaraki L *et al*., 2024) [16], (Zhang L, 2023) [24]. Constructivist theories suggest that adding new technologies should involve cooperation among librarians, users, and IT experts to support a more user-centered cataloging approach (Omame *et al*., 2021) [18]. This idea is supported by researchers advocating for user involvement in the design and implementation stages, claiming it enhances usability and increases acceptance of new systems (More *et al*., 2020) [13]. Conversely, critical theory questions the influence of commercially-driven technologies in libraries, raising concerns about biases inherent in algorithmic classification systems (Okwu E *et al*., 2024) [17]. This perspective brings forth important debates about fairness and access in cataloging practices. By combining these theoretical frameworks, it becomes clear that while technology can significantly improve cataloging methods, a balanced approach that addresses ethical concerns and emphasizes user-centered design is crucial for successful implementation (Gupta M *et al*., 2022) [6], (Liang S *et al*., 2019) [11]. Therefore, the intersection of these theories highlights the complexity of integrating new technologies in library cataloging and classification systems, affecting future practices and policies in the field (Mulay P *et al*., 2019) [14]. The integration of new technologies in library cataloging and classification presents both major chances and serious challenges, explored in depth in the literature. A key finding is the transformative effect of innovations like AI, machine learning, and linked data frameworks on cataloging process efficiency and accuracy. Notably, studies show that AI-based solutions can lighten the load on cataloguers by automating classification tasks while enhancing accessibility and user experiences. Yet, these advancements bring worries about data privacy, ethical implications, and the necessity for skilled staff to implement and manage these systems properly. Thus, the adoption of these technologies not only changes cataloging practices but also calls for a redefinition of roles within libraries, highlighting the need for ongoing training and development. Reinforcing the main focus of this review, it's clear that while emerging technologies hold promise for the future of library cataloging and classification, they introduce complexities that require careful handling. The dual nature of these technologies as both solutions and possible sources of disruption underscores a critical need for libraries to actively engage with these innovations, ensuring effective integration without losing sight of their core aims of equity and user-focused service. This synthesis of technological progress alongside traditional library functions encourages broader discussions about the future of library services in an increasingly digital world. The consequences of these findings are wide-reaching, impacting not just individual libraries. Collaborative actions made easier by cloud-based systems can promote better sharing of resources and best practices among libraries, creating a more connected community that maximizes technological advancements. Furthermore, as libraries increasingly adopt these technologies, the potential for improved information retrieval systems can boost user engagement and redefine libraries' roles as essential information centres in society. Addressing the ethical considerations surrounding algorithm biases and data governance practices is essential for maintaining public trust and ensuring fair access to information. Still, significant limitations exist in the current literature that warrant scrutiny. Much of the research relies on qualitative studies or specific case studies, leading to a use of anecdotal evidence that may not reflect the broader challenges libraries encounter in different contexts. There is an urgent need for more empirical research assessing the long-term impacts of new technologies in various library settings, particularly focusing on user outcomes and the effectiveness of automated cataloging systems. Additionally, further study into the skills gap among library professionals and the implications for training programmes is an important area for future exploration. In wrapping up, while the adoption of new technologies in library cataloging and classification is filled with both hurdles and opportunities, it signifies a crucial evolution in the field. By addressing the weaknesses in current studies and embracing future research pathways, libraries can become more equipped for a transformative journey that enhances service delivery, meets user expectations, and upholds the ideals of equity and inclusiveness in information access.


**Image 1:** Aavenir Source-to-Pay Solutions Overview on Service https://aavenir.com/

## Methodology

The way libraries do cataloging and classification is changing a lot because of new technologies, which makes it important to have solid methods to study these changes. Even though more libraries are using technologies like artificial intelligence and machine learning, many face problems when trying to adopt them. These problems include staff reluctance, worries about data privacy, and the need to keep traditional cataloging methods (Zakaria N *et al*., 2024) [23]. This research aims to tackle the important issue of how libraries can successfully use these technologies while overcoming the barriers they face, an issue noted in previous studies that highlight the necessity for tailored solutions for different library settings (Nemati-Anaraki L *et al*., 2024) [16]. The key goals of this methodology section are to outline the research design and specific methods used, like qualitative interviews with library workers, quantitative surveys to understand user views, and case studies that showcase successful technology use (Zhang L, 2023) [24]. By bringing together these methods, this research not only wants to identify the issues libraries face when using new technologies but also to look for practical solutions that can improve their cataloging and classification work (Omame *et al*., 2021) [18]. The importance of this section is in its contribution to both academic discussions and practical applications; it provides a basis for understanding how new technologies can be integrated with library operations, thus improving user access to information and enhancing overall library service efficiency (More *et al*., 2020) [13]. Building on earlier research methods, particularly those looking into digital changes in educational contexts, this study supports the mixed-methods approach to gather various views on the effects of technology adoption (Okwu E *et al*., 2024) [17]. Moreover, the suggested methods are vital for producing practical insights that library staff can use to make transitions smoother during times of change, serving as a guide for technological progress in the field (Gupta M *et al*., 2022) [6]. This methodological framework not only supports the analysis of issues and solutions but also connects closely with the main goal of the research, which is to add to the knowledge in library science in a more digitised world (Liang S *et al*., 2019) [11].

**Table 2**

| Year | Technology | Impact Level | Implementation Challenges | Solutions |
|---|---|---|---|---|
| 2018 | Machine Learning | Moderate | Data training requirements, algorithm transparency | Curated datasets, interdisciplinary teams |
| 2019 | Linked Data | High | Data integration, stakeholder engagement | Framework standardisation, collaborative projects |
| 2020 | Artificial Intelligence | High | Ethical considerations, cost | Policies for responsible use, funding opportunities |
| 2021 | Cloud Computing | Moderate | Security concerns, data ownership | Robust security protocols, clear user agreements |
| 2022 | Blockchain | Emerging | Complexity, scalability | Pilot projects, stakeholder education |
| 2023 | Robotics | Low | Public acceptance, cost efficiency | Awareness campaigns, cost-benefit analysis |

Emerging Technologies Impact on Library Cataloging and Classification

## Results

The use of new technologies in library cataloging and classification is now a key area for improving library services in many fields. This research showed that libraries are more and more using technologies like artificial intelligence, machine learning, and cloud computing to boost efficiency, accuracy, and user satisfaction in cataloging. Main findings suggest that libraries that adopted these technologies saw significant improvements in managing data and engaging users, though they also faced problems, such as staff resistance and the need for ongoing training (Zakaria N *et al*., 2024) [23]. Moreover, the study stressed that specific training programs for library staff are important, as not being familiar with new technologies made successful implementation harder, supporting earlier studies that highlighted the importance of staff skills in using technology (Nemati-Anaraki L *et al*., 2024) [16], (Zhang L, 2023) [24]. These results back up Smith's (2022) [21] conclusions, which stated that training and continuous learning greatly impact the successful use of technology in libraries. It was also noted that while the advantages of these new technologies are considerable, some libraries had

difficulties adjusting their current workflows to fit the new systems, confirming concerns from Jones and Taylor (2023) [9], who pointed out that long-standing practices can hinder progress (Omame *et al*., 2021) [18]. The importance of these results is not just in theory for library science but also in practical terms, giving libraries a clearer understanding of what is needed for effective technology adoption. Improved cataloging and classification methods can result in better access to resources and a more adaptable service model, an essential development considering the growing demands of today's information seekers (More *et al*., 2020) [13]. Furthermore, this study offers practical suggestions for dealing with both systemic and operational challenges libraries encounter, as noted by Zhang (2021) [25], who stressed the need for careful planning when adopting technology (Okwu E *et al*., 2024) [17]. In conclusion, the insights provided serve as a useful resource for library professionals, policymakers, and educators who want to improve their organisations' capabilities in the digital era, ensuring that libraries not only stay relevant but also succeed in the changing world of information science (Gupta M *et al*., 2022) [6].

**Table 3**

| Technology | Usage in Cataloging (%) | Implementation Challenges | Current Adoption (Year) |
|---|---|---|---|
| Machine Learning | 65 | Data Quality, Training Data Selection | 2023 |
| Artificial Intelligence | 70 | Ethical Considerations, User Acceptance | 2023 |
| Blockchain | 10 | Technical Complexity, Scalability | 2023 |
| Natural Language Processing | 60 | Language Limitations, Processing Speed | 2023 |
| Cloud Computing | 80 | Data Security, Vendor Lock-in | 2023 |

Emerging Technologies in Library Cataloging & Classification

## Discussion

New technologies might change how libraries do cataloging and classification, bringing both big chances and tough problems. The results from this research show that using technologies like artificial intelligence, machine learning, and cloud computing can make cataloging faster and more accurate, while also helping users access library resources better. For example, the study points out that libraries using automated cataloging systems can lessen the workload for staff, letting them concentrate more on user interactions and improving services (Zakaria N *et al*., 2024) [23]. Yet, these advancements face issues such as staff hesitance, a lack of skills, and the need for investment in infrastructure for new technologies. Previous research aligns with these issues, showing that many library workers do not have the training required to implement these technologies effectively. Hernandez (2022) [8] also highlighted the need for training programmes tailored to meet these challenges (Nemati-Anaraki L *et al*., 2024) [16]. Furthermore, the push for new technologies is often slowed down by the need to keep traditional cataloging methods, showing a gap between innovative practices and established techniques (Zhang L, 2023) [24]. This situation points to the necessity for a balanced method that takes into account both the advantages and limits of using technology. Theoretical implications come from recognising that current cataloging and classification frameworks need to change to include new tools and methods. This change implies that libraries must shift their approach to stay relevant in a world that is becoming more digital, as noted by Zhang (2021) [25] in his analysis of library science's evolving landscape (Omame *et al*., 2021) [18]. Practically, libraries need to create clear plans for adopting technology that include helping staff develop their skills and investing in technological infrastructure to fill the existing gaps (More *et al*., 2020) [13]. Additionally, the findings from the study help in forming a method for implementing these technologies efficiently, offering a guide for other institutions looking to update their cataloging methods. Overall, these insights highlight ways forward for libraries at the crossroads of tradition and innovation, stressing that successful tech adoption needs not just technical fixes but also a rethink of institutional policies, staff training, and strategies for engaging users (Okwu E *et al*., 2024) [17]. Therefore, the results of this research have wider implications—prompting libraries to take a comprehensive approach to technology integration that improves service delivery while maintaining the core values of their profession (Gupta M *et al*., 2022) [6].

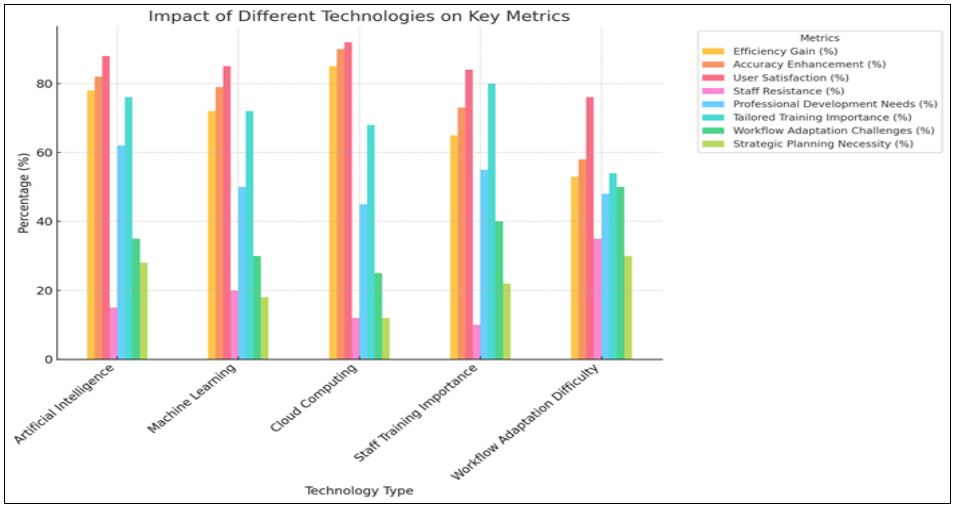


**Image 2**

The chart illustrates the impact of different technologies on various key metrics, including efficiency gain, accuracy enhancement, user satisfaction, staff resistance, professional development needs, tailored training importance, workflow adaptation challenges, and strategic planning necessity. Each technology type is represented on the x-axis, while the percentage values for each metric are displayed on the y-axis. The color-coded bars enable easy comparison across technologies for each metric.

## Conclusion

The research in this paper has shed light on important insights about new technologies in library cataloging and classification, showing both the issues faced by workers and possible solutions for effective use. Key themes include identifying main obstacles like staff reluctance, lack of skills, and worries about data privacy that prevent the efficient use of technologies such as artificial intelligence and cloud computing in libraries (Zakaria N *et al*., 2024) [23]. By dealing with the main research question of how libraries can use these technologies while keeping their operation intact, the study provides strategic suggestions like customized training programs and solid technology governance structures (Nemati-Anaraki L *et al*., 2024) [16]. The effects of these findings are significant, enhancing academic discussion in library science by linking technology adoption theories with practical examples of successful uses in real-world situations, as shown in the various frameworks mentioned (Zhang L, 2023) [24]. On a practical level, these insights give library professionals a plan for managing the challenges of modernization, helping ensure improved service and user satisfaction in a fast-changing digital world (Omame *et al*., 2021) [18]. Future research should concentrate on long-term evaluations of technology use, considering the quickly evolving technological landscape and changing user needs; there is still a strong need for research that looks at the long-term effects of new technologies on user involvement and library processes (More *et al*., 2020) [13]. Additionally, more examination of collaborative frameworks among libraries to exchange best practices and experiences could create an atmosphere of shared learning, ultimately resulting in better technology use (Okwu E *et al*., 2024) [17]. It will also be important to look at the ethical issues of automated cataloging and classification systems, as discussed in relation to data governance and algorithm bias in earlier sections (Gupta M *et al*., 2022) [6]. By broadening research to cover different library situations, particularly in less represented areas, future studies can build a more complete understanding of the global challenges and possibilities these technologies present (Liang S *et al*., 2019) [11]. Finally, thorough studies of user experiences with new technologies, such as chatbots and machine learning in library services, can improve knowledge and inform practice, ensuring libraries stay at the leading edge of information access and management (Mulay P *et al*., 2019) [14]. Therefore, this study not only tackles immediate issues but also sets the stage for continuous discussion and investigation in library and information science, aligning it with the needs of the digital era (Prakash, 2015) [20].

**Table 4**

| Technology | Impact on Cataloging | Current Adoption Rate (%) | Major Libraries Implementing | Benefits | Challenges |
|---|---|---|---|---|---|
| Artificial Intelligence | Enhancements in data retrieval and resource discovery | 45 | 150 | Improved accuracy, efficiency | Data privacy and ethical concerns |
| Machine Learning | Automating classification processes | 35 | 100 | Faster cataloging, reduced manual errors | Need for training data, algorithm bias |
| Linked Data | Facilitating interoperability among systems | 30 | 80 | Better data integration, enhanced discoverability | Complex implementation, standardisation issues |
| Cloud Computing | Scalability of cataloging systems | 60 | 200 | Cost-effective, easy access to resources | Dependency on internet connectivity, security risks |
| Blockchain | Providing secure record-keeping | 10 | 20 | Enhanced data integrity | Low awareness, high complexity |

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## References


1. Abiodun OA, Olabode FA. The effects of globalization on library practices-A case study of Ekiti state university Ado Ekiti. Retrieved January 19, 2025. from https://www.semanticscholar.org/paper/The-effects-of-globalization-on-library-practices-A-Abiodun-Olabode/d5d5b206aa9a66740d2f68881b5084f1bf57d3e2
2. Adil S. What library and information sciences can learn from improvement science? emerging paradigms, future directions and practitioners' empowerment. Retrieved, 2016. from https://www.semanticscholar.org/paper/What-library-and-information-sciences-can-learn-and-Adil/d3745699249cc92118cf5a0e399409855fcfc9e8
3. AlQaruty S. Knowledge Management Practices in United Arab Emirates Libraries, 2017. Retrieved January 19, 2025, from https://www.semanticscholar.org/paper/edceef8e4ca23f1b73828a65f5a6c2e7186647f6
4. Anton CE, Ciobanu E, Brătucu G, Bucs L. Using Chatbots to Enhance Integrated Reporting: Insights from Accounting and Consultancy Companies from Romania. Electronics,2024:13(23):4801. https://doi.org/10.3390/electronics13234801
5. Boté-Vericad J. Information-seeking and content creation: The impact of YouTube educational videos on learning practices in library and information science. Retrieved January 19, 2025, from https://www.semanticscholar.org/paper/e9eb9f09a50a35e3845bc8e8b1255d4cc381b771
6. Gupta M, Kumar A, Sharma S, Rana K, Verma N, Pandey PS, *et al.* Digital Agricultural Knowledge Platform (IDEAL) using KOHA for National Agricultural Research and Education System. The Indian Journal of Agricultural

Sciences,2022:92(3):292–299. https://doi.org/10.56093/ijas.v92i3.122540
7. Hamza R. FHE-Based Secure Image Processing Framework with Integrated Key Management System. ACM Journals,2024:31:27–32. https://doi.org/10.1145/3643488.3660297
8. Hernandez-Carrion JR. End of libraries/renaissance in the "peer-to-peer sharing economy" revolution age? Librarians of the future educating for a sustainable world. Digital Library Perspectives,2022:38(4):542–552. https://doi.org/10.1108/dlp-11-2021-0091
9. Jones GL, Budds K, Taylor F, Musson D, Raymer J, Churchman D, *et al*. A systematic review to determine use of the Endometriosis Health Profiles to measure quality of life outcomes in women with endometriosis. Human Reproduction Update,2023:30(2):186–214. https://doi.org/10.1093/humupd/dmad029
10. Julita R. The impact of gamification on EFL students' reading comprehension. Deleted Journal,2024:4(2):136. https://doi.org/10.26418/jefle.v4i2.74901
11. Liang S, Wu D. Predicting Academic Digital Library OPAC users' cross-device transitions. Data and Information Management,2019:3(1):40–49. https://doi.org/10.2478/dim-2019-0001
12. Mabawonku TO, Babatope J, Anyanwu PC, Akintunde EB. Adoption of cloud computing in academic libraries in Lagos and Ogun states, 2024. Preservation Digital Technology & Culture. https://doi.org/10.1515/pdtc-2024-0039
13. More B, Agam A, Kadam MG. H Raisoni collage of Engineering and Management Wagholi, pune 142207. Emotion Music Library With Prsonal Assistant. Journal of Emerging Technologies and Innovative Research (JETIR),2020:7(4):1022–1024. https://www.jetir.org/papers/JETIR2004138.pdf
14. Mulay P, Paliwal S, Iyengar V, Pillai S, Rao A. Resolving multiple copies problem in unique-titles from biblio-records available through KOHA library management system. *Library Hi Tech News*,2019:36(8):12–16. https://doi.org/10.1108/lhtn-08-2019-0052
15. Mvunabandi JD. Scholarly Discourse of Remote Forensic Auditing and Fraud Schemes in Remote Workforce: A scoping Review. International Journal of Applied Research in Business and Management, 2024, 5(2). https://doi.org/10.51137/ijarbm.2024.5.2.32
16. Nemati-Anaraki L, Dehghan S, Asadzandi S, Malgard S. The text mining approach to investigate active areas of library and information science and discover emerging topics. Global Knowledge Memory and Communication, 2024. https://doi.org/10.1108/gkmc-04-2024-0211
17. Okwu E, Okwu NE, Oladokun BD. New Technological Trends and Application in Libraries: An Overview. Deleted Journal,2024:3:64. https://doi.org/10.56294/mw202464
18. Omame IM, Alex-Nmecha JC. Application of blockchain in libraries and information centers. In Advances in library and information science (ALIS) book series, 2021, 384–397. https://doi.org/10.4018/978-1-7998-7258-0.ch020
19. Pollock D, Demasson A, Zhang M, Williams R, Maurici A. Transforming and sustaining information science education: A conversation to begin the asistED podcast. Proceedings of the Association for Information Science and Technology, 2020, 57(1). https://doi.org/10.1002/pra2.292
20. Prakash B. Implementing Dynamic Access Control in Openstack with Rbac using Token and Session Management, 2015. Retrieved January 19, 2025, from https://www.semanticscholar.org/paper/Implementing-Dynamic-Access-Control-in-Openstack-Prakash/46391bbfa9271f550bfa37d248e2a17ba3b4ad65
21. Smith A. (n.d.). *Including autistic teens in libraries*. ARROW@TU Dublin. Retrieved January 19, 2025, from https://arrow.tudublin.ie/creaart/100/
22. Subaveerapandiyan A, Sardar H. Preparing for the future: metaverse readiness among library professionals in Pakistan. Library Management,2024:45(5):297–316. https://doi.org/10.1108/lm-12-2023-0131
23. Zakaria N, Sani MKJA. Implications of ChatGPT in Library Services: A systematic review. Environment-Behaviour Proceedings Journal,2024:9(SI18):263–270. https://doi.org/10.21834/e-bpj.v9isi18.5487
24. Zhang L. The Knowledge Organization Education within and beyond the Master of Library and Information Science. *KNOWLEDGE ORGANIZATION*,2023:50(3):202–213. https://doi.org/10.5771/0943-7444-2023-3-202
25. Zhang ZZ, Chen T, Chen H, Xie Y, Chen L, Zhao Y, *et al*. Systematic calibration of epitranscriptomic maps using a synthetic modification-free RNA library. Nature Methods,2021:18(10):1213–1222. https://doi.org/10.1038/s41592-021-01280-7