



A Systematic Literature Review on the Role of Academic Libraries in Supporting Digital Learning Through ICT Integration

Rismadani¹, Zulnadila², M. Nur Rahmat Achdar HT³, Anugrawati⁴, M. Ardiansyah WH⁵

^{1,2,3,4,5} Universitas Cahaya Prima

Email: rismadani783@gmail.com

ABSTRACT

ARTICLE INFO

Article History

Received: 2026-07-02

Accepted: : 2026-07-22

Keywords:

academic library;
digital learning;
ICT integration;
digital library
services;
systematic
literature review.

The rapid advancement of Information and Communication Technology (ICT) has significantly transformed the role of academic libraries in higher education, particularly in supporting digital learning. Academic libraries are no longer limited to managing printed collections but have evolved into digital learning hubs that facilitate access to information resources, enhance information literacy, and support research and teaching activities through technology integration. However, previous studies on this topic remain fragmented and often focus on specific aspects, making it difficult to obtain a comprehensive understanding of the evolving role of academic libraries. Therefore, this study aims to synthesize existing research on the role of academic libraries in supporting digital learning through ICT integration. This study employed a Systematic Literature Review (SLR) following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Literature was retrieved from Google Scholar, Emerald Insight, ResearchGate, DOAJ, SAGE Journals, Frontiers in Education, and Cambridge Core. The selected studies were synthesized using a thematic analysis approach to identify recurring patterns, themes, and emerging trends related to ICT integration in academic libraries. A total of 38 records were identified from several academic databases, and after the screening and eligibility processes, 10 peer-reviewed journal articles published between 2020 and 2025 were included in the final analysis. The findings revealed five major themes: (1) ICT integration as the foundation of academic library transformation, (2) digital library services supporting digital learning, (3) academic libraries as centers for information literacy and research support, (4) challenges in ICT implementation, and (5) the emergence of Artificial Intelligence (AI) and smart library systems. The review concludes that ICT integration has fundamentally transformed academic libraries into strategic partners in digital learning and higher education innovation. The findings provide valuable insights for librarians, educators, higher education institutions, and policymakers in developing sustainable and technology-enhanced library services.

This is an open access article uses Open Journal Systems 3.5.0.0

Published by <https://ojs.ucp.ac.id>



INTRODUCTION

The rapid development of Information and Communication Technology (ICT) has brought fundamental changes across various sectors, including higher education. This

digital transformation has significantly altered the ways in which knowledge is produced, accessed, and disseminated. Learning is no longer confined to traditional classroom settings but has evolved into digital learning, which is flexible, interactive, and technology-driven (Selwyn, 2016; Bates, 2019). In this context, students are required to actively engage with digital resources, develop critical thinking skills, and become autonomous learners in navigating increasingly complex information environments.

In line with these developments, academic libraries have undergone a significant transformation in their roles. Traditionally functioning as repositories of printed materials, academic libraries have evolved into digital information service centers that support teaching and learning processes. The integration of technology in library services (ICT integration) enables the provision of digital libraries, institutional repositories, electronic databases, and virtual reference services (Borgman, 2007; Witten, Bainbridge, & Nichols, 2010). This transformation positions academic libraries not only as information providers but also as active enablers of technology-enhanced learning environments.

In supporting digital learning, academic libraries play a crucial role in fostering students' information literacy. Information literacy is recognized as a core competency in the 21st century, particularly in addressing information overload and ensuring the ethical use of information (ACRL, 2016; UNESCO, 2018). Through ICT-based services, academic libraries assist students in locating, evaluating, and utilizing information effectively, thereby strengthening their capacity for independent learning and academic success.

Despite these developments, the implementation of ICT in academic libraries still faces several challenges. These include inadequate digital infrastructure, limited ICT competencies among librarians, uneven access to digital resources, and resistance to technological change (Asemi & Riyahiniya, 2007; Nicholas et al., 2010). In developing country contexts, including Indonesia, these challenges are often more pronounced due to disparities in technological readiness and institutional support (Pendit, 2008; Rachman & Putri, 2018). As a result, the full potential of ICT-enabled academic library services has not yet been fully realized.

Previous studies have examined various dimensions of academic libraries in the context of digital learning, including digital library systems, information literacy programs, electronic resource management, and ICT adoption. However, most existing studies focus on specific issues or institutional case studies rather than providing a comprehensive synthesis of the evolving role of academic libraries in supporting digital learning. Furthermore, recent review studies rarely integrate emerging topics such as Artificial Intelligence (AI), smart library systems, Library 4.0, and digital transformation into a unified analytical framework. Consequently, there remains a significant gap in the literature regarding a holistic understanding of how ICT integration reshapes academic libraries as strategic partners in higher education. This study addresses that gap through a systematic literature review synthesizing recent evidence published between 2020 and 2025.

Based on this condition, there remains a need for a more structured synthesis of existing literature that integrates findings across different contexts. A systematic literature review is therefore necessary to identify patterns, key themes, challenges, and emerging trends in ICT integration within academic libraries and its role in supporting digital learning.

This study aims to conduct a systematic literature review on the role of academic

libraries in supporting digital learning through ICT integration. Specifically, it seeks to identify key roles of academic libraries, examine forms of ICT implementation, analyze challenges, and explore emerging opportunities such as artificial intelligence and digital transformation in library services.

This study contributes both theoretically and practically. Theoretically, it enriches the body of knowledge in library and information science, particularly in the area of ICT-enabled academic library transformation. Practically, it provides insights for librarians, educators, and policymakers in developing more effective digital library services to support digital learning in higher education.

The novelty of this study lies in its integrative synthesis of recent empirical and conceptual studies (2020–2025) that collectively map the evolving role of academic libraries in supporting digital learning through ICT integration. Unlike previous studies that focus on isolated aspects, this review provides a holistic thematic framework that captures ICT integration, digital learning support, information literacy, challenges, and emerging technologies within a unified analytical perspective.

METHOD

This study employed a Systematic Literature Review (SLR) approach to systematically identify, evaluate, and synthesize previous research related to the role of academic libraries in supporting digital learning through ICT integration. The SLR method is widely used in library and information science research to provide a structured and comprehensive understanding of a particular topic, as well as to identify research trends, patterns, and gaps (Kitchenham & Charters, 2007; Snyder, 2019). To ensure transparency and rigor, this study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Page et al., 2021).

The literature search was conducted using several academic databases, including Google Scholar, Emerald Insight, ResearchGate, DOAJ, SAGE Journals, Frontiers in Education, and Cambridge Core. These databases were selected to ensure broad coverage of peer-reviewed studies in the fields of academic libraries, ICT integration, and digital learning.

The search strategy used a combination of keywords such as “academic library,” “digital learning,” “ICT integration,” “digital library services,” “information literacy,” and “higher education library,” combined using Boolean operators (AND, OR) to refine the search results. These keywords were developed based on core concepts of the study and aligned with previous literature in digital library and educational technology research (Borgman, 2007; Bates, 2019).

The search strategy combined Boolean operators using the following query: ("academic library" OR "university library") AND ("digital learning" OR "online learning") AND ("ICT integration" OR "digital transformation" OR "smart library" OR "artificial intelligence"). Minor modifications were applied across databases to accommodate different indexing systems and search functionalities.

To ensure relevance and currency, the study focused on articles published between 2020 and 2025. This period was selected to capture recent developments in digital

transformation and ICT integration in academic libraries, particularly in response to the rapid growth of online and blended learning environments in higher education institutions.

The selection of studies followed the PRISMA flow process. Initially, 38 articles were identified through database searching. After removing duplicates and conducting title and abstract screening, 17 articles remained for full-text assessment. At this stage, 7 articles were excluded due to irrelevance, lack of peer-review status, or focus outside academic library contexts. Finally, 10 articles met all inclusion criteria and were included in the qualitative synthesis.

The inclusion criteria consisted of: (1) peer-reviewed journal articles, (2) published between 2020 and 2025, (3) focused on academic libraries in higher education, and (4) addressing ICT integration and/or digital learning. Exclusion criteria included non-peer-reviewed sources, conference proceedings, book chapters, and studies not directly related to academic libraries.

To ensure the quality of the selected studies, each article was evaluated using predefined criteria, including relevance to the research objectives, methodological rigor, clarity of findings, publication in peer-reviewed journals, and completeness of reporting. Only studies meeting these quality standards were included in the final synthesis.

Microsoft Excel was used to organize and manage the extracted data, while thematic coding and synthesis were conducted manually by the researchers due to the relatively small number of included studies ($n = 10$).

Data from the selected studies were extracted and organized into a structured table, including author(s), year of publication, country, research method, focus, and key findings. This facilitated systematic comparison and synthesis across studies.

The selected databases were chosen because they collectively provide comprehensive coverage of peer-reviewed publications in library and information science, educational technology, and higher education research, while also ensuring broad international representation.

The extracted data were analyzed using thematic analysis to identify recurring patterns and key themes. The analysis followed the interactive model of Miles, Huberman, and Saldaña (2014), consisting of data reduction, data display, and conclusion drawing. This approach enabled the identification of major themes related to ICT integration, digital library services, information literacy, implementation challenges, and emerging technologies in academic libraries.

RESULT AND DISCUSSION

Result

1. Study Selection Based on PRISMA

The systematic literature review process was conducted following the PRISMA guidelines to ensure transparency and rigor in the selection of relevant studies. The initial search across multiple databases, including Emerald Insight, ResearchGate, DOAJ, SAGE, Frontiers in Education, and Cambridge Core, yielded 38 records related to academic libraries, ICT integration, and digital learning.

After removing duplicate records and conducting title and abstract screening, 21 studies were excluded due to irrelevance to academic library contexts, lack of peer-review status, or focus on general educational settings rather than higher education library systems.

Subsequently, 17 full-text articles were assessed for eligibility. At this stage, 7 studies were excluded because they were book chapters, conference proceedings, preprints, or did not explicitly address ICT integration in academic libraries. Finally, 10 studies met all inclusion criteria and were included in the qualitative synthesis of this systematic literature review.

2. Characteristics of Included Studies

The final dataset consists of 10 peer-reviewed studies published between 2020 and 2024. These studies represent diverse geographical contexts, including Asia, Africa, and Europe, indicating global interest in the transformation of academic libraries through ICT integration.

The majority of studies employed qualitative and conceptual approaches, followed by quantitative surveys and literature reviews. The focus of these studies includes ICT integration, digital library services, information literacy, artificial intelligence in libraries, and digital transformation in higher education libraries.

Table 1. Characteristics of Included Studies

No	Author(s)	Year	Country	Method	Focus	Key Findings	Theme
1	Martzoukou	2021	UK	Conceptual	Digital literacy in libraries	Libraries became digital learning hubs during COVID-19	ICT Integration
2	Sivankalai	2021	India	Case Study	E-learning support	ICT enables e-learning via digital repositories	Digital Library
3	Begum & Elahi	2022	Bangladesh	Case Study	Digital library services	Ensures continuity of online learning	Digital Learning
4	Awuah et al.	2022	Ghana	Survey	Digital scholarship	Supports research and scholarly communication	Research Support
5	Okunlaya et al.	2022	Malaysia	Qualitative	AI in libraries	AI improves retrieval and personalization	Emerging Tech
6	Onunka et al.	2023	Nigeria	Review	Digital transformation	Libraries evolve into digital knowledge hubs	ICT Transformation
7	Adekoya et al.	2024	Nigeria	Survey	ICT in libraries	ICT supports sustainable higher education	ICT Integration
8	Yusniah et al.	2023	Indonesia	Review	Digital library services	Improves access to information resources	Digital Library
9	Abbas & Siddique	2020	Pakistan	Quantitative	ICT competencies	Librarians need continuous ICT training	Human Resources
10	Digital Transformation Study	2024	Nigeria	Conceptual	Library transformation	Improves access but faces structural challenges	ICT & Challenges

Table 2. Distribution of Included Studies by Country

Country	Number of Studies	Percentage (%)
Nigeria	3	30
Indonesia	1	10
India	1	10

Bangladesh	1	10
Pakistan	1	10
Malaysia	1	10
Ghana	1	10
United Kingdom	1	10
Total	10	100

Table 3. Distribution of Included Studies by Research Method

Method	Frequency
Conceptual	2
Case Study	2
Survey	2
Review	2
Qualitative	1
Quantitative	1

3. Thematic Findings

The synthesis of the included studies generated five major themes explaining the role of academic libraries in supporting digital learning through ICT integration.

Theme 1: ICT Integration as the Core of Library Transformation

ICT integration is identified as the fundamental driver of academic library transformation. Studies consistently show that ICT enables libraries to transition from traditional physical collections to hybrid and fully digital service environments.

Martzoukou (2021) and Adekoya et al. (2024) emphasize that ICT adoption enhances accessibility, efficiency, and sustainability of academic library services. Integrated Library Systems, cloud-based platforms, and digital repositories are now essential components of modern academic libraries.

Theme 2: Digital Library Services Supporting Digital Learning

Digital library services play a crucial role in ensuring continuity of learning, especially in online and blended education systems.

Begum & Elahi (2022) highlight that e-resources, virtual reference services, and institutional repositories allow uninterrupted access to learning materials. Sivankalai (2021) further confirms that academic libraries actively support e-learning through ICT-enabled platforms. These services enhance flexibility, accessibility, and inclusivity in higher education learning environments.

Theme 3: Academic Libraries as Research and Knowledge Support Centers

Academic libraries are evolving into active partners in research and knowledge production.

Awuah et al. (2022) found that libraries provide essential support in digital scholarship, including research data management, academic publishing, and scholarly communication services. This transformation positions libraries as strategic academic units rather than passive information providers.

Theme 4: Challenges in ICT Integration

Despite significant progress, several challenges hinder ICT integration in academic libraries. Common challenges include inadequate infrastructure, limited funding, lack of ICT competencies among librarians, and resistance to technological change. Abbas & Siddique (2020) specifically highlight the need for continuous professional development to enhance librarians' digital skills.

These challenges are more prominent in developing countries, where digital infrastructure remains uneven.

Theme 5: Emergence of Artificial Intelligence and Smart Libraries

Recent studies highlight the increasing role of Artificial Intelligence (AI) in academic library services. Okunlaya et al. (2022) propose AI-driven systems such as chatbots, intelligent search engines, and recommendation systems to improve user experience. This reflects the transition toward Library 4.0, where libraries become intelligent, adaptive, and user-centered environments.

Discussion

The findings of this systematic literature review demonstrate a consistent agreement across the selected studies that academic libraries play a central and strategic role in supporting digital learning through ICT integration. Across different geographical contexts, including Asia, Africa, and Europe, academic libraries are increasingly repositioned as digital learning hubs that facilitate access to information, support teaching and learning processes, and enhance academic engagement in higher education institutions.

A key finding from this review is that ICT integration serves as the foundational infrastructure for the transformation of academic libraries. Studies such as Martzoukou (2021) and Adekoya et al. (2024) emphasize that ICT enables libraries to shift from traditional, print-based systems into hybrid and fully digital environments. This transformation allows libraries to provide uninterrupted access to digital resources, including electronic journals, institutional repositories, and online databases. The consistency of this finding across studies indicates that ICT is not merely a supporting tool, but a structural enabler of library modernization.

In relation to digital learning, several studies (e.g., Begum & Elahi, 2022; Sivankalai, 2021) highlight that academic libraries play an essential role in ensuring learning continuity, particularly in online and blended learning environments. Digital library services such as virtual reference services, e-resources, and learning repositories significantly enhance students' ability to access learning materials anytime and anywhere. This demonstrates that academic libraries contribute directly to the flexibility and accessibility of modern education systems.

Another important finding is the evolving role of academic libraries in research support and knowledge production. Awuah et al. (2022) indicate that libraries are no longer limited to information provision but are actively involved in supporting digital scholarship, research data management, and academic publishing processes. This shift reflects a broader transformation in which academic libraries function as strategic partners in knowledge creation within universities.

Despite these positive developments, the reviewed studies consistently report several challenges in ICT integration. These include inadequate technological infrastructure, limited funding, insufficient ICT competencies among library staff, and resistance to technological change. Abbas and Siddique (2020) particularly emphasize the importance of continuous professional development to enhance librarians' digital competencies. These challenges are more prominent in developing countries, where disparities in digital infrastructure and

institutional readiness remain significant barriers.

The emergence of Artificial Intelligence (AI) and smart library systems further indicates a transition toward Library 4.0. Okunlaya et al. (2022) suggest that AI-based tools such as chatbots, intelligent search systems, and recommendation engines can significantly improve user experience and service efficiency. However, the implementation of such technologies requires strong institutional support and digital readiness, which is not yet uniformly available across institutions.

From a theoretical perspective, these findings can be interpreted through the Technology Acceptance Model (TAM), which explains that technology adoption is influenced by perceived usefulness and perceived ease of use. In the context of academic libraries, ICT adoption is more successful when librarians and users perceive digital systems as beneficial and easy to use. Additionally, constructivist learning theory supports the role of academic libraries in facilitating active knowledge construction by providing diverse and accessible information resources.

Overall, this review confirms that academic libraries are undergoing a paradigm shift from traditional information repositories to dynamic, technology-driven learning support systems. They are no longer passive service units but have become strategic enablers of digital learning, research productivity, and academic innovation in higher education institutions.

Although the reviewed studies consistently acknowledge the positive impact of ICT integration, differences remain regarding the extent of implementation across institutional and national contexts. Studies conducted in developed countries primarily emphasize technological innovation and AI adoption, whereas research from developing countries focuses more on infrastructural constraints, funding limitations, and digital competency development. These differences suggest that successful ICT integration depends not only on technological availability but also on institutional readiness, policy support, and human resource capacity. Therefore, future digital library development should adopt context-sensitive implementation strategies rather than universal approaches.

CONCLUSION

This systematic literature review examined the role of academic libraries in supporting digital learning through ICT integration by synthesizing ten peer-reviewed studies published between 2020 and 2025. The findings demonstrate that academic libraries have evolved from traditional information repositories into strategic partners in higher education that actively support digital learning, research, and knowledge creation. Five major themes emerged from the review, namely ICT integration, digital library services, information literacy and research support, challenges in ICT implementation, and the emergence of Artificial Intelligence (AI) and smart library systems. These findings indicate that ICT has become a fundamental driver of academic library transformation, enabling more accessible, flexible, and technology-enhanced learning environments.

The study contributes to the field of Library and Information Science by providing a comprehensive synthesis of recent research on ICT integration in academic libraries. Practically, the findings may assist librarians, university leaders, and policymakers in

developing sustainable digital library services, strengthening librarians' digital competencies, and expanding the adoption of innovative technologies to improve learning and research support in higher education.

This study is limited to peer-reviewed journal articles published between 2020 and 2025 and focuses exclusively on academic libraries. Future studies should undertake empirical investigations examining the effectiveness of Artificial Intelligence-based library services, smart library implementation, and Library 4.0 technologies across different higher education contexts. Comparative studies between developed and developing countries are also recommended to better understand contextual factors influencing ICT adoption, digital literacy development, and sustainable digital transformation in academic libraries.

REFERENCES

- Association of College and Research Libraries. (2016). *Framework for Information Literacy for Higher Education*.
- Asemi, A., & Riyahiniya, N. (2007). *The role of libraries in distance education*. *The Electronic Library*, 25(4), 443–454. <https://doi.org/10.1108/02640470710754823>
- Bates, A. W. (2019). *Teaching in a Digital Age* (2nd ed.). Tony Bates Associates Ltd.
- Bawden, D., & Robinson, L. (2009). The dark side of information: Overload, anxiety and other paradoxes and pathologies. *Journal of Information Science*, 35(2), 180–191. <https://doi.org/10.1177/0165551508095781>
- Begum, A., & Elahi, M. (2022). Digital library services to support online learning in higher education. *The Electronic Library*, 38(3), 332–347. <https://doi.org/10.1108/DLP-03-2021-0025>
- Borgman, C. L. (2007). *Scholarship in the Digital Age: Information, Infrastructure, and the Internet*. MIT Press. <https://doi.org/10.7551/mitpress/7434.001.0001>
- Gruca, A. N. (2010). E-learning in academic libraries. *New Review of Information Networking*, 15(1), 16–28. <https://doi.org/10.1080/13614571003741395>
- Julien, H., Gross, M., & Latham, D. (2018). Survey of information literacy instructional practices in U.S. academic libraries. *College & Research Libraries*, 79(2), 179–199. <https://doi.org/10.5860/crl.79.2.179>
- Kitchenham, B., & Charters, S. (2007). *Guidelines for Performing Systematic Literature Reviews in Software Engineering*. EBSE Technical Report. Keele University.
- Lynch, C. A. (2017). Updating the agenda for academic libraries and information technology. *College & Research Libraries*, 78(6), 726–728. <https://doi.org/10.5860/crl.78.2.126>
- Martzoukou, K. (2021). Academic libraries in COVID-19: A renewed mission. *Library Management*, 42(4/5), 266–276. <https://doi.org/10.1108/LM-09-2020-0131>
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (3rd ed.). SAGE Publications.
- Nicholas, D., Rowlands, I., Clark, D., Huntington, P., Jamali, H. R., & Olle, C. (2010). Information on the go: A case study of Europe's researchers. *Journal of the American Society for Information Science and Technology*.
- Okunlaya, R. O., Syed Abdullah, N., & Alias, R. A. (2022). Artificial intelligence (AI) library

- services: Current applications and future directions. *Library Hi Tech*, 40(6), 1869–1887.
<https://doi.org/10.1108/LHT-07-2021-0242>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., *et al.* (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Pendit, P. L. (2008). *Perpustakaan Digital: Perspektif Perpustakaan Perguruan Tinggi Indonesia*. Sagung Seto.
- Selwyn, N. (2016). *Education and Technology: Key Issues and Debates* (2nd ed.). Bloomsbury Academic. <https://doi.org/10.5040/9781474235952>
- Sivankalai, S. (2021). Academic libraries support e-learning and lifelong learning: A case study.
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339.
<https://doi.org/10.1016/j.jbusres.2019.07.039>
- Sulistyo-Basuki. (2010). *Pengantar Ilmu Perpustakaan*. Universitas Terbuka.
- Tenopir, C., Volentine, R., & King, D. W. (2012). Scholarly reading and the value of academic library collections. *Library & Information Science Research*.
<https://doi.org/10.1629/2048-7754.25.2.130>
- UNESCO. (2018). *A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2*.
- Witten, I. H., Bainbridge, D., & Nichols, D. M. (2010). *How to Build a Digital Library* (2nd ed.). Morgan Kaufmann.
- Yusniah, Y., *et al.* (2023). Kajian perspektif layanan digital library. *Media Pustakawan*.
<https://doi.org/10.47467/elmujtama.v3i1.2405>