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The Role of Digital Libraries in Enhancing Students' Digital Literacy: A Systematic Literature Review

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ABSTRACT

This study aims to examine the role of digital libraries in enhancing digital literacy skills among students, in response to the paradox between high internet access and persistently low digital literacy among the younger generation. A systematic literature review method was employed. Articles were retrieved from Google Scholar using the keywords "peran perpustakaan digital" AND "literasi digital" AND "siswa" in Indonesian, covering publications from 2015 to 2025. From 66 articles identified, 10 were selected based on their relevance through a three-stage process of collection, evaluation, and synthesis. The findings reveal that digital libraries contribute to improving student digital literacy through three primary mechanisms: (1) the availability of diverse digital resources such as e-books, e-journals, and interactive platforms; (2) the provision of flexible media access that supports both in-class and distance learning activities; and (3) the active involvement of competent librarians who serve as instructional partners and digital ethics mentors. Digital libraries have evolved beyond mere electronic repositories and now function as comprehensive literacy ecosystems. Their effectiveness depends on infrastructure readiness, adaptation to the visual and mobile preferences of digital native students, and sustained collaboration among librarians, teachers, and parents to transform students into critical, productive, and responsible digital users.

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1. INTRODUCTION

The rapid expansion of internet access in Indonesia has not been matched by a corresponding improvement in digital literacy skills, particularly among students. According to the latest APJII survey, internet penetration in Indonesia reached 80.66% in 2025, equivalent to approximately 229 million users (APJII, 2025). Generation Z, who dominate internet usage, spend an average of 4–6 hours online daily, with a significant portion dedicated to social media and entertainment rather than educational or productive activities (APJII, 2025; Kemp, 2025). Despite this high connectivity, various studies consistently indicate that students' digital literacy, encompassing the ability to find, evaluate, use, create, and share information critically and ethically, remains alarmingly low (Ananda et al., 2023; Baterna et al., 2020; Mangarin & Climaco, 2024; Silvhiany et al., 2021).

This paradox is further evidenced by the Indonesia Digital Society Index (IMDI) 2025, which shows that while the infrastructure pillar scores relatively high, the digital literacy and empowerment pillars remain among the weakest components, with overall national scores still far from satisfactory levels (Komdigi, 2025). UNICEF's baseline study on children's online knowledge and practices in Indonesia (2023) reveals that most children use the internet primarily for chatting, socializing with friends, and consuming entertainment content such as movies or videos. Only a small proportion engage in purposeful information-seeking or critical evaluation of online sources. Furthermore, many children report experiencing uncomfortable or frightening online encounters, with limited guidance on digital safety and ethics from adults (UNICEF, 2025). These patterns leave students highly vulnerable to misinformation, cyber threats, data privacy violations, and inefficient use of digital resources for academic purposes (Juditha, 2018; Ekawati & Arifin, 2024; Massie & Nababan, 2021).

The consequences of low digital literacy are particularly concerning in the educational context. Students who frequently use gadgets for entertainment often fail to develop the higher-order skills needed to manage information overload in the digital age. Research indicates that many students treat the internet as a quick-answer tool rather than a platform for deep learning, critical analysis, or knowledge construction (Praseptiawan et al., 2019; Rais et al., 2024). This situation is exacerbated by the preference of digital-native students for fast, visual, and mobile-friendly content, which makes traditional static learning resources less appealing (Ridlwan et al., 2025; Wahidi & Prasetio, 2025).

Previous research has increasingly explored the potential of digital technologies to support education. Several studies have documented the shift from conventional libraries to digital formats as a response to the demands of distance learning and independent study, especially during and after the COVID-19 pandemic (Lubis & Marlini, 2021; Mubarok, 2021). Others have examined specific interventions, such as the integration of digital library applications in schools, gamification strategies, and librarian-led mentoring programs to boost student motivation and information-seeking behavior (Anshor et al., 2025; Rahmi et al., 2025; Wasilah et al., 2025). Positive outcomes reported in these studies include improved access to learning materials, greater learning independence, and better ability to filter credible information amid the flood of online content (Lestari, 2024; Nabila et al., 2025; Oktarina et al., 2025).

State-of-the-art literature further demonstrates that well-designed digital libraries can function as dynamic platforms for literacy development rather than mere repositories of electronic books. Evidence suggests strong correlations between the availability of diverse digital resources (e-books, e-journals, interactive multimedia, and virtual collections) and enhancements in students' information literacy, critical thinking, and ethical digital behavior

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(Anggara & Khoeron, 2023; Judijanto & Suroso, 2025; Radhiyah, 2025; Sukri & Wahyuni, 2024). Moreover, the active role of librarians as facilitators, mentors, and collaborators with teachers has been identified as a crucial success factor in transforming passive users into active, responsible digital learners (Husnawati et al., 2022; Ridlwan et al., 2025).

Despite these promising findings from individual case studies and small-scale implementations, a significant research gap remains. Most existing studies are context-specific, focusing on single schools or particular educational levels (elementary, vocational, or high school), with limited attempts to synthesize findings across broader Indonesian educational settings. There is also a scarcity of systematic literature reviews that comprehensively map the mechanisms through which digital libraries contribute to digital literacy while addressing persistent challenges such as infrastructure inequality, teacher and librarian readiness, adaptation to Generation Z's learning preferences, and the integration of digital ethics education (Anshor et al., 2025; Nabila et al., 2025; Oktarina et al., 2025). Consequently, policymakers and school administrators still lack a holistic evidence-based framework for optimizing digital libraries as core components of national digital literacy initiatives.

This study addresses the identified gap by conducting a systematic literature review that synthesizes recent empirical evidence on the role of digital libraries in enhancing students' digital literacy in Indonesia. The novelty of this review lies in its holistic perspective: it not only documents the provision of resources and flexible access but also emphasizes the transformation of digital libraries into comprehensive literacy ecosystems. These ecosystems integrate technological infrastructure, human facilitation by competent librarians, and collaborative efforts involving teachers and parents. By focusing exclusively on studies published between 2015 and 2025 and employing a rigorous three-stage selection process, this review offers timely, contextually relevant insights aligned with Indonesia's current priorities in digital society development.

The purpose of this article is to examine the role of digital libraries in enhancing digital literacy skills among students through a systematic synthesis of recent literature, to identify the primary mechanisms of their contribution, and to propose strategic recommendations for educational stakeholders aimed at effectively bridging the persistent digital literacy gap in Indonesia.

2. METHODS

This study employed a systematic literature review (SLR) design to synthesize existing research findings on the role of digital libraries in enhancing students' digital literacy. The systematic literature review approach was selected because it enables a rigorous, transparent, and replicable process for identifying, evaluating, and synthesizing relevant studies, thereby providing a comprehensive and unbiased overview of the current evidence base (Snyder, 2019).

The population of this review included all scientific articles that discussed the role or contribution of digital libraries in relation to digital literacy or information literacy among students at elementary, junior high, senior high, or vocational school levels. The sample consisted of articles indexed in Google Scholar that met the predetermined inclusion and exclusion criteria.

Data collection was carried out using Google Scholar as the primary search engine. The search strategy utilized a combination of Indonesian keywords with Boolean operators: "peran perpustakaan digital" AND "literasi digital" AND "siswa". To ensure the relevance and

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currency of the findings, the search was restricted to publications issued between 2015 and 2025.

The research procedure followed a structured three-stage process. In the identification stage, a total of 66 articles were retrieved using the specified keywords and time frame. In the screening and eligibility stage, the articles were evaluated based on their relevance to the research topic. The inclusion criteria required that the articles (1) explicitly addressed the role or contribution of digital libraries to students' digital literacy, (2) focused on school or student contexts, and (3) were published between 2015 and 2025. Exclusion criteria eliminated articles that (1) only mentioned digital libraries peripherally without substantial discussion, (2) focused solely on general digital literacy without linking it to library services, or (3) were duplicates or non-academic publications. After careful screening and evaluation, 10 articles were selected for the final synthesis stage.

Thematic synthesis was employed as the data analysis technique. All selected articles were read in full, and key findings related to the mechanisms, benefits, challenges, and roles of digital libraries were extracted and coded. The extracted data were then organized into major themes, including the availability of diverse digital resources, flexible access supporting learning activities, and the facilitative role of librarians. The findings from the individual studies were compared, contrasted, and integrated to generate comprehensive conclusions regarding the contribution of digital libraries to students' digital literacy in the Indonesian educational context (Cahyono et al., 2019).

This systematic approach ensured that the review was focused, objective, and capable of providing a holistic understanding of how digital libraries can serve as effective tools for improving digital literacy among students.

3. RESULTS AND DISCUSSION

The systematic literature review of the 10 selected articles reveals that digital libraries play a multifaceted and evolving role in enhancing students' digital literacy. Rather than functioning merely as electronic repositories, digital libraries have transformed into comprehensive literacy ecosystems that support resource access, flexible learning, and human facilitation. The findings are synthesized into three primary themes derived from the selected studies: (1) provision of diverse digital resources, (2) flexible media access supporting independent and distance learning, and (3) the active role of librarians as instructional partners and digital ethics mentors. These themes collectively address the gap between high internet penetration and low digital literacy among Indonesian students.

Table 1. Research's Finding

No.	Title	Author	Year	Role of Digital Libraries in Enhancing Digital Literacy Among Students
1.	Perpustakaan Digital Sebagai Penunjang Pembelajaran Jarak Jauh	Ramdanil Mubarok	2021	In the context of distance learning, digital libraries have a role to be a primary learning resource that is available without space and time limitations, therefore supporting the shift in

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No.	Title	Author	Year	Role of Digital Libraries in Enhancing Digital Literacy Among Students
				the role of students from passive receivers to active learners who are expected to be more independent in searching, selecting, and developing learning materials on their own.
2.	Manajemen Digital Perpustakaan Sekolah untuk Mendorong Literasi Siswa	Zainul Wasilah, Ima Widiyanah, Syunu Trihantoyo	2025	Digital Library management recommended a comprehensive approach that not only boosted student motivation through the implementation of gamification strategies and AI-based recommendations, but also played an impactful role in supporting project-based learning, which students were required to independently search for and process digital information to solve real-life cases that directly enhanced critical thinking skills.
3.	Adaptive Information Service Development Strategy to Improve Information Literacy and Student Learning Independence	Lailatur Rahmi, Khoirun Nisa Lubis, Arwendria, Fadhila Nurul Husna Zalmi & Suci Riqsyah Amaliah	2025	The key to success of school libraries in the digital age is not only the availability of computers, but also the adaptability of services, which is the librarian's ability to "repackage" information and provide individual mentoring to follow the learning styles of the modern student.
4.	Peran Perpustakaan Digital dalam Kebutuhan Literasi Informasi di Sekolah	Puji Lestari	2024	A great digital library is a library that can change students' behavior from being just "fast information seekers" to students who have a long-term digital literacy skill (knowing how to search for, evaluate, and use information with ethics).
5.	Implementasi Manajemen dan Digitalisasi Perpustakaan di SMA Negeri 13 Surabaya	Risma Putri Oktarina, Raditya Eko Syaputra, Sa'diyatul Munawwaroh, Jihan Abida, Alyadea Puspita Ribiana,	2025	The digitization of libraries schools has been proven to bring the concept of digital literacy through the "Pojok Baca" program, which is distributed in school gazebos, where students

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		Azlina Laila Syahriza, Silva Afiza, Rezki Nurma Fitria		can open e-book instantly using the barcode scanning feature on their gadgets. This is supported by the implementation of an automation system based on OPAC and SLiMS, which successfully pushes students to search the catalog independently, so they can learn to find and use learning resources from many digital media more effectively. The integration of digital systems and physical accessibility has fully impacted students' learning independence and strengthened their digital literacy skills.
6.	Upaya Mengembangkan Literasi Anak Usia Dini dengan Perpustakaan Digital	Husnawati, Fifi Italiana, Zariatul, Erna Budiarti	2022	Digital libraries as facilities that can improve literacy through regular additions to their collections, instilling awareness of the existence of libraries as sources of information from an early age, providing selected educational stories with attractive illustrations, and utilising children's interest in using gadgets, and certainly by adult supervision.
7.	Perpustakaan Sebagai Jantung Pendidikan	Makmur Sukri, Sri Wahyuni	2024	Libraries, as the heart of education, clarify the strategic aspects of their implementation in supporting teaching and learning activities by paying attentions to the completeness of library collections, both print and digital, such as e-journals, proceedings, e-books, magazines, and links that can connect to the other libraries, as well as the provision of educational facilities and resources. The presence of library managers whose skills are

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No.	Title	Author	Year	Role of Digital Libraries in Enhancing Digital Literacy Among Students
				continuously enhanced through workshops and various other activities teaches students how to search for information, evaluate its credibility, and use it ethically.
8.	Pendampingan Literasi DIgital Berkelanjutan untuk Guru dan Siswa melalui Perpustakaan Digital di SDIT ANNIDA	Abdul Halim Anshor, Fitri Rezeki, Rismawati, Erdi, Ahmad Fauzi	2025	The use of digital libraries is provided through integrated guidance and socialisation to ensure that students are able to effectively access and manage digital resources, thereby creating a habit of learning and improving their understanding of the use of information technology to independently search for and read learning materials. Digital libraries with a flexible and open learning ecosystem can increase awareness of the importance of digital transformation in elementary school.
9.	Aksesibilitas dan Efisiensi Melalui Implementasi Perpustakaan Digital di SMK Negeri 2 Padang Panjang, Sumatera Barat	Jeihan Nabila, Yona Primadesi, Desriyeni	2025	The practical use of the application-based digital library concept introduced through socialization activities was successful in improving understanding and finding more inclusive and responsive learning strategies by increasing the visibility of library collections. Open access to digital resources encouraged higher reading interest and digital literacy among students.
10.	Peran Perpustakaan Digital dalam Pembelajaran Literasi Digital Siswa Sekolah Dasar	Muhammad Ridlwan, Almaytasa Munfarikah, Lana Camelya, Muhammad Nofan Zulfahmi	2025	The integration of digital libraries in the elementary school environment offers significant potential and plays a crucial role in students' learning and digital literacy skills. The presence of a digital library provides easy and fast access to various types of information sources, helps

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				develop critical and evaluative thinking abilities, and serves as collaborative space that influences the interactive learning process.

The availability of diverse digital resources emerges as the foundational mechanism through which digital libraries enhance literacy. Studies consistently highlight that collections such as e-books, e-journals, interactive multimedia, and virtual reality materials expand students' access beyond physical limitations (Mubarok, 2021; Ridlwan et al., 2025; Sukri & Wahyuni, 2024). This variety enables students to engage with information in formats that align with their preferences, thereby increasing motivation and comprehension. For instance, the integration of visual and interactive elements helps digital-native students move from passive consumption to active knowledge construction.

Flexible access represents the second critical mechanism. Digital libraries eliminate space and time constraints, making them particularly valuable for distance learning and independent study (Mubarok, 2021; Nabila et al., 2025; Oktarina et al., 2025). Innovations such as barcode scanning in "Pojok Baca" and mobile-friendly applications allow instant access via students' gadgets, fostering learning independence and accommodating asynchronous learning patterns. This flexibility directly addresses the challenge of low engagement with educational content amid high entertainment-oriented internet use.

The third and perhaps most decisive mechanism is the active involvement of competent librarians. Far from being passive custodians, librarians serve as instructional partners who repackage information, provide personalized mentoring, conduct socialization, and teach digital ethics (Anshor et al., 2025; Lestari, 2024; Rahmi et al., 2025; Wasilah et al., 2025). Their role in guiding students to evaluate source credibility, avoid misinformation, and practice responsible digital behavior is repeatedly emphasized as essential for long-term literacy development. Collaboration among librarians, teachers, and parents further strengthens this ecosystem, ensuring consistent guidance both at school and home (Husnawati et al., 2022; Sukri & Wahyuni, 2024).

When comparing findings across educational levels, interesting patterns emerge. Studies at the elementary level (Husnawati et al., 2022; Ridlwan et al., 2025) tend to emphasize early habituation, visual content, and adult supervision. In contrast, research at senior high school level (Oktarina et al., 2025; Nabila et al., 2025) highlights more advanced features such as automation systems, OPAC, and project-based learning with gamification. This suggests that digital libraries must adapt their strategies according to students' developmental stages while maintaining core principles of accessibility and guidance.

Furthermore, the reviewed literature consistently underscores the importance of human factors. Technology alone is insufficient; the presence of skilled librarians who can collaborate with teachers and provide ongoing mentoring proves to be a determining factor for success (Anshor et al., 2025; Rahmi et al., 2025; Wasilah et al., 2025). Without this human element, even the most sophisticated digital library system risks being underutilized by students who still prefer entertainment over educational content.

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Despite these strengths, the reviewed studies also identify implementation challenges, including infrastructure disparities, limited teacher and librarian digital competencies, and the need for continuous training (Anshor et al., 2025; Oktarina et al., 2025; Ridlwan et al., 2025). Successful cases, such as those in SMA Negeri 13 Surabaya and SDIT ANNIDA, demonstrate that strong leadership, systematic socialization, and integration with the curriculum are key to overcoming these barriers.

Overall, the synthesis confirms that digital libraries contribute significantly to bridging the digital literacy gap when they function as integrated ecosystems rather than isolated tools. Their effectiveness depends on three interlocking elements: rich and accessible resources, flexible technological infrastructure, and human facilitation through skilled librarians. These findings extend previous case-specific research by providing a holistic framework applicable across educational levels in Indonesia.

4. CONCLUSION

This systematic literature review concludes that digital libraries have evolved from mere electronic repositories of books into comprehensive literacy ecosystems that play a pivotal role in enhancing students' digital literacy skills in Indonesia. The synthesis of ten selected studies demonstrates that digital libraries contribute significantly through three interconnected mechanisms: the provision of diverse and accessible digital resources (e-books, e-journals, and interactive materials), flexible access that supports both classroom and distance learning, and the active facilitation by competent librarians who serve as instructional partners and mentors in digital ethics. These elements collectively help bridge the persistent paradox between high internet penetration and low digital literacy levels among Indonesian students by transforming passive information consumers into critical, productive, and responsible digital users.

The findings highlight that the effectiveness of digital libraries is not automatic but depends heavily on adequate infrastructure readiness, adaptation to the visual and mobile preferences of digital-native students, and sustained collaboration among librarians, teachers, and parents. When these components are well-integrated, digital libraries can foster independent learning, improve critical thinking skills, enhance the ability to evaluate information credibility, and promote awareness of digital safety and ethics. Successful implementations in various school levels from elementary to senior high schools, provide concrete evidence that strategic digitization combined with human guidance yields measurable improvements in students' information literacy and learning autonomy.

For practical implementation, school administrators and policymakers are recommended to prioritize the development of robust digital library infrastructure and integrate digital literacy programs into the regular curriculum. Librarians should be empowered through continuous professional development to actively collaborate with teachers in designing participatory learning activities that utilize digital collections. Furthermore, parental involvement is essential to reinforce responsible digital habits at home. Future efforts should also focus on addressing infrastructure disparities across regions to ensure equitable access to these literacy-enhancing resources.

In conclusion, digital libraries represent a strategic and promising intervention for overcoming Indonesia's digital literacy challenges. By fully realizing their potential as dynamic literacy ecosystems, educational institutions can better prepare students to navigate the complexities of the digital age with confidence, competence, and responsibility.

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