

Integrating Artificial Intelligence (AI) in School Libraries: Improving Educational Support and Advancing Librarian Competencies

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ABSTRACT

The objective of this study is to explore the role of artificial intelligence (AI) in school libraries and examine how this technology can be implemented to enhance library services. Using a literature review methodology, this study analyzes previous research sourced from the Scopus and Web of Science (WoS) databases. The study successfully identifies the factors that both support and hinder the integration of AI in school libraries. Factors such as adequate infrastructure and an inclination toward innovation serve as facilitators for AI implementation. In contrast, challenges like high costs, limited human resources, and concerns about AI's reliability present significant barriers. Additionally, the study emphasizes the crucial role of school librarians in the age of AI and identifies the essential competencies they must develop to effectively guide students and manage AI-based services. Future study should concentrate on the long-term impacts of AI on student engagement and learning results, with eventual development of training programs to assist school librarians in adapting AI technologies in school libraries.

INTRODUCTION

School libraries are indispensable pillars of educational institutions, providing essential resources and support for student learning and development. In Indonesia, in this case, the government has realized the important role of libraries in an educational institution, which then prompted them to compile the government regulation of the republic of Indonesia number 19 of 2005 concerning national education standards. It is written in article 42 paragraph (2) that one of the facilities that must exist to support a regular and continuous learning process is a library. The library is a main resource for primary school students' studies since it provides a wealth of knowledge that is essential to their development on both an intellectual and personal level (De Souza & Balduino, 2023). The main purpose of school libraries is to foster the habit

of reading in students from an early age and to accompany the intellectual development of students, and offer an explorative learning environment.

In the eyes of the world, the existence of school libraries is highly regarded. Many countries have also realized the essence of school libraries for intellectual growth and development and as a place to transfer knowledge to students. The International Federation of Library Associations and Institutions (IFLA) in 1999 issued a School Library Manifesto which is a guideline suggested to be implemented in school libraries around the world. The manifesto states: "Governments, through their ministries responsible for education, are urged to develop strategies, policies, and plans that implement the principles of this Manifesto". This statement means that governments are responsible for creating and developing strategies, policies and plans with the aim of promoting sustainable education. IFLA's School Library Guidelines focus on creating equality of opportunity for students and upholding social justice. In addition, in the UK, Great School Libraries is a three-year evidence-based campaign whose mission is to ensure that every school in the UK has access to information through school libraries and librarians. All of this is done because Great School Libraries hold the principle that every child deserves a great school library. With this, it can be seen that every government in a country has a mission to build the right policies in order to develop school libraries that will be useful to support the information needs of their students, of course, keep in mind that each existing policy adapts to the curriculum and culture of each country, in other words, policies for school libraries cannot be generalized.

Despite the acknowledgment of school libraries' roles and the establishment of national and international standards, fulfilling these goals presents significant challenges. Libraries must not only offer a sufficient array of reading materials but also consider several other critical factors, including supporting infrastructure. Dependable infrastructure is essential for establishing an optimal learning environment, particularly given the increasing need for technology in contemporary library services. The constraints of infrastructure influence class size and density, the learning environment, and educational technology, thus impacting the attainment of educational objectives (Sumual et al., 2023). The preparedness of infrastructure, including sufficient library space, internet connectivity, and technological gadgets, is essential for libraries to operate as vibrant information centers that meet students' requirements. E-Readiness refers to the preparedness of libraries or information institutions to implement, adapt, utilize, and derive advantages from information and communication technologies. E-readiness in libraries includes several characteristics such as human resources, electronic infrastructure, networked services, and facilitating factors (Keshavarz & Noorafrooz, 2020)

Moreover, regarding facilities and infrastructure, research by Maharani and Hadiapurwa (2023) evaluating the legal framework governing the organization and management of high school libraries at the BPI Foundation's library revealed that users deemed the library's infrastructure excessively confined. This leads to insufficient room for library patrons to engage in information retrieval and knowledge sharing. Library infrastructure includes various elements, notably the preparedness to integrate information technology, which is essential for enhancing contemporary library services and improving accessibility for users in the digital era. Purnamayanti and Oktaria (2022) in their research on the preparedness of Muhammadiyah Senior High School 2 in Bandar Lampung for the development of a library website identified several obstacles in the implementation of technology, including librarians' insufficient proficiency in developing and operating the Electronic Library website, inadequate internet connectivity, and incomplete features within the Electronic Library website's menu.

It is important for school libraries to start considering the use of information technology based on artificial intelligence. Artificial Intelligence, or AI, has emerged as a transformative technology for libraries, offering the potential to enhance services and operations. AI applications in libraries include natural language processing, computer vision, voice recognition, and robotics. (Saputra & Ilhami, 2024). Artificial intelligence offers significant benefits for libraries and education in the digital age. In the library, AI can enhance services by predicting user needs, providing interactive assistance, and enabling access to

a variety of online resources. (Mutiarachim & Sayekti, 2023; Subchan, 2024). In other words, even though a school library has limited infrastructure, AI can optimize the use of existing resources, which can help improve access to digital resources. As a result, considering the issues at hand, the use of AI in school libraries is becoming increasingly important.

In addition, AI can simplify the tasks of librarians that are still limited to technology. For example, in the research by Sanji et al. (2022) regarding the use of chatbots in libraries, it was found that chatbots have more flexible operating hours than librarians. These AI-driven solutions can automate several library functions, such as reference services, information retrieval, and tailored suggestions (Fatouh, 2024; Sugiono, 2022). Chatbots can provide services even when the library is closed. In addition, with the chatbot, librarians have the opportunity to answer more complex and personal questions from patrons. However, it is important to remember that artificial intelligence applications are merely tools designed to facilitate the work of librarians and provide effective and efficient services to patrons, not to imply that librarians will be replaced by artificial intelligence.

Librarians are tasked with the vital responsibility of facilitating knowledge access and assisting users in navigating a complicated web of digital resources, given the constantly changing digital information world (Diseiye et al., 2023). Achieving self-sufficiency in these roles requires utilizing digital literacy. To fulfil this, librarians must be trained and provided opportunities to master technology, enabling them to leverage AI and other innovations to enhance library services while preserving their core roles as facilitators of literacy and knowledge. As information managers, mastering information technology is a challenging endeavor that demands an understanding of the main components of digital competence in libraries. These components include working with digital information, communicating in digital media, creating digital content, applying information security, and addressing the challenges of digital modernization (Davydova & Marina, 2020). When integrating technologies such as artificial intelligence, the aim is to enhance these capabilities, not to replace the human element. AI can assist in encompassing back-end processes, services, data science communities, literacy initiatives, and user management. However, the empathetic and nuanced decision-making, as well as the interpersonal connections that librarians bring, remain irreplaceable. By combining their professional expertise with AI tools, librarians can focus more on critical responsibilities, such as engaging with patrons, fostering intellectual curiosity, and cultivating an inclusive and resource-rich library environment (Cox & Mazumdar, 2022).

Unfortunately, school librarians who are truly information experts or have a specialized educational background in library science are still rarely found. Most school librarians are teachers who also take on the role of managing the library, they are called teacher librarians. Teacher librarians act as lifelong learning coaches, emphasizing processes and skills above content, while teaching cognitive, personal, and interpersonal competencies to students at all educational levels (Garrison & Spruce, 2021). This condition often leads to limitations in terms of competencies and skills in information management, including the mastery of information technology that is increasingly needed in the digital era. The heavy workload as teachers makes it difficult for them to focus on improving the competencies of librarians, especially in terms of adopting technology such as artificial intelligence. As a result, numerous school libraries remain behind in modernization and service innovation, which should ideally improve educational quality. These libraries frequently face obstacles, including inadequate strategic positioning and insufficient infrastructure, which hinder their operational efficacy (Nukhbatillah et al., 2023). Therefore, it is important for the government and educational institutions to provide adequate training and support to librarians, so that they can serve as competent information managers relevant to current technological developments.

The purpose of this writing is to explore the role of artificial intelligence (AI) in school libraries and how this technology can be implemented to enhance library services. Through the analysis of various challenges faced, including limited infrastructure and human resource constraints, this paper aims to provide an overview of how prepared school libraries around the world are to implement AI-based tools, which are hoped to be solutions and innovations in addressing the dynamics present in libraries.

Additionally, this paper emphasizes the importance of librarians in their role as facilitators of literacy and knowledge, as well as how mastery of technology, including AI, can strengthen that role without replacing the essence of the librarian profession. Thus, it is hoped that this study can contribute to the development of school libraries in the digital era and encourage the adoption of balanced and inclusive technology.

METHODOLOGY

The research method used in this study is a literature review. A literature review involves a critical evaluation of existing research on a specific academic topic, theme, or subject to identify gaps and propose future research agendas (Chigbu et al., 2023). This approach allows researchers to build on established knowledge while providing a comprehensive overview of the current state of the field. The process begins with a thorough search of various relevant sources, such as academic papers, scholarly articles, and reports related to Artificial Intelligence (AI), school libraries, children's libraries, and teacher librarian competencies. For this study, the search for academic papers was conducted using two credible databases, namely Scopus and Web of Science (WoS), ensuring access to high-quality, peer-reviewed sources.

An in-depth search within these databases was performed using Boolean search techniques with relevant keywords such as “school libraries” AND “artificial intelligence,” “children libraries” AND “artificial intelligence,” “school libraries” AND “technology,” “school libraries” AND “digital age,” “teacher librarian,” and “librarian complexity roles.” The use of Boolean operators facilitated the retrieval of more targeted and specific results, enhancing the accuracy and relevance of the findings. This aligns with Ebidor and Ikhide's (2024) overview of literature reviews, which emphasizes that a comprehensive literature search is often conducted in major databases, supplemented by browsing relevant journals and citations using appropriate keywords. By employing these strategies, this literature review seeks to gather a well-rounded collection of studies that not only reflect current developments in the integration of AI in school libraries but also address the evolving roles and competencies of librarians in the digital age.

STUDY FINDINGS

How Artificial Intelligence (AI) Support Students' Learning Process

The digital era is characterized by the wide use of technology in every aspect of life, particularly in education. In response, the school library, as an agent for knowledge dissemination, is anticipated to implement innovative strategies for integrating current technology advancements. Through the utilization of AI, libraries can attain sustainable learning by developing surroundings and services that are flexible and accessible for students. This is an illustration of AI's application in libraries as an educational resource for students, as noted by Masrek et al. (2024):

- a. **Personalized Learning:** Through the analysis of data regarding student choices and interactions during activities in the school library, AI can develop customized learning paths that deliver content specifically suited to their requirements.
- b. **Unrestricted Accessibility:** Availability of knowledge that is boundless in both spatial and temporal dimensions. AI-powered content distribution enables users to access information from any location using any device.
- c. **Adaptive Content Delivery:** Consistent with tailored learning materials, AI can also adjust to students' learning capabilities. AI offers enrichment exercises for students excelling in a certain learning concept. In contrast, for students who find it challenging to maintain the learning pace, AI can offer educational material that is more accessible and comprehensible.
- d. **Instant Feedback and Assessment :** Real-time feedback on homework assignments and tests is delivered through assessments powered by artificial intelligence. Students obtain instantaneous feedback on their performance, facilitating the identification of areas for enhancement and enabling timely adjustments to their learning approach.

- e. Natural Language Processing (NLP): AI equipped with NLP skills can assist students in interpreting educational material. Involving students in natural question-and-answer sessions promotes more intuitive and responsive learning experiences.
- f. Data-Driven Insights : AI analyzes student interaction data to develop patterns and insights regarding learning behaviors. Educators can utilize this data to improve instructional methods, customize the curriculum, and tackle particular challenges encountered by students.
- g. Assistance and Support : Students obtain immediate assistance from chatbots and AI-enhanced virtual assistants to navigate problems and impediments. This can serve as a proactive measure to mitigate students' displeasure in participating in learning activities.
- h. Personal Learning Assistants: To augment collaborative learning, AI-powered systems can function as virtual instructors, delivering teaching, suggesting resources, and promoting conversation among students.
- i. Customized Learning Resources: AI detects deficiencies in comprehension and suggests supplementary materials, enabling students to delve deeper into subjects of interest or to strengthen areas requiring improvement.
- j. Effective Time Management: AI assists students in managing their time efficiently by providing appropriate study timetables, break durations, and study intervals. This seeks to attain balanced and optimal educational outcomes.

How Artificial Intelligence (AI) Integrated in School Libraries

The implementation of artificial intelligence-based information technology is considered crucial for enhancing students' engagement with school libraries and for facilitating the acquisition of new knowledge. Students' routines, centered on educational activities, must be harmonized with individual discovery to acquire practical knowledge beyond the school curriculum. A study by Stejskal et al. (2020) on child patrons at the Municipal Library of Prague revealed that children allocated more time to the library when utilizing internet services, playing computer games, or interacting with console games. Furthermore, Lee (2024) discovered via his research at the National Taiwan Library (NTL) that attempts have been made to implement artificial intelligence-based technology in children's library services. NTL is dedicated to improving the digital literacy competencies of its users through the utilization of AI to create accessible digital resources and electronic databases.

The regulations and concepts for establishing school libraries differ globally, as noted in the introduction. This policy is customized to the social, cultural, and needs aspects of the nation. Technological innovation, educational infrastructure, and human resource preparedness influence this policy. Consequently, a notable disparity exists in the varieties and categories of information technology, including artificial intelligence (AI), employed by school libraries across various nations. The change illustrates the efficacy of the way each nation employs technology to accomplish its educational objectives.

This research involved identifying relevant data through a comprehensive search of the Web of Science (WoS) and Scopus databases. The outcome comprises three key papers illustrating how the policies and competencies of each nation affect the adaptation of school libraries to information technology and artificial intelligence. These articles not only validate the prior ideas but also present a tangible depiction of the diverse applications of AI. This encompasses the utilization of basic automation systems to more sophisticated AI applications to facilitate learning and library administration. This indicates that despite variations in technology, all nations possess a common objective: to enhance school library services in order to improve the educational process.

Table 1 Implementation of Artificial Intelligence in School Libraries Across Various Countries Around the World

Title	First Author	Country	AI Implementation	Summary
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Artificial Reality + Education : Guangzhou Children's Library Services Innovation (2020)	Cui Honog Wu	China	Artificial reality technology : Virtual Reality (VR) and Augmented Reality (AR) programmes	Guangzhou Children's Library has integrated augmented reality technology into its teaching methods to improve children's learning experiences. The library's goal is to stimulate creativity and literacy education, demonstrating the potential of new technologies. However, the integration of AR technology may challenge librarians' information literacy, necessitating ongoing education and training programs, and rethinking library layouts to accommodate new reading patterns. Continuing education and training programmes should focus on improving instructors' management and maintenance skills with new technology and equipment Furthermore, readings integrated with innovative technology frequently captivate large
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				audiences and enhance their interest in reading; thus, librarians should excel in providing on-site instruction.
Reading with robot and human companions in library literacy activities: A comparison study (2020)	Hsiu-Ping Yueh	Taiwan	Robot librarian, Julia, as a children reading companion	This study examines the application of social robots in library literacy initiatives and their efficacy in enhancing children's reading engagement. The robotic reading buddy was deemed more preferable than human co-readers, offering mentorship, oversight, and social engagement. Children found the robot to be an entertaining companion for reading, while robots were favored for peer tutoring and social relations. Robots fulfilled young patrons' expectations of possessing superhuman knowledge by accessing vast resources and delivering accurate responses. This study enhances the literature on library literacy initiatives by offering empirical evidence about the implementation of a robot as a tailored reading partner. Nevertheless,

				constraints encompass a limited sample size and the possible distortions arising from children's anthropomorphic perspectives. Future research should examine various age demographics or genres of reading materials and implement more direct behavioral or physiological assessments. The study's results may serve as a reference for subsequent research on robotic reading companionship in libraries and educational reading initiatives.
Artificial Intelligence and Multimedia Facilities School Libraries : Possibilities of the Future (2023)	M.O. Ragunathan	Dubai	Artificial Intelligence (AI) robot called 'Pepper'	The GEMS Modern Academy library has integrated an Artificial Intelligence robot, Pepper, to address students' informational requirements and respond to worldwide developments. Pepper, an integral component of the library, assists students in identifying their preferred books by evaluating their Lexile level and offering tailored recommendations. This technology enhances reading strategies and cultivates a passion for

				reading. The use of AI robots has diminished inefficiencies and delays in conventional library operations, improving accessibility and the experience of reading. The robot's partnership with the school IT department has markedly enhanced library services.
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All three publications demonstrate a uniform perspective on the integration of AI in school libraries. International school libraries have begun to integrate traditional information technology with artificial intelligence to achieve innovative and enhanced library service goals. Their observations indicated that the young students they served needed something unique and innovative to stimulate their interest in visiting the library. Furthermore, the deployed artificial intelligence serves not only for leisure purposes but is predominantly focused on augmenting lifelong learning for students. This is demonstrated by the technological component, which encompasses interactive teaching materials.

Librarians as Catalysts for AI Integration in Educational Environments

According to IFLA's guidelines on school libraries, a school librarian is defined as the one accountable for the school's physical and digital learning environment, where reading, inquiry, research, critical thinking, imagination, and creativity are fundamental to the educational process. Moreover, school librarians can contribute to enhancing students' digital and information literacy, which are increasingly vital in the age of artificial intelligence. Given AI's capacity to analyze data and deliver information rapidly, students must be educated on the functionality of this technology, its potential to assist or affect their decision-making, and the importance of upholding academic integrity when utilizing tools like automated writing software or voice recognition applications. In this context, the librarian serves as a guide, encompassing both technical proficiency and the ethical application of technology.

As AI is integrated into school libraries, librarians must consistently improve their skills, stay abreast of the newest technical advancements, and formulate methods to assist students in AI-driven learning processes. School librarians who adapt to new technology will enhance their roles as educators and strategic collaborators in advancing the school's educational purpose. Consequently, the school library serves as a venue where technological advancements, such as AI, are not only integrated but also fully used to enhance student empowerment.

Table 2 The Role of School Librarians in Supporting AI Adoption for Student Learning

Title	First Author	Country	AI Implementation
Navigating tomorrow's classroom : The future of information literacy	Elizabeth Hutchinson	United Kingdom (UK)	The expanding role of librarians in integrating Artificial Intelligence

and inquiry-based learning in the age of AI (2024)			(AI) within school libraries underscores their essential function as information specialists. School librarians must adopt AI and utilize frameworks such as the Framework of Skills for Inquiry Learning (FOSIL) to incorporate Information Literacy (IL) effectively into the curriculum. Librarians, as information specialists, are essential in assisting students to traverse the intricacies of an AI-driven environment, where the vast amount of information necessitates rigorous assessment of legitimacy and quality. By implementing inquiry-based learning, which promotes student questioning, critical thinking, and the application of knowledge to real-world issues, librarians can equip students to navigate the ethical difficulties and opportunities posed by AI. The transition from conventional information literacy instruction to inquiry-based methodologies corresponds with the changing educational objectives, fostering active student engagement and collaboration between librarians and educators. Nevertheless,
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			numerous librarians exhibit reluctance to interact with AI, owing to ambiguity regarding its influence on education. School librarians must establish themselves as vital resources for students and educators, engaging in discussions on ethical AI utilization and tailored learning experiences, thus enhancing their significance in the educational sphere.
Navigating Generative AI : The Teacher Librarian's Role in Cultivating Ethical and Critical Practices (2023)	Kay Oddone	Australia	The incorporation of Generative Artificial Intelligence (GAI) in education offers both advantages and obstacles for teacher librarians (TLs), placing them in a pivotal role in cultivating critical and ethical information consumers. With the swift emergence of GAI tools like Quillbot, Perplexity, and ChatGPT, TLs are charged with investigating the potential of these platforms to both enhance educational objectives and cultivate students' skills in critically assessing and ethically utilizing AI-generated content. Utilizing frameworks such as CATWOE, team leaders can evaluate and structure the transformative educational processes provided by GAI tools.

			This encompasses helping students comprehend the ethical ramifications associated with AI utilization, including data privacy, bias, intellectual property, and environmental consequences. Team Leaders are essential in directing students to become knowledgeable and accountable producers and consumers of information, utilizing AI as a means to augment their education while upholding academic integrity. By employing this strategy, TLs can reconcile the disparity between AI's potential and the ethical dilemmas it presents, thus enhancing their significance within the overarching educational framework.
Developing Digital Literacy Practices in Yogyakarta Elementary Schools (2022)	Dyna Herlina Suwanto	Indonesia	The study highlights that the majority of digital literacy training takes place in computer laboratories, with a lesser number of sessions conducted in classrooms and libraries. It advocates for schools to implement a more holistic strategy that integrates ICT education, media literacy, and information literacy. The library needs to function as the central

			hub for digital literacy, with school administrators promoting collaboration between librarians and other educators to enrich the digital curriculum. The research recognizes the difficulties encountered by educators in integrating digital media, especially at institutions with inadequate ICT infrastructure or where teachers possess insufficient skills in utilizing digital technologies. Initiatives to tackle these difficulties encompass training programs and the mentorship of novice educators by seasoned teachers to aid the transition to digital learning settings. The research advocates for a comprehensive and inclusive strategy for digital literacy in educational institutions, engaging all educators and leveraging the complete capabilities of libraries and ICT technologies to furnish students with essential skills for the digital era.
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The effective integration of artificial intelligence (AI) technology in school libraries necessitates the active involvement of proficient librarians in its administration. AI cannot operate independently without sufficient human involvement, highlighting the critical importance of the school librarian. The examined literature reveals that school librarians or teacher librarians are important in the implementation of AI in

libraries. Moreover, library customers, especially students, require support and guidance from librarians on properly using AI technology in enhancing their educational experience.

DISCUSSION

Readiness of School Libraries in Adopting and Implementing AI for Library Services

The research findings highlighted the necessity of initiating AI implementation in school libraries and children's libraries, as it is crucial for enhancing educational support and upgrading library services. In conjunction with technological changes, school libraries must evolve to maintain their function as purveyors of information and knowledge for students. For encouraging students to utilize the library, creative tactics are essential, including the implementation of artificial intelligence technologies to foster a more dynamic and engaging learning environment.

School libraries are progressively acknowledging the significance of AI in facilitating the knowledge transfer process for students. Comprehensive studies reveal that numerous educational institutions, including the Guangzhou Children's Library, The GEMS Modern Academy, and the Children's Library of the National Public Library of Taiwan, have commenced the integration of AI into their services. These examples demonstrate that school libraries implementing AI can offer more contemporary and pertinent services to address students' requirements in the digital era.

The implementation of Artificial Reality services at the Guangzhou Children's Library relies on the institution's objective to offer services that align to the IFLA Guidelines for Library Services to Children aged 0-18, which advocate for libraries to collaborate with technology so that they could provide children with innovative, enjoyable, and engaging technologies. In the advancement of Artificial Reality, the Guangzhou Children's Library encounters numerous options and problems, nevertheless consistently aims to select greater technological components, including headsets and software. The Artificial Reality company develops Virtual Reality (VR) technology that offer an immersive experience for youngsters, enabling direct interaction with the displayed patterns. The function of AI in this service is to modify content that corresponds with children's interests. For example, a virtual exhibition centers on Jurassic World that immerses children in a prehistoric environment.

In addition to making this new technology effectively incorporated into library services, promotions are conducted periodically through monthly free events including varied themes aligned with the chosen content. Furthermore, to augment literacy and promote the dissemination of printed literature, library personnel employ virtual reality as a promotional tool for book collections. Books of relevance are shown on shelves positioned in high-traffic locations to enhance visibility. The primary problem encountered by the Guangzhou Children's Library in implementing this technology is improving the management and maintenance competencies of the teachers tasked with managing this new service. The Guangzhou Children's Library is prepared to implement AI in its services, demonstrated by its effective approach of leveraging technological breakthroughs to captivate children's interest in reading and borrowing printed books from the library's collection.

Research similar to what was conducted in China was also performed in Taiwan, with a sample of third-grade elementary school students. This study aims to analyze child patrons' views and performance in reading activities with a robot companion against human companions. The findings suggest that younger children with impaired literacy skills primarily concentrate on visual content and necessitate narrative assistance in their reading activities. The researchers evaluated three distinct situations for this purpose: 1) Students reading autonomously without support, 2) Students accompanied by a librarian who offered an introduction to the reading materials, and 3) Students accompanied by a robot called 'Julia' that presented the reading materials. The findings indicate that children perceive the Julia robot as an entertaining companion during reading activities. The robot satisfies children's aspirations for superhuman knowledge

by leveraging broad assets to deliver precise responses. The child patrons preferred the robot as a peer tutor rather than authority personnel, and they valued social connection with the co-reader over reading instruction from a teacher. The comparative analysis revealed that robots possess significant advantages regarding feasibility and scalability in library literacy initiatives.

The reading companion robot Julia uses artificial intelligence to generate emotional emotions tailored to the engaging user. Robot Julia was adapted for this study to function as a reading buddy in the library learning setting. Equipped with a front-mounted monitor, an eye-winking expressive visage, and a pair of agile robotic arms, Robot Julia is capable of engaging with youngsters both verbally and nonverbally by utilizing its monitor to present reading materials. The limitation of the research is that the researchers failed to figure out what challenges libraries face in adopting AI into their services. A possible topic for discussion is how AI has enhanced the enjoyment of reading among child users.

The GEMS Modern Academy in Dubai has included an AI robot named Pepper to address students educational requirements and respond to global technological advancements. Pepper significantly aids students in discovering books that match with their Lexile levels, a system that assesses reading proficiency, and offers tailored recommendations. This device improves students' reading strategies and cultivates their interest in reading. Moreover, the implementation of AI robots such as Pepper reduces inefficiencies and delays in conventional library operations, therefore enhancing accessibility and the reading experience. It interacts with young readers to identify their reading preferences, favorite genres, and competence levels. The robot 'Pepper' increases students' access to reading, thus boosting their enthusiasm for it. The article asserts that to substantially enhance library services, collaboration among multiple stakeholders is essential, starting from school librarians and extending to the school's information technology department.

The researchers did not report any challenges faced by The GEMS Modern Academy in using artificial intelligence-based technology regarding infrastructure. Researchers express concerns about the features of AI, namely Chat GPT, which is perceived to still lack rational thought in delivering responses within the context of libraries. This role comes to librarians; despite the implementation of AI, they must continually provide oversight and direct assistance to users dealing with AI-based services. Consequently, it can be inferred that The GEMS Modern Academy possesses the infrastructure to implement AI; nevertheless, enhancements are required in human resources preparation.

While the implementation of AI in school libraries in Indonesia remains limited, there is a growing recognition of its potential to enhance educational services. Currently, the majority of school libraries in Indonesia focus on the use of automated systems that enhance operational efficiency, including digital library systems, RFID technology for collection management, and open-source library administration solutions. These technologies primarily seek to enhance efficiency in documenting, tracking, and lending operations; nevertheless, they have yet to fully leverage AI's potential to completely transform user experiences and personalized learning. Kangko et al. (2021) identified that the revitalisation program of the Bina Pangudi Luhur Vocational School library in Indonesia converts traditional libraries into a system-based library, known as the School Integrated Library System (SchILS), together with the implementation of a barcode system, with the objective of enhancing access to information and digital resources.

Drawing from the findings of the literature review mentioned above, it is evident that school libraries are integrating AI because they aim to actively contribute to the improvement of students' literacy abilities and actively encourage students to frequent the library. While maintaining the idea that libraries are essential resources for students pursuing lifelong learning, artificial intelligence (AI) can be applied to many different kinds of library services. With its advantages and disadvantages, artificial intelligence (AI) is being used in school libraries more and more. The investigation demonstrates that AI has a beneficial impact on libraries by enabling them to develop more personalized services that are suited to the unique requirements of their patrons. But there are other drawbacks that must be taken into account, like the possible harm to kids' willingness to learn and over-reliance on technology. (Firdaus, Muhammad Rizki et

al., 2024). However, because AI may improve student engagement with the library and develop their digital literacy—both of which are very important in today's technologically advanced world—its use is still deemed appropriate.

Factors Supporting and Hindering the Integration of AI in School Libraries

The integration of AI into school libraries offers substantial opportunities for enhancing tailored services and boosting student engagement; nevertheless, it also presents considerable hurdles that must be meticulously addressed, including human resource capacity and technological readiness. There are factors that support the development of AI integration in library services; these supporting factors are typically internal and depend on the library's readiness to optimize its existing resources.

Based on the literature review analysis above, here are the factors that support the integration of AI in school libraries:

a. Infrastructure Preparedness

The establishment of digital library systems, servers, electronic collections, and automation capabilities, along with the procurement preparedness of school libraries, constitutes the infrastructure primed for AI integration (Murliasari, 2022). The three previously investigated libraries show no signs of difficulty in purchasing infrastructure, suggesting their readiness to incorporate AI into their services. Libraries can effectively utilize AI-based systems due to the absence of known issues with the hardware or network.

b. Excellent Technical Assistance

To ensure the seamless integration of AI into library services, it is essential to utilize high-quality hardware and software components while addressing consumer needs. To enhance their Virtual Reality (VR) services, the Guangzhou Children's Library opted to acquire Pico G2 VR headsets, which provide vivid, high-resolution visuals and a motion controller for user interaction. The headset is lightweight, rendering it suitable for children to utilize.

c. Cooperation with the Information Technology Department

To implement optimal AI-based services, libraries require collaboration with experts experienced in technology development. This collaboration integrates resources and expertise to surmount technological challenges and enhance information accessibility (Tiaranisa & Silvana, 2024). The GEMS Modern Academy's AI integration derives advantages from a close collaboration between the IT department and the library, facilitating the operation and maintenance of AI systems.

d. Accessibility of Financial Resources

Certain foreign libraries demonstrate that schools with greater financial resources can acquire more advanced AI systems and provide staff training. Financial resources must be accessible to acquire and sustain the requisite technological infrastructure.

On the other hand, here are the factors that create obstacles to the implementation of AI in school libraries:

a. Lack of Human Resources

Libraries such as The GEMS Modern Academy remain challenged with human resource readiness even with their own infrastructure. The management of AI technologies, which frequently call for

a higher level of technical proficiency, requires library staff to be properly trained. To stay up to date with the latest technology breakthroughs and educational trends, librarians must engage in continuous professional development activities such as formal education, on-the-job training, and seminar participation (Chigwada, 2021; Posilović, 2020). Therefore, it is important for school librarians to acknowledge their substantial responsibility to be pioneers in developing students' digital literacy abilities, critical thinking, as well as dedication to sustainable learning.

b. High Costs of Implementing Technology

The substantial expenses associated with technology implementation pose a considerable obstacle to the incorporation of AI in school libraries, especially for those with constrained resources. Significant financial investments are initially essential for hardware, including computers, servers, and AI-driven devices such as robotics and virtual reality equipment, in addition to software licenses required for AI systems and analytics tools. Enhancing the current IT infrastructure is essential, requiring improved internet connectivity, strengthened security measures, and cloud storage capabilities, which may increase expenses. The budgetary implications of integrating AI can be overwhelming for numerous school libraries, presenting a considerable obstacle to their efforts to improve educational assistance via technology advancement.

c. Limitations of AI Itself

Ragunathan (2023) discusses in his research on the integration of AI in school libraries that certain AI technologies, such as Chat GPT, continue to exhibit difficulties in providing logical and accurate responses. This may impact the quality of information services provided to students, necessitating increased control from librarians when AI is utilized.

LIMITATIONS

This literature review includes limits, just like research in general does. A few of these constraints are as follows: First, due to linguistic restrictions, only English-language publications were assessed; consequently, studies authored in other languages were excluded. Secondly, finding earlier studies that fit the requirements is a major challenge for the researcher, especially when it comes to those that focus on integrating artificial intelligence (AI) in school libraries. The majority of current research focuses on the use of AI in academic libraries, which limits access to relevant data and knowledge about AI applications in the context of school libraries. The lack of research particularly addressing this subject means that there aren't many references or comparisons to support the findings of this study, which affects the range of the analysis and the applicability of the conclusions drawn.

CONCLUSION

In conclusion, the implementation of artificial intelligence (AI) technology in school libraries is now essential. This research has effectively discovered the factors that facilitate and hinder the integration of AI in school libraries. Factors such as adequate infrastructure and a propensity for innovation facilitate AI implementation. In contrast, obstacles such as elevated expenses, insufficient human resources, and doubts over the reliability of AI provide considerable barriers.

School libraries must invest in essential infrastructure, including hardware, software, and dependable internet connectivity, while simultaneously improving their staff's technical skills to prepare for AI integration. Furthermore, school librarians must cultivate critical competencies, such as digital literacy, AI ethics, and novel pedagogical approaches like inquiry-based learning, to guarantee the effective application of technology. To surmount challenges, libraries must prioritize obtaining funds, collaborating with

stakeholders, and delivering continuous training to their personnel. By focusing on these aspects, school libraries may proficiently use AI, improve educational results, and foster lifelong learning among students.

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