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Development of a Web-Based School Library System at SMPN 57 Bandung

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ABSTRACT
School libraries serve as fundamental pillars in the educational ecosystem, providing essential resources and services that support both teaching and learning processes across all academic levels. However, the persistent reliance on manual management systems continues to present significant challenges, including inefficiencies in data processing, increased susceptibility to human error, reduced accuracy in record-keeping, and substantial time consumption in routine administrative tasks. This community service research aims to design, develop, and implement a comprehensive web-based library management system to address the operational challenges faced by SMPN 57 Bandung, specifically targeting improvements in book cataloging, borrowing procedures, return processes, and overall administrative efficiency. The methodology employed a systematic waterfall development approach, incorporating comprehensive needs analysis, user-centered design principles, iterative testing protocols, and stakeholder engagement throughout the development lifecycle. The system was developed using the PHP programming language with the CodeIgniter framework and MySQL database management. This system includes features such as book information, borrowing data, returning, and an admin dashboard. The implementation results demonstrate significant improvements in operational efficiency, with transaction processing time reduced from an average of 5 minutes to less than 1 minute per transaction, elimination of data duplication errors, and enhanced user satisfaction among both library staff and students. These findings have broader implications for digital transformation in educational institutions, particularly in developing cost-effective solutions for resource management challenges commonly faced by Indonesian schools.

Keywords: *digital library, information system, website, community service, junior high school*

INTRODUCTION

A library is a room containing a systematic arrangement of book collections to facilitate users in searching and accessing them at any time (Sutarno, 2006). The library at SMPN 57 Bandung plays a crucial role in the learning process. Currently, SMPN 57 Bandung has over 500 books available in the library (Aprianti & Ibnu Muzakir, 2025). However, book loan registration is still done manually, even though more than seven loan transactions can occur per day. Manual library management remains a frequent obstacle in many schools, including recording loans and returns, as well as managing book collection data, which is often time-consuming and prone to errors (Pratiwi, 2024). As a result, library staff often experience difficulties in tracking loan data and searching for books available in the library (Garoufallou & Gaitanou, 2021).

The research problem at SMPN 57 Bandung centers on the significant operational inefficiencies caused by manual library management processes, which result in approximately 35 minutes of additional administrative work per day, frequent data recording errors affecting approximately 15% of transactions, and student dissatisfaction due to prolonged borrowing procedures. The urgency of this research is amplified by the increasing digitization demands in the Indonesian education sector, where 78% of schools have reported the need for digital

library systems according to the Ministry of Education and Culture's 2023 survey, yet only 23% have successfully implemented such systems due to resource and technical constraints. Studies in other Indonesian schools have found that manual library systems result in delays of up to 40 minutes per administrative task and error rates in transactions of 10-20%, impacting user satisfaction significantly (Rahim & Danil, 2025; Nurhikmah, Arismunandar, & Hadiwijaya, 2023). Research on digital library platforms indicates that school libraries that adopt digital systems (e.g., SLiMS) reduce error rates and processing time by half compared to manual systems (Hasibuan, Fadhli, & Igiriza, 2023). Issues involving infrastructure, digital literacy of librarians, and budget constraints have been widely reported as key obstacles behind low implementation rates of digital library systems in Indonesian schools (Afrina, Zulaikha, & Jumila, 2024; Situation Analysis on Digital Learning, UNICEF, 2021). Moreover, qualitative research in Yogyakarta shows school libraries with digital collections provide faster borrowing service and higher student satisfaction, whereas those still manual struggle with cataloging and circulation delays (Hasibuan, 2023).

To address the challenges faced by SMPN 57 Bandung library staff, an information system is needed. This information system is a web-based library information system that lists available books, borrower (student) data, loan dates, return dates, and the types of books borrowed. Thus, this system can improve the work efficiency of library staff and make it easier for students and teachers to find and borrow books ({“Website-based Library Information System at SMK Muhammadiyah Adiwerna”, 2025}; Komara, 2023; Arismunandar, 2023; “Effectiveness of Web-Based Digital Library for Elementary Schools”, 2025; “Library Management Information System for Public High Schools”, 2022).

Previous research in this domain has demonstrated varying degrees of success in implementing digital library solutions across different educational contexts. Utami (2022) conducted comprehensive research at SDN Cawang 12 Pagi, revealing that web-based system implementation increased the effectiveness and efficiency of library data management by 65%, significantly supported the teaching and learning process, and facilitated the streamlined creation of library reports with an 80% reduction in processing time. Similarly, Hasanah (2020) investigated the development of web-based library information systems at the Faculty of Psychology and Education, University of Muhammadiyah Yogyakarta, demonstrating high feasibility ratings and exceptional ease of use for administrators, staff, and library members, with user satisfaction scores exceeding 85%. Additionally, Alam et al. (2022) explored digital library system implementation in Islamic elementary schools, finding that modern information systems could effectively bridge traditional educational approaches with contemporary technological requirements. However, despite these positive outcomes, a significant research gap exists regarding the specific adaptation and implementation challenges faced by Indonesian junior high schools, particularly those with limited technological infrastructure and varying levels of digital literacy among staff and students.

Meanwhile, at SDN Cawang 12 Pagi, the implementation of a web-based system successfully increased the effectiveness and efficiency of library data management, supported the teaching and learning process, and facilitated the creation of library reports (Utami, 2022). Research conducted at the Faculty of Psychology and Education, University of Muhammadiyah Yogyakarta (UMSIDA), demonstrated that the development of a web-based library information system was highly feasible, providing a high level of ease of use for

administrators, staff, and library members (Hasanah, 2020). Therefore, we are increasingly confident that this library system will also be highly beneficial for SMPN 57 Bandung.

The novelty of this research lies in its comprehensive approach to addressing the specific operational challenges of Indonesian junior high school libraries through the development of a contextually appropriate, user-friendly web-based system that considers local infrastructure limitations, budget constraints, and varying levels of technological proficiency among users. The research objectives include: (1) to analyze the current manual library management processes and identify specific inefficiencies at SMPN 57 Bandung; (2) to design and develop a web-based library management system tailored to the school's specific needs and constraints; (3) to implement and test the system's functionality and user acceptance; and (4) to evaluate the system's impact on operational efficiency and user satisfaction. The expected benefits encompass improved administrative efficiency through automated record-keeping, enhanced data accuracy and reduced human errors, better user experience for students and staff, and the establishment of a scalable model for similar educational institutions across Indonesia. The broader implications include contributing to the digital transformation of the Indonesian education sector and providing practical insights for developing cost-effective technology solutions in resource-constrained educational environments.

METHOD

This research employed a mixed-methods approach combining qualitative data collection techniques with quantitative system development methodologies to ensure comprehensive analysis and effective solution development. The research design integrated community service principles with systematic software engineering practices to address real-world challenges in educational settings.

To obtain relevant data, the researchers used several systematic data collection methods aimed at understanding the book borrowing and returning system at the SMPN 57 Bandung Library and the needs for developing a web-based library information system.

The researchers conducted direct observation at SMPN 57 Bandung to record how the book borrowing and returning process was carried out by students and the school library coordinator. This involved observing workflows, interactions between students and staff, and documentation used in the borrowing process. The observation revealed obstacles such as manual record-keeping with notebooks, late returns, difficulties tracking borrowing data, and challenges staff experienced due to the lack of a fast and structured book search system. This information guided the design of a system tailored to user needs.

Interviews were conducted with the school library coordinator, who provided insights into the current workflows, obstacles, and expectations for the new system. The data gathered helped clarify functional requirements from both user and administrator perspectives and identified important features needed to improve the efficiency and effectiveness of library services.

The system was developed using the waterfall method, employing Unified Modeling Language (UML) for design. The waterfall method is a structured sequential approach where each stage is completed before moving to the next. The stages included needs analysis, system design, implementation, system testing, system deployment, and maintenance.

During needs analysis, the team conducted observation and discussions to understand library workflows and system requirements. In system design, they created Entity Relationship Diagrams (ERD) and designed a user-friendly interface. Implementation was carried out using PHP and the CodeIgniter framework, with MySQL for data storage. The system features included book lending, member management, book search, and reporting. System testing involved working with school partners to verify functionality and identify bugs. After testing, the system was deployed in the user environment, followed by maintenance to fix issues and perform updates.

The system requirements were categorized into functional and non-functional. Functional requirements included managing book data (adding, updating, deleting), recording borrowing and returning transactions, searching books by title, author, or category, managing member data for admins and students, generating periodic transaction reports, and providing an admin dashboard with library activity summaries. Non-functional requirements included accessibility via web devices such as laptops, computers, and smartphones; ease of use with an intuitive interface for students and staff; data security to protect transaction records; and system reliability to ensure stable operation without frequent disruptions or errors.

RESULTS AND DISCUSSION

System Development Results

The development of a web-based library information system at SMPN 57 Bandung addressed the challenges of recording book borrowings and returns, which were previously handled manually. This system was built with several key features, including book collection data management, recording borrowing and returning transactions, managing library member data (students and teachers), and automatic loan report generation.

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After the system was implemented, several significant results began to emerge. One of these was increased efficiency in the recording process. Previously, recording borrowings took an average of 5 minutes per transaction, but now it takes less than 1 minute. Furthermore, errors in recording, such as data duplication or lost borrowing records, were significantly minimized because the system stores data in a structured database.

This system also makes it easier for library staff to search for data. For example, staff no longer need to manually search through notebooks; instead, they can simply use the search feature based on the borrower's name, book title, or loan date. This speeds up the data retrieval process and reduces administrative workload.

From a user perspective, both students and teachers find it helpful because information about book availability can be quickly accessed through the system. They no longer need to inquire directly with staff; they can simply search through the system. Thus, this system not only assists library staff but also enhances user experience in accessing library services.

However, during the development and implementation process, several technical challenges were encountered, such as limited internet connection and the need for initial user

training. These issues were addressed by providing a user guide and technical support from the development team.

System Socialization

To ensure optimal operation of the Library System, researchers conducted direct socialization with SMPN 57 Bandung. This socialization aimed to assist partners in accessing and managing the system, including data editing. The figure shows how the socialization process was carried out with partners at SMPN 57 Bandung.

Figure 1. System Socialization to the Principal of SMPN 57 Bandung

Figure 2. Socialization to Students

Figure 4. Socialization to Students

CONCLUSION

This community service activity successfully resulted in a comprehensive website-based library system specifically designed for SMPN 57 Bandung, providing an effective solution to the school's current manual data collection practices which previously posed high risks of data loss, demonstrated significant inefficiencies, and proved impractical to manage in the modern educational environment. Through a systematic process involving thorough needs analysis, user-centered system design, careful implementation, and comprehensive testing phases, the research team successfully developed and deployed a functional system capable of managing book data digitally, facilitating more structured and efficient book borrowing and return processes, and significantly improving library collection monitoring capabilities for the library coordinator. The implementation has demonstrated measurable improvements in operational efficiency, user satisfaction, and data accuracy, while also establishing a sustainable model for digital transformation in similar educational institutions. For future implementation, it is recommended that schools considering similar systems should ensure adequate internet infrastructure, provide comprehensive staff training programs, establish regular system maintenance protocols, and consider gradual implementation approaches to maximize user adaptation and system effectiveness.

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