Development of Web-Based Library Management System for SMA Negeri 13 Surabaya (PUSGALAS)

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Abstract

School libraries are one of the important facilities that can be used to improve literacy culture and learning quality. However, managing libraries manually often causes various problems, including problems with recording book data, borrowing transactions, and limited access to information for students and teachers. Community service activities in the form of building a web-based library management system called PUSGALAS (Pusat Galeri Literasi SMA Negeri 13 Surabaya). The purpose of the system is to improve efficiency and ease of access to literacy services in schools. Needs analysis, design, implementation, testing, and evaluation are part of the Waterfall model used in the development of this system. This system is built using the PHP programming language and utilizes the Laravel framework and MySQL database. Book collection management, borrowing and returning, book searching, digital shelf visualization, and statistical reports are the main features available. The test results showed that the system was well received by users and met functional needs, with a satisfaction rate of more than 90% based on the User Acceptance Testing (UAT) evaluation. Therefore, PUSGALAS is considered effective in helping the transformation of school libraries into digital and can be an innovative solution to improve literacy services in secondary schools.

Keywords: *Digital Library, Library Management, PUSGALAS, Web Based.*

INTRODUCTION

School libraries play an important role in providing teachers and students with learning resources (Granita et al., 2020). As a center for learning resources, libraries provide various types of library materials that can be accessed by students, teachers, and school staff to increase knowledge and improve the quality of education (Adithama & Maslim, 2019).

However, many school libraries still use manual systems in management, both for collection data collection, book returns, and loan records (Paulina Sari & Yudi Arifin, 2020). Often, library management is done manually, which causes errors such as error-prone recording, long search times, and low user accessibility, including at SMA Negeri 13 Surabaya (Darmono, 2007).

SMA Negeri 13 Surabaya, located on Jl. Menganti, Lidah Kulon, Surabaya, faces many problems. Among these problems is the manual administration process, starting from book recording, borrowing transactions, to reporting. This process often causes various problems, such as inaccurate data, problems with book tracking, and delays in borrowing and returning services. Figure 1 is the atmosphere of the SMA Negeri 13 Surabaya library.

Figure 1. Atmosphere of the Library of State Senior High School 13 Surabaya

Previous studies have discussed the development of IT-based library information systems. For example, research on creating a desktop-based library system for junior high schools (Gufron Siregar & Sulastri, 2024) and research on creating a mobile-based library system to facilitate user access (Alifah Rahmawati & Bachtiar, 2018)

In addition, research on the use of web-based library systems in universities shows that more efficient services and more accurate data are available (Rosiana et al., 2024). However, most studies have not met the specific needs of users at the high school level, especially in terms of direct involvement of students and teachers as primary users, as well as the integration of the system into school management practices.

One of the community service activities is the development of a web-based library management system that is tailored to the needs and operations of SMA Negeri 13 Surabaya. The system not only performs basic tasks such as borrowing and returning books, but also has statistical reports, borrowing notifications, and a user-friendly interface for teachers and students. In addition, this system uses the idea of PUSGALAS (Pusat Galeri Literasi SMA Negeri 13 Surabaya) as the school's digital literacy identity that has not been found in previous studies.

The purpose of the community service activity is to create and implement a web-based library management system that can be adjusted to the needs of SMA Negeri 13 Surabaya. Evaluate how effective the system is in improving library management and providing better services to students and teachers (Rosiana et al., 2024). Provide scientific contributions to the process of developing educational information systems in high schools.

Figure 2 shows the initial website of SMA Negeri 13 Surabaya. The web-based library application offers various features, including online book search, book borrowing and return management, library statistical report provision, and notification of overdue book returns (Gordon Tanu et al., 2024). This approach is expected to make library management more efficient, reduce administrative errors, and improve user services.

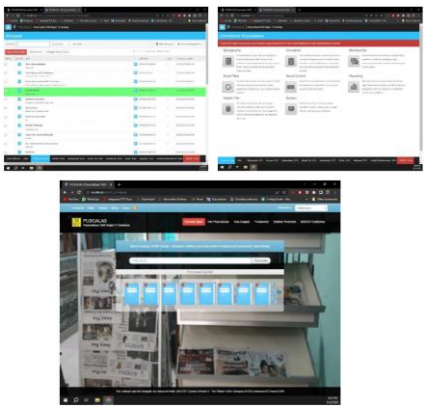

Figure 2. Initial view of the library website

Figure 2 shows the interface of the PUSGALAS (Literacy Gallery Center) system of SMA Negeri 13 Surabaya which is divided into 3 parts, namely Backend View, Module Management View, and Front-End View. The Backend or Admin view displays the dashboard used by the library manager or admin (Apriyanto & Berlian, 2018). The book list is displayed in a table with search and quick action features, which makes it easy to manage collection data. In addition, admins can view the book collection list and manage information about books, such as title, author, and publisher.

The Module Management View is part of a documentation or content management system. Several features, such as news management, announcements, categories, and literacy archives appear to be arranged modularly, allowing administrators to customize the content that will be displayed on the system's front page (Luvita Ningsih et al., 2024).

The Front-End view shows the main page of PUSGALAS or user interface. The front-end view highlights the visualization of the digital literacy shelf, where users can view the collection of books and content available online (Alfarabi & Budi Wintoro, 2025). The front-end view is easy to use and attractive to students and teachers (Widjaya et al., 2024).

IMPLEMENTATION METHOD

The community service implementation method uses the Waterfall Model approach in system development (Putra Yudha & Sinatra, 2017). The following are the stages in the community service implementation method, namely:

1. Data Collection
   There are several stages in data collection, namely:
   a. Direct observation of conventional cooperative management processes.
   b. Interviews are specifically for library managers and users.
   c. Documentation, such as book borrowing logs and library archives.
   d. The evaluation questionnaire was designed to measure the level of user satisfaction with the system created.
2. Subject and Location of Community Service
   Community service activities were carried out at SMA Negeri 13 Surabaya. The subjects involved in data collection and system testing were:
   a. Library officer.

b. Teachers serve as users and validators of content.
c. Students as end users.

3. Needs Analysis *(Requirement Analysis)*
   At the needs analysis stage, data was collected through direct observation at the Library of SMA Negeri 13 Surabaya and interviews with library staff, teachers, and students who use the system.
4. System Design *(System Design)*
   System design is done based on the results of the needs analysis. Including system architecture design, database design with ERD, and user interface (UI/UX) design for admins and general users.
5. Implementation *(Coding)*
   The implementation phase includes creating web-based applications using the PHP programming language and Laravel framework, as well as the MySQL database management system.
6. System Testing *(Testing)*
   System testing is carried out after implementation using the black box testing method to ensure that all functions run as needed (Zen et al., 2024). *User Acceptance Testing* (UAT) is carried out together with library staff and user representatives to test the functionality and convenience of the system (Yundari et al., 2017).
7. Evaluation and Maintenance
   System documentation is prepared to facilitate future maintenance and test results and user feedback are used as a basis for system improvements and enhancements.

RESULTS AND DISCUSSION

PUSGALAS is a web-based application that helps people manage school libraries more easily. Some of the main features of the PUSGALAS system are book search, online book borrowing and returning, due date notifications, and statistical reports (Sukmawan et al., 2021). The following are the results of the system development and implementation process:

1. Book Search
   Users can search for books through a responsive search interface by title, author, or category. The search results display all information about the book, including its availability status. Figure 3 shows the book search feature.

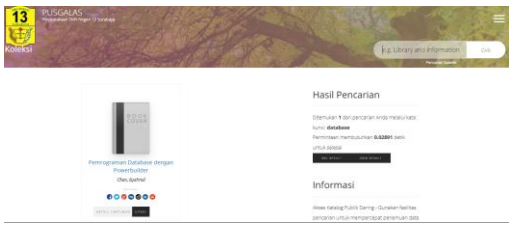

Figure 3. Book Search Feature

2. Borrowing and Returning Books
   The borrowing and returning process is done digitally through automatic system recording. The system also notifies users of the return deadline. Figure 4 shows the book borrowing and returning feature.

Figure 4. Book Borrowing and Returning Features

3. Library Member Control
   The administrator is responsible for library data management, which includes registering students and teachers as new users. Figure 5 shows the member control feature.

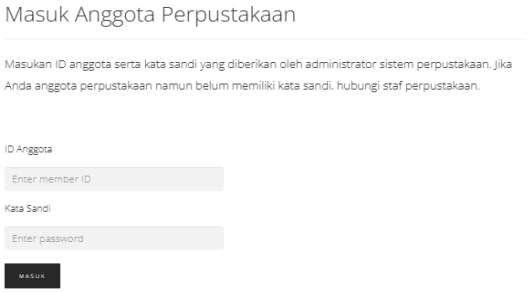

Figure 5. Library Member Control

4. Statistics Report
   The system provides statistical reports on the number of borrowings, returns, frequently borrowed books, and active members. These reports are presented in

the form of tables and graphs for easy analysis.

5. Due Date Notice
   Members receive automatic notification via email when the book return deadline approaches.
6. System Testing
   The test results of this system show that it operates well and meets user requirements. Here are the test results:
   a. *Unit Testing*
      Each feature is independently tested to ensure that the functionality works properly. For example, the book search feature displays accurate results based on the keywords entered.
   b. *Integration Testing*
      Shows that the system workflow such as searching for books to borrowing runs smoothly.
   c. *User Acceptance Testing* (UAT)
      Users, including students, teachers, and library staff, had the opportunity to try out the app. The results were as follows:
      a) 90% of people responded that they found the app easy to use.
      b) 95% of people find the due date notification feature very helpful.
      c) 75% of people find the system interface attractive and informative.

CONCLUSION

In SMA Negeri 13 Surabaya, a structured software engineering approach has been used to implement community service activities in creating a web-based library management system PUSGALAS. The results of the needs analysis, system design, implementation, and functional and user testing can be used to conclude the following:

1. The PUSGALAS system, a web-based library management platform, has the ability to digitize book collections, borrowing and returning transactions, user administration, and integrated data reporting in real-time.
2. The user interface created for two types of users—administration and general—was deemed effective, easy to use, and appropriate to the needs of school libraries. Improving digital literacy in schools can be supported by features such as digital shelf visualization, collection search, and return notifications.
3. The test results showed that the system met the specifications with a high success rate in the main functions. Users, including students, teachers, and librarians, were very satisfied with the ease of use of the system and its benefits.
4. The PUSGALAS system helps create more sophisticated, clear and effective library services by overcoming various problems that have occurred in manual systems, such as recording errors, late reporting and limited access to collection information.

Thus, the PUSGALAS system is not only an innovation in educational information technology. In addition, it is an important strategy to build a sustainable digital literacy culture at SMA Negeri 13 Surabaya.

SUGGESTION

Based on the results of the development and implementation of the PUSGALAS system, several recommendations for further development are possible which are beneficial for interested parties, such as:

1. Additional Feature Development
   The system can be improved by adding barcode scanning features, auto reminders via email or WhatsApp, and book review and rating features to increase user interaction with library collections.
2. Data Security Enhancement
   To prevent data loss due to damage or cyber-attacks, it is necessary to improve system security elements, such as implementing data encryption, dual authentication (or two-factor authentication), and regular backups.
3. Training and Socialization of System Use
   To ensure the system can be used optimally and sustainably, library staff must be trained regularly and socialized to students and teachers.
4. Mobile Application Development
   Creating a mobile application version (Android/iOS) can be a strategic solution to make digital libraries more accessible anytime and anywhere.

5. Periodic Evaluation of System Performance
   It is recommended to conduct periodic evaluations of system performance and user satisfaction to plan continuous improvements and enhancements to system quality.

ACKNOWLEDGEMENT

The author would like to thank LPPM Telkom University for deciding to conduct community service activities at SMA Negeri 13 Surabaya. The author would also like to thank the Principal of SMA Negeri 13 Surabaya and the Head of the Library for giving permission to conduct the activity.

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