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Web-Based Student Attendance Information System Design At Sdn 050600 Kuala Using The Waterfall Method

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Abstract

This study aims to design and implement a web-based student attendance information system for SDN 050600 Kuala using the Waterfall software development method. The research was motivated by the school's use of paper-based attendance records, which made attendance data vulnerable to loss or damage and required teachers to compile monthly reports manually. Data collection and requirements analysis were conducted through observation, interviews, and document review to understand the existing attendance procedures and user needs. The system was designed for three user roles: administrators, teachers, and students or parents. Its main functions include managing student and teacher records, recording daily attendance, storing attendance data in a centralized database, presenting attendance recapitulations, and allowing students or parents to view attendance information. The system was implemented as a web application and configured to operate locally using a server environment such as XAMPP, so an internet connection is not required for local use. The implementation demonstrates that the system can support more structured attendance recording and reporting. It also provides a centralized way to retrieve attendance records and improves access to attendance information for school stakeholders.

Keywords: Student Attendance, Information System, Web Application, Waterfall Method

INTRODUCTION

Information systems support the collection, processing, storage, and presentation of data so that organizational activities can be carried out in a more orderly and informed manner. In educational institutions, these functions are relevant to routine administration, including student attendance, because attendance records must be recorded consistently, retrieved when needed, and summarized for reporting. Web-based attendance applications can provide a structured way to manage such records and improve access to attendance information (Yuliana et al., 2022; Sutiyono & Naf'ana, 2021). Nevertheless, the availability of digital administrative tools differs across schools, and some institutions continue to depend on paper-based procedures (Aizah & Santoso, 2024).

At SDN 050600 Kuala, teachers recorded student attendance in daily paper registers and prepared recapitulations manually. This process required attendance statuses to be counted and transferred into reports, which could consume time and make historical records harder to locate. Paper documents could also be misplaced or damaged, while the school had no centralized digital record through which authorized users could conveniently review attendance information. These local conditions established the practical need for an application that could organize attendance data, support report preparation, and provide a clearer way for students or parents to view attendance information.

In this study, a student attendance information system is understood as an application that manages attendance-related data through connected functions for data entry, storage, retrieval, and reporting. Its value depends not only on recording presence or absence, but also on whether the stored information can be managed consistently by the school personnel who need it. Previous studies have explored different ways of addressing this need. Sutiyono and Naf'ana (2021) discussed the analysis and design of a student attendance information system, while Pradana et al. (2021) examined a website-based attendance system using automatically generated QR codes. Other studies have incorporated communication features,

such as WhatsApp Gateway, to support attendance-related information sharing (Nababan et al., 2022; Aizah & Santoso, 2024). Together, these studies show that attendance systems can be designed with different technologies and supporting features according to the context of use.

Although these studies provide relevant precedents, the design of an attendance application must still respond to the actual procedures, available infrastructure, and user roles of the school where it will be implemented. The present research focuses on SDN 050600 Kuala and on the core administrative requirements identified there, rather than on QR-code attendance or automated messaging as its principal contribution. The proposed application separates access according to three user roles: administrators manage master data and reports, teachers record attendance, and students or parents view attendance information. The system is also configured to operate in a local environment, reflecting the implementation conditions described in the thesis.

The Waterfall method was selected as the software development approach because it organizes development into sequential stages, including requirements analysis, system design, implementation, testing, and maintenance planning. This structure provides a clear progression from identifying school needs to implementing the functions specified for the application. Accordingly, this study aims to design and implement a web-based student attendance information system for SDN 050600 Kuala using the Waterfall method. The intended contribution is a locally appropriate system that centralizes attendance records and supports more structured attendance entry, recapitulation, and access to information.

RESEARCH METHODS

This study used a system development approach based on the Waterfall method. The research began with identification of the attendance administration problems and a review of relevant literature. Data about the existing procedures and user needs were gathered through observation, interviews with relevant school personnel, and document review. These activities informed the requirements analysis and system design.

The development process followed sequential stages: requirements analysis, system design, implementation, testing, and maintenance planning. The design covered the application interface, database structure, and data-flow representations. The application was developed using web technologies identified in the thesis, including PHP and a MySQL-compatible database, with XAMPP used as a local development environment. The system was designed for three user roles: administrator, teacher, and student/parent. The administrator manages master data, including student, teacher, class, and related academic records; teachers record student attendance and access recapitulations; and students or parents view attendance information through their accounts.



Figure 1. Waterfall software development stages

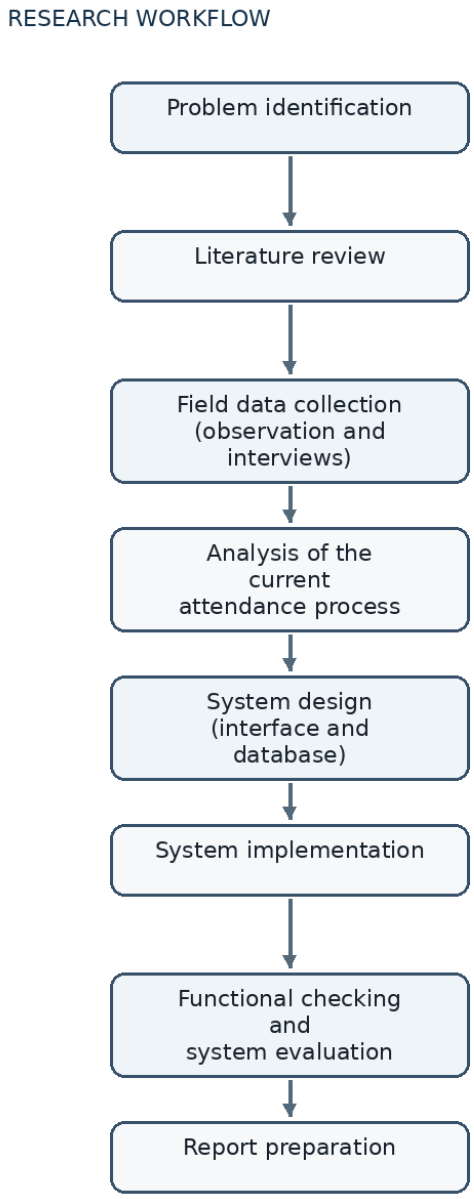


Figure 2. Research workflow

System verification was described through examination of the implemented application pages and core functions, including login, master-data management, teaching schedules, attendance input, attendance recapitulation, and student attendance views. The thesis documents the implementation and interface flow; it does not provide a numerical test score or a quantified success rate. Accordingly, this article reports the functional capabilities described in the source document without assigning unsupported performance statistics.

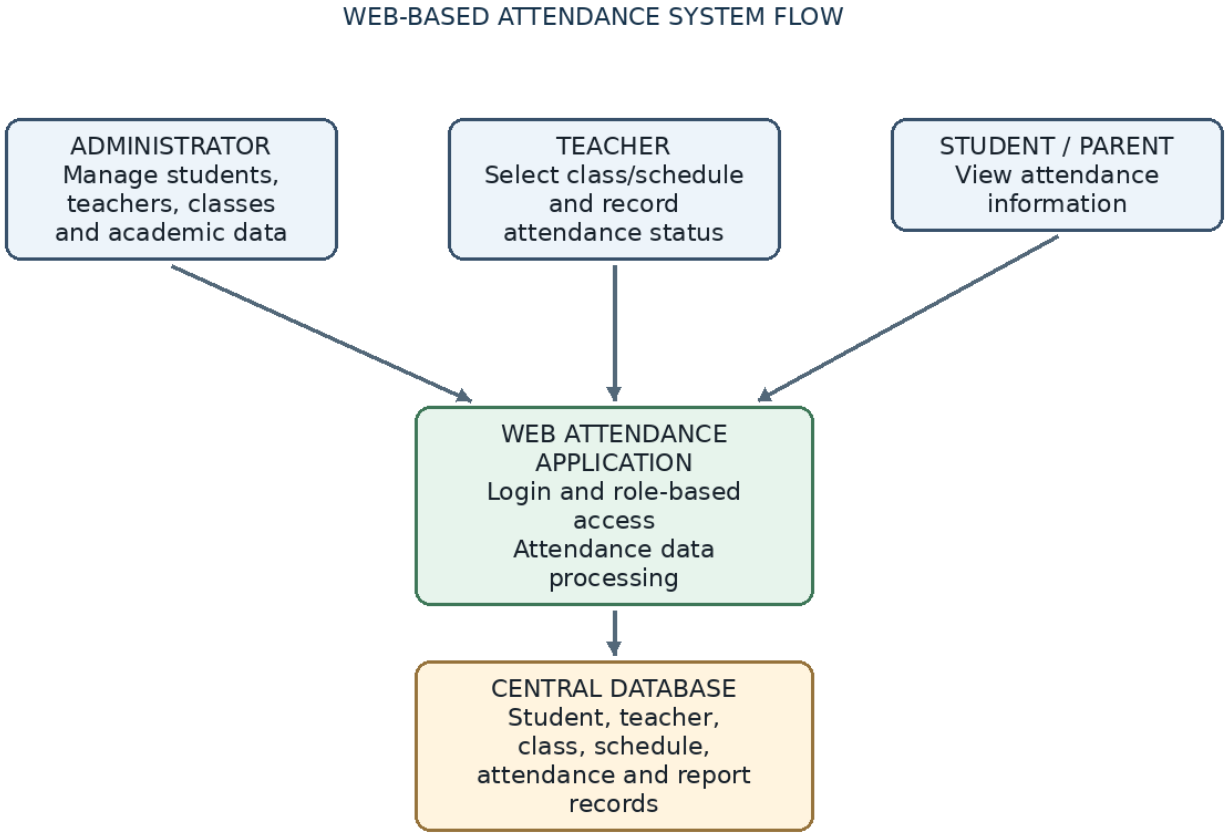


Figure 3. Functional flow of the proposed attendance system

RESULTS AND DISCUSSION

The developed application provides a web-based interface for managing attendance data at SDN 050600 Kuala. Unlike the previous process, in which daily attendance was recorded in physical books and summarized manually, the proposed system stores attendance records in a database. This provides a centralized location for retrieving and organizing records and supports more consistent attendance administration.

The application supports three user roles. Administrators manage school master data and attendance reports. Teachers select the relevant class and teaching schedule, record each student's attendance status, and access attendance recapitulations. Students or parents can log in to view attendance information associated with the student. The principal functions described in the thesis are summarized in Table 1.

Table 1. User roles and core system functions

User role	Main functions	Expected contribution
Administrator	Manage student, teacher, class, and related school data; prepare attendance reports.	Centralized data management and easier report preparation.
Teacher	Record daily attendance and view attendance recapitulations by class or period.	More structured attendance entry and retrieval.
Student/parent	Log in and view recorded attendance information.	More direct access to attendance information.

The implementation includes login pages, administrator and teacher dashboards, master-data pages, teaching-schedule pages, attendance-entry forms, and attendance reports by month or semester. The documented interface flow indicates that access and functions

are organized according to the user's role. The system can also display attendance recapitulations for reporting purposes. These functions address the main issues identified in the initial process: manual recording, time-consuming monthly recapitulation, and the difficulty of accessing attendance records when requested.

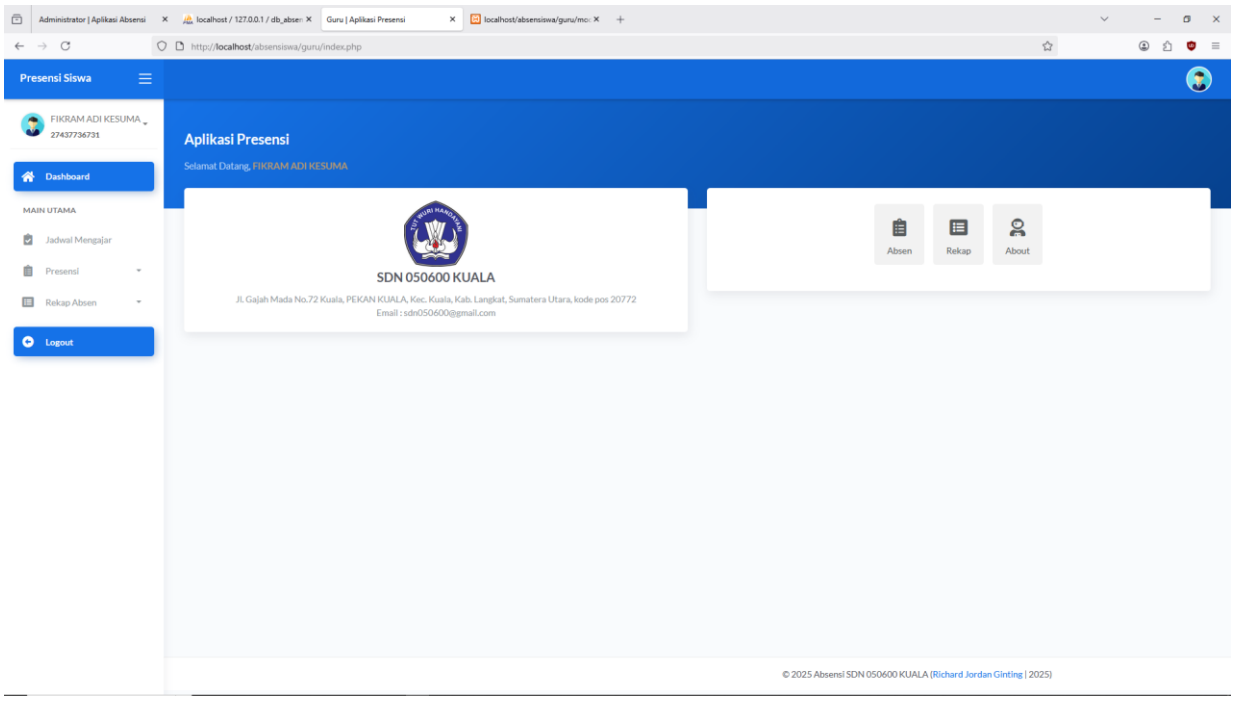


Figure 4. Administrator dashboard interface

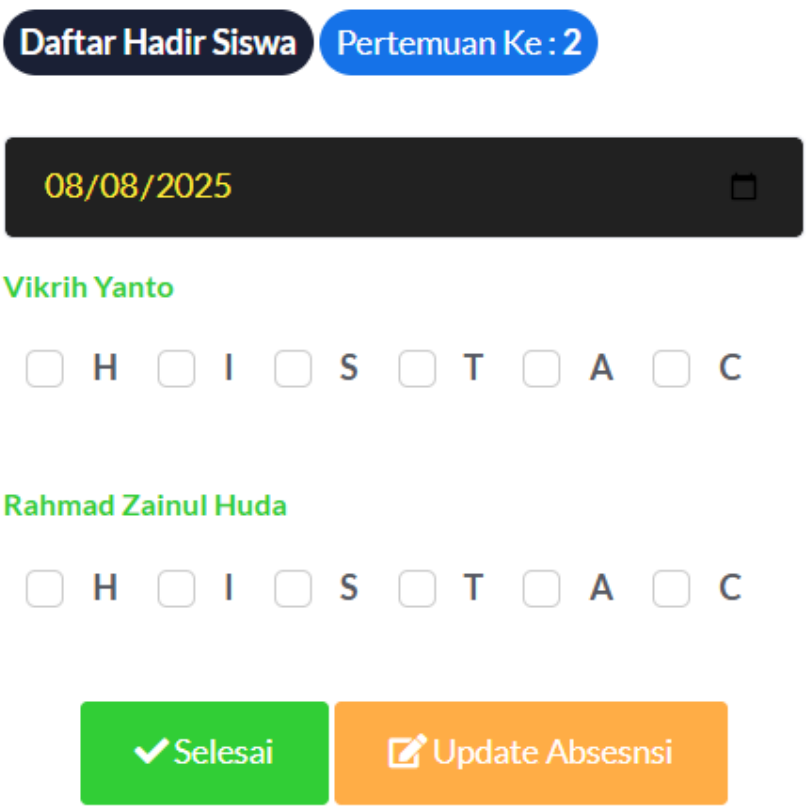
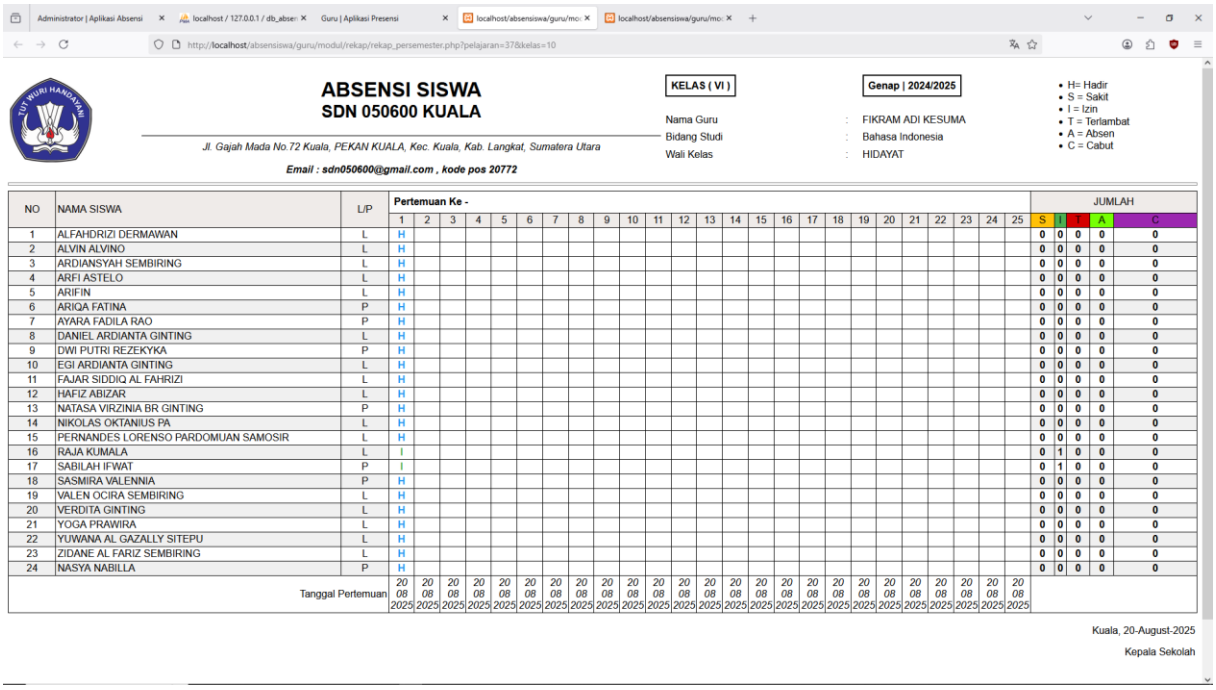


Figure 5. Teacher attendance-entry interface



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Genap | 2024/2025

- H= Hadir
- S = Sakit
- I = Izin
- T = Terlambat
- A = Absen
- C = Cabut

NO	NAMA SISWA	L/P	Pertemuan Ke - 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	JUMLAH S	I	T	A	C
1	ALFAHDRIZI DERMAWAN	L	H																									0	0	0	0	0
2	ALVIN ALVINO	L	H																									0	0	0	0	0
3	ARDIANSYAH SEMBIRING	L	H																									0	0	0	0	0
4	ARFI ASTELO	L	H																									0	0	0	0	0
5	ARIFIN	L	H																									0	0	0	0	0
6	ARIQA FATINA	P	H																									0	0	0	0	0
7	AYARA FADILA RAO	P	H																									0	0	0	0	0
8	DANIEL ARDIANTA GINTING	L	H																									0	0	0	0	0
9	DWI PUTRI REZEKYKA	P	H																									0	0	0	0	0
10	EGI ARDIANTA GINTING	L	H																									0	0	0	0	0
11	FAJAR SIDDIQ AL FAHRIZI	L	H																									0	0	0	0	0
12	HAFIZ ABIZAR	L	H																									0	0	0	0	0
13	NATASA VIRZINIA BR GINTING	P	H																									0	0	0	0	0
14	NIKOLAS OKTANIUS PA	L	H																									0	0	0	0	0
15	PERNANDES LORENSO PARDOMUAN SAMOSIR	L	H																									0	0	0	0	0
16	RAJA KUMALA	L	I																									0	1	0	0	0
17	SABILAH IFWAT	P	I																									0	1	0	0	0
18	SASMIRA VALENNIA	P	H																									0	0	0	0	0
19	VALEN OCIRA SEMBIRING	L	H																									0	0	0	0	0
20	VERDITA GINTING	L	H																									0	0	0	0	0
21	YOGA PRAWIRA	L	H																									0	0	0	0	0
22	YUWANA AL GAZALLY SITEPU	L	H																									0	0	0	0	0
23	ZIDANE AL FARIZ SEMBIRING	L	H																									0	0	0	0	0
24	NASYA NABILLA	P	H																									0	0	0	0	0
	Tanggal Pertemuan		20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025	20 08 2025					

Kuala, 20-August-2025
Kepala Sekolah

Figure 6. Attendance report interface

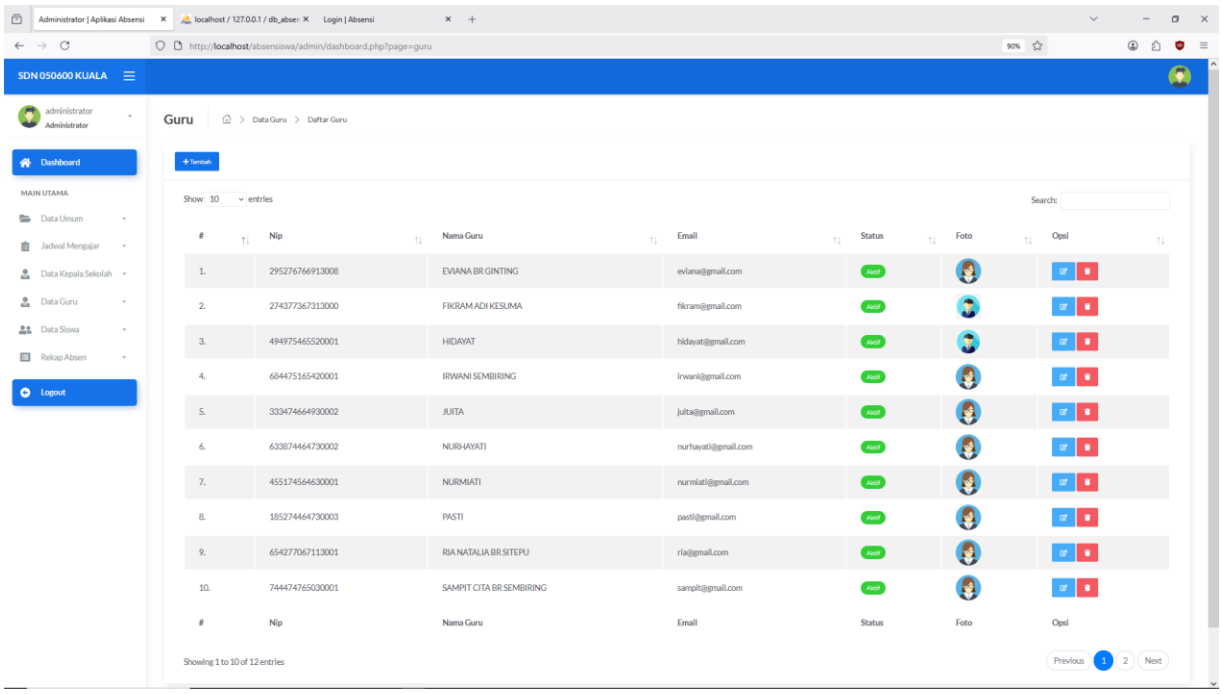


Figure 7. Attendance data management interface

The system is configured to operate locally through a server environment such as XAMPP and can be accessed using a browser on the local setup. This arrangement supports use without an internet connection in the local environment, as described in the thesis. However, local operation also means that access from outside the school's local environment is not available unless the system is subsequently deployed or configured for network access. The thesis recommends online deployment as a future improvement, together with

automated notifications through SMS or WhatsApp and possible integration with other school academic functions.

These findings are consistent with the broader purpose of web-based attendance systems: organizing attendance records and making them easier to manage and retrieve (Nababan et al., 2022; Sutiyono & Naf'ana, 2021). The specific contribution of this implementation is its alignment with the administrative workflow and user roles described for SDN 050600 Kuala. Nevertheless, the source thesis does not report quantitative measurements of time savings, error reduction, or formal usability scores. The benefits discussed here should therefore be interpreted as functional contributions of the implemented system rather than statistically measured improvements.

CONCLUSION

This study designed and implemented a web-based student attendance information system for SDN 050600 Kuala using the Waterfall method. The application supports administrator management of school data and reports, teacher entry of daily attendance, centralized storage of attendance records, and student or parent access to attendance information. These functions provide an organized alternative to paper-based attendance recording and manual recapitulation. The system is configured for local operation, so its current deployment does not require internet access. Further development may include online access, automated notifications to parents, interface improvements, user training, and integration with other school information systems. Since the thesis does not report quantified testing metrics, future evaluation should include structured functional testing and user feedback to measure system reliability and usability.

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