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DESIGNING A WEB-BASED STUDENT ATTENDANCE MONITORING SYSTEM FOR PARENT INFORMATION USING BLACK BOX TESTING

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Abstract

Student attendance management that is still carried out manually has the potential to cause recording errors, delays in information delivery, and suboptimal attendance monitoring by parents. Although many web-based attendance systems have been developed, some studies still focus on attendance recording and have not integrated the delivery of information to parents in real-time accompanied by an evaluation of the functionality and ease of use of the system. This research aims to design a web-based student attendance monitoring system as an information medium for parents at SMPN 2 Saronggi. The system was developed using the Laravel framework and MySQL database. The test was conducted using the Black Box Testing method on 46 test scenarios to test the functionality of the system as well as the System Usability Scale (SUS) involving 83 respondents, consisting of 28 teachers and 55 students, to measure the level of ease of use. The results showed that all system functions ran as needed with a 100% success rate, while the SUS test obtained an average score of 96.02 which indicates that the system has an excellent level of ease of use. Based on these results, the system was declared feasible to be implemented to support more effective student attendance management and accelerate the delivery of information to parents.

INTRODUCTION

The development of information technology has had a significant impact on various fields, including education. One of the important aspects in the implementation of education is the management of student attendance because the level of attendance reflects the discipline, participation, and involvement of students in the learning process. Good attendance data management also supports schools in evaluating and delivering information to related parties, especially parents. However, in some schools, the

attendance recording process is still carried out manually using an attendance book, which has the potential to cause recording errors, delays in data recapitulation, risk of data loss, and slow delivery of information to parents. This problem was also found at SMPN 2 Saronggi, where the attendance process was still carried out conventionally so that student attendance information could not be monitored quickly and integrated.

Various studies have developed web-based attendance systems to improve the effectiveness of student attendance management. Research by (Djama et al., 2024) It shows that web-based attendance systems are able to improve the efficiency of data management compared to manual methods. Furthermore, (Stuart & Nerisafitri, 2025) implement the Black Box Testing method to ensure that all system functions run according to the user's needs. Meanwhile, (Tanjung et al., 2023) develop an attendance system that utilizes WhatsApp notifications as a medium for conveying attendance information to parents. However, these studies still have limitations because they have not integrated attendance management, real-time monitoring to parents, and evaluation of the functionality and ease of use of the system in one integrated system.

Based on these conditions, this study designed a web-based student attendance monitoring system as an information medium for parents. The system was developed using the Laravel framework and MySQL database to support integrated attendance data management and information delivery through WhatsApp and email notifications. The performance of the system was evaluated using the Black Box Testing method, while the level of ease of use was measured using the System Usability Scale (SUS).

This research aims to produce a web-based student attendance monitoring system that is able to increase the effectiveness of attendance data management, accelerate the delivery of information to parents, and provide a system that has good functionality and ease of use based on test results.

LITERATURE REVIEW

Research on the student attendance monitoring system has been carried out as an effort to increase the effectiveness of attendance management in the school environment. According to (Djama et al., 2024), the implementation of a web-based attendance system is able to increase the efficiency of attendance data management compared to manual methods. The research also shows that digitizing the attendance process can make it easier to present information to schools faster and more accurately.

The development of an attendance system has also been combined with communication technology to increase parental involvement. (Rahi et al., 2024) designed a web-based attendance system that is integrated with WhatsApp Gateway, so that student absence information can be received by parents in real-time. Meanwhile, (Praditiya & Simatupang, 2025) develop a web-based attendance application equipped with parental monitoring features and conduct evaluations using Black Box Testing and System Usability Scale (SUS). The results of the study show that the system has good functionality and is easy to use by users.

Conceptually, the student attendance monitoring system is an information system that supports the process of recording, storing, and delivering attendance information in a computerized manner so that it is easier for schools and parents to monitor (Yoki Firmansyah, Reza Maulana, 2021) (Kurniawan et al., 2022). In this study, the system was developed using the Laravel framework which applies the Model-View-Controller (MVC) architecture to support the web application development process in a more

structured manner (Leviathan, 2024).

To ensure system quality, this study uses Black Box Testing, which is a testing method that evaluates the suitability of system functions based on inputs and outputs without paying attention to the program code structure (Habibah Nurfauziah, 2022). In addition, the level of usability of the system was evaluated using the System Usability Scale (SUS) which is a method of measuring usability through ten statements on a Likert scale resulting in a score in the range of 0–100 (Mulyodiputro et al., 2023) (PrayudaRaditya, 2024).

Based on these various studies, it can be found that the web-based attendance system has been able to increase the effectiveness of student attendance management. However, there are still limitations in integrating attendance data management, real-time delivery of information to parents, and system evaluation that combines functionality and usability testing in one study. Therefore, this study designed a web-based student attendance monitoring system that is equipped with notifications to parents and evaluated using Black Box Testing and System Usability Scale (SUS).

RESEARCH METHODS

This research uses the Waterfall development method which consists of the stages of problem identification, data collection, needs analysis, system design, implementation, testing, and evaluation. This method was chosen because it has systematic stages so that the system development process can be carried out in a structured manner according to user needs. The object of the research is SMPN 2 Saronggi with a focus on designing a web-based student attendance monitoring system as an information medium for parents. The research framework used in the system development process is shown in Figure 1.

Image 1. Research Framework

Source: Researcher documentation (2026)

Data collection was carried out through observation, interviews, questionnaires, and literature studies. Observations were carried out by observing the process of managing student attendance at SMPN 2 Saronggi, while interviews were conducted with the school to obtain information about the needs of the system. A questionnaire was given to 83 respondents consisting of 28 teachers and 55 parents to measure the level of ease of use of the system after implementation. Literature studies are used as a theoretical foundation in the process of designing and developing systems. Based on the results of the needs analysis, a web-based student attendance monitoring system was developed that allows administrators to manage master data, teachers record attendance, and send

attendance notifications to parents via WhatsApp and email. The system workflow is shown in Figure 2.

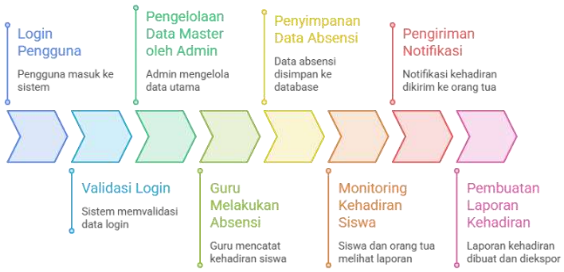

Image 2. Student Attendance Monitoring System Workflow

Source: Researcher documentation (2026)

The system testing was carried out using the Black Box Testing and System Usability Scale (SUS) methods. Black Box Testing is used to test the functionality of each system feature based on a predefined test scenario regardless of the program's code structure. Furthermore, the level of ease of use of the system was evaluated using the System Usability Scale (SUS) method through a questionnaire consisting of ten statements with a five-level Likert scale.

The System Usability Scale (SUS) statement instrument used in this study is presented in Table 1.

Table 1. System Usability Scale (SUS) Statement Instrument

Yes	Statement	Score
P1	I feel that the student attendance monitoring system is easy to use.	1-5
P2	I feel that this system is too complicated to use.	1-5
P3	I was able to understand the menus and features available on the system easily.	1-5
P4	I need someone else's help to use this system.	1-5
P5	The features available on the system run according to the needs of the user.	1-5
P6	I feel like there are parts of the system that are confusing when used.	1-5
P7	I feel like other users will be able to learn how to use this system quickly.	1-5
P8	I felt that the process of using this system was too difficult and required many steps.	1-5
P9	I feel confident when using this system.	1-5
P10	I need to get used to it before I can use the system properly.	1-5

Source: Data Processed by researchers (2026)

The answer choices for each statement use the five-level Likert scale as presented in Table 2.

Table 2. Rating Scale

Code	Answer Options	Shoes
STS	Strongly Disagree	1
TS	Disagree	2
N	Neutral	3
S	Setuju	4
SS	Strongly agree	5

Source: Data Processed by researchers (2026)

Each respondent's score was calculated based on the provisions of the SUS method, then converted into a value range of 0–100. The average score of all respondents was calculated using the following Equation (1).

$$\bar{x} = \frac{\sum x}{n} \quad (1)$$

Description:

$\bar{x}$ = SUS Average Score

$\sum x$ = Total SUS Scores of All Respondents

n = Number of Respondents

The results of the calculation are used to determine the level of ease of use and user acceptance of the developed system.

RESULTS AND DISCUSSION

Based on the stages of research that have been carried out, a Web-Based Student Attendance Monitoring System has been successfully developed which is able to support the integrated management of attendance data at SMPN 2 Saronggi. This system provides master data management features, recording student attendance, sending notifications to parents via WhatsApp and email, and presenting attendance reports. To ensure that the system meets the needs of users, tests are carried out using the Black Box Testing and System Usability Scale (SUS) methods. The test aims to evaluate the suitability of system functions and the level of ease of use based on user experience.

Black Box Testing was conducted on 46 test scenarios that included user authentication features, master data management, attendance logging, notification delivery, and report generation. The recapitulation of the test results is shown in Table 3.

Table 3. Pengujian Black Box Testing

No	Testing Aspects	Number of Scenarios	Successful	Success Rate
1	User Authentication	4	4	100%
2	Master Data Management	15	15	100%
3	Attendance Management	12	12	100%
4	Reports and Exports	7	7	100%
5	Notifications & Security	8	8	100%
Total		**46**	**46**	**100%**

Source: Researcher-Processed Data (2026)

The percentage of test success is calculated using Equation (2).

$$Persentase\ Keberhasilan = \frac{Jumlah\ Skenario\ berhasil}{Total\ Skenario\ Uji} \times 100\% \quad (2)$$

$$= \frac{46}{46} \times 100\%$$

$$= 100\%$$

Based on the test results, a success rate of 100% was obtained, which showed that all system functions were running according to the expected results. These results prove that the system is able to carry out every process according to user needs, from the login process to the presentation of attendance reports. These findings are in line with research (Djama et al., 2024) which states that Black Box Testing is effectively used to ensure the suitability of system functions to the specified specifications. In addition, the results of

this study also support the research (Rahi et al., 2024) which shows that functional testing is able to ensure that all features of the web-based system are running properly before being applied to the user. Thus, the student attendance monitoring system developed has met the functional aspect and is suitable for use as a media for attendance management at SMPN 2 Saronggi.

In addition to functional testing, a System Usability Scale (SUS) test is carried out to measure the level of ease of use of the system based on the user experience after using the application. The test involved 83 respondents consisting of 28 teachers and 55 students. The recapitulation of the test results is shown in Table 4.

Table 4. SUS Test Results Recapitulation

Respondent Group	Number of Respondents	SUS Value
Teacher	28	91,96
Students	55	98,09
Overall Average	**83**	**96,02**

Source: Researcher-Processed Data (2026)

The average value of SUS is calculated using Equation (3).

$$\bar{x} = \frac{\sum x}{n} \tag{3}$$

$$\bar{x} = \frac{2575 + 5935}{28 + 55}$$

$$\bar{x} = \frac{7970}{83}$$

$$\bar{x} = 96{,}02$$

Based on the results of the calculation, the average SUS score was 96.02. This value indicates that the system is in the Acceptable category, obtained a Grade A, and is included in the Excellent level. The results show that the system has an excellent level of ease of use so that users can operate all the features without experiencing any significant difficulties. The high usability value indicates that the system interface is easy to understand, the usage process runs efficiently, and the features provided have been in accordance with the user's needs. These findings are in line with research (Praditiya & Simatupang, 2025) which states that the evaluation using the System Usability Scale is able to show the level of user acceptance of the information system effectively. Thus, the system developed not only meets the functional aspect through Black Box Testing, but also has a high level of ease of use so that it is feasible to apply as a media for monitoring student attendance at SMPN 2 Saronggi.

CONCLUSION

Based on the results of the research, the web-based student attendance monitoring system was successfully designed and implemented as needed at SMPN 2 Saronggi. The results of the Black Box Testing test on 46 scenarios obtained a success rate of 100%, while the System Usability Scale (SUS) test resulted in an average score of 96.02 indicating that the system has an excellent level of ease of use and is acceptable to users. The system developed is able to support digital attendance recording, simplify data management, and speed up the delivery of information to parents through WhatsApp and email notifications. The results of this study provide an implication that the implementation of a web-based attendance monitoring system can help schools improve

the efficiency of attendance data management while strengthening communication between schools and parents through real-time information delivery.

This research still has limitations because the system is only implemented in one school and the notification mechanism still depends on third-party services. Therefore, further research is recommended to develop the system in the form of a mobile application, implement a multi-gateway notification mechanism, and add backup and restore features to improve system security and reliability.

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