

## Design and Development of a Web-Based School Portal at SDN 060878 Using the Waterfall Method

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### ABSTRAK

Current technological developments are encouraging the world of education to begin transforming into a digital-based system, which is one way to improve the effectiveness of administrative services and expand access to information in the school environment. The aim of this research is to build a website-based school portal that can be used to help deliver information while supporting academic and administrative activities. The system development process employed a waterfall approach, consisting of five phases: needs identification, system design, system development, implementation, and ongoing maintenance. The data used for this research was obtained through school observations, direct discussions with relevant school officials, and the collection of documentary data through photographs. The development of this school portal, the author hopes that the administration process and information delivery will be faster and well-documented, and can support the school digitalization process for information managers at SD Negeri 060878.

**Kata Kunci:** *Website, System Information, Waterfall Method*

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### INTRODUCTION

The development of information and communication technology has brought changes to various aspects of life, including education. The use of the internet and technology has begun to become part of educational needs, supporting more modern information systems for managing various internal and external activities. One positive impact of the application of technology is the ease of information delivery, where access to information can be accessed at any time by those who need it. [1] The design of a web-based school information system has been proven to improve the quality of administrative, communication, and learning services. However, some schools still lack digital means to convey information to prospective applicants, one of which is SDN 060878. Based on observations, this school does not yet have an official online media to introduce the school to prospective applicants. Furthermore, administrative activities and information delivery at the school are still carried out manually. This condition makes the process of information delivery at the school less effective, as the information shared is not properly stored and is difficult for the wider community to access. Therefore, a system is needed that can assist administrative activities and facilitate the dissemination of school information through digital media.

Referring to the problems found, the researcher will design and build a web-based school portal that not only displays the school profile but also provides separate login features for students and teachers. Through this portal, students can access class and exam schedules, submit assignments online, and participate in discussion forums with teachers. Furthermore, teachers in this portal can have access to assign assignments and grades and manage student attendance online, allowing parents to view student attendance daily by logging into their respective portal accounts.

This research was conducted using the waterfall development method, starting with needs analysis, system design, implementation, testing, and system maintenance. This method is



considered suitable for this research because of its structured and sequential process, which aligns with research conducted by Aprianto [2] in their study of a website-based academic information system for elementary schools.

### **Literature Review**

A school portal is a digital media designed to display all information, making it easier for users to obtain information on one site. According to Dalli et al. [3], a school portal functions as an information center that connects users, including students, teachers, and administrative staff.

A website is a page containing information that can be accessed using the internet [4]. A website has an address known as a URL (Uniform Resource Locator), which is used to indicate the location of a web page, image, or other file [5]. The beginning of a website address often includes www, which stands for World Wide Web. The reason why www was used was, among other things, to identify services and distinguish website content from other servers that may be located on the same domain. Currently, most websites no longer require the "www" at the beginning; simply typing google.com is enough to navigate to the Google page. This is because developers want to simplify addresses to make them easier for users to remember.

When building a website, several technologies are used to create the user interface, including HTML (Hypertext Markup Language), the foundation or framework of the website being visited, and CSS (Cascading Style Sheet), a language responsible for beautifying and styling web pages [6]. CSS can help us determine everything related to the visual appearance, from color choices, fonts, borders, and backgrounds. Meanwhile, JavaScript is a programming language that makes web pages interactive [6]. Without JavaScript, web pages would be just text and images. However, with JavaScript, we can view animations, interactive maps, and even receive data updates without needing to refresh the page.

Besides the display, this website development utilizes back-end technology that manages the system and database. PHP, or Hypertext Preprocessor, is a programming language that works behind the scenes on the server side of the website. Meanwhile, MySQL is a popular database system and falls into the RDBMS (Relational Database Management System) category. MySQL can store data in interconnected tables that can be structured [7], so all collected information is neatly stored in one place.

To ensure the system design meets requirements, this research utilizes UML (Unified Modeling Language) as a visual aid used by developers to design the structure to be created. UML plays a crucial role as the primary means of exchanging ideas and explaining the system blueprint to all team members. Three types of UML diagrams are commonly used: Use Case Diagrams, Sequence Diagrams, and Activity Diagrams [7].

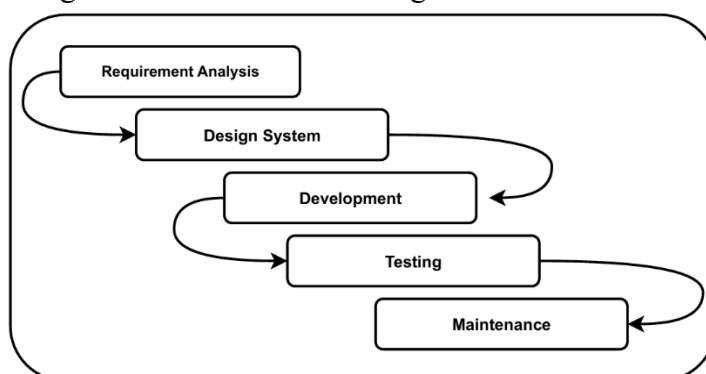
Use Case Diagrams illustrate how users interact with the system [8]. These diagrams are crucial for determining all actions taken by actors and the system, as they provide developers with a clear understanding of the system being designed. [9] Sequence diagrams represent the sequence of interactions between objects within a system. Meanwhile, Activity Diagrams represent the flow of system activities. These diagrams not only explain the processes within an operation but also illustrate more complex usage flows [10].

The Waterfall method, or waterfall model, is a software development method that implements systematic and step-by-step work. This method is particularly suitable for projects with a clear project plan from the outset. The Waterfall method has 5 stages, namely, Requirements Analysis, System Design, Development, Testing and Maintenance [11].



## Method

In the research stages section, several steps have been defined to ensure the research is well-planned. The following is a flowchart of these stages.



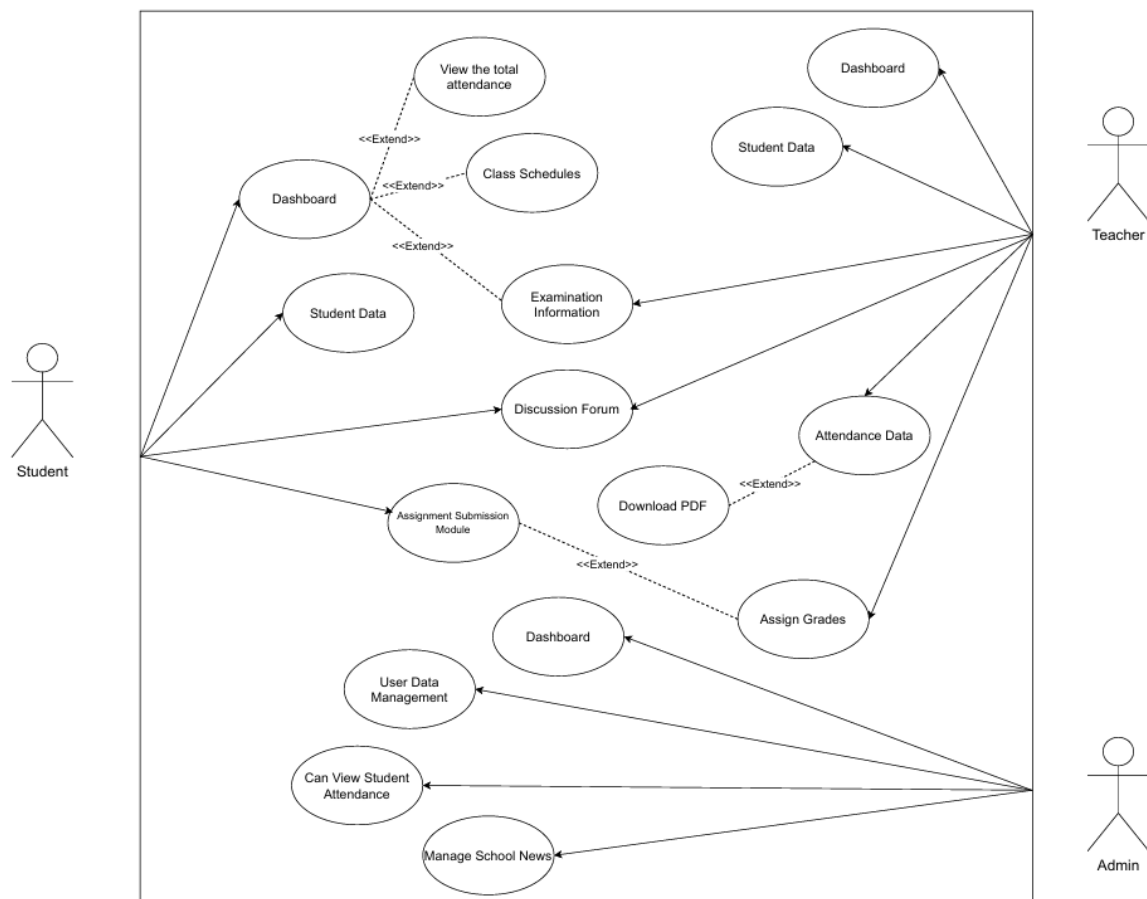
**Figure 1.** Research stages

Based on the research stages above, there is an explanation for each stage, namely:

1. Requirement Analysis: This stage analyzes system requirements through observations and interviews at SDN 060878. Researchers identify various problems faced by the school.
2. Design System: Researchers begin developing a system design according to the school need.
3. Development: After designing the overall system design, researchers begin building the actual system using HTML, CSS, and JavaScript (front-end), and PHP and MySQL for the server-side (back-end).
4. Testing: In this stage, once the entire system has been built, testing begins with the involvement of students, teachers, the principal, and the administration to ensure its ease of use.
5. Maintenance: This stage is the process of maintaining and correcting errors in the system.

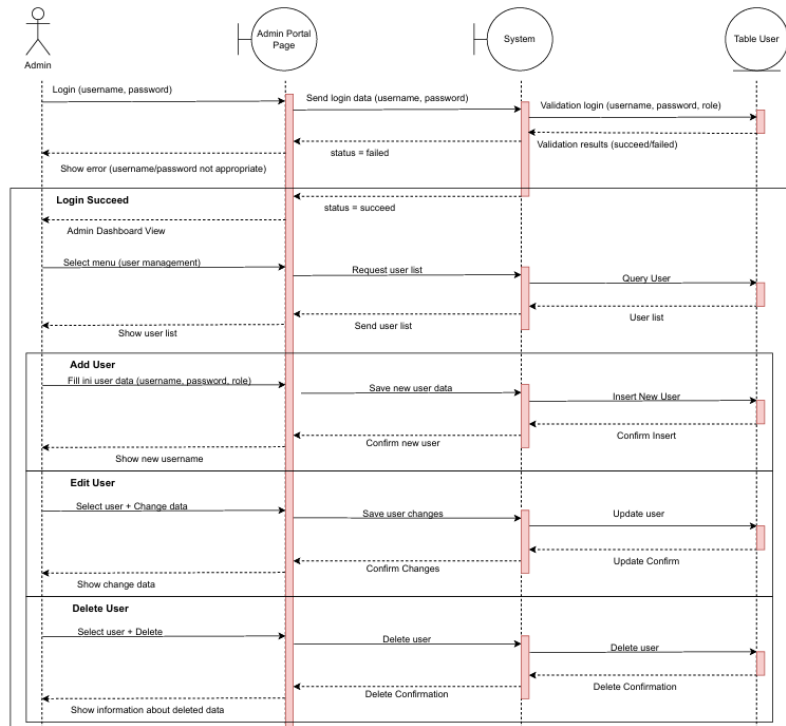
The three data collection methods are:

1. Observation: This helps researchers directly observe system requirements because it allows researchers to see processes that need improvement. Observation also helps researchers directly observe how work processes occur.
2. Interviews: During the observation, several work processes cannot be observed directly. Therefore, interviews allow for direct information from key sources such as teachers and school operators.
3. Documentation: In this research, documentation is necessary for the author because it contains tangible data, such as organizational structure, class schedules, student data, and so on.

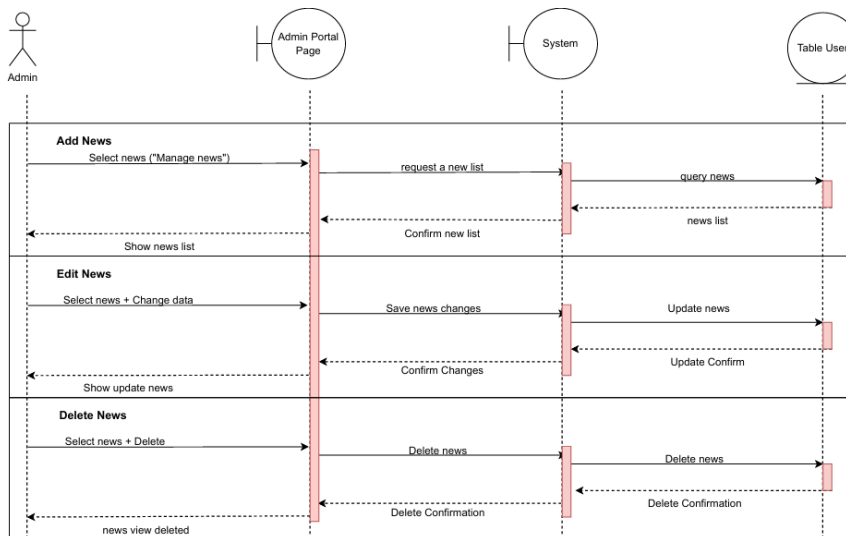


**Figure 2.** Use Case Diagram All User Role

Use case diagram of the web-based school portal designed in this study displays the interaction between three main actors, namely students, teachers and admin.



**Figure 3. Admin Sequence Diagram**



**Figure 4. Sequence Diagram of Admin Managing News**

## RESULTS AND DISCUSSION

After completing the research at the school, it was shown that the implementation of a web-based school portal at SDN 060878 is an effective step in supporting the administration process and disseminating school information. This system makes it easier for teachers to take attendance, assign assignments, and deliver exam information online. For students, the portal facilitates access to data, assignment pockets, and discussion forums. Meanwhile, for administrators, the system helps manage user data and quickly update school news.



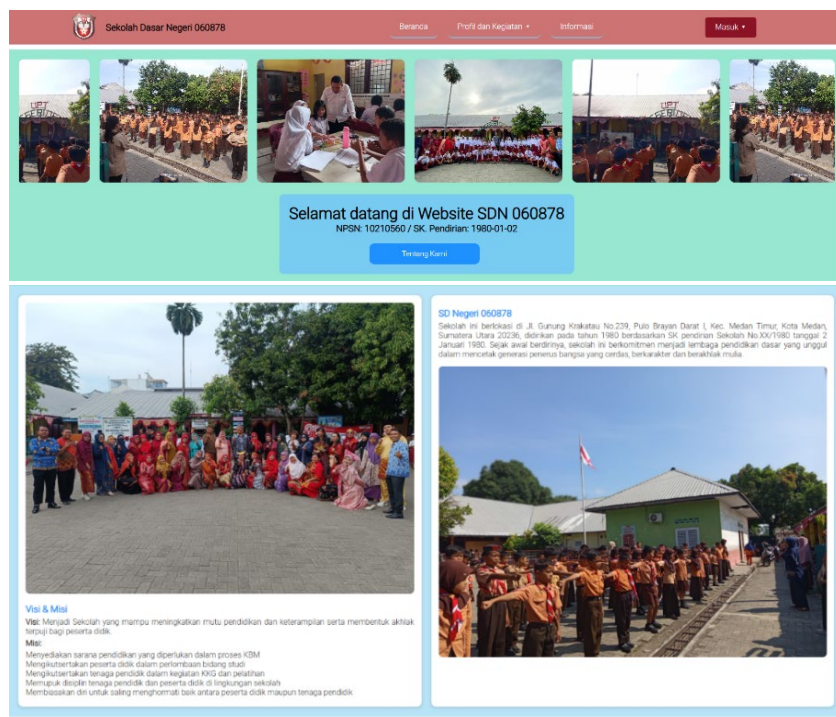


Figure 5. School Profil Display

This display is the school profile that is displayed on the front page before entering the information about the portal. In this section, the school profile contains information about the school so that prospective applicants can see the condition of the school.

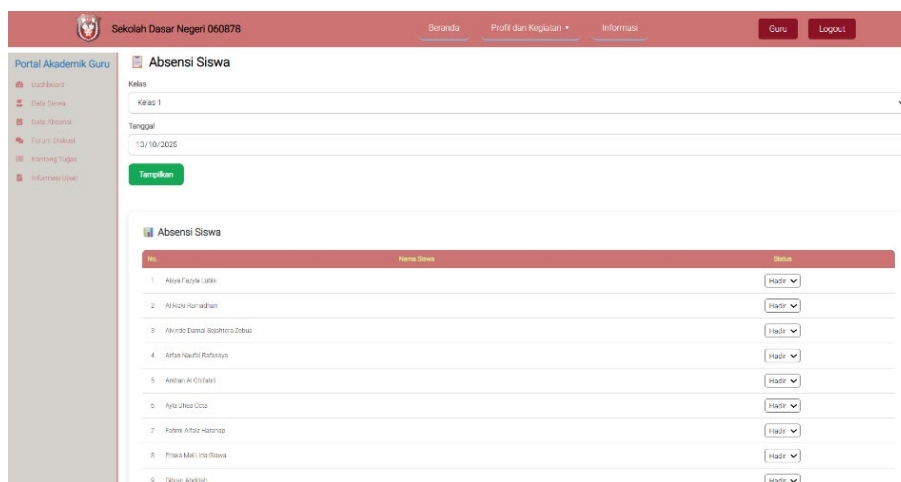
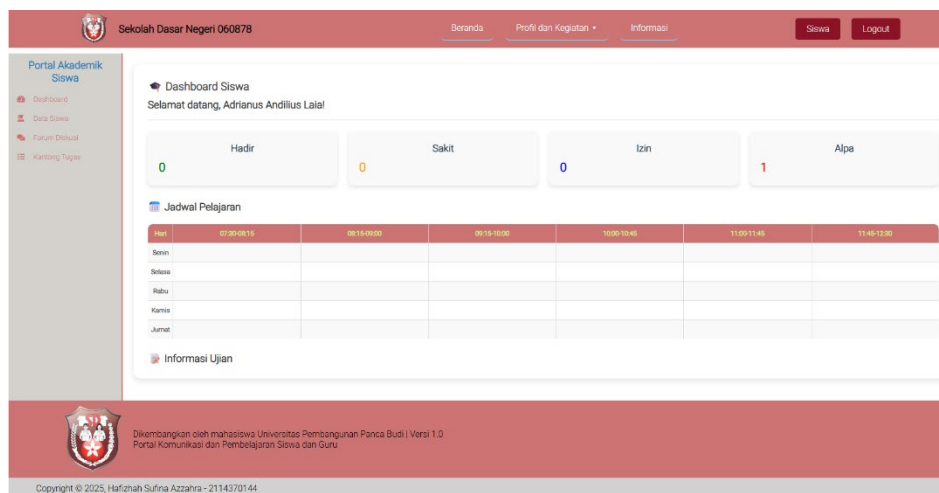


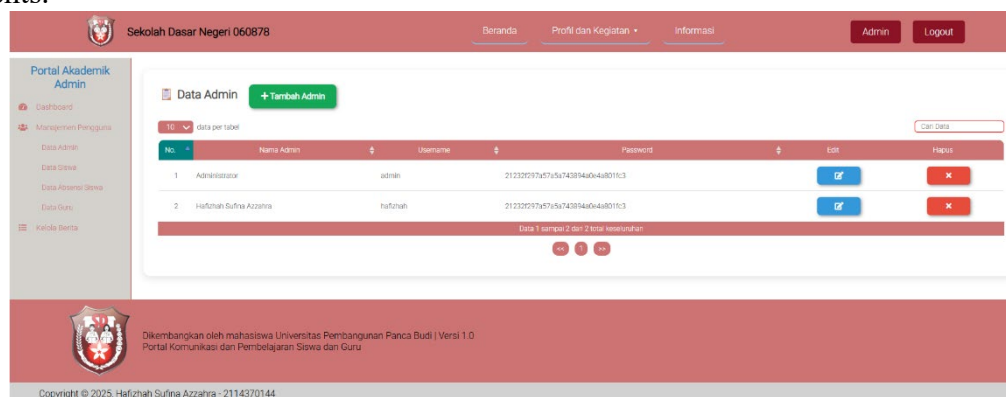
Figure 6. Teacher Portal Display When Taking Attendance

This display is part of the teacher portal when taking attendance for students online and teachers can also view student data according to the class they teach.



**Figure 7.** Student Portal Dashboard Display

This view represents the dashboard of the student portal. Students can view a summary of their attendance, class schedules, and exam schedules. The student portal also includes features such as student data for viewing individual user information, assignment pockets for submitting assignments online, and a discussion forum to connect students and teachers to discuss assignments.



**Figure 8.** Admin Data Management Display

The display above is part of the admin portal, in this feature the admin can change, add and delete admin, student and teacher accounts.

## CONCLUSION

Based on the results obtained from the research entitled "Design and Construction of a Website-Based School Portal at SD Negeri 060878 Using the Waterfall Method," it can be concluded that the design and construction of this school portal were successfully carried out according to user needs. This portal was designed using the waterfall development method and built with HTML, CSS, Java Script, PHP, and MySQL. The implementation results show that the system can support administrative and communication processes within the school environment. Overall, this portal functions well, is easy to use, and is suitable for implementation as an information system at SDN 060878 to support digital-based school activities.

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