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Development of a School Profile Website as a Digital Information Medium Using the Waterfall Method

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Abstract - The development of information technology encourages educational institutions to utilize digital media in delivering information more effectively. However, SMPN 4 Praya Tengah still uses conventional methods in disseminating information, resulting in limited reach and inefficiency. This study aims to design and implement a school profile website as a digital information medium that can be widely accessed by students, parents, and the community. The method in this study uses the Waterfall model, which was selected due to its systematic and structured development stages that are well-suited for projects with clearly defined and stable requirements. The Waterfall model includes the stages of analysis, design, implementation, and testing. This research integrates PHP and JavaScript programming languages with a MySQL database. The resulting system provides comprehensive features ranging from school profile, vision and mission, news, announcements, gallery, to online admission services (PPDB). The website is designed with a simple and user-friendly interface so it can be well managed by the school. Through Black Box Testing, this website has been proven to function optimally in presenting information accurately and in a structured manner. System validation was conducted through two methods: Black Box Testing, which confirmed all features operate according to specifications, and User Acceptance Testing (UAT) involving 50 respondents with 16 evaluation items, yielding an average score of 78.50% (categorized as 'Agree'). These results empirically validate that the implementation of this website provides measurable benefits in improving the effectiveness of information delivery, expanding access, and supporting digital transformation within the school environment. This system is expected not only to facilitate digital transformation in schools but also to serve as a reference for the development of other school websites.

Keywords: design, implementation, web-based, information system, waterfall method.

I. INTRODUCTION

Advances in information technology have brought profound transformation to various aspects of human life, particularly in the Education sector [1]. The implementation of web-based information systems is one form of digital transformation that educational institutions widely apply to optimize the distribution of information effectively and efficiently [2]. An educational institution's website functions as a publication medium that can present important data quickly, widely, and easily accessible to the public [3]. Through the website, information on the school profile, vision and mission, academic and non-academic activities, announcements, and other relevant details can be delivered in an integrated manner to students, parents, and the general public. Managing information through a web-based system also allows for the presentation of data in a systematic and precise manner and supports the dynamic updating of information according to the relevance of user needs [4].

The utilization of websites as a medium for educational information is also considered capable of improving the transparency of educational institutions, as well as the quality of information services to the public [5]. A school website serves as a public communication medium that facilitates interaction between the school and the community [6]. In addition, the website can also be used as a means of promoting educational institutions, documenting school activities, and providing information that can be accessed anytime and from anywhere [7]. Thus, the existence of a school website not only supports the delivery of information more effectively, but also contributes to enhancing the image and public trust in the educational institution [8].

Even so, there are still educational institutions that do not have a website as an official means of information dissemination [9]. One example is SMPN 4 Praya Tengah, which is located in the Praya Tengah District, Central Lombok Regency. Based on the results of observations and initial interviews conducted in January 2026, it was found that the process of delivering information at the school is still carried out conventionally, such as through the school notice board or by putting up banners [10]. The use of this conventional method shows several systemic weaknesses, including limited information dissemination reach, a relatively small capacity of information that can be conveyed, and requiring more time and cost in the delivery process [11]. This condition causes school information to not be conveyed optimally to students, parents, or the general public.

Various previous studies have examined the development of school websites as digital information media [12]. Most previous research tends to focus on developing school websites as a medium for promoting educational institutions or integrating them into a larger framework, such as academic information systems and e-learning [12]. In addition, some studies only focus on the system design stage without continuing to the stage of implementing and thoroughly testing the system [13]. Other research is also widely applied at various levels of

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education, ranging from preschool, primary education, to vocational secondary education, with various methodological approaches, such as Research and Development (R&D) as well as qualitative approaches [13].

Based on a review of previous research, there are still limitations in studies that specifically discuss the design and implementation of school profile websites as an official information medium in public junior high schools with a systematic software development approach [14]. In addition, literature that comprehensively combines the stages of needs analysis up to system testing in a single systematic development process is still relatively limited [15]. Therefore, research is needed that not only focuses on system design, but also directly implements the system so that it can be used by schools as a digital information medium.

In information system development, the selection of software development methods is one of the important factors in producing a system that meets user needs [16]. One of the methods widely used in software development is the Waterfall method [17]. This method has a development stage that is systematic and structured, which includes needs analysis, system design, implementation, and system testing [17]. The Waterfall method is considered suitable for this research compared to other methods, such as Agile or Prototype, because the system requirements have been clearly identified through observation and interviews prior to development, and are not expected to change significantly during the process. Several previous studies have also confirmed that the Waterfall method is effective for developing information systems with well-defined and stable requirements, particularly in educational website development contexts [17][18][19]. In contrast, Agile is more appropriate for projects with frequently changing requirements, while Prototype is better suited when user feedback is needed at early design stages. Since the scope of this system is focused and well-documented, Waterfall provides a more structured and measurable development process [17].

Based on these issues, this study aims to design and implement a school profile website as a digital information medium at SMPN 4 Praya Tengah using the Waterfall method [19]. The developed website is designed to provide various important information about the school, such as the school profile, announcements, event agendas, school news, documentation gallery, and contact information that can be widely accessed by students, parents, and the general public. In addition, the developed system is also designed to be easily managed by the school so that the process of delivering information can be carried out more effectively and sustainably [20].

The main contribution of this research is to produce a school profile website that is structured, easy to manage, and capable of improving the effectiveness of disseminating school information to the community. The system was validated through Black Box Testing to ensure functional correctness, and through User Acceptance Testing (UAT) with 50 respondents to empirically confirm that the website provides real benefits to its users [8]. In addition, this study is also expected to serve as a reference for the development of school profile websites at other educational institutions as a simple yet effective digital information medium in supporting digital transformation in the educational environment [21].

II. RESEARCH METHODOLOGY

2.1 Types of Research

This research is a study on information system development that aims to design and implement a school profile website as a digital information medium [19]. The approach used in this research is the software engineering approach, which focuses on the processes of analysis, design, implementation, and structured system testing [16].

The software development method used in this research is the Waterfall method [16]. The method in this study uses the Waterfall model, which was selected due to its systematic and structured development stages that are well-suited for projects with clearly defined and stable requirements. The Waterfall model includes the stages of analysis, design, implementation, and testing. The Waterfall method was chosen because it has systematic and structured development stages, making it easier to develop the system gradually and measurably, from the initial analysis phase to the final functionality testing stage [16]. This method is also considered suitable for the development of school profile websites because the system requirements are relatively clear and do not undergo significant changes during the development process [22].

2.2 Research Location and Time

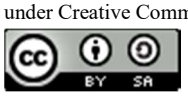
This research was carried out at SMPN 4 Praya Tengah, which is located in Praya Tengah District, Central Lombok Regency. The selection of the research location was based on the condition of the school, which does not yet have a website as a digital information medium, so the delivery of information is still carried out conventionally.

As for the research implementation time, it was carried out in several stages, which included the initial observation process, data collection, system design, system implementation, and system testing. This research was conducted within the time span from January 2026 to April 2026.

2.3 Data Collection Techniques

In this study, data collection techniques were conducted to obtain the information needed in the system development process. The data collection techniques used include:

a. Observation
   Observation was conducted by directly observing the information delivery process that takes place at SMPN 4 Praya Tengah. Through this observation, the researcher can find out how the information delivery system is used by the school and identify various problems that occur in the process.
b. Interview
   The data collection process was carried out through interview techniques with relevant school parties, such as the principal, administrative staff, and school operators. The interviews aimed to obtain direct information regarding system requirements, the types of information that need to be provided on the school



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website, as well as the challenges faced in delivering information to students and the community.

c. Literature Study
A literature study is conducted by reviewing various reference sources relevant to the research, such as books, scientific journals, and previous studies related to the development of web-based information systems and school profile websites. This literature study aims to obtain a theoretical foundation and strengthen the scientific basis of the research.

2.4 System Development Method

The system development method used in this research is the Waterfall method. The Waterfall method is one of the software development methods that has systematic and sequential development stages [16]. The stages of the Waterfall method include requirements analysis, system design, implementation, and system testing [22].

The stages of system development in this research are explained as follows:

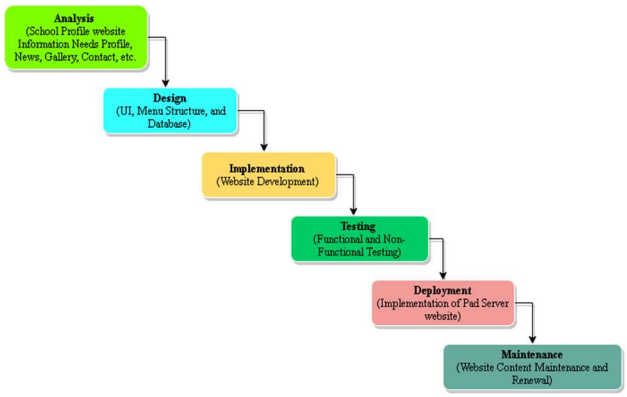

Figure 1. Waterfall Method

a. Requirement Analysis
At the analysis stage, the process of identifying system requirements is carried out based on the results of observations and interviews that have been conducted. The needs analysis aims to determine the type of information required by users and to define the features that will be provided on the school profile website [16] [23].

b. System Design
The system design stage is carried out after the system requirements have been successfully identified. At this stage, the design of the system structure is conducted, which includes database design, user interface design, and system flow design. The purpose is to provide an overview of how the system will be built before the implementation process is carried out. [16] [23][24].

c. Implementation
The implementation stage is the stage of applying the results of system design into program form. System implementation integrates the PHP and JavaScript programming languages with a MySQL database. The designed system is a school profile website that can be accessed by users through the internet network [22].

d. Testing
After the system is implemented, the next stage is system testing to ensure that the system can operate according to the functions that have been designed. System testing is conducted using the Black Box Testing method, which focuses on testing the system's functions without looking at the program code structure. This testing is carried out to ensure that all system features can work properly according to user needs [25] [24].

2.5 System Design

System design is carried out to illustrate the structure and workflow of the system to be developed. In this study, system design is carried out using several system modeling diagrams, including:

a. A Use Case Diagram is used to show user interactions with the system.
b. Flowchart used to depict the workflow of the system
c. An Activity Diagram is used to describe the steps of the activities of the system.

Through the design of this system, it is expected that the process of developing a school profile website can be carried out more structured and systematically [18].

a. Use Case Diagram

A Use Case Diagram is one of the components in the Unified Modeling Language (UML) that is used to depict functional interactions between actors and the system. This diagram helps in identifying system requirements as well as the functional boundaries that will be developed [16]. Based on recent research, use case diagrams are very effective to use at the requirements analysis stage because they can provide a clear and easily understood overview of the system for both developers and users [26].

In this study, the Use Case Diagram is used to describe the interaction relationship between users and the admin with the school profile website system. Users can access various information such as the school profile, vision and mission, categories, gallery, directory, downloads, and contact. Meanwhile, the admin has access rights to manage all system data through the login process and content management.

The use of use case diagrams in this research aligns with the requirements analysis stage in the Waterfall method, where all system requirements must be clearly defined before entering the design and implementation stages [22].

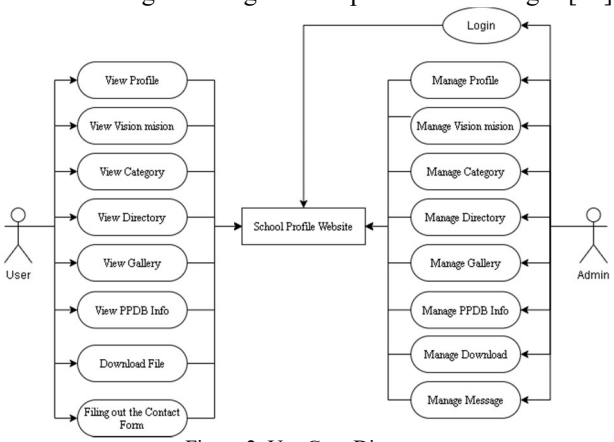

Figure 2. Use Case Diagram

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b. Flowchart

A flowchart is a graphic diagram used to visualize the flow of a system process systematically with standard symbols. Flowcharts are used to visualize process steps, making it easier to understand the workflow of the system [22][27]. Recent research shows that flowcharts are very helpful in improving the clarity of system flow and minimizing errors during the implementation stage [26].

In this study, a flowchart is used to illustrate the system flow of the school profile website from the perspective of users and admins. The process starts with the user accessing the website, selecting a menu, and then the system processes the request and displays the information. On the admin side, the process starts from login, validation, and data management carried out through the dashboard.

The use of flowcharts in this research supports the system design stage in the Waterfall method, as it helps in illustrating the process flow in a structured manner before the system is implemented [22].

Figure 3. User and Admin System Flowchart

c. Activity Diagram

An Activity Diagram is a UML diagram used to illustrate the flow of activities in the system in more detail, including interactions between users and the system. This diagram shows the sequence of activities as well as the control flow within the system. Based on recent research, activity diagrams are very effective in modeling system processes dynamically and improving understanding of the system workflow [26].

In this study, an activity diagram is used to depict the interaction between users, the system, and the admin in the school profile website. The process begins when the user accesses the website, and then the system displays the main page. Next, the user selects a menu, and the system processes the request by retrieving data from the database before displaying the information.

On the admin side, the process starts with login, system validation, and then data management such as categories, gallery, directory, and downloads. Every data change will be saved and displayed directly on the system.

The use of activity diagrams in this research supports the system design process in the Waterfall method because it can depict the flow of activities in detail and in an integrated manner [22].

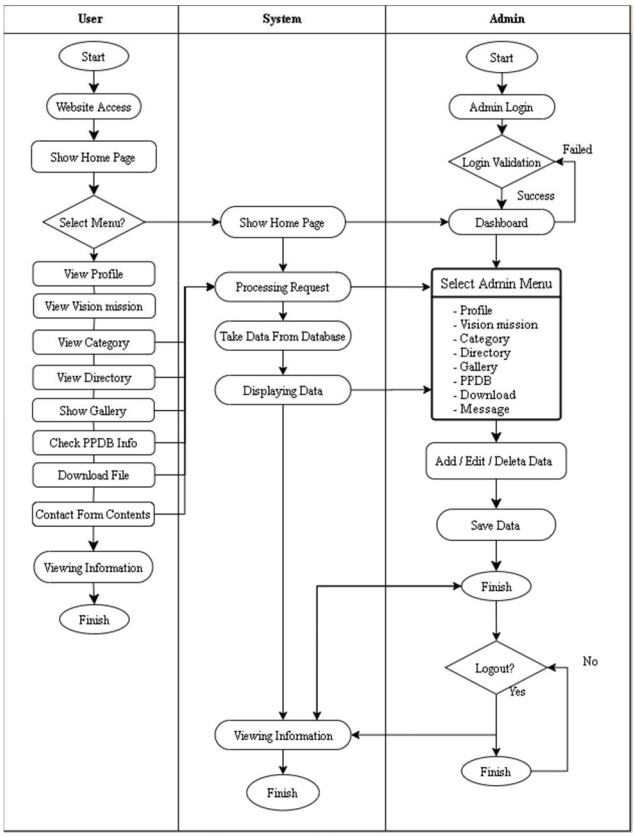

Figure 4. Activity Diagram

2.6 System Testing Methods

The testing method used in this study is Black Box Testing. This method is used to test the system functions based on user requirements without considering the internal structure of the program. Testing is carried out by examining each feature available on the school profile website, such as the school profile management feature, announcements, news, gallery, activity agenda, and the school contact feature [25].

The results of this testing are used to ensure that all system features can function properly and meet user needs, so that the school profile website can be used optimally as a digital information medium [22].

III. RESULTS AND DISCUSSION

3.1 Admin Login

The school profile website system consists of two user levels, namely the website admin and the user. After accessing the system, the admin will be directed to the login page [12].

Each admin role has specific functions and access rights, whereas users act as visitors who can access the information available on the website as follows:

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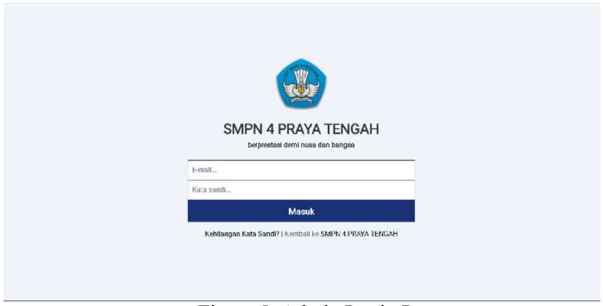

Figure 5. Admin Login Page

On this page, the admin is required to input a username/email and password, which will then be validated by the system. If the data is valid, the admin will be directed to the dashboard, whereas if it is not valid, the system will deny access and request re-entry. This mechanism plays an important role in maintaining system security and preventing illegal access to data.

Figure 6. Admin Homepage

After going through the authentication process, the admin can access various main menus available in the system. The admin homepage functions as a control center in system management, designed to provide easy navigation and quick access to all system functions, thereby improving efficiency in data management. The admin dashboard or homepage plays an important role in enhancing the system's usability because it presents information and features in a structured and easily accessible manner.

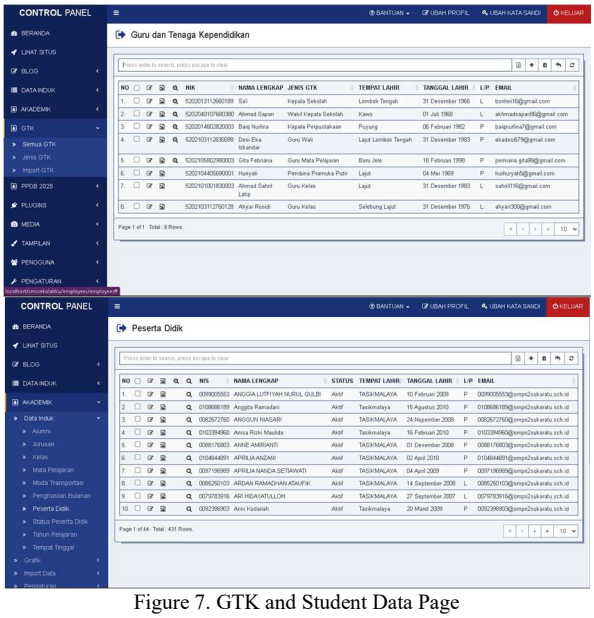

Figure 7. GTK and Student Data Page

The GTK (Teachers and Education Personnel) and Student Data Page is a feature used to manage teacher, education staff, and student data in a centralized system. This page displays important information such as full name, gender, place, and date of birth, as well as other supporting data in a structured table format. This feature makes it easier for admins to manage data, such as searching, adding data, editing data, and deleting data efficiently. The presentation of data in an interactive table format also helps to increase information access speed and accuracy in data processing. A web-based data management system can improve administrative efficiency and simplify the data management process within the education environment.

3.2 Login User

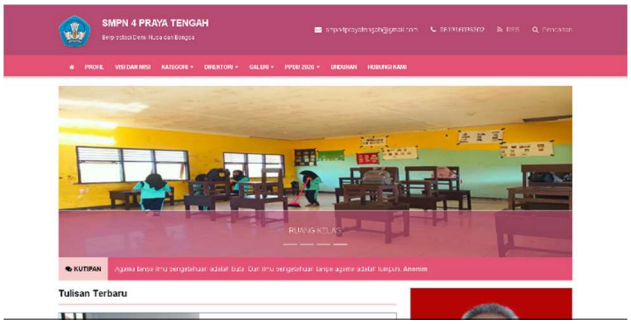

Figure 8. User Home page

The user's homepage is the initial view accessed by users when opening the school profile website via a link or website domain. This page serves as the main medium for conveying information to users, such as the school profile, news, announcements, student admission information (PPDB), and navigation menus to other features. The homepage design is made simple and informative with the aim of making it easy for users to obtain the information they need. A structured and user-friendly homepage layout can enhance the user experience as well as the effectiveness of information delivery in a web-based system.

Figure 9. Profile Page

The school profile page is one of the main components of a school website that serves to provide general information about the identity and overview of the institution to the public. This page becomes a digital information source that can be accessed by students, parents, and the community to get to know the school comprehensively without having to visit in person.

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Figure 10. Vision and Mission Page

The vision and mission page is one of the important components on a school website that serves to present the goals, direction, and core values that serve as guidelines in the development of the institution. This page becomes a digital information source that can be accessed by students, parents, and the public to understand the school's policy direction and aspirations comprehensively without having to come in person.

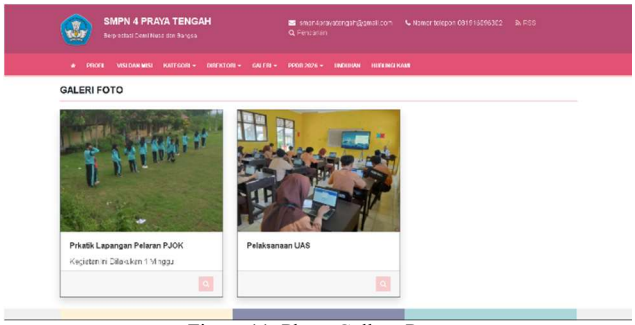

Figure 11. Photo Gallery Page

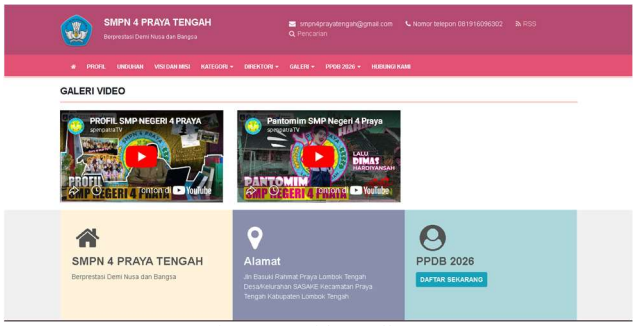

Figure 12. Video Gallery Page

The gallery page is a feature used to display documentation of school activities in visual and audiovisual forms to users. On this page, users can view a collection of photos and videos arranged systematically, making it easier to access information related to school activities. Presenting content in the form of images and videos aims to increase the website's appeal and provide information that is more communicative and interactive compared to text alone. The use of visual and audiovisual media on the website can enhance user engagement as well as the effectiveness of information delivery in a web-based system.

Figure 13. News Category Page

The news category page is a feature used to group and display school news information based on certain categories, making it easier for users to find relevant information. On this page, news is organized in a structured and systematic manner, allowing users to quickly access the latest information or information based on the desired topic. Grouping information in the form of categories also helps to improve content orderliness and ease of navigation within the system. Organizing content based on categories on a website can enhance the efficiency of information searching as well as the user experience in accessing a web-based system.

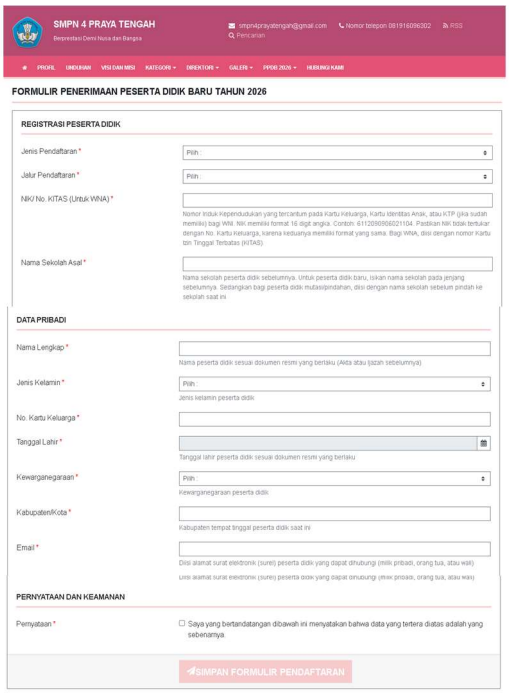

Figure 14. PPDB Form Page

Figure 15. PPDB Form Print Page

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Figure 16. PPDB Selection Page

The PPDB page has several main features, namely the registration form, form printing, and selection results. The form page is used by prospective students to input registration data online with a structured format that has been adjusted. Once the data is successfully saved, users can access the form printing page to download or print the registration proof as an archive. In addition, the selection results page allows users to check the acceptance status by entering certain data, such as registration number and date of birth. The integration of these three features supports a more efficient, transparent, and easily accessible registration process. The web-based PPDB system is able to improve administrative efficiency, data accuracy, and ease of information access for users compared to conventional methods.

3.3 System Testing

The developed system was then tested before being fully implemented. Testing was carried out using the Black Box Testing method, which focuses on the system's functions without considering the internal code structure. The test results are shown in Table 1, which includes various test scenarios to ensure that all system features function according to specifications [22].

Table 1. Blackbox Testing

Feature Test	Expected Result	Result
Admin Login	The system is able to validate the username/email and password input, and direct the user to the admin dashboard page if the entered data is valid.	Valid
Admin Home Page	The system is able to display the admin dashboard page containing brief information as well as the system data management menu.	Valid
GTK and Student Data Page	The system can display teacher and student data in a structured form in tables and provides data management functions (add, edit, and delete)	Valid
User Home Page	The system is able to display the main page of the website, which contains general information and navigation to other features.	Valid
Profile Page	The system is capable of displaying school profile information completely, in a structured manner, and is easy for users to understand.	Valid
Vision and Mission Page	The system is able to present the school's vision and mission information clearly and informatively.	Valid
Photo Gallery Page	The system is able to display a collection of photo documentation of school activities that can be accessed by users.	Valid
Video Gallery Page	The system is able to display video content of school activities and ensure that the videos can be played properly.	Valid
News Category Page	The system is able to display news information based on the categories selected by the user systematically.	Valid
PPDB Form Page	The system is able to display the PPDB registration form and process the data entered by the user.	Valid
PPDB Form Print Page	The system is able to display and provide a printing feature for the registration form data according to the data that has been entered.	Valid
PPDB Selection Page	The system is able to display the PPDB selection results accurately based on the registration data that has been processed by the system.	Valid

The results of Black Box Testing indicate that all test scenarios have been successfully executed according to the specifications. Furthermore, user acceptance testing was conducted using the User Acceptance Test (UAT) method, where respondents were asked to answer several questions with a predetermined evaluation weight [25].

Table 2. Assessment Weights

Score Weight	Description
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

In addition to Black Box Testing, User Acceptance Testing (UAT) was also conducted to validate the system's benefits from the user's perspective, ensuring that the developed website truly meets user needs and expectations [25]. These criteria are used as a reference in determining the UAT assessment weights presented in Table 3.

Table 3. UAT Assessment Criteria

Percentage	Description
81% - 100%	Strongly Agree
61% - 80%	Agree
41% - 60%	Neutral
21% - 40%	Disagree
0% - 20%	Strongly Disagree

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The questions posed by the researcher to the users consist of 16 items that must be answered by the respondents, as shown in Table 4.

Table 4. List of Questions

NO	Questions
1	Is the Home Page layout easy for users to understand?
2	Is the information presented on the Home Page complete?
3	Is the information on the school Profile Page presented clearly and easily understood?
4	Does the Profile Page provide a sufficient overview of the school?
5	Are the displayed vision and mission easy to understand?
6	Is the information about the vision and mission presented engagingly?
7	Is the Photo Gallery layout attractive and easy to access?
8	Does the displayed photo provide relevant information about school activities?
9	Can the displayed video be played properly?
10	Does the video content help you understand school activities or the school profile?
11	Is the presented news easily accessible based on categories?
12	Is the displayed news information current and useful?
13	Is the PPDB form easy for users to fill out?
14	Are the instructions for filling out the form clear?
15	Can the form print feature be used easily?
16	Does the printed form match the data entered?

.

The number of respondents involved was 50 people. After that, the answers given by the respondents were calculated using weights that had been determined based on the answers received, according to the calculation formula.

$$\frac{Total\ Respondent\ Weigh\ /Number\ of\ Respondents}{Maximum\ Weigh} \quad (1)$$

1. $\frac{147/50}{5} x\ 100\% = 58{,}80\%\ "Neutral"$
2. $\frac{191/50}{5} x\ 100\% = 76{,}40\%\ "Agree"$
3. $\frac{234/50}{5} x\ 100\% = 93{,}60\%\ "Strongly\ Agree"$
4. $\frac{175/50}{5} x\ 100\% = 70{,}00\%\ "Agree"$
5. $\frac{191/50}{5} x\ 100\% = 76{,}40\%\ "Agree"$
6. $\frac{218/50}{5} x\ 100\% = 87{,}20\%\ "Strongly\ Agree"$
7. $\frac{182/50}{5} x\ 100\% = 72{,}80\%\ "Agree"$
8. $\frac{194/50}{5} x\ 100\% = 77{,}60\%\ "Agree"$
9. $\frac{209/50}{5} x\ 100\% = 83{,}60\%\ "Strongly\ Agree"$
10. $\frac{179/50}{5} x\ 100\% = 71{,}60\%\ "Agree"$
11. $\frac{205/50}{5} x\ 100\% = 82{,}00\%\ "Strongly\ Agree"$
12. $\frac{217/50}{5} x\ 100\% = 86{,}80\%\ "Strongly\ Agree"$
13. $\frac{157/50}{5} x\ 100\% = 62{,}80\%\ "Neutral"$
14. $\frac{201/50}{5} x\ 100\% = 80{,}40\%\ "Strongly\ Agree"$
15. $\frac{241/50}{5} x\ 100\% = 96{,}40\%\ "Strongly\ Agree"$
16. $\frac{199/50}{5} x\ 100\% = 79{,}60\%\ "Agree"$

The next step is to calculate the average percentage of all questions using the following formula: (58.80% + 76.40% + 93.60% + 70.00% + 76.40% + 87.20% + 72.80% + 77.60% + 83.60% + 71.60% + 82.00% + 86.80% + 62.80% + 80.40% + 96.40% + 79.60%) / 16 = 78.50%. The result of calculating the average percentage of all questions shows that the UAT testing for the School Profile Website falls under the “Agree” criteria”.

IV. CONCLUSION

Based on the research that has been conducted, the design and implementation of the School Profile Website as a digital information medium at SMPN 4 Praya Tengah was successfully developed using the Waterfall method, which includes the stages of requirements analysis, system design, implementation, and testing. The website provides various main features such as school profile, vision and mission, news, announcements, photo and video gallery, news categories, as well as an online-based student admission service that can be accessed by students, parents, and the wider community. This system is designed with a simple, structured, and easy-to-use interface, making it easier for the school to manage and deliver information more effectively. The testing results using the Black Box Testing method showed that all system features functioned according to the design without any significant functional issues. In addition, the User Acceptance Test (UAT) involving 50 respondents with 16 questions obtained an average percentage score of 78.50%, which falls into the "Agree" category. These results indicate that the developed system has been well received by users and is able to enhance the effectiveness of information delivery more quickly, accurately, and efficiently compared to previous conventional methods. The implementation of this website is expected to support the digital transformation process in the educational environment and improve the quality of school information services. For further development, the system can be added with more comprehensive features such as academic system integration, e-learning, student attendance, and other administrative services to optimize the website's functions. In addition, the development of a more interactive and responsive user interface across various devices also needs to be considered to enhance the user experience. Further research can also consider using other software development methods such as Agile or Prototype so that the development process is more flexible to changes in user needs, as well as expanding testing methods by involving more respondents and usability evaluations so that the system's quality can continue to be improved.

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