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Implementation of Black Box Testing and Usability Testing on the PPDB Website of YPP Nurul Huda Surabaya

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Abstract

This study aims to evaluate the quality of the PPDB (online student admission) website of YPP Nurul Huda Surabaya using black box testing and usability testing approaches. The black box method was applied to assess the functional performance of the available features, while usability testing was employed to measure user satisfaction using the USE questionnaire. The black box test results indicate that all features operate correctly, and the usability testing produced a score of 0.90, which is close to the ideal value. These findings demonstrate that the website meets the criteria of a well-designed information system and is suitable for use in the PPDB process.

I. INTRODUCTION

A website is a collection of digital pages that present various forms of content such as text, visuals, animations, and audio, all interconnected through hyperlinks. Websites may be static or interactive, and they have been widely utilized across multiple sectors, including the educational domain [1]. In school environments, websites serve a strategic role as a medium for disseminating information and as a promotional platform that reaches students, parents, and the general public [2]. One of the major contemporary needs in education is the digital transformation of the New Student Admission (PPDB) process through web-based platforms.

Schools under the YPP Nurul Huda Surabaya foundation have begun adopting web-based information systems to support the online PPDB process. However, these information systems must undergo thorough quality evaluation before being used operationally. The quality of an information system is not only

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assessed from the functional aspect of its features but also from the user experience when interacting with the system. Therefore, software testing is essential prior to full-scale implementation.

Software testing is a critical stage to ensure that a system operates according to specifications and is free from functional defects [3]. One commonly applied approach is Black Box Testing, which evaluates system outputs based on specific inputs without examining the internal structure of the program [4], [5]. This method aims to verify whether the features provided function in accordance with system expectations. Black box approaches are also widely recommended for validating web-based services due to their simplicity and efficiency [8], [9].

In addition to functionality testing, usability testing is crucial to determine how users perceive the system in terms of ease of use, learnability, and satisfaction. In this study, the System Usability Scale (SUS) is used as the evaluation tool. SUS, developed by John Brooke in 1986, has long been adopted as a practical and efficient benchmark to measure user perceptions of systems [6]. The instrument consists of ten statements rated on a five-point Likert scale, producing a total score between 0 and 100, where a score ≥ 68 is generally interpreted as acceptable usability quality [7], [10], [11].

Furthermore, usability evaluation plays a significant role in improving the overall effectiveness of educational platforms, ensuring that digital services remain accessible and user-friendly for diverse user groups [12], [13]. Several studies also emphasize that both functional accuracy and usability quality greatly influence the successful adoption of web-based information systems in school environments [14]–[17]. Thus, combining black box testing with usability assessment provides a comprehensive evaluation framework for ensuring system reliability and user satisfaction.

II. METHODS

This study aims to evaluate the PPDB website of YPP Nurul Huda Surabaya using two primary approaches: Black Box Testing and Usability Testing. These methods are employed to assess both the functional performance of system features and the level of user satisfaction during interaction with the website.

A. Black Box Testing Method

Black Box Testing is a software testing approach that focuses on validating system functions based on their specifications without referencing the internal details or code structure of the program [Ahrizal *et al*., 2020]. In this study, testing was conducted on the main functional features of the PPDB website, including:

- User login
- New student registration
- File upload
- Viewing selection/graduation results
- Contact form submission

The testing procedure involved creating test scenarios for each function and comparing the actual outcomes with the expected results. A feature was categorized as successful if the actual output matched the expected output.

B. Usability Testing Method

In this research, the usability aspect of the system was assessed using the **System Usability Scale (SUS)**. SUS is a simple and efficient evaluation technique introduced by John Brooke in 1986 to measure user

perceptions of a system's ease of use. The instrument consists of 10 statements answered by respondents using a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5)**.** This structure enables a practical and reliable measurement of overall system usability.

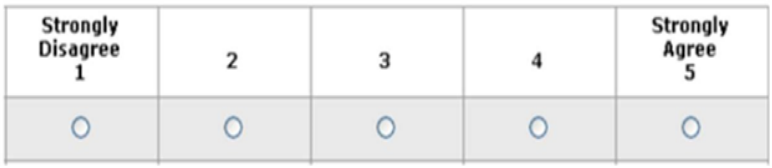

Figure 1. Likert Scale

Each statement in the SUS questionnaire carries a different polarity: odd-numbered items are positive statements, while even-numbered items are negative. Scoring is performed by converting each response using the following rules:

- Odd-numbered statements: score minus one
- Even-numbered statements: five minus the score
- The converted scores are summed, then multiplied by 2.5
- The final SUS score ranges from 0 to 100

After obtaining the SUS score from each respondent, the next step is to interpret the average score using the approach proposed by Bangor, Kortum, and Miller (2009). This interpretation framework includes four evaluative dimensions:

1. Grade
2. Adjective Rating
3. Acceptability
4. Net Promoter Score (NPS)

These dimensions help to determine the meaning behind the SUS score—whether the system is acceptable, good, excellent, or otherwise. A comprehensive overview of the SUS interpretation scale can be seen in the following illustration:

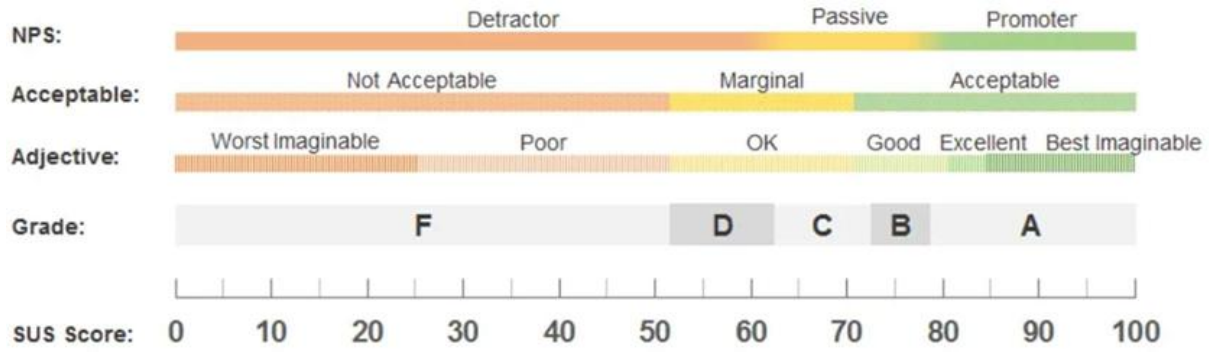

Figure 2. SUS Score Interpretation Scale

As additional clarification, Table 1 below presents the interpretation categories based on SUS scores:

Table 1. SUS Score Interpretation Scale

SUS	***Grade***	***Adjective***	***Acceptable***	***NPS***
84.1 – 100	A+	Best Imaginable	Acceptable	Promoter
80.8 – 84.0	A	Excellent		
78.9 – 80.7	A-	Good to Excellent		
77.2 – 78.8	B+	Good		Passive
74.1 – 77.1	B			
71.1 – 74.0	B-			
65.0 – 71.0	C	Ok	Marginal	
51.7 – 64.9	D	Poor	Not Acceptable	Detractor
0 – 51.6	F	Worst Imaginable		

Using the SUS method and its interpretation approach, the results of the usability evaluation of the system are not based solely on quantitative aspects (numerical scores), but also reflect the quality of user perceptions and their level of satisfaction when interacting with the system as a whole.

C. Research Flow Process

To outline the steps taken in conducting this study, a flowchart is used to illustrate the systematic process, beginning from the identification of system features to the conclusion stage. This diagram is intended to provide an overall depiction of the methodological phases carried out in the research.

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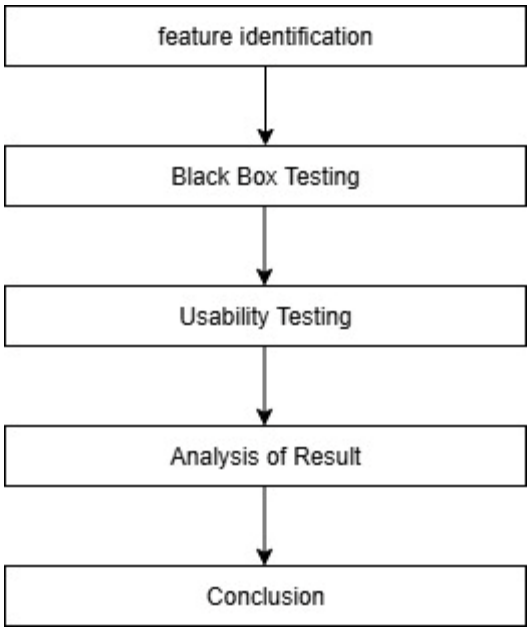

Figure 3. Research Flow Process

To facilitate understanding of the stages involved in using the developed PPDB system, the process flow is presented below in the form of a flowchart. This diagram represents the sequence of activities starting from the main page until the student is declared accepted.

III. RESULTS AND DISCUSSIONS

A. Feature Identification

Before conducting functional testing and usability evaluation, the first step is to identify all features available in the PPDB website of YPP Nurul Huda Surabaya. This identification process is crucial to ensure that all system elements align with user needs and support a smooth online student registration process.

The PPDB website is designed as the primary platform for managing new student admissions in an integrated, efficient, and easily accessible manner for prospective students and their parents or guardians. This mechanism was developed to reduce reliance on manual processes while increasing transparency and the speed of administrative services within the institution. Therefore, the features implemented must support administrative needs such as data collection, document verification, fee information, and announcement of selection results.

The features of the PPDB system are divided into two types based on user access. The following is a comprehensive list of features identified within the system:

Table 2. PPDB Features Based on User Access

No	Feature	Access
1	Home	Public
2	Education Unit Registration	Public

3	Fee Information	Public
4	Contact	Public
5	Announcements	Public
6	User Login	Internal
7	Biodata Entry	Internal
8	Document Submission	Internal
9	Payment	Internal
10	Selection Results Announcement	Internal

With this feature identification, the testing process can be conducted systematically and comprehensively, covering all functional aspects of the developed system.

B. Black Box Testing

Black Box Testing is carried out to ensure that each function within the PPDB system operates according to its design. The evaluation covers 10 features with a total of 33 test scenarios. This testing approach does not consider the internal code structure of the system; instead, it focuses on the inputs and outputs of each feature.

Testing is conducted by creating specific test scenarios for each feature and then comparing the actual results with the expected outcomes. The following is a summary of the feature testing:

Table 3. Black Box Testing

No	Feature	Test Cases
1	Login	4
2	Home	9
3	Registration (all units)	8
4	Fee Information	6
5	Contact	1
6	Announcements (public)	1
7	Biodata Entry	1
8	Document	1

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	Submission	
9	Payment	1
10	Announcements (selection results)	1

C. Example Test Cases

1. Positive Test Case (Valid Login):

   The test is conducted by entering a username and password that match the registered data, i.e., username: `user123` and password: `pass123`. After entering the credentials and pressing the login button, the system successfully directs the user to the main dashboard page without any errors. This outcome meets the expected result, and therefore, the test case is considered successful (passed).

2. Negative Test Case (Invalid Login):

   In this scenario, the test is performed by entering a correct username but an incorrect password, for example, username: `user123` and password: `wrong123`. After pressing the login button, the system displays a notification stating, "Username or password is incorrect," and the user remains on the login page. This outcome aligns with the expected result, indicating that the system validation for incorrect credentials works correctly, and the test case is deemed successful.

Based on evaluations conducted on 10 key features covering 33 test scenarios in total, several discrepancies between actual and expected results were initially observed. The testing process was carried out in stages, where some scenarios did not produce perfect results on the first attempt, requiring 4 rounds of improvements until all scenarios ran successfully according to specifications. After these refinements, the functional testing success rate reached 100%, indicating that all features operate as intended.

The successful execution of all scenarios demonstrates that the system has fully met functional requirements. Testing also showed that user interactions with features such as login, registration, biodata entry, document submission, fee information, and selection result announcements could be performed without technical issues and provided correct responses according to the given inputs. Therefore, it can be concluded that the PPDB system has passed functional testing effectively using the Black Box Testing approach.

D. Usability Testing Results (SUS)

In addition to functional aspects, the success of an information system is also strongly influenced by its usability, or how easily users can operate the system. For the PPDB YPP Nurul Huda Surabaya website, usability is a critical aspect because the system will be used by diverse user groups, including prospective students, parents/guardians, and school administrative staff with varying levels of technological proficiency.

Usability testing was conducted using the System Usability Scale (SUS)**,** a standard evaluation method developed by John Brooke in 1986. SUS provides an efficient, concise, and reliable way to assess users' perceptions of the comfort and ease of system use. This method includes 10 statements, which respondents answer using a 5-point Likert scale, from 1 (Strongly Disagree) to 5 (Strongly Agree).

The following are the statements used as the basis for the SUS questionnaire:

Table 4. Questionnaire Statement Items and Variables

No	Statement	*Indicator*
1	I would most likely use this system frequently.	*Frequency of Use / Desire to Use*
2	This system is quite complex.	*Complexity*
3	This system is easy to use.	*Ease of Use*
4	I need technical support to operate this system.	*Learnability / Dependence on Support*
5	The functions in this system are well integrated.	*Consistency / Integration*
6	This system contains many inconsistencies.	*Consistency*
7	Most people can quickly learn to use this system.	*Learnability*
8	This system feels confusing.	*Understandability / Confusion*
9	I feel confident when using this system.	*Confidence*
10	I need to learn a lot before using this system.	*Learnability / Initial Training Need*

In this study, the SUS questionnaire was completed by 10 respondents. Each response was converted into a SUS score using the official formula (final score = total score × 2.5), resulting in a value ranging from 0 to 100.

Next, the responses from each participant were converted to a SUS score using the proper calculation to obtain a final score within the 0–100 range. A higher average score approaching 100 indicates an excellent level of usability. In this research, the SUS scores will be analyzed to determine whether the PPDB YPP Nurul Huda system meets the standards of comfort and ease of use for its users.

The responses collected from the 10 participants related to the Information Systems Study Program website were measured across three characteristic aspects, as follows:

1. **Respondent Characteristics**

To understand the background of users involved in the usability testing, the characteristics of respondents were inventoried, including gender, age range, and role in using the system. The detailed data are presented in the following table:

Table 5. Respondent Characteristics

Status	Number of Respondents
Prospective Student	6
Teacher	2
Operator/Admin	2
Total: 10 Respondent	

This testing involved 10 respondents, consisting of 6 prospective students, 2 teachers, and 2 operators/admins. After the questionnaires were distributed and returned by the respondents, the data were processed using the established formula to obtain the SUS scores. A summary of the calculation results is presented in Table 5 below.

2. Calculation Results

After the participants completed the System Usability Scale (SUS) questionnaire, individual scores were calculated. Responses to items Q1 through Q10 were processed using the standard SUS formula and then summed to obtain the total score. The detailed results of the SUS score calculations are presented in the following table:

Table 6. SUS Score Calculation Results

Respondent	Calculated SUS Score										Total	Value
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		Total (Sum × 2.5)
R1	4	3	4	3	3	2	4	2	4	3	32	80,00
R2	4	2	5	2	4	1	4	2	4	2	32	80,00
R3	5	2	4	2	4	2	5	2	4	2	32	80,00
R4	5	1	5	1	4	2	4	1	4	1	36	90,00
R5	4	2	4	2	4	1	4	2	5	1	33	82,50
R6	**5**	**2**	**5**	**1**	**5**	**1**	**5**	**2**	**5**	**1**	**38**	**95,00**
R7	5	2	5	2	5	2	5	1	5	1	37	92,50
R8	4	2	4	2	4	1	4	1	4	1	33	82,50
R9	5	2	5	4	5	2	5	2	5	2	33	82,50

R10	5	2	5	2	5	2	4	2	5	2	34	85,00
Rata-Rata Score											**34**	**85,00**

Based on the calculations in Table 6, the highest System Usability Scale (SUS) score reached 95.00, while the lowest score was 80.00, with an overall average of 85.00. These scores were obtained from the responses of 10 participants to 10 statements (Q1–Q10) representing key aspects of usability, such as ease of use, efficiency, user confidence, and system consistency. Each item was rated on a 5-point Likert scale and then converted using the SUS formula, where odd-numbered statements (Q1, Q3, Q5, Q7, Q9) are positive and increase the score if rated high, whereas even-numbered statements (Q2, Q4, Q6, Q8, Q10) are negative and reduce the score if rated high.

The highest score was achieved by respondents who gave maximum ratings to almost all positive statements and low ratings to negative statements, reflecting an excellent user experience. Conversely, the lowest score still falls within the "good" category, as all respondents scored at least 80.00. This indicates that the PPDB YPP Nurul Huda Surabaya system is generally perceived as easy to use, comfortable, and highly recommendable, with usability falling into the "Excellent" category.

Based on the average score, data interpretation can now be conducted using the SUS score interpretation scale proposed by Bangor et al., as illustrated in Figure 4.

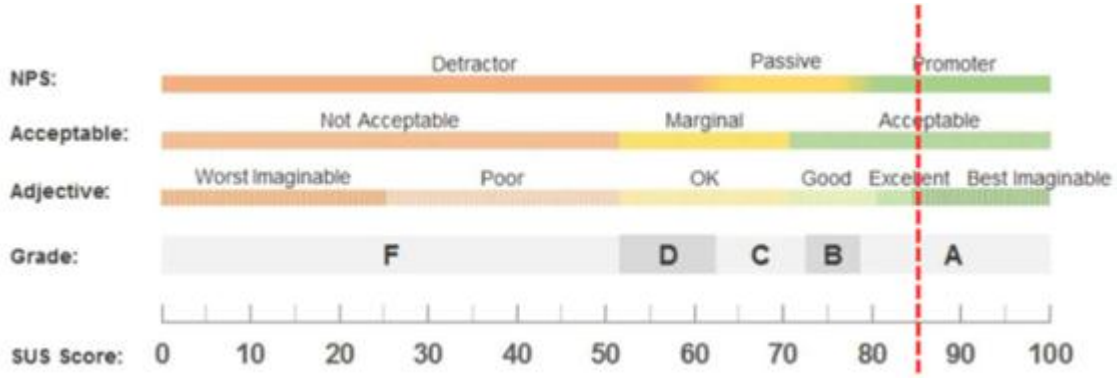

Figure 4. SUS Score Calculation Results

Based on the System Usability Scale (SUS) questionnaire data from 10 participants, individual scores for each respondent were obtained from answers to 10 questions (Q1–Q10) using a 1-to-5 Likert scale. Each score was processed according to the SUS formula (odd-numbered questions: score minus 1; even-numbered questions: 5 minus score), then summed to reach a total of 850. This total was then divided by the number of respondents to obtain an average SUS score of 85.00. Based on this interpretation, a score of 85.00 falls into the category of:

Table 7. Interpretation of SUS Score Calculation Results

Element	Description	Details
Grade	A	Represents one of the highest ratings in usability assessment. This means the system is considered very good overall, and users would

		be happy to use it again.
Adjective Rating	Excellent	Users feel highly satisfied with the system; interactions with the system are smooth and enjoyable.
Acceptability Range	Acceptable	The system is generally accepted and suitable for use without requiring significant improvements.
NPS Category	Promoter	Users are highly likely to recommend this system to others because they have had an overall positive experience.

Therefore, it can be concluded that the average SUS score of 85.00 indicates that the PPDB system of YPP Nurul Huda Surabaya possesses an excellent level of usability. This score reflects a user experience that is not only effective but also intuitive, enjoyable, and confidence-inspiring during use. Based on interpretation, the system is classified as Grade A with an Excellent rating, falls within the Acceptable range, and is categorized as a Promoter according to the Net Promoter Score method. This demonstrates that the system has been very positively received by users and has a high potential to be recommended to others. Overall, the system is considered suitable for broader implementation as a digital solution to support the student admission process at YPP Nurul Huda Surabaya.

IV. CONCLUSIONS

This study aims to evaluate the quality of the PPDB website system at YPP Nurul Huda Surabaya from two main aspects: functionality and usability. The evaluation was conducted using the Black Box Testing approach and the System Usability Scale (SUS). The results from both methods provide a comprehensive view, indicating that the system has been optimally designed and is technically capable of meeting user expectations while ensuring a comfortable user experience.

Through Black Box Testing, the system was examined across 33 test scenarios representing various usage conditions. The tests confirmed that all core functions—including login, registration, document management, announcement information, and communication—operate according to the established criteria. No errors or discrepancies were found in the system's functionality, indicating that it meets technical feasibility standards and can operate stably.

From the user experience perspective, usability testing was conducted using SUS with 10 respondents from diverse backgrounds. The results showed an average usability score of 85.00, well above the acceptable threshold of 68. According to Bangor et al.'s SUS interpretation, this score falls into Grade A with an Excellent rating, within the Acceptable range, and classified as Promoter. This means the system is not only well-accepted by users but also highly satisfying and very likely to be recommended. These findings demonstrate that the PPDB system at YPP Nurul Huda Surabaya successfully fulfills usability requirements and is ready for optimal implementation.

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