Development of a Web-Based Student Grade Information System as a System for Processing Student Grades and Monitoring Student Progress at SMK Negeri 1 Mondokan

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***Abstract*— Implementing a website-based information system as a system for processing student grades is a way to facilitate monitoring of student progress. Monitoring activities have a very important role for teachers, students, and parents/guardians. By implementing website-based student assessments, the system for processing student grades is recorded manually using spreadsheets. This research uses research and development methods through the application of four method stages, namely exploration, development, testing, and dissemination. The results of implementing a website-based information system as a student grade processing system aim to create a website-based assessment system, a precise and accurate student grade processing system. The research results show that the use of a website-based student assessment system can speed up the teacher's work in monitoring student development. Apart from that, it can make it easier for parents to monitor their students at school. The use of a website-based assessment system has proven effective in monitoring student progress. Therefore, it can be concluded that a website-based assessment system can be a useful system in the world of education, especially for monitoring student progress in school.**

Keywords—Information Systems, Website, Monitoring.

I. INTRODUCTION

The role of information technology is now very necessary in all aspects of human work. Apart from providing ease of operation, it can also speed up work [1]. Seeing the progress of the development of information technology, many schools are implementing information and communication technology [2]. The application of information and communication technology in the world of education is used to process student grades and monitor student progress with an online system via websites, because processing grades is the most important thing in schools. The school has hundreds of students, and each student has a procedure for receiving files in the form of student grades in each lesson [3]. So, assessment is very necessary to find out how students/students are able to see the learning outcomes that have been given [4].

Apart from being used to process student grades, the implementation of a website-based information system is also used as a medium for monitoring student progress. Monitoring activities have a very important role for teachers, students, and parents/guardians [5]. Like educational institutions that utilize website-based information systems to process student grades, namely SMK Negeri 1 Mondokan Sragen. Based on interviews conducted, SMK Negeri 1 Mondokan experienced several problems. Ineffective processing of student grades, lack of understanding of technology so that the use of technology for processing student grades is still mininum, and there is no information system specifically used for processing student grades and monitoring student progress. Seeing several problems regarding the information system as the value processing system used is not running well. So information on student assessments and monitoring of student progress is made website-based and developed using AppSheet.

Using AppSheet is able to manage data on student grades and is able to provide a display of the results of the latest student assessments. Apart from that, the system implemented can be accessed anywhere by teachers and students. This system is considered capable of making it easier for students to continue monitoring and making it easier to find out the value obtained from their learning results. Apart from that, this system also makes it easier for teachers to carry out assessments because the system can be run anytime and anywhere. Apart from providing ease of operation, it can also speed up precise and accurate work. This value information system can also make it easier for parents to monitor their students. Research and development (RnD) methods are a type of research used to produce certain products and also to carry out tests on whether the product is effective or not [6]. This can certainly provide support for the development of solutions that suit the problems being faced by users.

Previous research has employed research and development (RnD) methods. Research (Ambarita & Huda, 2021) discusses the design of a web-based academic information system. This research applies the RnD (Research and Development) method, with the system being developed, namely a website-based value processing information system, and implementing the waterfall method [7]. Haryono et al.'s research (2022) discusses the implementation of the waterfall model in the development of library information system applications. Researchers apply the RnD (Research and Development) method by applying the waterfall method. From the results of this research, researchers revealed that the Library Information System Application is very suitable for use [8].

From the various research that has been explained previously, it can be seen that the RnD (Research and Development) method is used in the process of developing a website-based information system as a processing of student grades with the aim of providing new creations in design completion that have fulfilled the user's sense of satisfaction, in accordance with the assessment. through the application of the System Usability Scale (SUS). SUS is a comfort testing

approach process that is considered effective and robust for testing applications [9]. This research aims to develop a student grade information system website that is able to make it easier to process student grades at SMK Negeri 1 Mondokan Sragen. By designing a website-based information system to process student grades, it is hoped that it will make it easier for students and teachers to monitor student progress.

II. MATERIALS AND METHODS

Research is implemented by applying the R&D (Research and Development) method with the aim of producing services that innovate, suit user needs, and are able to overcome the problems being faced. This method focuses on providing new product results and testing whether the product is effective or not. As a way or step to provide development to a product and improve existing products. There are four stages in this research, namely exploration, development, testing, and dissemination [10].

A. Eksplorasi

This part of the stage is to analyze whether or not the development of an information system is needed in order to assist in processing grades and monitoring students, as well as analyzing the development of information systems. The development of an information system began with problems in the activities of processing student grades and monitoring student progress that had been implemented [11]. Problems that occur are due to information systems that are currently less effective and computerized. In the exploration stage, the researcher will conduct interviews with the school to obtain data that the author will use as a reference for research.

B. Development

In developing an information system, a research method is usually used, which is known and is usually called a system development methodology. One development model is the waterfall model. The waterfall model has various sequential steps, namely the first is the requirement step, the second is the design step, the third is implementation, the fourth is verification, and the final step is maintenance [12].

C. Testing

Before being implemented on students, teachers, and parents/guardians of SMK Negeri 1 Mondokan Sragen, this system will first be tested on student affairs leaders and media experts to determine the feasibility of the product. Apart from that, at this stage several trials were also used, namely black-box testing, media expert testing, and trials using SUS.

D. Dissemination

Dissemination is the dissemination of ideas or ideas to observers. Dissemination of research results also aims to socialize the product so that it can be used by many people. Products that are successful through research and development must be socialized.

III. RESULTS AND DISCUSSION

A website-based information system for processing student grades was developed to help and make it easier for students and teachers to process grades or monitor student assessments at SMKN 1 Mondokan Sragen. Processing student grade data uses a computer system to process student grades, including daily grades, mid-semester grades, and final semester grades, so that it can provide student grade information quickly, precisely, and accurately as required [13]. Processing grades for students is an activity carried out by the school in recapping the grades obtained in learning for one semester, which will be written in a report card in order to know the students' progress at school.

Apart from that, monitoring of students is also carried out. Monitoring of students is an activity carried out by the school in monitoring and evaluating student learning activities. Monitoring provides information and data that aims to evaluate results continuously and objectively and improve the efficiency and effectiveness of a program [14]. Student assessment and monitoring media was developed using a website. Users can access this student assessment and monitoring media using the Android and desktop platforms [15].

.A website-based information system for student monitoring is implemented for all vocational school students. Before conducting this research, the researcher determined which vocational school would be used as a place to research this medium. Researchers chose SMKN 1 Mondokan Sragen as the place to conduct research on this website-based information system. Before conducting research on students, researchers conducted interviews with teachers at SMKN 1 Mondokan Sragen. The problem was the lack of effectiveness in processing student grades, a lack of understanding of technology so that the use of technology for processing student grades was still minimal, and the absence of a special information system for processing student grades. and monitoring student progress. The use of website-based information systems in the world of education is to process student grades and monitor student progress through an online system via the website.

This website-based information system was tested by media experts and material experts before being given to end users. For media experts, namely two lecturers in Informatics Engineering Education, Faculty of Teacher Training and Education, Muhammadiyah University of Surakarta. The meter experts are representatives of SMKN 1 Mondokan Sragen teachers. This research data was obtained from a questionnaire distributed to media experts and material experts.

The following are the results of the design of the website-based information system product that was developed :

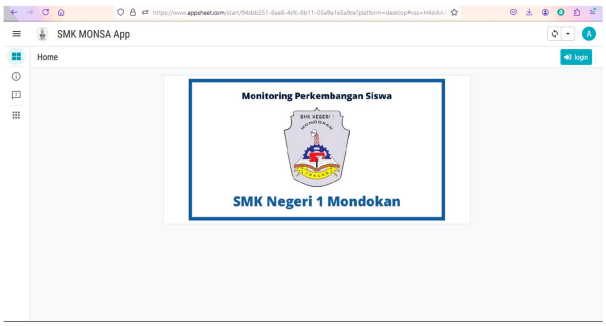

Figure 1. Initial View

Figure 1 is the initial display of the Student Monitoring Information System website. On this page there is a Login button to enter the system.

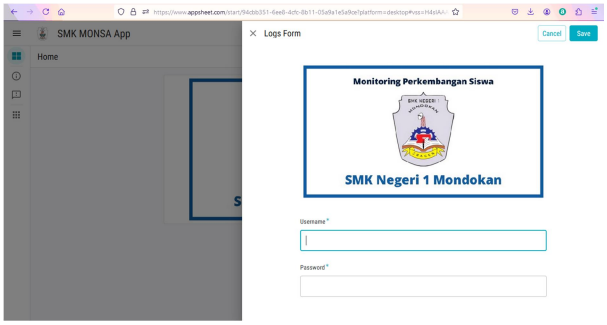

Figure 2. Login Display

Figure 2 is a display for the login page. Where on this page the user can log in with the specified username and password.

Figure 3. Home display as admin

Figure 3 is the home page as admin. Where on this page there are several navigations, namely, Home, Schedule, Absence, ISA, Grades, Violations, Achievements, Attendance, Database, Settings, Profile, and Logout.

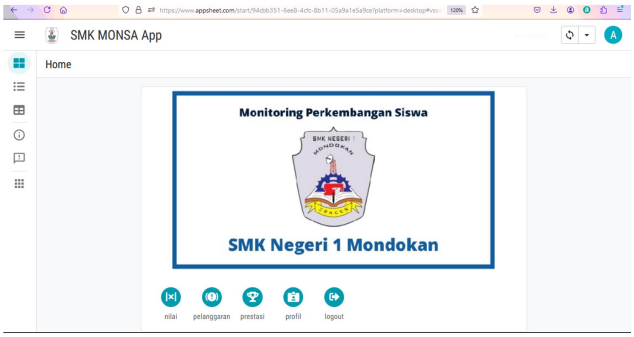

Figure 4. Home page as a teacher

Figure 4 is the home page as a teacher. Where on this page there is only some navigation that can be accessed by teachers, namely, Home, Schedule, Absence, ISA, Grades, Violations, Achievement, Attendance, Database, Profile, and Logout.

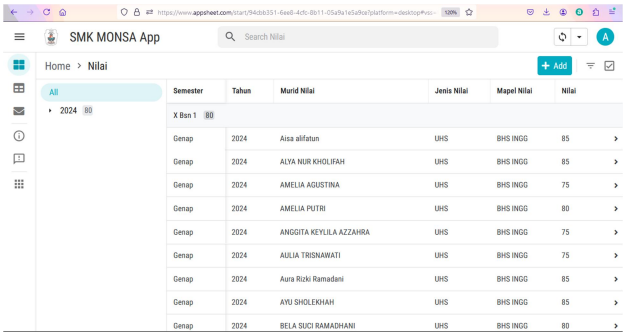

Figure 5. Values Page

.Figure 5 is the Student Grades page, where the teacher can input student grades according to the class he teaches by clicking Add in the top right corner. On this page, teachers can also edit or delete student grades.

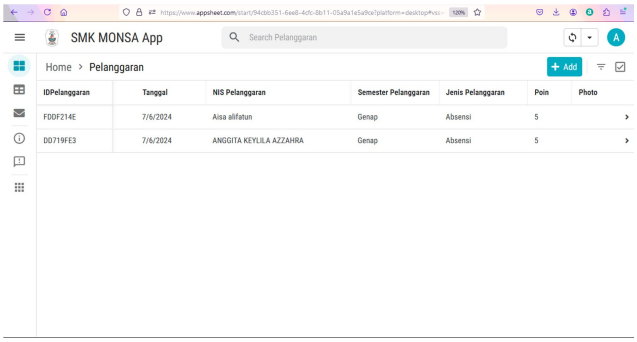

Figure 6. Violation page

.Figure 6 is the Violations page, where teachers can also input student violations by clicking Add in the top right corner. On this page, teachers can also edit or delete student violations.

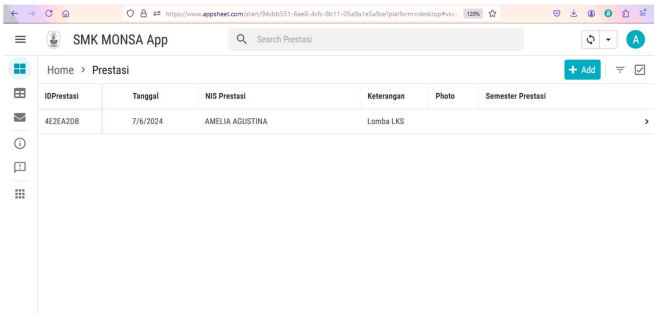

Figure 7. Achievements page

Figure 7 is the Achievements page, where teachers can input student achievements by clicking Add in the top right corner. On this page, teachers can also edit or delete student achievements.

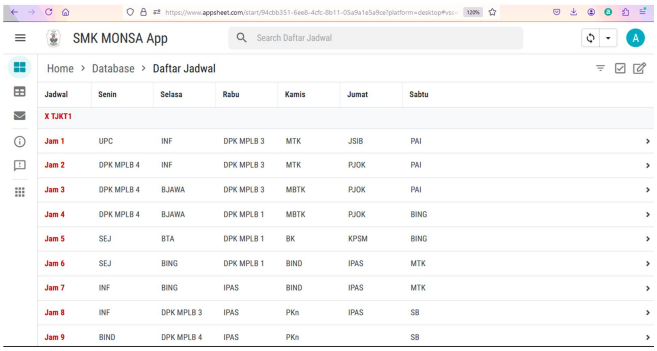

Figure 8. Schedule page

In figure 8 is the schedule page. On this page, the learning schedule is listed from the first hour to the last hour, which can be accessed by students and teachers from Monday to Saturday.

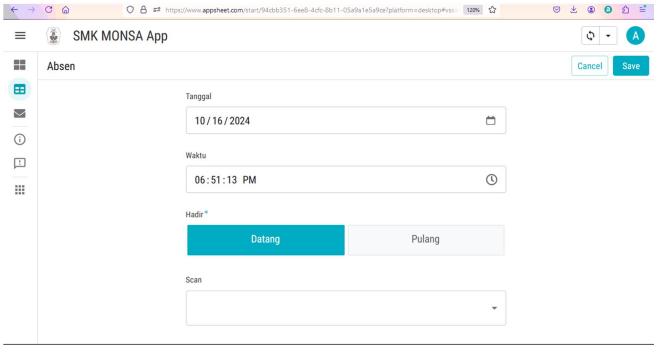

Figure 9. Absence page

In figure 9 is the absence page; on this page the arrival and return attendance are listed, which can be accessed by the teacher. This page displays the date and time when the user is absent.

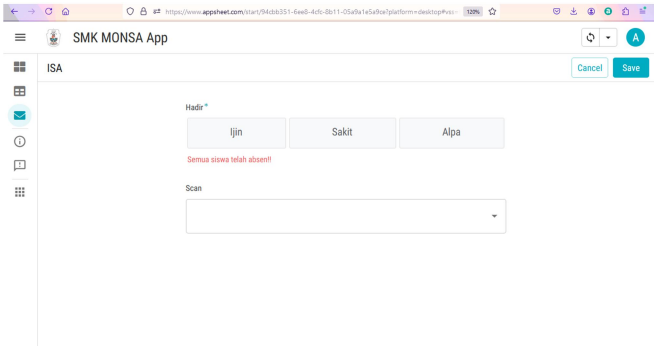

Figure 10. ISA page

In Figure 10, the ISA page has Permission, Illness, and Alpha navigation, which can be accessed, so that there is information for students when they cannot take part in learning.

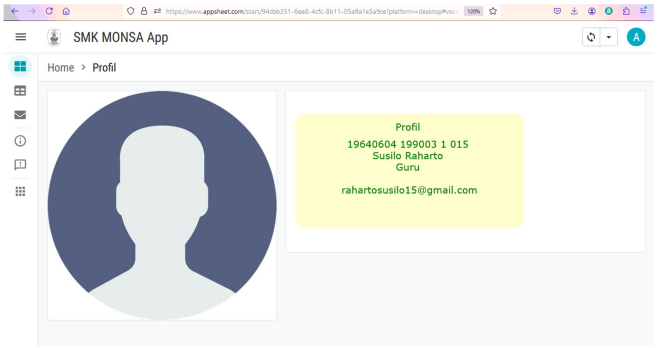

Figure 11. Profile page

Figure 11 is the profile page that has been accessed by teachers on the SMK MONSA App. The profile page will include the teacher's profile in the form of name, email, and NIP.

A. Blackbox Test

The applied functionality test aims to test the feasibility of the student grade processing information system [16]. Tests developed by researchers focus on the functionality of website-based value processing systems using black box testing.

TABLE I. SUMMARY OF BLACKBOX TESTING RESULTS

Number of Tests	Succeed	Fail
14	14	0
Presentation	100%	0%

From table 1, it is known that from 14 total tests, a success percentage of 100% was obtained, which means that all the features and menus of the website-based information system as a value processing system function well.

B. Media Expert Test

The feasibility or validation assessment was carried out by a media expert, where checks were carried out by two lecturers, namely the Informatics Engineering Education lecturer, Faculty of Teacher Training and Education, Muhammadiyah University of Surakarta. The results of the Media Expert validation test were processed using the Likert scale calculation method. The results of this media expert assessment can be seen in Table 1.

Likert Calculation

$$Feasibility\ presentation\ (\%) = \frac{\text{score obtained } x\ 100\%}{maximum\ score}$$

TABLE II. INTERPRETATION OF LIKERT CALCULATIONS

Feasibility Presentation	**Interpretation**
81%-100%	Very feasible
61%-80%	Feasible
41%-60%	Enough
21%-40%	Not feasible
1%-20%	Not feasibles

Based on table II, this is an interpretation of the percentage of product suitability. After carrying out the calculations, the following answer is obtained:

1. Media expert 1 with a final calculation of 94%. The interpretation statement is said to be "very feasible" to be implemented.
2. Media expert 2 with a final calculation of 69%. The interpretation statement is said to be "feasible" to be implemented.

So that after the calculations were carried out, the average value was 81.5%, so the interpretation statement was said to be "very feasible" to be implemented.

C. Student Eligibility Test

Testing of the website-based information system experiment applied to process student grades was carried out on the core subject, namely students at SMKN 1 Mondokan Sragen with 30 student participants. The trial questionnaire used to conduct the trial was appropriate and referred to the System Usability Scale questionnaire (SUS) by John Brooke. Provisions regarding giving grades by applying a ratio scale, namely from ratio 1 to ratio 5. The results of the questionnaire that has been tested on students can be seen in Table 5 below:

TABLE III. STUDENT QUESTION RESULTS

No	Question Items										Score	SUS Score
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
1	4	3	3	4	3	4	4	4	2	3	34	85
2	4	4	4	4	3	4	3	4	4	4	38	95
3	3	3	3	1	4	4	4	4	3	0	29	72.5
4	4	4	4	2	3	2	4	4	3	3	33	82.5
5	4	4	4	3	3	4	3	4	3	4	36	90
6	3	3	3	2	4	4	3	3	4	0	29	72.5
7	3	4	4	4	3	3	4	4	4	4	37	92.5
8	2	2	3	0	3	3	3	2	4	0	22	55
9	4	4	4	3	4	4	4	4	4	4	39	97.5
10	3	4	3	4	3	3	4	3	4	2	33	82.5
11	4	4	4	4	3	3	4	4	4	3	37	92.5
12	3	4	4	4	4	4	4	4	3	4	38	95
13	3	4	4	4	4	4	3	4	4	4	38	95
14	3	3	3	4	4	3	3	3	3	4	33	82.5
15	4	4	4	4	3	4	4	4	3	3	37	92.5
16	3	4	4	3	4	4	3	4	3	3	35	87.5
17	4	4	3	4	4	4	4	3	3	4	37	92.5
18	3	3	3	3	3	4	4	4	4	3	34	85
19	3	4	3	4	4	4	4	4	4	4	38	95
20	4	4	3	4	4	4	4	4	3	4	38	95
21	4	4	3	4	4	4	4	4	3	4	38	95
22	4	3	4	4	3	3	4	4	4	3	36	90
23	4	4	3	3	4	4	3	4	4	4	37	92.5
24	2	2	3	1	2	1	3	3	3	1	21	52.5
25	2	2	3	0	3	3	3	2	4	0	22	55
26	4	4	4	3	4	4	4	3	4	4	38	95
27	3	2	3	2	2	2	4	2	3	0	23	57.5
28	3	4	4	3	4	3	2	3	4	4	34	85
29	4	4	4	4	3	4	4	3	4	4	38	95
30	2	2	3	0	3	3	3	2	4	0	22	55
Total												**2510**
Average SUS Score												**83,66**

The results of the usability test showed that the average value of the SUS score was 83.66, providing an indication that the website-based information system as a value processor can be carried out with a good understanding of how to use it by the user, and the system has met the requirements of the usability value standard provisions, which must be met, so that system use can run optimally. Figure 12 is a picture of the variation in comparison of SUS score values according to the criteria regarding acceptance of an application, class scale, and level of application characteristics.

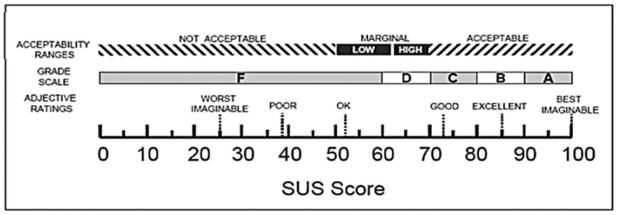

Figure 12. SUS Score

DISCUSSION

The product resulting from this research is a website-based information system for monitoring student progress, which can be accessed on mobile or desktop. Where previously the assessment system for monitoring student progress was deemed less effective in processing grades. Therefore, a website-based information system was developed as a processing tool so that it can be used as an information system that makes it easier for students and teachers.

A. Blackbox Test

The research results obtained from 14 total tests obtained a success percentage of 100%, which means that all features and menus of the website-based information system as a value processing system function well.

B. Media Expert Validation

The research results obtained from calculating the questionnaire that had been filled in by media experts were that the average test result for media experts was 81.5%, so the results from the Likert scale percentage table were said to be very feasible. This research was carried out with the aim of determining the feasibility of the product that has been developed. It can be concluded from the tests that have been carried out that the product developed is in the approved category and suitable for use.

C. Student Trial Results

The results of the average score obtained from distributing questionnaires to students who were tested at SMKN 1 Mondokan Sragen received a score of 83.6 based on SUS provisions that with 30 students the results were included in the acceptable criteria and in accordance with

the EXCELLENT category with the grade scale B. So, the conclusion is that in terms of usability, based on existing data, we get acceptable score results and are suitable for use as a website-based information system for processing student scores.

Previous research conducted by Ambarita & Huda (2021) discussed the design of a web-based academic information system. This research uses the RnD (Research and Development) method, with the system developed being a website-based value-processing information system and using the waterfall method. The research results showed that the web-based value processing information system at SMK Negeri 2 Kisaran using the waterfall method that had been built was running optimally. The results of this research are the same as research that has been carried out in that the website-based information system for processing student grades at SMKN 1 Mondokan Sragen was developed optimally.

Research by Haryono et al. (2022) discusses the implementation of the waterfall model in library information system application development. Researchers used the RnD (Research and Development) method by applying the waterfall method. From the results of this research, researchers revealed that the Library Information System application is very suitable for use. Research (Rifai & Yuniar, 2019) discusses the application of the waterfall method in designing web-based examination information systems at Indonesian Global Vocational Schools. The research results show that a website-based exam information system can make it easier for teachers to process their students' score data to be more effective and efficient in making score reports [17].

In its development, the website-based information system for processing student grades at SMKN 1 Mondokan Sragen can be accessed just by using a smartphone, making it easier to do anywhere and anytime. This system is also being developed by adding several menus. Following are some of the navigations developed, such as Home, Schedule, Absence, ISA, Grades, Violations, Achievements, Attendance, Database, Settings, Profile, and Logout.

The results of the research explain that the use of a website-based student assessment system can speed up the teacher's work in monitoring student development. Apart from that, it can make it easier for parents to monitor their students at school, and the use of a website-based assessment system has proven to be effective in monitoring student development.

IV. CONCLUSION

The application developed by the researcher is a learning application based on mobile websites and also desktops that is used as an assessment and monitoring system for student progress, consisting of: 1) The login page is used to enter the system; 2) The home page has several navigations such as Home, Schedule, Absence, ISA, Grades, Violations, Achievements, Attendance, Database, Settings, Profile, and Logout. There are several conclusions that can be drawn from this research, including:

1. The black box test results in a success percentage of 100%, which means that all features and menus of the website-based information system as a value processing system function "good."
2. The test results involving Media Experts obtained an average score of 81.5%, so the interpretation information regarding the information system as value processing at SMKN 1 Mondokan Sragen is said to be "very feasible" to be implemented.
3. The results of the trial on students at SMKN 1 Mondokan obtained an average of 83.66 in the SUS criteria, which was in the acceptable category and included in the EXCELLENT category with a grade scale of B. So in terms of usability, the information system for processing grades at SMKN 1 Mondokan Sragen is said to be "very feasible" to be implemented.

The implications for the development carried out in this research are as follows:

1. A website-based information system can make it easier for students to take attendance.
2. A website-based information system can make it easier for teachers to carry out assessments and monitor student progress.
3. This website-based information system can be accessed via mobile phone.
4. This website-based information system was developed so that it can become a precise and accurate student assessment information system.

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