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ASSIGNMENT AND MONITORING INFORMATION SYSTEM OF PRAKERIN STUDENTS BASED ON SMS GATEWAY WITH RASPBERRY PI

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ABSTRACT

This research is aimed to: (1) develop of assignment and monitoring information system of prakerin students based on SMS gateway with Raspberry Pi, and (2) reveal the quality of assignment and monitoring information system of prakerin students based on SMS gateway with Raspberry based on ISO 9126 on aspects of usability, functionality and portability.This development study refers to the Waterfall development procedure by Roger S. Pressman. The development design was grouped into five procedures, consisting of: (a) communication, (b) planning, (c) modeling, (d) construction and (e) deployment. The results of this research are: (1) development of assignment and monitoring information system of prakerin students based on SMS gateway with Raspberry Pi done by using web-based CMS Kalkun and (2) testing the quality level using ISO 9126 on usablity aspect results 85% (high) with alpha cronbach of 0.851 (good), functionality aspect yields 1 (good), and meets the portability aspect.

Keywords: system, sms gateway, raspberry pi, prakerin, dual system

INTRODUCTION

One of the competency training in vocational education is the apprenticeship system. In Australia this system is called the apprentice system and in Germany it is called a dual system. This system produces workers' skills in accordance with their fields Euler [2].The Vocational Education and Training (VET) education system in Germany is a good example and is applied in several European countries. In Indonesia, the dual system education environment is called the Dual System Education (DSE) and is now often referred to as Industrial Work Practices (Prakerin terms in Indonesia). Prakerin is part of a joint program between Vocational High School and the industrial world.

Presidential Instruction No. 9 of 2016 concerning the revitalization of Vocational High School (VHS) education in the context of improving the quality and competitiveness of Indonesian human resources. The Vocational High School program (2012) must really be able to be a link and match with the needs of the labor market, hopefully it is prepared to be able to support the local, regional and global job markets with standardized and certified competencies. In Constitution Number 20 of 2003 concerning the National Education System (NES) article 15 it is stated that vocational education is secondary education which prepares students to work in certain fields. The VHS 1 Sawit Boyolali applies the Prakerin system for 3 months in the Business World and Industrial World (BW/IW) for students throughout the academic year.

The combination of apprenticeship with workplace-based education within the classroom is a differentiator between vocational education and general education[9]. The success and effectiveness of the implementation of vocational education and training programs is highly dependent on collaboration with BW/IW [1].

The mechanism of the implementation of internship in VHS 1 Sawit is to model of half the number of classes carrying out internship and the rest carry out learning as usual. Students who have a turn to carry out internship before departing, first get briefing by their respective expertise program team. Internship training is held to provide final preparation for students. Material on the training of internship includes: (1) Technical matters for the implementation of internship, (2) tips on implementation of internship so that objectives can be achieved, (3) Motivation so students can utilize internship to learn while building networks and learning career possibilities, and (4) Best Practices and Lesson Learned [1].

In addition, things that need to be emphasized in the implementation of training candidates for internship include: (1) discipline, (2) work ethic, (3) competition, (4) thinking maturity, responsibility, (5) labor regulations, honesty, (6) OSEH (Occupational Safety and Environmental Health), and (7) social habits and social sanctions Huda.

Permendikbud Year 2017 Number 3 Article 4 states, "Students on formal pathways who take the UN, US, and USBN must meet the following requirements: (a) be registered in the last semester at an Education Level at the Education Unit and have a complete report on the assessment of learning outcomes at a Education levels in certain Education Units start from semester I to semester V; or (b) have completed all the SKS loads required for students in the Education Unit based on the Semester Credit System (SCS) which is equivalent to semester V ". During the implementation of internship in BW/IW, students focus on these activities and leave the teaching and learning activities.

One of the functions of the SMS gateway information system is to create a centralized SMS service that can perform one action and send a mass message. Sending messages can be done with a class grouping model, majors or expertise programs as well as waves that carry out internship. Initial studies conducted by researchers, students who have cellphones at VHS 1 Sawit reached 98%, but only 50% of Android smartphone phones and the rest are Symbian and Java-based phones which do not support whatsapp access. The VHS 1 Sawit on Saturday November 3 2016 has launched the "Smartschool". Smartschool or smart schools that use technology in the educational process, in teaching and learning activities and systems in the school.

This of course A learning method that uses ICTs to support teaching and learning process ubiquitously and facilitate the acquisition and use of knowledge". The exponential growth of Information and Communication Technology (ICT) has changed the education systems and contributed to the improvement of the learning process[3].

Some factors that influence individuals in addressing the use of technology are openness to technology, teacher attitudes, knowledge and skills, and teacher work time and workload. For example, the 'Smart School' program in Malaysia needs time to be implemented in connection with the socialization process within the bureaucracy and the strategic planning of the department concerned. Information is data that is processed into a form that is more useful and more meaningful for those who receive it. The source of information is data which is the plural of the singular form datum or data item. Data is a reality that describes a real event and unity [4].

RESEARCH METHODS

This research uses a research and development (R&D) model. Research and development procedures conducted by researchers use the Waterfall development model, while the stages in the Waterfall development model are: communication, planning, modeling, construction and deployment [8].

The research subjects for the usability aspect were 20 respondents consisting of

adaptive normative subjects, the executive committee and the smartschool developer at VHS 1 Sawit Boyolali. Determination of the sample for usability testing refers to Jakob Nielsen [7] who argues that for quantitative testing (aiming at statistical results), user tests are at least 20 respondents. While the research subject for functionality and portability aspects is the SMS gateway system with Raspberry Pi.

RESULTS AND DISCUSSION

The needs analysis phase aims to obtain the information needed in building the SMS gateway system with Raspberry Pi for the assignment and monitoring of industrial students. At this stage, the study begins with observations and interviews to obtain information on system requirements. The interview stage was conducted on the smartschool developer and vice head of Public Relations at VHS 1 Sawit. System needs as a means of information for students through an SMS gateway that uses Raspberry Pi. In this stage, an analysis of hardware or hardware requirements is used in developing the SMS gateway system. The following hardware requirements in system development include: Raspberry Pi type 3, SD Card 16GB Class 10, Wavecom Modem, Computer or laptop to access the SMS gateway system with Raspberry Pi.

Modeling Framework Results

The definition of actor in the SMS gateway system with Raspberry Pi is divided into 1 namely:

Table 1. Definition of the SMS Gateway System Actor

Actor	Description
Mapel Teacher / Management of Internship (User)	Actors in charge and responsible and have full access rights to all information in the system
Student	Actors who receive information about subject assignments and prakerin monitoring via SMS
BW/IW	Actors who receive information about subject assignments and industrial monitoring via SMS

Use Case Diagram

The Use Case diagram of the teacher / user of the SMS Gateway System with Raspberry Pi is shown in Figure 1 below:

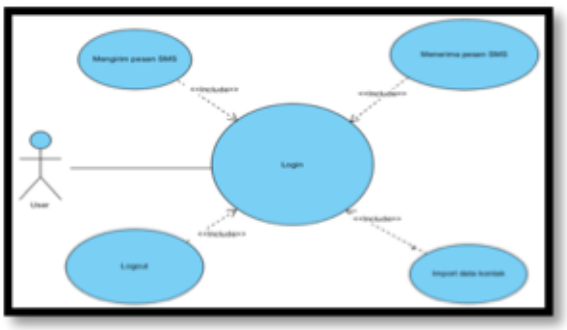

Figure 1. Use Case Diagram User

Use Case diagram of students and DUDI as recipients of messages from the SMS Gateway Information System with Raspberry Pi is shown in Figure 2 below:

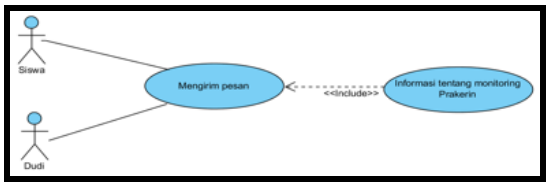

Figure 2. Student and BW/IW Use Case Diagrams

Activity diagram of Raspberry Pi access via internet is shown in the following figure 3:

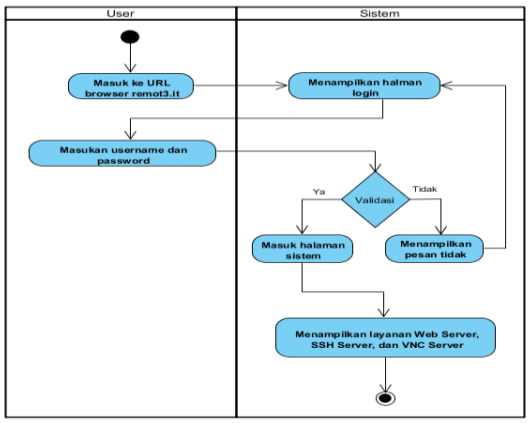

Figure 3. Activity diagram of Raspberry Pi access through the Internet

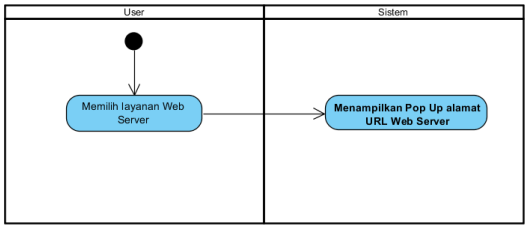

Figure 4. Activity diagram of web server access

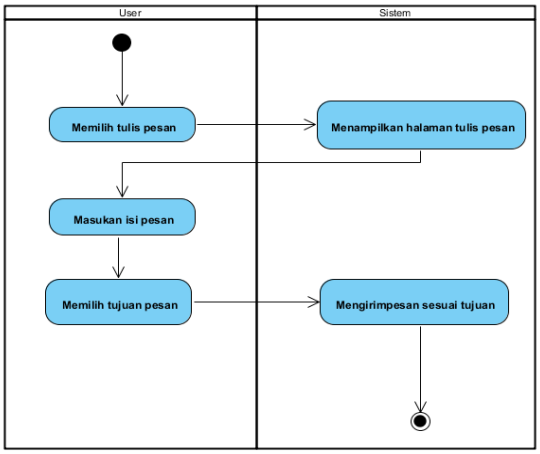

Figure 5. Activity Diagram Write Message

System Design

Architectural design of Information Systems Assignment and Monitoring of Internship Students based on SMS Gateway with Raspberry Pi is shown in Figure 6 below:

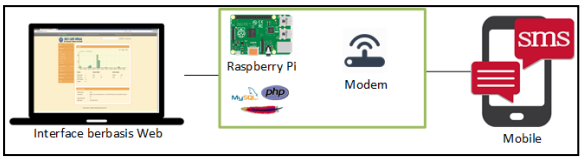

Figure 6. Architecture Design of the Raspberry Pi System

Overall architecture of the SMS Gateway Assignment and Monitoring Student Assignment and Monitoring Information System with Raspberry Pi is shown in Figure 7 below:

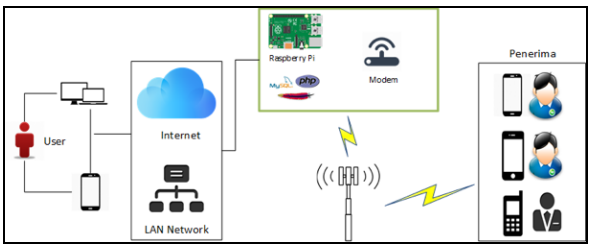

Figure 7. Raspberry Pi System Architecture Design

Interface Design

The login page is the first page that will appear as user access to enter the SMS gateway web dashboard page. The login page interface page is made simple by displaying a username and password form. The login page interface design is shown in Figure 8 below:

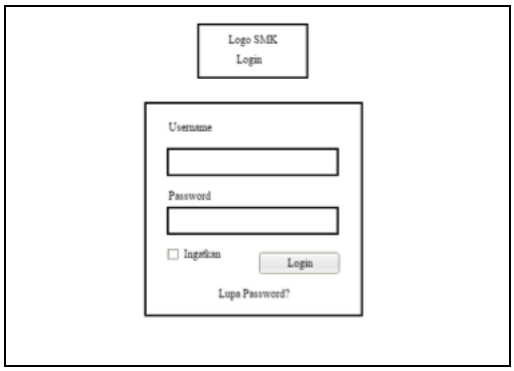

Figure 8. Login page

The dashboard page contains system information and message statistics. The dashboard page design is shown in Figure 9 below:

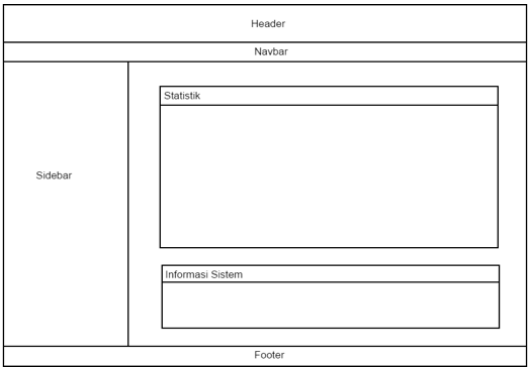

Figure 9. Dashboard page

The message compilation page design is shown in Figure 10 below:

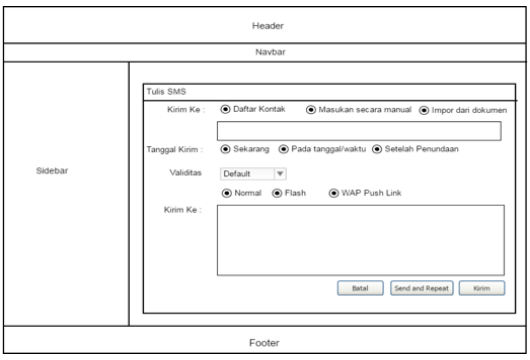

Figure 10. Message Write Page

The incoming message page design is shown in Figure 11 below:

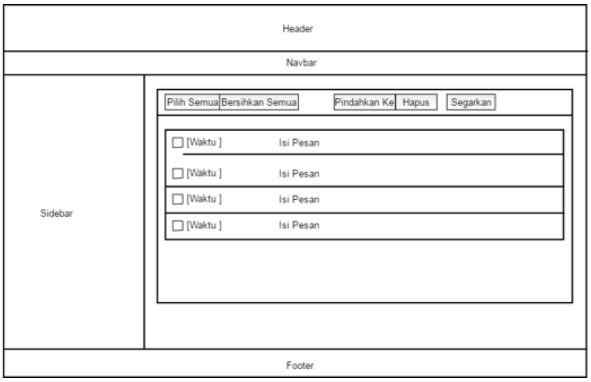

Figure 11. Incoming Message Page

The out going message page design is shown in Figure 12 below:

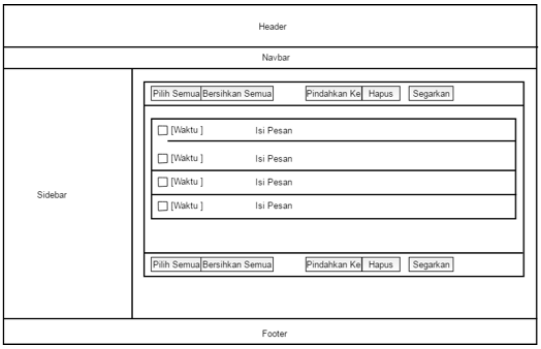

Figure 12. Outgoing Message Page

The contact page design is shown by the following picture 13:

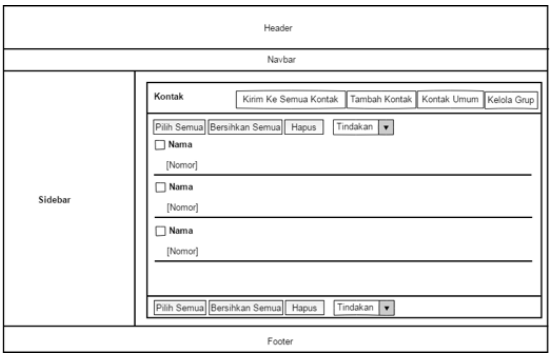

Figure 13. Contact page

The contact import page design is shown in Figure 14 below:

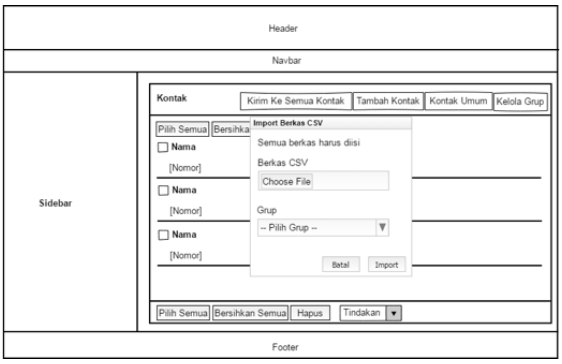

Figure 14. Import Contacts page

The design of the user page interface is shown in the following figure 15:

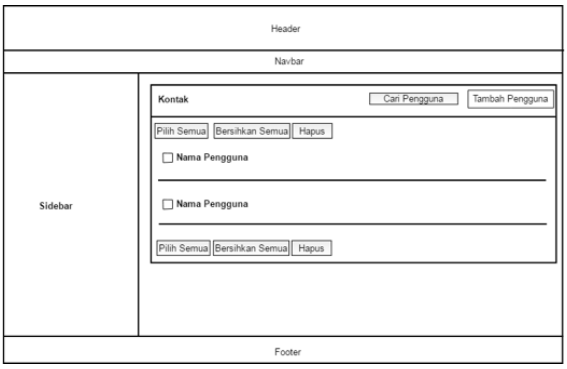

Figure 15. User Page

Results of the Construction Framework Implementation

The web server implementation on the Raspberryaspberry Pi by writing the Raspberry Pi (Internet Protocol) IP address in the browser application is shown in the following figure 16:

Figure 16. Implementation of a Web Server on the Raspberry Pi

The implementation of the login page interface is shown in Figure 17 below:

Figure 17. Login page

The interface implementation of the dashboard page is shown in Figure 18. On this page the message statistics are displayed through bar graphs and gammu versions on the Raspberry Pi.

Figure 18. Dashboard page

The message compilation page is a pop-up page shown in Figure 19 below:

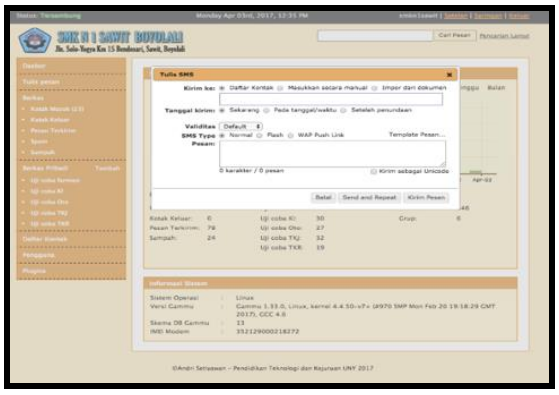

Figure 19. Compose Message Pop-up page

The implementation of the incoming message page is shown in Figure 20 below:

Figure 20. Inbox Page

The implementation of the outgoing message page is shown in Figure 21 below:

Figure 21. Message Sent Page

The contact page implementation is shown in Figure 22 below:

Figure 22. Contact page

The implementation of the contact import page is shown in Figure 23 below:

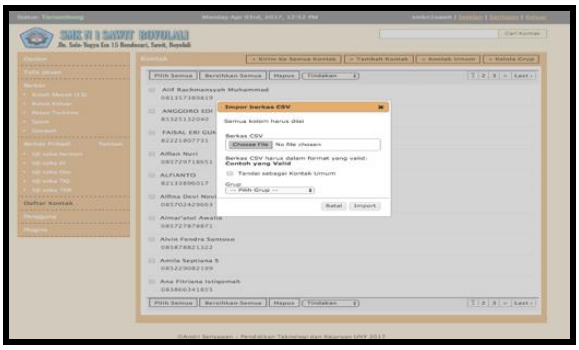

Figure 23. Import Contact Pop-up page

The user page implementation is shown in Figure 24 below:

Figure 24. User Page

Usability Testing Results

Testing the usability aspect using instruments that have been developed by IBM. The results of testing the usability aspects of the SMS Gateway System with Raspberry Pi are shown in the following table 2 and table 3:

Table 2. Calculation of Total Scores

	Score	Sum	Score x Sum
STS	1	0	0
TS	2	0	0
RR	3	23	69
S	4	225	900
SS	5	132	660
	Total		1629

The percentage of usability aspect testing results is 85%. The test results are then converted to a qualitative scale and the results are very high and meet the usability

aspect. Reliability calculation with alpha cronbach usability test results using the CSUQ instrument from IBM with the SPSS 23 application program is shown in Figure 25 below:

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.851	19

Figure 25. Alpha cronbach test results for usability aspects

The conversion of the Cronbach alpha value is shown by the following table 4:

Table 3. Cronbach Alpha Conversions

cronbach's alpha (α)	Internal Consistancy
$\geq .9$	Excellent
$.9 > \alpha \geq .8$	Good
$.8 > \alpha \geq .7$	Acceptable
$.7 > \alpha \geq .6$	Questionable
$.6 \alpha \geq .5$	Poor
$< .5$	Unacceptable

Usability test results with Cronbach alpha worth 0.851. Based on Cronbach alpha conversion the usability test results are categorized as "Good".

The functionality testing was tested on 5 people consisting of 2 people as requirements (committee of the apprenticeship), 2 experts smartschool developers and 1 expert in web programming or people who work as web developers. The instrument used fulfills the sub-characteristic aspects of functionality consisting of suitability, accuracy, interoperability, complience and security.

Table 4 Results of functionality testing

Statement	Ya	No	Statement	Ya	No
1	5	0	11	5	0
2	5	0	12	5	0
3	5	0	13	5	0
4	5	0	14	5	0
5	5	0	15	5	0
6	5	0	16	5	0
7	5	0	17	5	0
8	5	0	18	5	0
9	5	0	19	5	0
10	5	0	20	5	0

Calculation of functionality testing using the formula ISO / IEC 9126 as follows:

A = function not functioning properly (No) x number of testers = 0

B = all number of functions evaluated x number of testers = 20 x 5 = 100, So score X = 1 – A/B = 1– 0/100 = 1–0 = 1

Based on the test results above it can be concluded that the value of X = 1 so that the SMS gateway system with Raspberry Pi meets the aspect of functionality according to ISO / IEC 9126.

Testing aspects of portability using 5 types of desktop-based browsers, namely Mozilla Firefox, Palemoon, Chrome, Opera, and Safari. The test results of the portability aspects of the five web browsers are as follows:

Table 5. Portability Testing of Dashboard Pages

Browser	Display	Result
Mozilla Firefox		Get away

Palemoon		Get away
Chrome		Get away
Opera		Get away
Safari		Get away

The deployment stage is the stage of implementing the software to the customer and maintaining the software regularly so that the system can continue to run and develop according to its function. The SMS Gateway system with Raspberry Pi is used as an information media for the delivery of apprenticeship assignments and monitoring of students prakerin at VHS 1 Sawit Boyolali.

Discussion of Usability Testing Results

Based on the results of testing the quality of software developed on the usability aspect has a percentage of 85% or has a high quality scale and based on alpha cronbach calculations has a calculation result of 0.851 or has a "good" category. The SMS Gateway system with Raspberry Pi for Internship Assignment and Monitoring of prakerin the usability aspect and is suitable for use.

Discussion of Functionality Testing Results

Based on the results of testing the quality of software developed on the aspect of functionality has a percentage of success of 100% and has a value of x = 1 so that it has a very high quality and is said to be good based on calculations according to ISO / IEC 9126 in aspects of functionality with sub characteristics of security, suitability, accuracy and compliance. The SMS Gateway system with Raspberry Pi for Internship Assignments and Monitoring of prakerin fulfills functionality and suitable for use.

Discussion of Portability Test Results

Based on the results of testing the quality of software developed on the portability aspect by using 5 desktop-based web browsers namely Mozilla Firefox, Palemoon, Chrome, Opera, and Safari with the results of meeting portability aspects based on Schach (2008), that is, web-based applications are said to meet the portability aspect if can be read on various web browsers. The SMS Gateway system with Raspberry Pi for Internship Assignment and Monitoring of prakerin the portability aspect and suitable for use.

CONCLUSION

The development of SMS Gateway Assignment and Monitoring of Student prakerin Information System software based on Raspberry Pi is done using Turkey CMS. Information System for Assigning and Monitoring Student Prakerin based on SMS Gateway with Raspberry Pi web based can be accessed through the local network and the internet using Gammu as the SMS Gateway engine. The system was developed to assist

the dissemination of information on assignment and monitoring of students who are carrying out internship.

Testing the quality level of Information Systems Assignment and Monitoring of Prakerin Students based on SMS Gateway with Raspberry Pi is carried out using ISO 9126 testing standards. The usablity aspect test produces a percentage of 85% (high) with alpha cronbach of 0.851 (good), the functionality aspect produces a value of 1 (good), testing the portability aspect using 5 web browsers, the result is that the software can run without errors so that it meets the portability aspect. Based on the test results, the SMS Gateway System with Raspberry Pi suitable to be used.

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