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DEVELOPMENT OF SMP PGRI REJOTANGAN WEBSITE USING THE PERSONAL EXTREME PROGRAMMING MODEL

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ABSTRACT

SMP PGRI Rejotangan is one of the 7 schools in Rejotangan sub-district. Where PGRI Rejotangan Jun-ior High School does not yet have a school website as a means of advertising or publication to provide information about the school completely, simply, quickly, and accurately. With the absence of school pro-motion media such as social media and the lack of publication of school information in the community, SMP PGRI Rejotangan has not been widely known by the public. This research aims to develop a feasible school website of SMP PGRI Rejotangan so that it can be utilized as a school information media. The type of research used is Research and Development (RnD) with the Personal Extreme Programming (PXP) model. Personal Extreme Programming (PXP) consists of 7 phases, namely: (1) Requirements, (2) Planning, (3) Iteration Initialization, (4) Design, (5) Implementation, (6) System Testing, (7) Retrospective. The results of the assessment from media expert I and media expert II can be stated that the product developed has reached very feasible criteria with a percentage achievement of 100% in the Compatibility aspect and 100% in the funtional suitability aspect. Meanwhile, the results of the assessment from the small group test can be stated that the product developed has reached the feasible criteria with a score of 97.5. Then the results of the assessment from the large group test obtained a score of 89.25 which was included in the Eligible criteria. Based on the results of the study, it is concluded that the PGRI Rejotangan Junior High School school website is suitable for use..

I. INTRODUCTION

The development of information technology, especially the internet, has provided great benefits in various fields, including education. The internet has become an efficient and accurate means of global communication and information transmission. The development of information technology not only affects the development of education, but also other fields such as public administration, healthcare and business. In today's information age, educational information systems of educational institutions have experienced a significant impact from the development of information technology. The management of school information media by utilizing website technology can be a place to store school data and a means for the community to find information about schools. The school website contains information that includes the school profile, the identity of the teaching staff, the agenda of school activities, photo and video galleries of activities carried out, and important information that is always updated. The use of school websites offers convenience in the management of organized information, faster access to information, and the delivery of more accurate information. In Rejotangan Sub-district, Tulungagung Regency, there is SMP PGRI Rejotangan that does not yet have a school website [1]. This shows that SMP PGRI Rejotangan has not utilized the potential of the school website as a means of advertising or publication to provide information about the school in a complete, simple, fast, and accurate manner. Whereas, SMP PGRI Rejotangan already has an internet network that can support the management of the school website as a means of publication to the community [2]. Currently, announcements to students and the delivery of information to the community at SMP PGRI Rejotangan are still done verbally in each class or through the bulletin board. The lack of school promotion media and the lack of publication of school information in the community also have a direct impact on SMP PGRI Rejotangan, which results in many people not knowing about SMP PGRI Rejotangan school.

II. RESEARCH METHODS

A. *Website*

According to [4], a website is a means of information, communication, and interaction with the public that is very important and needed by organizations, including educational institutions. Information on educational institutions on the website will greatly help information users because it is easily accessible anytime and anywhere via the internet. According to [5] the elements of the website to provide the existence of a website, the supporting elements must be available, as follows:

1) *Domain name or URL*
It is a unique address in the internet world that is used to identify a website.
2) *Web Hosting*
Can be interpreted as a room contained in the hard disk where various data, files, images and so on that will be displayed on the website.
3) *Program language*
Is the language used to translate every command on the website when accessed. The type of program language determines the static, dynamic, or interactive nature of a website.

B. *ISO 25010 Software Quality*

ISO / IEC 25010 is one of the quality models that can be used as a standard in measuring software quality. [6] Overall ISO / IEC 25010 has 8 characteristics:

1) *Functional Suitability*
Is a characteristic to measure the extent to which a product or system provides functions that meet needs when used under certain conditions.
2) *Performance Efficiency*
Is a characteristic to measure performance relative to the resources used under certain conditions in a system.
3) *Compatibility*
Is a characteristic to measure the extent to which a system can exchange information with other systems.
4) *Usability*
Is a characteristic to measure the extent to which a system can be used by users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specific context of use.
5) *Realiability*
Is a characteristic to measure the extent to which the system can perform functions under specified conditions for a specified period of time.
6) *Security*
Is a characteristic to measure a system in protecting information and data, so that the system has a level of data access according to the type and level of authorization.
7) *Maintainability*
Is a characteristic to represent the level of effectiveness and efficiency in the modification process for system improvements in accordance with adjustments and changes in the operational environment..
8) *Portability*
Is a characteristic to represent the level of effectiveness and efficiency of the system in transferring from one device to another.

C. *Personal eXtreme Programming*

The PXP method is a software development method designed for single programmers. The development process is iterative and applies practices that allow programmers to be more flexible and responsive to change [7].

D. *Research Model*

This research utilizes the Research And Development research procedure. Research And Development Research and development can be defined as a process or developing new product steps to improve existing products. The product does not have to be in the form of objects or hardware (hardware), such as books, modules, learning aids in the classroom or in the laboratory, but it can also be software (software) such as computer programs.

The design of the SMP PGRI Rejotangan school website uses the Agile Software Development model type Personal Extreme Programming (PXP). PXP was chosen because it can be used by a single developer and the development process is considered more efficient. Later there is an iterative development stage, which breaks down the creation of the system into small parts and is dynamic or can be modified if there are deficiencies or

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errors [8]. According to Dzhurov, software with the PXP method is iterative and consists of several iterations and parallel cycles. Each phase of Personal eX-treme Programming (PXP) is shown in Figure 1.

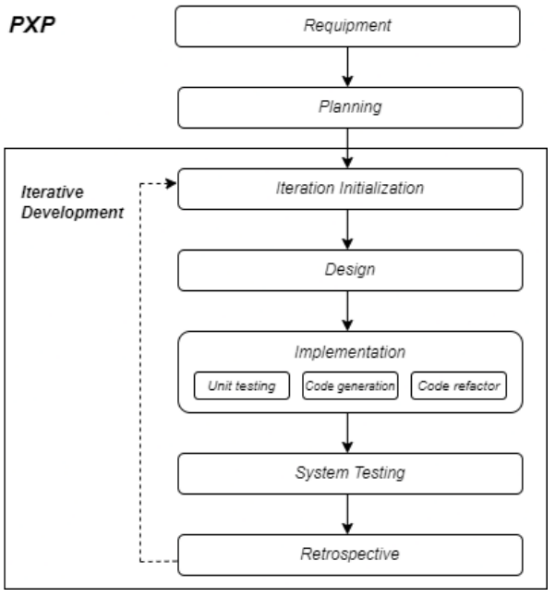

Figure. 1. Personal eXtreme Programming (PXP) phase.

E. Research Procedure

The research procedure used in this research is the Agile Software Development Model Personal Extreme Programming (PXP) type. Personal Extreme Programming (PXP) consists of seven phases, namely Requirements, Planning, Iteration Initialization, Design, Implementation, System Testing, Retrospec-tive.

1) *Requirements*

At this stage functional and nonfunctional requirements documents are created for the system. Requirements collection can be done by discussing with users of the system to be built.

2) *Planning*

at this stage from the basis of the problems obtained into user stories so that the system needs can be. then proceed with determining the priority of system needs using the MoS-CoW method which aims to identify user stories so that they can classify the list according to their priority level. User stories are categorized into four priority categories, namely (Must have, Should have, Could have, Won't have) [9].

3) *Iteration initialization*

Is the initial stage of each iteration that will be carried out. The iteration starts with task selection, which will be the main focus of the iteration. These tasks are obtained from the planning results at the planning stage.

4) *Design*

At this stage, design the application that will be made with web-based.

5) *Implementation*

This stage performs coding and unit testing. Implementation is split into three phases, namely Unit Testing, Code Generation, and Code Refactoring. Unit Testing is testing the features of the implemented iteration. In the Code generation phase, developers will create program code for each module of the user stories in the implemented iteration, Code refactor is the stage of correcting and revising the code. When the code is tested in unit testing, if there is an error, a re-correction or refactor is made on the code error found, if there is no error then proceed to the next unit [10].

6) *System Testing*

Testing the system that has been made by researchers whether the application can operate properly.

7) *Retrospective*

This stage is a past event where it is necessary to review and evaluate the processing time whether it is in accordance with the target and system planning.

F. Trial Subjects

The trials included individual trials, small group trials, and large group trials. The implementation of this trial aims to determine the feasibility of this school website. The following are the specifications that will be selected as testers:

1) Individual Test

Two Bhinneka PGRI University lecturers who are experts in the field of website expertise.

2) Small Group Test

This small group test was conducted by superuser, admin, and operator role users on the PGRI Rejotangan Junior High School website.

3) Large Group Test

This large group test was conducted by 10 (ten) teachers and students at SMP PGRI Rejotangan..

G. Data Collection Technique

As for this research, the data collection technique used is the questionnaire technique. This questionnaire will be used to obtain data from media experts, roles users and guests. The questionnaires that have been made will be given in stages, starting from media experts or lecturers then role users and teachers / students as guests. After all the questionnaires are filled in, the authors will analyze the data.

H. Data Analysis Technique

After the data is obtained, the next step is to analyze the data. This research focuses more on how to develop a school website so that the data is analyzed with a descriptive percentage system. To analyze the data from the media expert questionnaire (funtional suitability aspect, Compatibil-ity aspect), the following steps were taken:

1) Questionnaires that have been filled in by respondents, checked for completeness of answers, then arranged according to the respondent code.

2) Calculate the percentage with the formula:

$$Validation\ Score = \frac{\text{Total score assigned}}{\text{Total score (overall)}}\ X\ 100\% \quad [11]$$

Based on the above calculations, to determine the level of feasibility of the website, the percentage rating scale is used as in table 1.

TABLE 1

CRITERIA PERSENTASE RATING SCALE

No	Score	Category
1	< 21%	Very unfeasible
2	21% - 40%	Less feasible
3	41% - 60%	Decent enough
4	61% - 80%	Worth
5	81% - 100%	Very feasible

Furthermore, to analyze the data from the small and large group test questionnaires using the System Usability Scale (SUS) which is a questionnaire that can be used to measure the usability of computer systems according to the subjective point of view of users consisting of 10 question items. Score calculation rules apply to each respondent. Furthermore, the SUS score of each respondent is sought for its average score by summing all scores and dividing by the number of respondents. The following formula calculates the SUS score:

$$X = \frac{\sum x}{n}$$

Based on the above calculations, to determine the level of website feasibility, the results of processing SUS question components from respondents can be calculated for the average value of the SUS score as in table 2.

TABLE 2

SKOR SYSTEM USABILITY SCALE (SUS)

Skor	Grade Scale	Adjective Ratings
> 81	A	Excellent
68 – 81	B	Good
68	C	OK/Fair
51 – 67	D	Poor
< 52	F	Worst

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III. RESULT & DISCUSSION

A. *Data presentation, Problem and Needs Analysis Results*

The first analysis result is a functional needs analysis that produces: (1) The function of displaying all school information, (2) Role access rights function, (3) Dashboard login function, (4) News management function, (5) School structure management function, (6) Student data management function, (7) Gallery management function, (8) User menu management function, and (9) Message viewing function. The second analysis result is the analysis of non-functional needs which produces the needs in making the system in the form of: (1) XAMPP application, (2) Notepad++, (3) Web browser. As well as hardware requirements including (1) Processor at least Pentium Dual Core or equivalent, (2) Ram at least 1 GB, (3) 160 GB Hard Drive, (4) Monitor, (5) Keyboard, and (6) Mouse.

B. *Data presentation, Results Analysis of product development*

1) *Requirements*

The requirement stage is the first stage in the development of the SMP PGRI Rejotangan website. At this stage, an analysis is carried out to meet the usefulness of the system based on the wants and needs of users through a direct discussion process with Mr. Adji Winarko S.Pd. as the Principal. Based on the results of the interview, a user story was determined which can be seen in table 3.

2) *Planning*

At this stage, planning is carried out on user stories that have been made. website development planning based on determining the story points of each user story and planning iterations and priorities. Table 3 is a breakdown of user stories.

TABLE 3
USER STORY

User Story Code	Description
Iteration 1	
US-01	Create a homepage on the landing page.
US-02	Create a profile page (vision & mission and school structure) on the landing page.
US-03	Create a news page (document, link, news category) on the landing page.
US-04	Create a gallery page on the landing page.
US-05	Create a contact page on the landing page.
US-06	Create a login page.
US-07	Create a home menu on the dashboard.
US-08	Create a news menu (documents, links, news categories) on the dashboard.
US-09	Creating a school structure menu on the dashboard.
US-10	Creating a student data menu on the dashboard.
US-11	Creating a gallery menu on the dashboard.
US-12	Create an auth menu on the dashboard.
US-13	Creating a message menu on the dashboard.
Iteration 2	
US-14	Login to the dashboard
US-15	Manage the news menu on the dashboard.
US-16	Manage the school structure data menu on the dashboard.
US-17	Managing the student data menu on the dashboard.
US-18	Manage the gallery menu on the dashboard.
US-19	Managing the user (auth) menu on the dashboard.
US-20	View messages on the dashboard
Iteration 3	
US-21	View the home menu on the landingpage
US-22	View the profile menu on the landingpage
US-23	View the news menu on the landingpage
US-24	View the gallery menu on the landingpage
US-25	Sending a message on the contact us menu

3) *Iterasi initialization*

At this stage, the division of user story work that has been made at the planning stage where the work on iteration 1 (US-01 - US-13) is done first with a predetermined time of 3 weeks of work. The next iteration 2 (US-14 - US-20) was done in 7 weeks, and the last one did iteration 3 which was done in 2 weeks.

4) *Design*

At the design stage, an ERD (Class Diagram) is made according to the user story that has been made. The entities in ERD Design iteration 2 are news, categories, links, structures, documents, galleries, students, contacts, users, roles and several laravel default tables namely personal_access_tokens, migrations, views, failed_jobs and password_resets.

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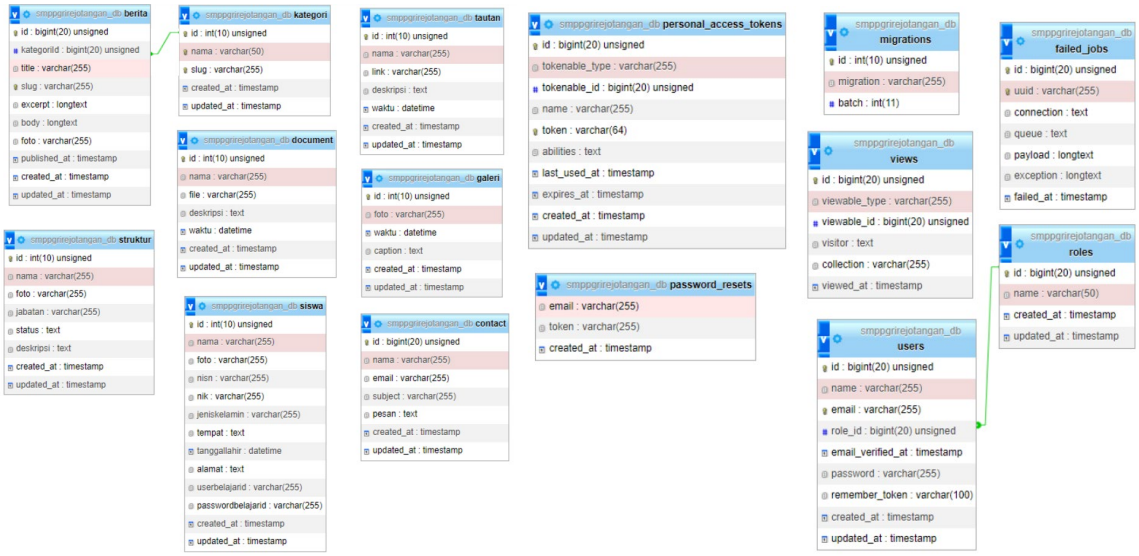

Figure. 2. Class Diagram

5) *Implementation*

At this stage, it starts from unit testing each user story using the PHPUnit library. The results of the unit testing are shown in Figure 3.

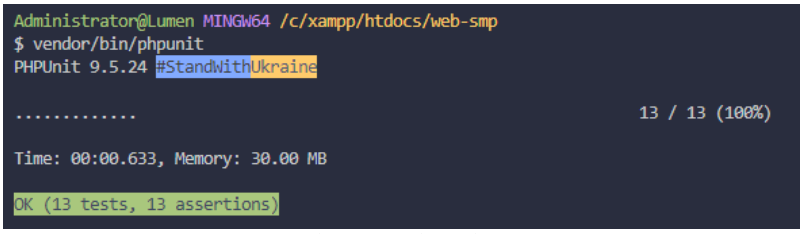

Figure. 3. Unit Testing

Next, test through code implementation where the benchmark for success in this implementation is to successfully run all the functions that have been written in the user story. Here are some implementations of each user story.

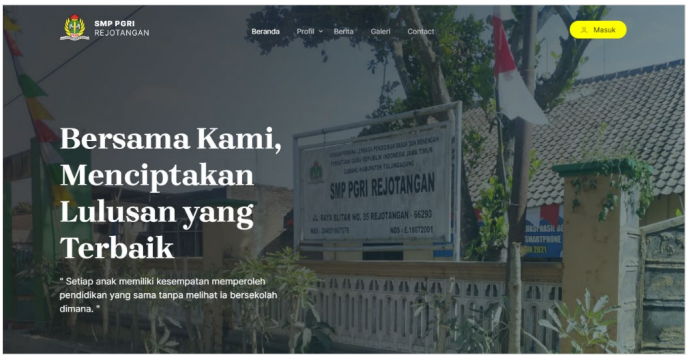

Figure. 4. Initial view of the website

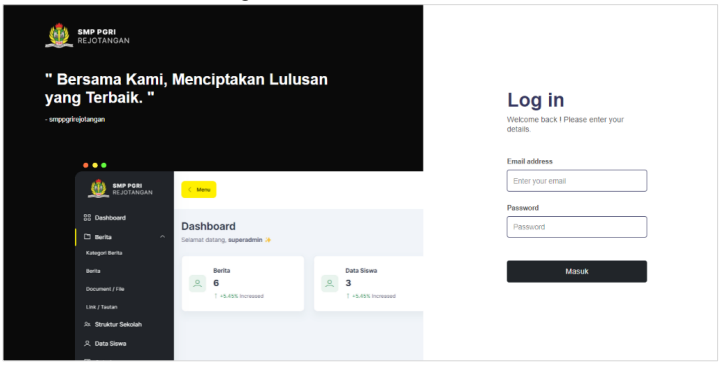

Figure. 5. Website login view

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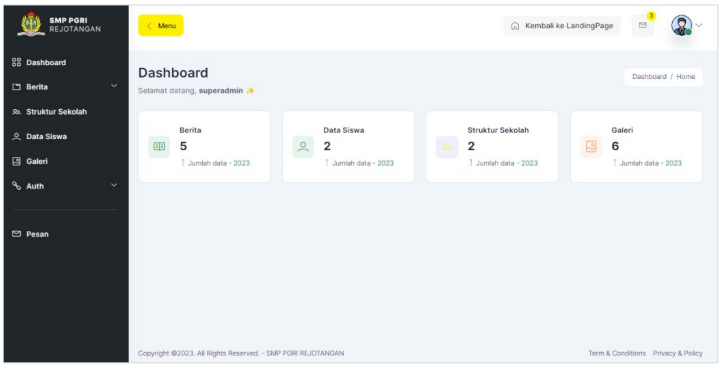

Figure. 6. Website dashboard view

6) *System testing*

At this stage, system testing will be carried out using Accepted Test Criteria in accordance with the iterations carried out at the implementation stage. The Accepted Test Criteria results are shown in table 4.

TABLE 4
ACCEPTED TEST CRITERIA

User Story Code	Description	Testing Result
Iteration 1		
US-01	Create a homepage on the landing page.	Successful
US-02	Create a profile page (vision & mission and school structure) on the landing page.	Successful
US-03	Create a news page (document, link, news category) on the landing page.	Successful
US-04	Create a gallery page on the landing page.	Successful
US-05	Create a contact page on the landing page.	Successful
US-06	Create a login page.	Successful
US-07	Create a home menu on the dashboard.	Successful
US-08	Create a news menu (documents, links, news categories) on the dashboard.	Successful
US-09	Creating a school structure menu on the dashboard.	Successful
US-10	Creating a student data menu on the dashboard.	Successful
US-11	Creating a gallery menu on the dashboard.	Successful
US-12	Create an auth menu on the dashboard.	Successful
US-13	Creating a message menu on the dashboard.	Successful
Iteration 2		Successful
US-14	Login to the dashboard	
US-15	Manage the news menu on the dashboard.	Successful
US-16	Manage the school structure data menu on the dashboard.	Successful
US-17	Managing the student data menu on the dashboard.	Successful
US-18	Manage the gallery menu on the dashboard.	Successful
US-19	Managing the user (auth) menu on the dashboard.	Successful
US-20	View messages on the dashboard	Successful
Iteration 3		
US-21	View the home menu on the landingpage	Successful
US-22	View the profile menu on the landingpage	Successful
US-23	View the news menu on the landingpage	Successful
US-24	View the gallery menu on the landingpage	Successful
US-25	Sending a message on the contact us menu	Successful

7) *Restropestive*

The next step is to verify the suitability of the estimated time and evaluate the implementation of the website. The time specified in iterations 1, 2 and 3 is 84 story points or 84 working days, where in the implementation of each iteration it is in accordance with the estimated time of 12 weeks. Next, at the stage of evaluating the implementation of the website, everything has gone according to what was planned so that there are no obstacles in working on the website.

C. *Product Trial Results*

1) *Media expert test results*

In the media expert test, researchers adopted from ISO 25010 on the funtional suitability and compatibility aspects with the following test results.

TABLE 5
MEDIA EXPERT TEST RESULT

Sub aspect	Media expert 1	Media expert 2	Total Score	Max Score(overall)	Percentage
funtional suitability aspect	597	597	1194	1194	100%
compatibility aspect	398	398	796	796	100%

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From the test results conducted by media experts in table 5, the percentage results are obtained as follows:

$$Validation\ Score = \frac{\text{Total score assigned}}{\text{Total score (overall)}}\ X\ 100\%$$

$$Validation\ Score = \frac{1990}{1990}\ X\ 100\%$$

$$Validation\ Score = 100\%$$

Based on the test results above, this system has a feasibility level of 100% with the feasibility criteria **Very feasible.**

2) *Small group test results*

In the small group test, researchers adopted from ISO 25010 in the usability aspect of the researcher taking 3 respondents, namely the website role holder, with the following trial results.

TABLE 6
SMALL GROUP TEST RESULTS

Respondents	Total Score	SUS Score
N1	40	100
N2	37	92,5
N3	40	100
Total SUS Score		292,5

From the results of testing conducted by the small group test in table 6, the percentage results are as follows:

$$X = \frac{\sum x}{n}$$

$$Average\ score = \frac{\text{Total SUS Score}}{\text{Number of Respondents}}$$

$$Average\ score = \frac{292,5}{3}$$

$$Average\ score = 97,5$$

Based on the test results above, this system has a feasibility level of 97.5 in the excellent acceptability ranges with **feasible** feasibility criteria.

3) *Large group test results*

In the large group test, researchers adopted from ISO 25010 in the usability aspect, researchers took 10 respondents, namely teachers and students, with the following trial results.

TABLE 7
LARGE GROUP TEST RESULTS

Respondents	Total Score	SUS Score
N1	34	85
N2	34	85
N3	35	87,5
N4	35	87,5
N5	35	87,5
N6	39	97,5
N7	38	95
N8	37	92,5
N9	36	90
N10	34	85
Total SUS Score		892,5

From the test results conducted by the large group test in table 7, the percentage results are as follows:

$$X = \frac{\sum x}{n}$$

$$Average\ score = \frac{\text{Total SUS Score}}{\text{Number of Respondents}}$$

$$Average\ score = \frac{892,5}{10}$$

$$Average\ score = 89,25$$

Based on the test results above, this system has a feasibility level of 89.25 in the excellent acceptability ranges with **feasible** feasibility criteria.

IV. CONCLUSION

A. Conclusion

Based on the research and analysis that has been done, the researcher can draw the conclusion that the results of the analysis of the small group trial produced a score of 97.5 which is included in the feasible criteria, while the results of the large group trial produced a score of 89.25 which is included in the feasible criteria. So the PGRI Rejotangan Junior High School school website that the researchers have developed is suitable for use.

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