

Development of Android-Based PAKIS Learning Media in Class X TKJ History Learning

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Abstract: The main problem in the History learning process in class X TKJ SMK Negeri 1 SIDRAP is the lack of interesting learning media with concise material that allows students to learn independently anytime and anywhere. This research aims to develop Android-based PAKIS learning media using the Research and Development (R&D) method with the ADDIE model, which includes five stages: (1) Analysis, namely competency analysis, student characteristics, and material, (2) Design, namely flowchart and storyboard design, (3) Development, namely product manufacturing, media validation, and revision, (4) Implementation, namely product trials, and (5) Evaluation, namely formative and summative evaluation. Data were collected through observation, interviews, documentation, questionnaires, and tests, using a mixed methods approach. The results showed: (1) media validation score of 87% very valid, (2) material validation score of 100% very valid, (3) teacher response of 90% very practical, (4) student response of 93% very practical, and (5) N-gain score of 78 effective. These findings indicate that PAKIS learning media is valid, practical, and effective, making it feasible to use in the History learning process in class X TKJ SMK Negeri 1 SIDRAP.

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Introduction

The utilization of learning media is one of the keys to improving the quality and effectiveness of the teaching and learning process, and in this digital era, where technology is developing very quickly, teachers must be more creative and innovative in delivering learning materials to students. According to Permendiknas Number 16 of 2007 concerning Academic Qualification Standards and Teacher Competencies and Law Number 14 of 2005 concerning Teachers and Lecturers, teachers must also meet the requirements of teacher competence related to mastery of learning media (Ummah, 2019).

The learning media used can help teachers in delivering the material presented and help students in understanding the material they learn (Ferdiansyah et al., 2021). The use of learning media is not an additional function, but has a function consisting as a means of helping to realize a more effective learning situation (Syamsunir et al., 2020). One tactic to

provide an interesting, fun, and even varied “learning experience” is to use educational media. If educational materials are made interactive, learners can engage in various activities while utilizing them in addition to using them as a source of knowledge (Pagarra H & Syawaludin, 2022).

Everything that can be moved, seen, heard, read, or discussed, as well as the equipment needed to do so, is considered media, according to the National Education Association (NEA) (Husniyah et al., 2022). According to Hamka, 2018 in a book written by (Nurfahillah, 2021) Learning media is a physical or non-physical tool that is deliberately used as an intermediary between teachers and students to help them understand material more effectively and efficiently. This helps learners as a whole to absorb material more quickly and attracts their interest to learn more (Nurfahillah, 2021).

Media, according to Sukiman (2012), is a channel that conveys messages from sender to receiver. In the context of teaching and learning, media is more often defined as graphic, photographic, or electronic tools that facilitate the understanding, management, and reorganization of verbal or visual information (Moto, 2019). In order to create planned and efficient teaching and learning activities in order to create a conducive learning environment, learning media functions as a forum for delivering and distributing information to recipients. This makes it easier for students to understand the subject matter and increase their interest in learning. (Wulandari & Mudinillah, 2022).

In essence, learning media provides a way for communicators (teachers) to transmit knowledge to communicants (learners) as recipients. The learning environment can achieve learning objectives better if it is created methodically. (Saleh & Syahrudin, 2023). Meanwhile, in general, the benefits of media in the learning process are to facilitate interaction between teachers and students so that learning activities will be more effective and efficient (Anjarani et al., 2020).

The use of media is very important in the learning process in accordance with the book written by Edgar Dale entitled Audio Visual Methods in Teaching in 1946. In this book, a model is also written which he gave the name The Cone of Experience. The Cone of Experience describes a taxonomy of learning events that starts with abstract representations (found at the top layer) and progresses to direct and concrete learning experiences (found at the bottom layer). To achieve the best learning outcomes, Dale suggests using a variety of media and experiences, rather than just one type of media. Dale emphasized that experiences tend to provide very high learning outcomes, up to 90% (Shoffan S, 2021).

To use learning media to learners, alternative media is needed. According to Minovic (2012) Media close to learners, such as through android applications, is another type of alternative media that can be used for education.

According to (Samsugi, 2021) and (Irvansyah, 2020) android is a mobile device on an operating system for cell phones based on linux. Android provides an open platform for developers to create their applications. (S.A.C & Widodo, 2021). Knowledge about the use of android-based applications needs to be improved so that it can help users in completing their work, making most or all of their work more efficient (Orlando et al., 2023).

Android has gained popularity and high demand in almost all sectors of society, according to Supeno et al. (2018). This is because, in addition to functioning as a communication tool, android offers many practical uses. According to a study conducted in 2020 by Indonesia's Central Bureau of Statistics, the percentage of people using smartphones increased to 63.53% in 2019. Teenagers between the ages of 15 and 19 are the ones who use

the internet the most (APJII, 2018) (Istighfarini et al., 2022). Therefore, it can be said that android applications, especially android-based media, can be used as an alternative form of media in the classroom.

Based on the results of observations made by the author at UPT SMK Negeri 1 Sidrap, UPT SMK Negeri 1 Sidrap is a school that has many enthusiasts with adequate facilities. The media used by teachers when teaching is printed media / packet books in learning History in class X TKJ, the book is given to students as media. However, the material is delivered late causing students to learn independently to speed up the learning process. This condition is exacerbated by History material that tends to be dense, thus reducing students' interest in learning. In addition, the textbooks that are considered too heavy cause students to prefer to leave them at school rather than take them home to study at home.

Regarding this, researchers took the initiative to use different learning media, namely android-based learning media. Android-based learning media made by researchers contains History learning materials that are packaged in an attractive way that can motivate students to learn independently anytime and anywhere. This learning media is also designed with interactive features that support a deeper and more enjoyable understanding of the material for students.

Research Method

Research and Development (R&D) is the type of research used in this study and uses the ADDIE model. The development model that can be used in development research is the ADDIE model (Analyze, Design, Development, Implementation, Evaluation) (Afwan et al., 2020). The approach used is mixed methods, mixed methods combine qualitative and quantitative methods. The goal to be achieved from this development is to produce a product in the form of android-based learning media called PAKIS in learning History Class X TKJ UPT SMK Negeri 1 Sidrap which is valid, practical and effective. The following are the stages of the ADDIE model research that have been adjusted:

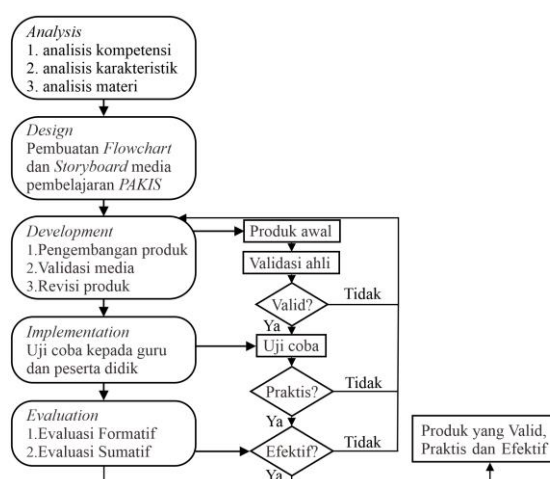


Figure 1. Flow of ADDIE Research and Development

The object of this research is to produce learning media called PAKIS and the subjects of this research are two validators who will assess the level of validity, including material experts and media experts. Furthermore, the level of practicality will be assessed by subject teachers and students totaling 98. For effectiveness, it will be seen from the test of 98 students.

This study used observation, documentation, interviews, tests, and questionnaires to collect data. Observation or observation aims to provide a detailed report of what happened in a particular location, including a list of learners, time, and interpretation of the events seen from the observation itself. Documentation aims to collect qualitative data. Documents can be in various forms, including written texts, photographs, regulations, and other media and tests are used to obtain effectiveness data.

Interviews to collect data in the form of learning conditions, the level of student involvement, and the obstacles faced by teachers and students during the learning process. Anket is used to obtain data on the validity and practicality of learning media, for the media expert validator questionnaire, material and teacher responses will be adopted from the research questionnaire (Firdaus et al., 2021), while for the student respondent questionnaire adopted from the research questionnaire (Sofiasyari et al., 2023).

The results of the expert validation test were used to determine the validation level of the PAKIS learning materials. Descriptive analysis of the validation results is carried out by providing an assessment which is divided into five categories, namely very valid, valid, quite valid, invalid, and very invalid. To calculate the percentage of each subject of PAKIS validity can be calculated using the percentage formula as follows:

$$V\text{-ah} = \frac{TSe}{TSh} \times 100$$

Source: (Basri H & Al-Asasiyya, 2022)

Description:

V-ah : Expert Validation

TSe : Total empirical score achieved

TSh : Total maximum score

Based on the percentage results of the validation assessment of media experts and material experts, then to determine the conclusion of the assessment results can be seen in the following validity criteria table:

Table 1. Criteria for validity

No	Percentage range (%)	Qualification	Description
1	81-100%	Very good	Very valid, no need to revise
2	61-80%	Good	Valid, no need to revise
3	41-60%	Fair	Moderately valid, needs revision
4	21-40%	Poor	Not valid, needs revision
5	<20%	Very Poor	Very invalid, needs revision

Source: (Ferdiansyah & Haling, 2021)

Practicality data analysis was obtained through the responses of students and teachers taken from the questionnaire responses of students and teachers to the PAKIS learning media subjects. To state the practicality of the PAKIS learning media developed, the questionnaire data scoring is used using a Likert scale. To calculate the percentage of each indicator of the

practicality of the PAKIS learning media, it is calculated using the percentage formula as follows:

$$P = \frac{TSe}{TSh} \times 100$$

Source: (Basri H & Al-Asasiyya, 2022)

Description:

P : Expressing the percentage of practicality

TSe : Total empirical score achieved

TSh : Total maximum score

Based on the percentage results of the assessment of the response of students and teachers, then to determine the conclusion of the assessment results can be seen in the following practicality criteria table:

Table 2. Practicality Criteria

No	Percentage range (%)	Category
1	81,00%-100%	Very practical
2	61,00%-80,00%	Practical
3	41,00%-60,00%	Practical enough
4	21,00%-40,00%	Less practical
5	00,00%-20,00%	Not practical

Source: (Ferdiansyah & Haling, 2021)

Analysis of effectiveness data obtained through tests given to students will be two tests, namely pre-test and post-test, after the pre-test and post-test will be tested N-gain. The n-gain test is a technique for evaluating how well educational materials or interventions improve learner learning outcomes. It offers a strong basis for assessing how much a learning program has improved learners' understanding. The n-gain method calculates the proportional change in learners' level of understanding before and after the class (Sukarelawa et al., 2024). To calculate the effectiveness of PAKIS learning media, it is calculated using the following formula:

$$N_{\text{Gain}} = \frac{\text{Posttest score} - \text{Pretest score}}{\text{ideal score} - \text{pretest score}} \times 100$$

Source: (Sukarelawa et al., 2024)

To determine the effectiveness of the intervention, refer to the table of criteria for determining the effectiveness of the intervention.

Table 3. Criteria for Determining the Effectiveness Level

No	Percentage (%)	Interpretation
1	< 40	Not Effective
2	40 – 55	Less Effective
3	56 – 75	Moderately Effective
4	>76	Effective

Source: (Sukarelawa et al., 2024)

Result and Discussion

The purpose of this research is to develop android-based PAKIS learning media on the material of the Influence of Islamic Religion and Culture in Indonesia. The research procedure is adapted using the stages of the ADDIE model development including five stages, namely: (1) Analysis including competency analysis, characteristic analysis, and materi analysis; (2) Design, namely, making flowcharts and storyboards of PAKIS learning media; (3) Development including Product Development, media validation by experts, and product revision; (4) Implementation including product trials; (5) Evaluation including formative evaluation and summative evaluation.

A. Analysis

1. competency analysis

Competency analysis is carried out by identifying the learning outcomes of the independent curriculum, especially in the material on the influence of Islamic Religion and Culture in Indonesia in the History class X TKJ SMK. The contents of the learning outcomes are that students can briefly explain the religion of Islam, students can analyze the factors that support the spread of Islam in Indonesia, students can analyze several kingdoms that have had a major influence on the development of Indonesian history, and students can understand the influence of Islam in the socio-cultural field.

2. characteristic analysis

In this stage, the researcher observes the condition of the students who will be the target of using the development product. In the learning process, students find it easier to understand the material by presenting the material briefly, students also like it when left to learn independently.

3. materi analysis

At the stage of analyzing this materi, researchers used printed media/package books used by teachers as learning tools and found material on the Influence of Islamic Religion and Culture in Indonesia which sub subjects are: the process of the entry and development of Islam in Indonesia, the routes of spreading Islam in Indonesia, Islamic kingdoms in Indonesia, and evidence of the influence of Islam that still exists today.

B. Design

At this stage, the thing to do is to compile a flowchart and storyboard. Flowchart is a layout or overview while Storyboard is a visual representation of the learning media concept that will be produced. Flowchart and Storyboard can be seen in the picture below.

The flowchart of PAKIS learning media is as follows:

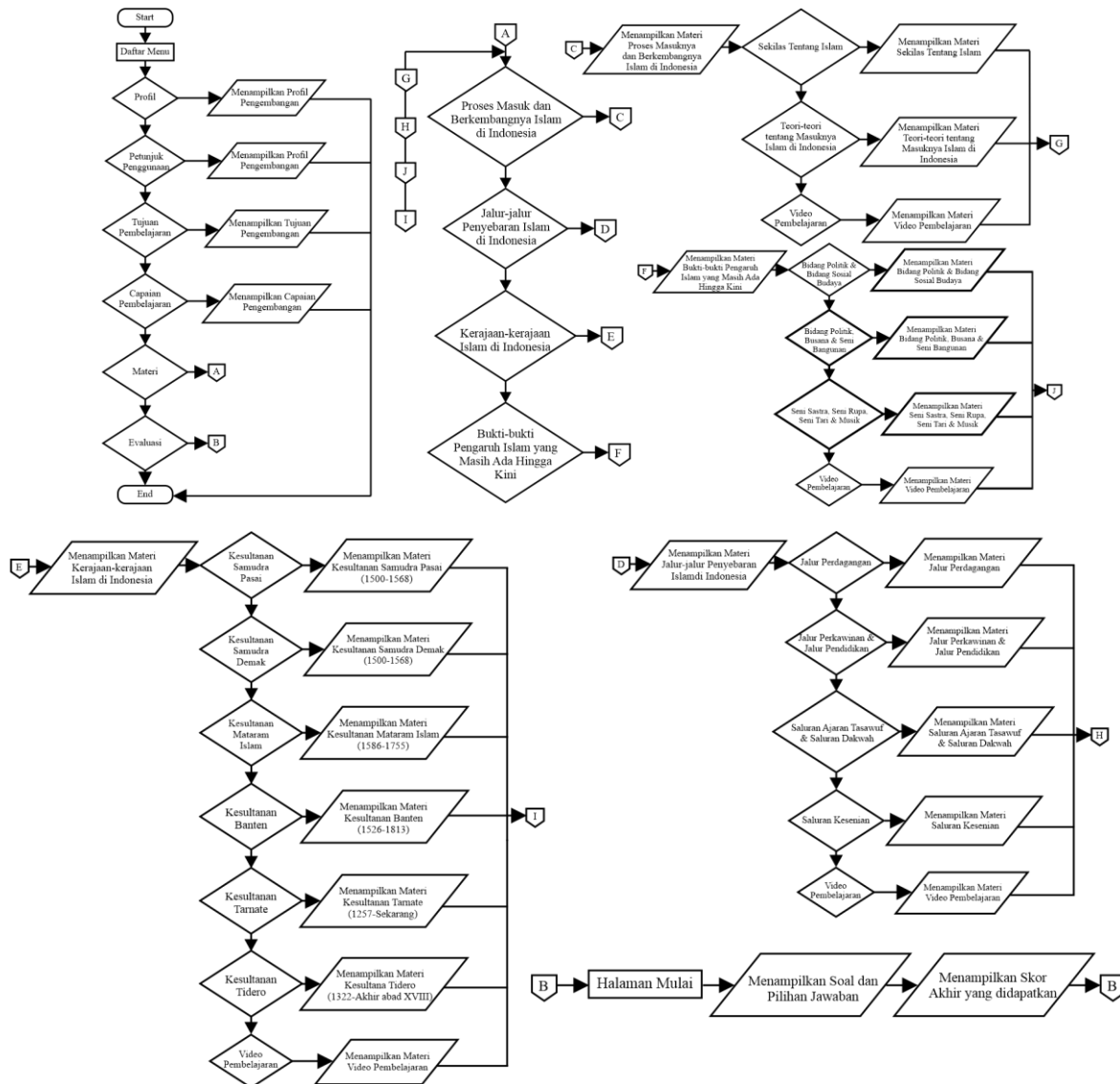

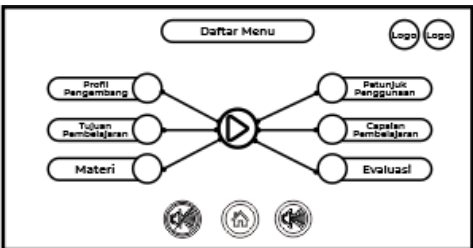
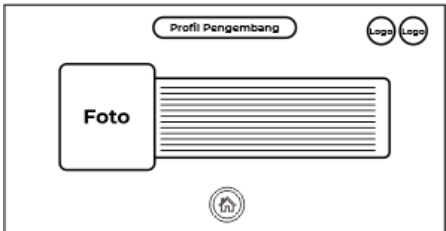
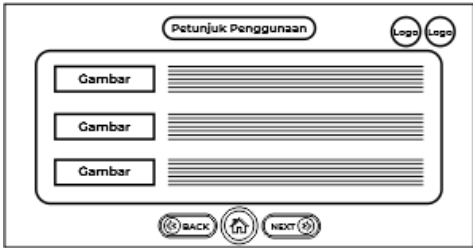


Figure 2. Flowchart of PAKIS Learning Media Learning Media

Storyboard of PAKIS learning media can be seen in the table below

Table 4. Storyboard of PAKIS Learning Media Learning Media

No.	Visual	Description
1	<p>Page start</p> 	<p>This page is the page that appears the first time the PAKIS learning media is run The start page contains:</p> <ul style="list-style-type: none"> • Background and images that are adjusted to the learning theme. • Logo. • Start button to start the learning media.
2	<p>Page daftar menu</p> 	<p>Page daftar menu contains:</p> <ul style="list-style-type: none"> • Customized background and logo. • Contains the page title “daftar menu”. • Consists of navigation buttons, namely: <ul style="list-style-type: none"> - Profil pengembang, goes to the developer profile page. - Petunjuk penggunaan, goes to the instructions for use page. - Tujuan pembelajaran, goes to the learning objectives page. - Capaian pembelajaran, goes to the learning achievement page. - Materi, goes to page “daftar materi”. - Evaluasi, goes to the evaluation page. - Button to turn off and turn on the sound. - Home, goes to the start page.
3	<p>Page profil pengembang</p> 	<p>The profil pengembang page contains:</p> <ul style="list-style-type: none"> • Customized background and logo. • Contains the title of the profil pengembang page. • Contains biodata and photos of PAKIS learning media developers. • Consists of navigation buttons, namely: <ul style="list-style-type: none"> - Home, goes to the daftar menu page
4	<p>Page petunjuk penggunaan</p> 	<p>The page petunjuk penggunaan contains:</p> <ul style="list-style-type: none"> • Customized background and logo. • Contains the title page petunjuk penggunaan. • Contains images of navigation buttons and their functions. • Consists of navigation buttons, namely: <ul style="list-style-type: none"> - Home, goes to the daftar menu page - Back, goes to the previous page.

5 Page tujuan pembelajaran

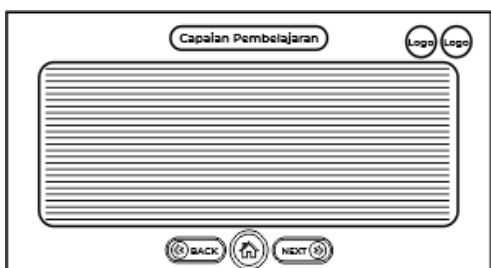


- Next, goes to the next page.

Page tujuan pembelajaran contains:

- Customized background and logo.
- Contains the title tujuan pembelajaran page.
- Contains learning objectives in History learning material on the influence of Islamic Religion and Culture in Indonesia.
- Consists of navigation buttons, namely:
 - Home, goes to the daftar menu page
 - Back, goes to the previous page.
 - Next, goes to the next page.

6 Page capaian pembelajaran



Page capaian pembelajaran contains:

- Customized background and logo.
- Contains the title capaian pembelajaran page.
- Contains the learning outcomes of the History of the Influence of Islamic Religion and Culture in Indonesia.
- Consists of navigation buttons, namely:
 - Home, goes to the daftar menu page
 - Back, goes to the previous page.
 - Next, goes to the next page.

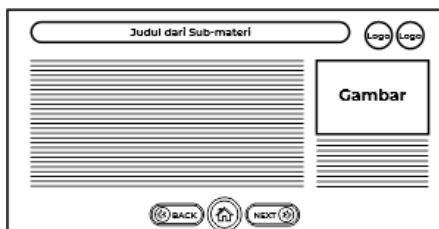
7 Page daftar materi



Page daftar materi contains:

- Customized background and logo.
- Contains the title daftar materi page.
- Consists of navigation buttons, namely:
 - Home, goes to the daftar menu page
 - A, goes to the material page of part A of the process of entry and development of Islam in Indonesia.
 - B, goes to the material page of section B the paths of the spread of Islam in Indonesia..
 - C, to the material page of section C, the works of Islamic kingdoms in Indonesia.
 - D, go to the material page of section D, evidence of the influence of Islam that still exists today.

8 Page sub materi



Page sub materi contains:

- Customized background and logo.
- Contains the title sub materi page.
- Consists of navigation buttons, namely:
 - Home, goes to the daftar materi page
 - Back, goes to the previous page.
 - Next, goes to the next page.

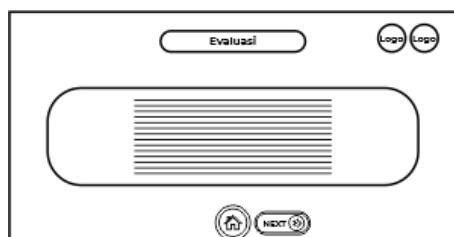
9 Page video pembelajaran



Page video pembelajaran contains:

- Customized background and logo.
- Contains the title video pembelajaran.
- Contains online learning videos
- Consists of navigation buttons, namely:
 - Home, goes to the daftar menu materi
 - Back, goes to the previous page.

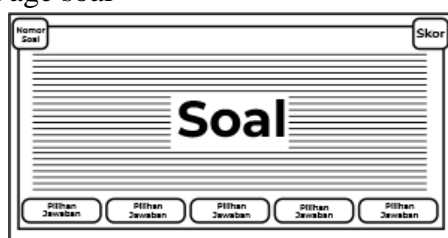
10 Page evaluasi



Page evaluasi contains:

- Customized background and logo.
- Contains the title video evaluasi.
- Contains instructions for doing the problem.
- Consists of navigation buttons, namely:
 - Home, goes to the daftar menu page
 - Next, goes to the next page.

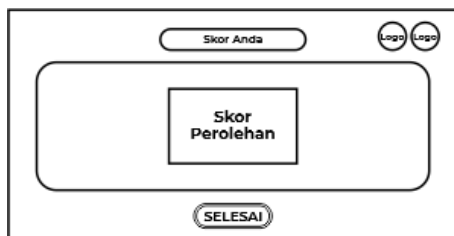
11 Page soal



Page soal contains:

- Customized background and logo.
- Contains the question number, the score obtained if the answer is correct, and questions from the History lesson.
- Consists of navigation buttons, namely:
 - The answer options consist of five choices, if one answer has been chosen, it will move on to the next question.

12 Page skor



Page skor contains:

- Customized background and logo.
- Contains the title skor anda.
- Contains skor perolehan.
- Consists of navigation buttons, namely:
 - Selesai, go to the evaluasi page

C. Development

1. Product Developer

Flowcharts and storyboards that have been made by researchers are then developed into PAKIS learning media, PAKIS learning media is developed using Canva and Smart Apps Creator applications. The following is the appearance of the PAKIS learning media that has been developed by researchers in accordance with the flowchart and storyboard that has been designed:



Figure 3. Start Page Display

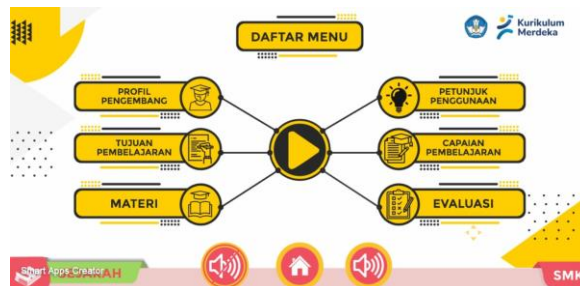


Figure 4. Display Of The Daftar Menu Page



Figure 5. Display Of The Profil Pengembang Page



Figure 6. Display Of The Petunjuk Penggunaan Page

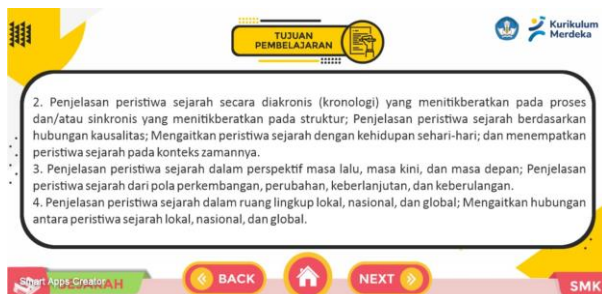


Figure 7. Display Of The Tujuan Pembelajaran Page



Figure 8. Display Of The Capaian Pembelajaran Page



Figure 9. Display Of The Daftar Materi Page



Figure 10. Display Of The Sub Materi Page



Figure 11. Display Of The Video Pembelajaran Page



Figure 12. Display Of The Evaluasi Page

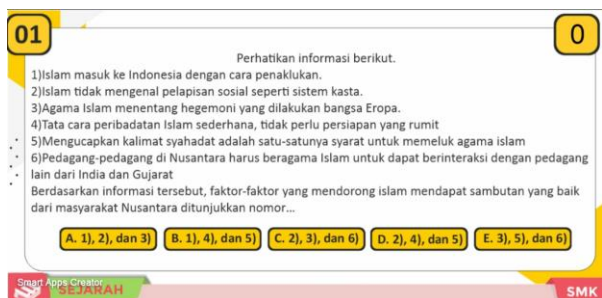


Figure 13. Display Of The Soal Page



Figure 14. Display Of The Skor Page

2. Media Validation by Experts

After the learning media has been developed, the next step is to validate the feasibility of the product. PAKIS learning media is validated by expert validators in their fields. The purpose of product feasibility validation is to see the feasibility of learning media that has been made.

3. Product Revision

After the learning media is validated by media expert validators and material experts, researchers revise the learning media according to the revisions given by media expert validators and material experts and if there are no revisions, the learning media can be used without revision.

D. Implementation

At this stage, researchers conducted a small group trial with 5 students. After it was declared that it could be used in the learning process, then a medium/simple group trial was carried out where the students involved were 15, then a large group coa test/field trial of PAKIS learning media to 97 students. In the large group trial / field trial, a pre-test and post-test were carried out to determine the effectiveness of the product developed. In addition, the test was also conducted on the History subject teacher. After using PAKIS learning media, researchers distributed response questionnaires to teachers and students to determine the practicality of the products developed.

E. Evaluation

Formative evaluation is conducted to collect data at each stage that is used for improvement and summative evaluation is conducted at the end of the program to determine its effect on learner learning outcomes (Fayrus & Slamet, 2022).

1. Formative evaluation

a. Media validation

To find out the validity of the learning media, the researcher gave a questionnaire to the validator to give a value to the product, from the validator's assessment the researcher will see whether the product that has been developed is valid or not. the following details of the assessment of the media expert validator can be seen in the media expert validation questionnaire assessment score table.

Table 5. Media Expert Validation Questionnaire Assessment Score

No	Validation	Aspects assessed	Indicator	Rating Score				
				1	2	3	4	5
1	Media	View	Proportional layout (text and image layout)				✓	
2			Appropriateness of background selection					✓
3			Clarity of color portion selection				✓	
4			Appropriateness of font selection					✓
5			Suitability of letter size selection				✓	

6		Clarity of music / sound	✓
7		Appropriateness of music / sound selection	✓
8		The attractiveness of learning evaluations on the play menu	✓
9		The attractiveness of the presentation of material on the learning menu	✓
10		The suitability of infographics (learning menu) with the material	✓
11		The attractiveness of the button / navigator menu	✓
12		Consistency (button) button display	✓
13		The attractiveness of the initial design of the application	✓
14		Completeness of information application	✓
15	Programming	Ease of use of the program	✓
16		Ease of program menu selection	✓
17		Freedom to choose material to learn	✓
18		Ease of interacting with the program	✓
19		Ease of understanding the navigation structure	✓
20		Speed of button function (navigation performance)	✓
21		Accuracy of button reaction (navigation button)	✓
22		Ease of searching for material	✓
23		Ease of running the program menu	✓
24		Operating system compatibility	✓
25		Operating system access	✓

	speed	
26	Program file capacity for easy duplication	✓
27	Strength / durability of program pieces	✓
Total score	118	
	$118:135=0,87 \times 100\%$	
	$= 87\%$ (Very Valid)	

The score obtained in table 5 is 87%. Based on this data, it can be concluded that the validation of media experts on PAKIS learning media products is included in the very valid category, because the percentage of the final score is in the range 81%-100%.

b. Materials validation

After the researcher conducts the next media validation, namely material validation, the researcher gives a questionnaire to the validator to give a value to the product, from the validator's assessment the researcher will see whether the product that has been developed is valid or not. the following details of the assessment of the material expert validator can be seen in the material expert validation questionnaire assessment score table.

Table 6. Materi Expert Validation Questionnaire Assessment Score

No	Validation	Aspects assessed	Indicator	Rating Score				
				1	2	3	4	5
1	Materials	content/ material	Coverage (breadth and depth) of material content					✓
2			Clarity of material content					✓
3			Organizational structure / sequence of material content					✓
4			Actualization of the content of the material					✓
5			Clarity of the included examples					✓
6			Sufficiency of examples included					✓
7			Clarity of language used					✓
8			Language suitability with target users					✓
9			Clarity of information on image illustrations					✓
10			Clarity of information on animated illustrations					✓
11			Suitability of exercises / tests with competence					✓
12			Balance of the proportion of exercise/test questions with the					✓

		material	
13		The sequence of questions presented	✓
14	Learning	Suitability of Basic Competencies with Indicators	✓
15		Conformity of Basic Competencies with program material	✓
16		Suitability of Basic Competencies with Core Competencies	✓
17		Clarity of program title	✓
18		Clarity of target users	✓
19		Clarity of learning instructions (instructions for use)	✓
20		Appropriateness of the use of learning strategies	✓
21		Variety of delivery of informal types	✓
22		Accuracy in explaining conceptual material	✓
23		Accuracy in the explanation of practical material	✓
24		The attractiveness of the material to the user's motivation	✓
25		Clarity of instructions for using exercises / tests	✓
26		Clarity of question / test formulation	✓
27		The level of difficulty of the question / test	✓
28		The accuracy of providing feedback on user answers	✓
Total score		140	
		$140:140=1 \times 100\%$	
		$= 100\%$ (Very Valid)	

The score obtained in table 6 is 100%. Based on this data, it can be concluded that the validation of material experts on PAKIS learning media products is included in the very valid category, because the percentage of the final score is in the range 81%-100%.

c. Teacher respondents

When the PAKIS learning media development trial was carried out, the researcher gave a questionnaire to the subject teacher to find out the teacher's

response to the PAKIS learning media. the following details of the teacher respondents can be seen in the teacher respondent assessment score table.

Table 7. Teacher Respondent Assessment Score

Table 4: Teacher Respondent Assessment Score							
No	Respondents	Indicator	Rating Score				
			1	2	3	4	5
1	Teacher	Suitability of learning objectives with learning outcomes				✓	
2		Suitability of learning objectives with indicators					✓
3		Clarity of material on the learning menu				✓	
4		Clarity of user goals				✓	
5		Clarity of learning instructions				✓	
6		Appropriateness of the application of learning strategies					✓
7		Variety of material delivery					✓
8		Accuracy in material explanation				✓	
9		The attractiveness of the material in motivating users					✓
10		Clarity of instructions for working on exercise/test questions					✓
11		Clarity of question/test formulation					✓
12		The level of difficulty of the questions/tests				✓	
13		The accuracy of providing feedback on user answers					✓
Total score		65					
		59:65=0,90 X 100%					
		= 90% (Very practical)					

The score obtained in table 7 is 90%. Based on this score, it can be concluded that the teacher's response to assess the practicality aspect of the PAKIS learning media is included in the very practical category, because the percentage of the final score is in the range 81.00%-100%.

d. Learner respondents

Before using the PAKIS learning media, researchers conducted a small group trial with 5 students to see if there were still bugs that needed to be fixed on the PAKIS learning media. After the small group trial, the bugs found were the size of the media size that was too large and the layout of the evaluation score that needed to be corrected. After the bug was fixed, it was continued to the medium group trial.

After conducting a small group trial, then a medium test was conducted. researchers conducted a medium group trial to 15 students to determine whether the learning media could be used during the learning process in class. The results

obtained from the medium group trial were 93%, based on the acquisition of these values, it can be concluded that the PAKIS learning media is declared “very practical” because it is between the percentage of 81.00% - 100%.

After conducting a medium group trial, then a large trial was conducted. At this stage, researchers gave a questionnaire to X TKJ class students of SMK Negeri 1 SIDRAP totaling 97 people in History lessons to find out the students' response to the use of PAKIS learning media that had been developed. The percentage of the total score can be described using the diagram as follows:

**Acquisition of Questionnaire Respondents X TKJ
 Learners SMK Negeri 1 SIDRAP**

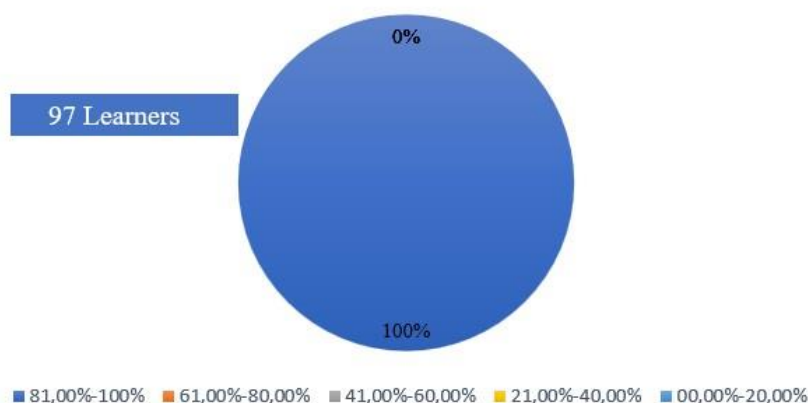


Figure 15. Learner response diagram

The diagram above is the percentage score of the acquisition score of the student response questionnaire using PAKIS learning media obtained from each student totaling 97 people. The acquisition score obtained by 97 students is at a percentage of 81.00%-100%. The average percentage of the students' questionnaire score is 93% and is included in the “Very Practical” category.

2. Summative evaluation

At this stage, researchers looked at the effectiveness of PAKIS learning media. Researchers started by giving a pre-test to students to find out their ability level before they used PAKIS learning materials. After the pre-test was given, then the treatment was given, namely by doing learning using PAKIS learning media. After being given treatment, a post-test was given to students.

From the two test results, to determine the effectiveness of PAKIS learning media, the results of the pre-test and post-test were collected and then calculated using the N-gain formula. The percentage of the total score can be described using the diagram as follows:

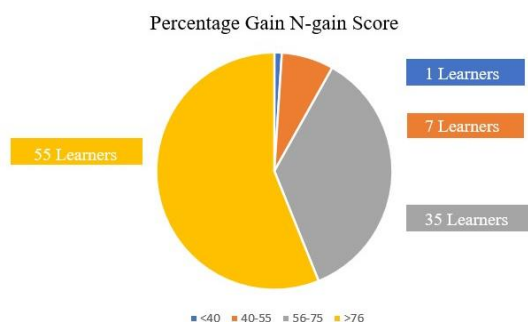


Figure 16. Percentage Gain N-gain Score

The diagram above is the result of the percentage of n-gain scores from the pre-test and post-test of students who have been calculated using the n-gain formula, obtained from each student totaling 98 people. The acquisition score >76 from 55 students, the acquisition score 56-75 from 35 students, the acquisition score 40-55 from 7 students, and the acquisition score <40 from 1 student. The average percentage of students' n-gain score is 78 and is included in the "Effective" category.

Conclusion

Based on the results of the media expert validator assessment, the value of media validation reached 87%. Therefore, it can be concluded that the validity of the PAKIS learning media is classified according to the "very valid" category. The value of the teacher respondents reached a value of 90% which can be concluded that the practicality of the PAKIS learning media is classified according to the "very practical" category, the results of the student respondents obtained an overall score of 93% which can be concluded that the practicality of the PAKIS learning media is classified according to the "very practical" category. The overall n-gain score percentage acquisition value reached 78, which can be concluded that the effectiveness of PAKIS learning media is classified according to the "effective" category. So it can be said that the PAKIS learning media can be used in the learning process in class X TKJ UPT SMK Negeri 1 SIDRAP.

Recommendation

Researchers found limitations, such as learning media can only be used on the Android operating system and cannot be used on the Apple iOS operating system. Therefore, future researchers can develop learning media that can be used on all operating systems on smartphones.

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