



DEVELOPMENT OF ANDROID-BASED PETA (*PENJELAJAHAN MATEMATIKA*) LEARNING MEDIA ON SPEED LEARNING MATERIALS AT A FIFTH-GRADE ELEMENTARY SCHOOL

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PENGEMBANGAN MEDIA PEMBELAJARAN PETA (*PENJELAJAHAN MATEMATIKA*) BERBASIS APLIKASI ANDROID PADA MATERI KECEPATAN DI KELAS V SD

ARTICLE HISTORY

Submitted:

28 Januari 2023
28th January 2023

Accepted:

14 Maret 2023
14th March 2023

Published:

25 April 2023
25th April 2023

ABSTRACT

Abstract: This paper describes the developmental process of PETA (*Penjelajahan Matematika*) learning media based on the Android application on speed learning materials at a fifth-grade elementary school, determines the feasibility of the application through the validation process of experts, and finds out the compatibility of applications in several devices with different Android versions. The research uses a research and Development (RnD) method with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The results of the research are (1) the development of the PETA application is relevant to the needs of the mathematics learning process on speed learning material at class V SD, (2) the design of the PETA application is adopted from the concept of exploring games with various forms of presentation, (3) the PETA application design that has been made is developed into file.apk., (4) the PETA application has the feasibility of the content in the very feasible category with a percentage of 97%, the feasibility of the media in the very feasible category with a percentage of 92.75%, and already fulfilled the standard of portability on adaptability and installability aspects with a testing percentage of 100%, and (5) the final product of the PETA application is developed based on the evaluation results at the testing stage of functional suitability and portability by making minor improvements to the instruction aspects of the use and the additional menu of an "additional information" to make it easier for users to get information about latest updates of the PETA application.

Keywords: PETA learning media, android application, speed learning materials, grade V elementary school

Abstrak: Artikel ini mendeskripsikan proses pengembangan media pembelajaran PETA (*Penjelajahan Matematika*) berbasis aplikasi Android pada materi kecepatan di kelas V, mengetahui kelayakan aplikasi melalui proses validasi para ahli, serta mengetahui kompatibilitas aplikasi di beberapa device dengan versi Android yang berbeda-beda. Penelitian merupakan Penelitian dan Pengembangan (RnD) dengan menggunakan model ADDIE (*Analysis, Design, Development, Implementation, Evaluation*). Adapun hasil penelitian, yakni 1) pengembangan aplikasi PETA relevan dengan kebutuhan proses pembelajaran matematika pada materi kecepatan di kelas V SD, (2) desain aplikasi PETA dirancang dengan mengadopsi konsep permainan penjelajahan dalam berbagai bentuk penyajian yang bervariasi, (3) desain aplikasi PETA yang sudah dibuat dikembangkan ke dalam bentuk file.apk., (4) aplikasi PETA memiliki kelayakan isi materi dengan kategori sangat layak dengan persentase sebesar 97%, kelayakan media dengan kategori sangat layak dengan persentase sebesar 92,75%, serta sudah memenuhi standar portability pada aspek adaptability dan installability dengan persentase pengujian sebesar 100%, dan (5) produk akhir aplikasi PETA dikembangkan berdasarkan hasil evaluasi pada tahapan pengujian functional suitability dan portability dengan melakukan perbaikan minor pada aspek petunjuk penggunaan dan tambahan menu "informasi tambahan" untuk memudahkan pengguna mendapatkan informasi tentang update terbaru aplikasi PETA.

Kata kunci: media pembelajaran PETA, aplikasi android, materi kecepatan, kelas V SD

CITATION

Sopian, S. B. P., Isrokatun, I., & Ismail, A. (2023). Development Of Android-Based Peta (*Penjelajahan Matematika*) Learning Media On Speed Learning Materials At A Fifth-Grade

INTRODUCTION

Education can be interpreted as a conscious and planned effort in forming intelligent Indonesian people with good character (Rahmatiani, 2020). Education plays an important role in creating quality human resources as an effort to encourage the progress of the Indonesian state in the era of technology and globalization (Ellya Novera, Daharnis, Yeni Erita, 2021). Education aims to prepare students to be ready to face life's challenges according to the demands of the times, including in dealing with changes in science and technology (Junaedi, 2019). Technology is seen as a valuable and potential asset (Rifai, 2013). Technology develops rapidly (Kiswanto et al., 2021) and will continue to improve over time (Rahardja et al., 2018). Information technology and digitalization have penetrated into human life (Dreyer et al., 2019), thus requiring the world to slide towards the fourth industrial revolution wave (Maheswari & Gorda, 2019) which will directly impact human life fundamentally, including in the implementation of education in the 21st-century.

21st-century education requires students to be able to have complex knowledge, higher-order thinking skills as well as skills in using technology and innovation by the 21st-century innovative learning framework (Muhali, 2019). Chiefly, learning aims to create changes in cognitive, affective, and psychomotor behavior (Fahrozy et al., 2022). Learning is interpreted as an educational process that provides opportunities for students to develop their potential to achieve certain competencies (Rusman, 2017) and can compete globally amid the development of 21st-century Science and Technology (IPTEK). The development of Science and Technology (IPTEK) in the 21st century has given rise to a new paradigm for integrating technology into the learning process (Rahayu et al., 2022). Teachers are required to

be able to deal with change swiftly and to be able to have new broader and more complex competencies (Blyznyuk, 2019), chiefly in carrying out effective and efficient classroom management through the use of technology in the learning process (Darling-Hammond, 2006). One of the efforts that teachers can do is to utilize technology as an innovative and interactive learning media (Aeni et al., 2022), with the result that students can encourage action to be active in constructing their understanding independently through student-centered learning.

In line with research (Rozali et al., 2022) on the learning process in elementary schools, it shows that teachers more often design teacher-centered classroom learning accompanied by the delivery of material following the textbooks. This practice will certainly make students passive during the learning process. Also supported by the results of the researcher's interviews with fifth-grade elementary school teachers in Bandung. The results of the interviews show that there are still many teachers who have not utilized technology-based learning media in delivering learning material, although there are some teachers who occasionally use learning media in the form of PowerPoint. The subject matter that is still rarely delivered using technological media is mathematics. Teachers more often design learning using the lecture method which only refers to student textbooks and that can impact students' feelings that students often feel bored when the teacher delivers mathematics learning material.

The lack of attractiveness of textbooks in schools is one of the factors that make mathematics less easy for students to understand. Presentation of material that is dominated by text rather than images, visualization of images that do not explain the material, or the attractiveness of colors in books

can be an obstacle for students in learning mathematics (Indaryati & Jailani, 2015). Data from research conducted by (Natasya et al., 2019) for elementary school students in Bangkinang Kota shows the percentage of several factors that cause students to find it difficult to carry out the learning process in mathematics, 82.1% is caused by the lack of media used by the teacher and the other 17.9% is caused by the teacher's teaching method, the way parents educate students, and caused by the family economy. In line with Arina et al. (2021) who argue that mathematical material is material that is abstract in nature which will be difficult for students to understand if it is presented without the use of interesting media. In addition, 64.28% of students stated that students did not have the desire to explore the material being studied by students. As many as 78.57% of students stated that the teacher never used learning media and only used books as the only learning media for students in class. Learning is a process of changing behavior as a result of the interaction of an individual with his environment. Behavioral changes occur in a sustainable, functional, positive direction, active, and directed, and can occur in all conditions (Pane & Darsopang, 2017).

In fact, according to the problems above, the teaching of mathematics conducted by teachers is often packaged in a conventional form and does not use supporting learning media in the classroom which makes students feel bored in the process of learning mathematics so it can cause students to have a low interest in learning mathematics. However, learning mathematics should be able to encourage students to be active in building their understanding and abilities independently. One of the efforts to be able to create a learning process that is active, fun, and able to encourage students to learn independently is to utilize technological assistance as a learning medium.

THEORETICAL SUPPORT

Mathematic Learning In Elementary School

Mathematics is a scientific discipline that arose from human systematic and logical

thinking processes in solving various kinds of complex problems in their lives (Isrok'atun et al., 2020). Mathematics learning leads to the achievement of basic SK (Standar Kompetensi) of students in schools which do not only have an orientation to be able to master mathematics material but mathematics is positioned as a tool and means of achieving competency in students (Nasaruddin, 2018), with the result that the scope of learning mathematics in schools basic needs to be adjusted to SK (Standar Kompetensi) that will be achieved by elementary school students. Mathematics learning that is presented for the elementary school level also needs to be adapted to the characteristics of elementary school students who have a level of concrete operational thinking (Wulandari et al., 2020). The level of difficulty and abstract mathematical concepts requires teachers to be able to deliver mathematics material in a way that is different from other subjects, such as utilizing learning media as a means of delivering material that can support student learning processes (Murdiyanto & Mahatama, 2014), as well as being able to help teachers achieve the learning objectives that have been set (Nurfadhillah et al., 2021).

Speed Material

Speed material is one of the material contents that need to be learned by elementary school students in grade V. The basic competencies that students must achieve in speed material are contained in Permendikbud No 37 Tahun 2018. Students will not be able to understand the speed material if they have not studied the prerequisite material in the unit time and distance units material. In line with research findings (Ramadhini & Kowiyah, 2022) which showed that students' lack of understanding of concepts in the material for units of time and distance had an impact on the emergence of student errors in solving problems in the speed material. Speed material is considered by students as one of the most difficult materials to understand in mathematics. Syamsudin (2021) argue that based on Rachmawati's research findings one of the learning difficulties of

students in Mathematics and Science based on raw data on student responses to the 2007 INAP test lies in the matter of comparison of scale, distance, and time. The research findings are reinforced by the results of observations (Syamsudin, 2021) of fifth-grade students which show that there are still some students who have difficulty solving speed and discharge questions. In line with the findings of this study, the researcher chose speed material as the content of the material in the learning media to be developed.

Learning Media Based on The Application Android

Android-based learning media is one of the media that students can use flexibly as learning media at school and out of school (Kuswanto & Radiansah, 2018). Android-based learning media developed by considering students' need will provide direct benefits for students (Nazar et al., 2020). The use of Android application media in learning is certainly inseparable from the use of smartphones. The flexibility of access to learning media through smartphones makes it easy for students to access learning materials. Nowadays, smartphones are already widely known by the public. In line with Komariah et al. (2018) who argued that smartphones are a communication tool that is ingrained in society and that almost all people use it.

The development of learning media based on Android applications in mathematics learning is not anything new. There are many researchers have developed Android applications with various mathematics learning materials. As is the case (Karseni et al., 2021) who developed an Android application-based math learning media on integer material for class VI SD. The Android application developed is packaged in the form of an educational game that contains three main levels accompanied by HOTS questions and material that contains examples of questions and their discussion. The development of learning media based on Android applications is also carried out by (Savitri et al., 2020) using the application online

App 73 inventor. The developed application is presented using the concept of a digital pocketbook. There is also research on the development of learning media based on Android applications on the material of mixed arithmetic operations of whole numbers in class VI SD (Amalia et al., 2022). This Android application-based learning media was developed by using Smart Apps Creator 3. Researchers develop applications that contain learning materials, guided learning videos, and interactive quizzes.

Based on the application products developed by three researchers, they have advantages and disadvantages. As is the case with research conducted by (Karseni et al., 2021) there are weaknesses in the aspect of presenting educational games that have not been equipped by the presentation of material in the form of learning videos. This weakness became an advantage in the research conducted (Amalia et al., 2022). However, weaknesses in research (Amalia et al., 2022) become strengths in research (Karseni et al., 2021) which presents educational games for students. This is also in line with research conducted by (Savitri et al., 2020) which has the same weaknesses in application products as (Karseni et al., 2021) in terms of material that is only presented in the form of reading text.

To equip the previous research, the research that will be carried out in the development of learning media based on Android applications with a combination of several aspects contained in the three previous studies. The development of Android application media will focus on speed material in grade V elementary schools which will contain various forms of presentation of material, such as texts, videos, games, adventures in the content of more levels, challenges, exercises, and answers key discussion, as well as features that support students to propose their opinions and engage in discussions. Android application development in this study uses smart apps creator which is the app to create mobile apps on Android or ios without programming code with outputting shaped apk. file, html5, and exe (Hamidah &

Nisa, 2022). Thus, the purpose of carrying out this development research was to describe the process of PETA (Penjelajahan Matematika) learning media based on the Android application on speed material in elementary school class V, find out the feasibility of the application through the validation process of experts, and find out the compatibility of applications in several devices with different Android versions.

METHOD

This research uses a Research and Development (RnD) method that aims to develop new products that have never been developed or improve existing products (Sukmadinata, 2012). The research model used is the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) which focuses on product development, such as learning media products (Ahmad et al., 2023).

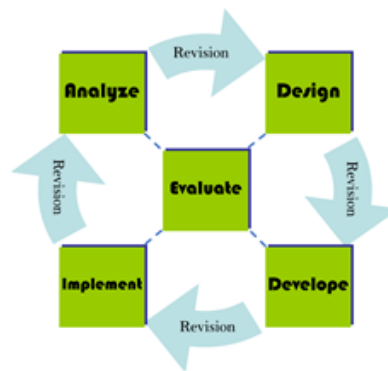


Figure 2. ADDIE Model Stages

The ADDIE model used in this study is based on the consideration of researchers to develop products based on effectiveness and efficiency through the five stages of the ADDIE model. At the analysis stage, the researcher conducted a teacher needs analysis, material analysis, and needs analysis of hardware and software to determine the needs of the development process that researchers do. The design stage is carried out to produce application product designs in accordance with the needs of learning media development. The development stage is carried out after all the content designs at the design stage are complete. The development stage is to produce a complete application product. The implementation stage is the testing stage functional suitability through application product validation by material experts and media experts, as well as the testing stage portability to find out the compatibility of the application in various devices with different Android versions. The evaluation stage is

carried out to determine the feasibility of the application product developed by the researcher.

Data collection was carried out through interviews with fifth-grade elementary school teachers, through questionnaire techniques through validation sheets which would be filled in by 2 material experts and 2 learning media experts, as well as observation to see, observe, and review application products developed in various devices with different versions of Android. The material validation sheet is used to determine the feasibility of the material contained in the application product being developed. The material expert validation sheet is made using by a score of 1-5, while the media expert validation sheet uses 5 rating scales, namely very poor, poor, fair, good, and very good (Sugiyono, 2016). The data from the application product testing results are then converted into a quantitative form using a Likert scale with the details as follows:

Table 1. Product Rating Score

Score	Criteria
1	Very Poor
2	Poor
3	Fair
4	Good
5	Very Good

The data that has been collected is then calculated using as follows:

$$NP = \frac{R}{SM} \times 100\%$$

Description :

NP = percentage value

S = score obtained

N = maximum score

The calculation results obtained are then interpreted using the following interpretation criteria:

Tabel 2. Average Rating Score Interval

Interval Rate Score (%)	Validity Category	Description	Product Feseability Interpretation
0-20	Very Poor	Revision Required	Very Unfeasible
21-40	Poor	Revision Required	Unfeasible
41-60	Fair	Revision Required	Feasible Enough
61-80	Good	Not Revision Required	Feasible
81-100	Very Good	Not Revision Required	Very Feasible

RESULTS AND DISCUSSION

Stages of Analysis

At the analysis stage, the researcher conducted interviews with the fifth-grade teacher at SDN 021 Ciporeat to find out how the process of implementing mathematics learning on speed material. The results of the interviews indicated that the teacher had difficulties in conveying mathematics subject matter to students. This is caused by the lack of availability of learning media in schools, with the result that implementation of the mathematics learning process in class is only guided by the student textbook. The learning process that only relies on student textbooks as the only source of student learning results in a lack of student motivation in the mathematics learning process. Students tend to feel bored and have difficulty understanding the math material delivered by the teacher.

Based on the problems that occur in the mathematics learning process at SDN 021 Ciporeat, the solution that researchers can raise

is to innovate the development of learning media PETA (Penjelajahan Matematika) based on the Android application as a learning media that can be used in the learning process of class V students at SDN 021 Ciporeat, especially on speed material. This PETA application can be used with the help of the technological tools of smartphones. One of the supporters of the use of the PETA application in the learning process in the classroom is the availability of smartphones for students. The teacher stated that most students have smartphones. Although, there are some students who have to borrow smartphones from their parents. The ability of students is quite good in operating smartphones of course it will support the success of the learning process in the classroom that is integrated with a touch of technology. Furthermore, the researcher analyzes the content of the material that will be loaded into the PETA application. The material content is prepared based on the basic competency guidelines for mathematics

subjects on the topic of speed contained in Permendikbud No. 37 Tahun 2018, namely on basic competencies "3.3 Menjelaskan perbandingan dua besaran yang berbeda (kecepatan sebagai perbandingan jarak dengan waktu, debit sebagai perbandingan volume dan waktu) and 4.3 Menyelesaikan masalah yang berkaitan dengan perbandingan dua besaran yang berbeda (kecepatan, debit)."

Design Stages

The design phase is carried out by researchers to produce a product design that is in accordance with the results of the needs analysis in the field. The researcher carried out the design in several steps, namely compiling the Media Program Outline (GBPM), making a flowchart, creating application design, creating video materials, and providing audio needs. There are several tools used by researchers to support the PETA application design process. Devices that assist researchers in the design process are divided into 2 types, namely hardware, and software. The hardware that the researcher used was an HP ProBook 450 G1 laptop with specifications processor Intel(R) Core(TM) i3-4000M CPU@ 2.40GHz, RAM 8 GB, system type 64-bit operating system, and HP OPPO F5 7.1.1 version. Software used in the design stage is google spreadsheet, Microsoft word 2019, PowerPoint 2019, Canva pro, Filmora, Compress png, Iloveimg, Internal recording, Padlet, Google form, and Youtube.

The design of the PETA application is designed by adopting the concept of an exploration game that has several exploration posts and levels. Each post is designed using an access code that can be found by students at

each level. This means that the PETA application is specifically designed to use an access code to encourage students to complete each post and level that contains learning material on the topic of speed. The content contained in the application consists of the presentation of material related to time units, distance unit material, speed material in the form of texts and learning videos, practice questions, discussion of questions, challenges, and evaluations. The PETA application contains 7 main posts. Post 1, 3, and 5, consist of several levels. While headings 2, 4, 6, and 7 do not have levels.

Development Stage

The development stage is carried out after all the content designs that will be loaded in the application are complete. The entire design created is then developed into an application product as a whole using the application builder Smart Apps Creator 3. After all the design plans are made, the researcher combines all the PETA application content designs into the application Smart Apps Creator 3 which can become a complete application product in the form of an .ahl file. That will be used by researchers as data to carry out the publishing stage the of application as a whole. After the entire content design is loaded in Smart Apps Creator 3, then the researcher carried out the staged publishing file. .ahl. into file.apk. through features publish contained in the display Smart Apps Creator 3 and will produce the PETA application that can be downloaded on a smartphone. The final appearance of the PETA application after going through the stages of publishing with the details are as follows.



Figure 2. Initial View



Figure 3. Main Menu



Figure 4. Adventures Level



Figure 5. Material View



Figure 6. Learning Video

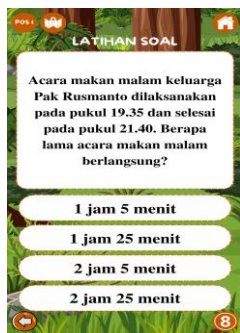


Figure 8. Exercise Implementation Stage



Figure 9. Challenge

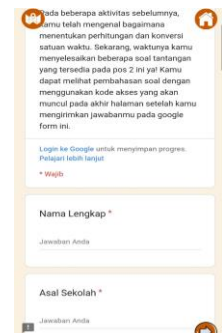


Figure 10. Evaluation

who has a background as a mathematics lecturer at a university in Indonesia and by material expert 1 who has a background as an elementary school mathematics teacher. The results of the validation of material experts 1 and material experts 2 can be seen in table 3.

Table 3. Results of Material Expert Validation of The PETA Applications

No	Validation Aspect	Score Acquisition	
		Material Expert 1	Material Expert 2
1	Content Eligibility	5	5
	Material relevance	5	5
	Material breadth	5	5
	Material depth	4	5
	Systematic presentation of material	5	5
2	Material up-to-date	5	5
2	Language Qualification		

	Easy for elementary students to understand	5	5
	Suitability with language rules	5	5
3	Presentation		
	Encourage active student participation	4	4
	Providing learning experiences to students	5	5
	Feasibility of supporting presentation	5	5
	Total Score	48	49
	Percentage	96%	98%
	Criteria	Very good	Very good

Table 3 shows the result of material expert 1 and material expert 2 validation of the material content contained in the PETA application. The validation scores of material

expert 1 and material expert 2 obtain 48 and 49 out of a total score of 50, resulting in a percentage of material expert 1's validation of 96% and material expert 2's validation of 98%.

Table 4. Material Expert Validation Results

Validator	Percentage
Material Expert 1	96%
Material Expert 2	98%
Average Percentage	97%

Table 4 shows the validation result of material experts 1 and material experts 2 with the acquisition of a validation percentage of 97% in the very feasible category.

subject of Learning Media and Learning Strategies in Elementary Schools and by material expert 2 who has a background as a lecturer in the subject of ICT Literacy and Learning Media Courses. The results of the validation of material expert 1 and material expert 2 can be observed in table 5.

In addition, researchers validated the PETA application with two media experts. Validation was carried out by media expert 1 who has a background as a lecturer in the

Table 5. Results of Media Expert Validation of The PETA Applications

No	Validation Aspects	Validation Details	Score Acquisition	
			Media Expert 1	Media Expert 2
1	Design Presentation			
	a. Design view	Design of application	5	5
		Image elements	5	5
	b. Quality color design	Design color composition	5	5
	c. Design layout proportions	Title layout proportions	5	5
		Icon layout proportions	4	5
		Button layout proportions	4	4
	d. The tidiness of the design presentation	Text layout	5	5
		Image layout	5	5
		Navigation button	5	5
	e. Image quality in design	Image conspicuousness	3	5
		Image size	5	5
	f. Appropriate use of writing	Font type	5	5

	Font size	5	5
	Title size	5	5
	Use of bold letters	5	5
g. Writing consistency	Lines spacing	4	4
	Letters spacing	4	4
2. Audiovisual Presentation			
a. Quality of learning videos	The conspicuousness of images in videos	4	5
	Image color	5	5
	Image size	5	5
b. Sound quality icon on learning video	Articulation	5	4
	Sound tempo	4	4
	Intonation	4	4
c. Narrator's voice quality in learning videos	Articulation	5	4
	Sound tempo	4	4
	Intonation	5	4
d. Sound quality	Suitability background with the application theme	5	4
	Appropriate navigation key sounds	5	4
3. User Interaction			
a. Navigation button layout	Size of navigation buttons	4	4
	Navigation button shape	5	5
b. Accessibility	Ease of application installation	5	4
	Ease of using application features	5	4
	Ease of opening the application	5	4
	Ease of closing the application	4	4
4. Presentation			
a. Presentation of Learning	Variations of student learning activities	5	5
	The suitability with the characteristics of elementary school students	5	5
	The conspicuousness of user instructions	5	5
b. Application logo suitability	The conspicuousness of App logo	5	5
	App logo color	5	5
	App logo shape proportions	4	5
Total Score		187	184
Percentage		93,5%	92%
Criteria		Very good	Very good

Table 5 shows the result of media expert 1 and media expert 2 validation of the PETA application. The validation scores of media expert 1 and media expert 2 were 187

and 184 out of a total score of 200, resulting in a percentage of media expert 1's validation of 93.5% and media expert 2's validation of 92%.

Table 6. Media Expert Validation Results

Validator	Persentase
Media Expert 1	93,5%
Media Expert 2	92%
Avarage Percentage	92,75%

Table 6 shows the validation result of media experts 1 and media experts 2 with the acquisition of a validation percentage of 92,75% in the very feasible category. Based on the results of the material expert validation in table 4 and the results of the media expert validation in table 6, it can be concluded that the PETA application is very feasible for use as a medium for learning mathematics in class. Based on the feasibility of the test result's functional suitability, furthermore researcher conducted the portability test of the PETA

application on adaptability and installability aspects to find out the compatibility of the PETA applications in various devices with Android versions 7 to 13. Aspect testing adaptability and installability were carried out by installing and uninstalling the PETA application on various devices with different Android versions, as well as find out the ability of the PETA application to adapt to various screen sizes. Table 7 shows the test results adaptability and installability the PETA application on 21 devices.

Table 7. Test Results in Adaptability and installability The PETA application

No	Device	Screen Size (inch)	Android version	Install		Uninstall		Screen Fit	
				S	F	S	F	S	F
1	OPPO F5	6	7.1.1	√		√		√	
2	OPPO A71	5.2	7.1.1	√		√		√	
3	Xiaomi Redmi Note 6 Pro	6.26	8.1.0	√		√		√	
4	OPPO A3S	6.2	8.1.0	√		√		√	
5	Xiaomi Redmi 8	6.22	9	√		√		√	
6	OPPO A12	6.22	9	√		√		√	
7	Infinix X650C HOT 8	6.52	9	√		√		√	
8	OPPO A15	6.52	10	√		√		√	
9	Xiaomi Realme 5	6.5	10	√		√		√	
10	Vivo 2027	6.51	10	√		√		√	
11	Samsung Galaxy A51	6.5	10	√		√		√	
12	Realme Narzo 50A Prime	6.6	11	√		√		√	
13	Vivo 1920	6.38	11	√		√		√	
14	Samsung A50S	6.4	11	√		√		√	
15	Xiaomi Redmi 9C	6.53	11	√		√		√	
16	Samsung Galaxy A04e	6.5	12	√		√		√	
17	Vivo 2029	6.51	12	√		√		√	
18	Vivo Y33S	6.58	12	√		√		√	
19	Vivo 2029	6.44	12	√		√		√	
20	Samsung Galaxy A04S	6.5	13	√		√		√	
21	Samsung Galaxy A73	6.7	13	√		√		√	

Description :

S = Success

F = Failed

Table 7 shows that devices with android versions 7 to 13 can do the process of installing and uninstalling the PETA application. In addition, the PETA application has the ability to adjust to several different screen sizes starting from the device with a

screen size of 5.2 inches to 6.7 inches. Based on the two tests that have been carried out, it can be concluded that the PETA application fulfilled the adaptability and installability standard with a percentage of 100%. Thus, it can be concluded that the PETA application can be used for all devices with the specifications of Android version 7 to Android version 13.

Evaluation Stage

The evaluation stage is the final stage in the PETA application development research conducted by researchers. The evaluation process is carried out by analyzing the data that has been obtained at the testing functional suitability and portability stage of the PETA applications that have been developed by

researchers. The evaluation phase aims to improve the quality of the PETA application based on comments and suggestions provided by material experts and media experts and to find out the strengths and weaknesses of the testing phase portability conducted by researchers. The comments and suggestions given by experts are as follows

Table 8. Material and Media Expert Comments and Suggestions of The PETA Applications

No	Experts	Expert Comments and Suggestions
1	Material Expert 1	In general, the aspect or scope of the material is very good and fulfilled the criteria of content validity. In addition, the display of instructions for use would be better presented with a larger text size such as the presentation of instructions for use padlet and google form.
2	Material Expert 2	The material presented is very good, interesting, and systematically arranged. The PETA application is very feasible to be used as a medium for learning mathematics in the classroom. It's just that it would be better if the instructions for use were enlarged so that students could see the instructions for use comfortably.
3	Media Expert 1	The developed media is very good and can use as learning media in the classroom.
4	Media Expert 2	The PETA application products have been presented very attractively. Suggestions for developers are to add menus or other facilities to make it easier for users to update existing products.

Table 8 shows that the suggestions given by experts in material 1 and material 2 have in common, namely suggestions related to the size of the writing in the instructions for using the PETA application which needs to be presented in a larger size. Based on the suggestions of material 1 and material 2 experts, the researcher made minor improvements to the PETA application in presenting the user manual. These improvements were made with the aim of providing convenience for the PETA application users in reading and understanding the instructions for using the PETA application. Then, on the media aspect, the comments of media expert 1 and media expert 2 show positive responses to the PETA application developed by the researcher. In addition, media experts 2 provide suggestions to researchers to add menus or other facilities to make it easier for users to update the PETA application. This suggestion was carried out by researchers by adding an "additional

information" menu to the menu options in the PETA application. The "additional information" menu contains the developer's personal contact which users can use as a place to submit suggestions, and criticisms, and equip with a google drive link as a place to convey information and update the latest PETA application.

Based on the result of the portability test, the PETA application has research limitations that the researchers do not conduct testing portability on all available android versions. Researchers conduct testing portability started on devices with Android version 7 to Android version 13. However, the use of the PETA application can still be used by Android users other than versions 7 to 13 through the PETA application which is made in html form.

CONCLUSIONS

The development of PETA (Penjelajahan Matematika) learning media

based on the Android application on speed material in class V SD is carried out using the ADDIE model through the five stages, namely analysis, design, development, implementation, and evaluation. Based on the results of research conducted at the five stages of ADDIE, it can be concluded that the PETA (Penjelajahan Matematika) learning media based on the Android application are: 1) the development of the PETA application is relevant to the needs of the mathematics learning process on speed material in class V SD, (2) the design of the PETA application is designed by adopting the concept of exploring games with various forms of presentation, (3) the PETA application design that has been made is developed into file.apk., (4) the PETA application has the feasibility of the content of the material in the very feasible category with a percentage of 97%, the feasibility of the media in the very feasible category with a percentage of 92.75%, and already fulfilled the portability standard on adaptability and installability aspect with a testing percentage of 100%, (5) the final product of the PETA application is developed based on the evaluation results at the testing stage-function suitability and portability by making minor improvements to aspects of the instructions for use and the addition of an "additional information" menu to make it easier for users to get information about updates latest of PETA application.

REFERENCES

- Aeni, A. N., Djuanda, D., Maulana, Nursaadah, R., & Sopian, S. B. P. (2022). Pengembangan Aplikasi Games Edukatif Wordwall sebagai Media Pembelajaran untuk Memahami Materi Pendidikan Agama Islam Bagi Siswa SD. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, 11(6), 1835–1852. <https://doi.org/10.33578/jpfkip.v11i6.9313>
- Ahmad, S., Sujana, A., & Nugraha, R. G. (2023). E-NIPA (Edukasi Nilai Pancasila) Application Development To Improve Grade 5 Students' Understanding About Pancasila Values. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, 12(1), 1–11. <https://doi.org/10.33578/jpfkip.v12i1.9442>
- Amalia, C., Alamsyah, T. P., & Pamungkas, A. S. (2022). Pengembangan Media Pembelajaran Matematika Berbasis Smart Apps Creator Untuk Meningkatkan Kemampuan Pemahaman Konsep Matematis Peserta Didik Di Sekolah Dasar. *Jurnal Pengembangan Pendidikan Dasar*, 6(2), 265–275. <https://doi.org/10.36379/autentik.v6i2.238>
- Blyznyuk, T. (2019). Formation of Teachers' Digital Competence: Domestic Challenges and Foreign Experience. *Journal of Vasyl Stefanyk Precarpathian National University*, 5(1), 40–46. <https://doi.org/10.15330/jpnu.5.1.40-46>
- Darling-Hammond, L. (2006). Constructing 21st-century teacher education. *Journal of Teacher Education*, 57(3), 300–314. <https://doi.org/10.1177/0022487105285962>
- Dreyer, A. M. F., Dodd, N., & Dalton, W. O. (2019). Applying game-based learning at the South African Military Academy: an experimental study. *International Journal of Technology Enhanced Learning*, 11(4), 380–397. <https://doi.org/10.1504/IJTEL.2019.102546>
- Ellya Novera, Daharnis, Yeni Erita, A. F. (2021). Upaya Peningkatan Pendidikan Berkualitas di Indonesia: Analisis Pencapaian Sustainable Development

- Goals (SDGs). *Jurnal Basicedu*, 5(6), 6349_6356.
<https://doi.org/10.31004/basicedu.v6i4.3296>
- Fahrozy, F. P. N., Iskandar, S., Abidin, Y., & Sari, M. Z. (2022). Upaya Pembelajaran Abad 19-20 dan Pembelajaran Abad 21 di Indonesia. *Jurnal Basicedu*, 6(2), 3093–3101.
<https://doi.org/10.31004/basicedu.v6i2.2098>
- Hamidah, A., & Nisa, C. (2022). Pengembangan Media Pembelajaran Tematik Berbasis Android Menggunakan Smart Apps Creator (SAC) pada Sekolah Dasar. *Cendekia*, 14(1), 177–189.
<https://doi.org/10.37850/cendekia>
- Isrok'atun, Hanifah, N., Maulana, & Suhaebar, I. (2020). *Pembelajaran Matematika dan Sains Secara Integratif melalui Situation-Based Learning*. Sumedang: UPI Sumedang Press.
- Junaedi, I. (2019). Proses pembelajaran yang efektif. *Journal of Information System, Applied, Management, Accounting and Research*, 3(2), 19–25.
- Karseni, Sariyasa, & Astawan, I. G. (2021). Pengembangan Media Game Edukasi Berbasis Android Pada Topik Bilangan Bulat Kela VI Sekolah Dasar. *Jurnal Teknologi Pembelajaran Indonesia*, 11(1), 1–9.
https://doi.org/10.23887/jurnal_tp.v11i1.1621
- Kiswanto, Kirana, C., Romadiana, P., Wijaya, B., Supardi, & Raya, A. M. (2021). Peningkatan Sumber Daya Manusia Melalui Pembuatan Video Pembelajaran Bagi Guru-Guru. *ADI Pengabdian Kepada Masyarakat*, 1(2), 1–7.
<https://doi.org/10.34306/adimas.v1i2.423>
- Komariah, S., Suhendri, H., & Hakim, A. R. (2018). *Pengembangan Media Pembelajaran Matematika Siswa SMP Berbasis Android*. 4(1), 43–52.
<https://doi.org/10.30998/jkpm.v4i1.2805>
- Kuswanto, J., & Radiansah, F. (2018). *Media Pembelajaran Berbasis Android Pada Mata Pelajaran Sistem Operasi Jaringan Kelas XI*. 14(1), 15–20.
<https://doi.org/10.37676/jmi.v14i1.467>
- Maheswari, K. I., & Gorda, A. A. N. O. S. (2019). Consumer Behaviour In The Era of Insdustrial Revolution 4.0. *Russian Journal of Agricultural and Socio-Economic Sciences*, 94(10), 152–157.
<https://doi.org/10.18551/rjoas.2019-10.20>
- Muhali, M. (2019). Pembelajaran Inovatif Abad Ke-21. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan: E-Saintika*, 3(2), 25.
<https://doi.org/10.36312/e-saintika.v3i2.126>
- Murdiyanto, T., & Mahatama, Y. (2014). Pengembangan Alat Peraga Matematika Untuk Meningkatkan Minat Dan Motivasi Belajar Matematika Siswa Sekolah Dasar. *Sarwahita*, 11(1), 38.
<https://doi.org/10.21009/sarwahita.111.07>
- Nasaruddin, N. (2018). Karakterisik Dan Ruang Lingkup Pembelajaran Matematika Di Sekolah. *Al-Khwarizmi: Jurnal Pendidikan Matematika Dan Ilmu Pengetahuan Alam*, 1(2), 63–76.
<https://doi.org/10.24256/jpmipa.v1i2.93>
- Natasya, N. D., Surya, Y. F., & Marta, R. (2019). Analisis Faktor Penyebab Kesulitan Belajar Matematika Di Kelas IV Sekolah Dasar Negeri 004 Bangkinang Kota (Materi Pecahan). *Jurnal Riset Pembelajaran Matematika Sekolah*, 3(6), 47–54.

- <https://doi.org/10.21009/jrpms.032.06>
Nazar, M., Oktarina, A., & Puspita, K. (2020). Pengembangan Aplikasi Pembelajaran Interaktif Berbasis Android untuk Membantu Mahasiswa dalam Mempelajari Materi Larutan Elektrolit dan Nonelektorlit. *Jurnal Pendidikan Sains Indonesia*, 8(1), 39–54. <https://doi.org/10.24815/jpsi.v8i1.16047>
- Nurfadhillah, S., Ningsih, D. A., Ramadhania, P. R., & Sifa, U. N. (2021). Peranan Media Pembelajaran dalam Meningkatkan Minat Belajar Siswa SD Negeri Kohod III. *PENSA: Jurnal Pendidikan Dan Ilmu Sosial*, 3(2), 243–255.
- Rahardja, U., Harahap, E. P., & Pratiwi, S. (2018). Pemanfaatan Mailchimp Sebagai Trend Penyebaran Informasi Pembayaran Bagi Mahasiswa di Perguruan Tinggi. *Technomedia Journal*, 2(2), 41–54. <https://doi.org/https://doi.org/10.33050/tmj.v2i2.323>
- Rahayu, R., Iskandar, S., & Abidin, Y. (2022). Inovasi Pembelajaran Abad 21 dan Penerapannya di Indonesia. *Jurnal Basicedu*, 6(2), 2099–2104. <https://doi.org/10.31004/basicedu.v6i2.2082>
- Rahmatiani, L. (2020). Pendidikan Kewarganegaraan sebagai Pembentuk Karakter Bangsa. *Prosiding Seminar Nasional Kewarganegaraan*, 87–94. <http://www.seminar.uad.ac.id/index.php/snk/article/view/3665/pdf>
- Ramadhini, D. A., & Kowiyah, K. (2022). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Cerita Matematika Materi Kecepatan Menggunakan Teori Kastolan. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 6(3), 2475–2488. <https://doi.org/10.31004/cendekia.v6i3.1581>
- Rifai, I. (2013). Various Dimensions of Globalization and Implication for Their Implications for The Leadership and Management of Education. *Jurnal Lingua Cultura*, 7(2), 87–91. <https://doi.org/10.21512/lc.v7i2.425>
- Rozali, A., Irianto, D. M., & Yuniarti, Y. (2022). Kajian Problematika Teacher Centered Learning dalam Pembelajaran Siswa Studi Kasus: SDN Dukuh, Sukabumi. *Journal of Elementary Education*, 05(01), 77–85. <https://doi.org/10.22460/collase.v5i1.9996>
- Rusman. (2017). *Belajar & Pembelajaran Berorientasi Standar Proses Pendidikan*. KENCANA.
- Savitri, D., Karim, A., & Hasbullah. (2020). Pengembangan Media Pembelajaran Matematika Berbasis Android di Kelas 4 Sekolah Dasar. *Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*, 1(2), 63–75. <https://doi.org/10.46306/lb.v1i2.17>
- Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Sukmadinata, N. S. (2012). *Metode Penelitian Pendidikan*. PT. Bandung: Remaja Rosydakarya.
- Syamsudin, A. M. (2021). Analisis Kesulitan Belajar Siswa Pada Mata Pelajaran Matematika Materi Kecepatan dan Debit di Rahmatiani, L. (2020). Pendidikan Kewarganegaraan sebagai Pembentuk Karakter Bangsa. *Prosiding Seminar Nasional Kewarganegaraan*, 87–94. <http://www.seminar.uad.ac.id>. In *Universitas Pendidikan Indonesia*.
- Wulandari, F. A., Kurniawati, U. M., & Rohimawan, M. A. (2020). Problematika Mata Pelajaran Matematika Dalam Pembelajaran Tematik Di Sekolah Dasar/Madrasah Ibtidaiyah. *Refleksi Edukatika: Jurnal*



PRIMARY: JURNAL PENDIDIKAN GURU SEKOLAH DASAR
VOLUME 12 NOMOR 2 APRIL 2023
ISSN : **2303-1514** | E-ISSN : **2598-5949**
DOI : <http://dx.doi.org/10.33578/jpfkip.v12i2.9650>
<https://primary.ejournal.unri.ac.id/index.php/JPFKIP>

Ilmiah Kependidikan, 11(1), 109–115.

<https://doi.org/10.24176/re.v11i1.4945>