DEVELOPMENT OF ANDROID-BASED LEARNING MEDIA ON THE BASICS OF ALGORITHM AND PROGRAMMING FOR CLASS X STUDENTS OF RANTAUPRAPAT REGIONAL VOCATIONAL SCHOOL

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ABSTRACT

This research uses a quantitative approach to test the hypotheses proposed in the research in the form of numbers and analysis using statistics, with the aim of the research being to determine the development of Android-based learning media products on the basics of Algorithms and Programming, as well as the feasibility of Android-based learning media. on the basics of Algorithms and Programming for class X students of Rantauprapat Regional Government Vocational School. The results of this research are Android-based learning media on the basics of Algorithms and Programming for class Meanwhile, the results of testing by material experts obtained an overall average of 88.6% in the "Very Eligible" category. The results of the feasibility test by students were 82.47% which was included in the "Very Eligible" category. So overall it can be concluded that the learning media developed is very suitable for use.

KEYWORDS	*Learning Media, Android, Feasibility, Algorithms and Programming*

INTRODUCTION

Learning is a process of interaction between educators and students in a learning environment. In the learning process, a media is needed to support the smoothness and effectiveness of students' learning. The rapid development of technology today has impacted the use of media for learning without limits. For example, computer technology, laptops, the internet, and even smartphones can now be used as effective learning sources. The development of information technology, which has

become a convenience in various aspects, has been utilized in various schools to implement interactive learning media, which can be used on both PCs and Android smartphones. Various media can help students overcome learning difficulties. For example, in Android-based learning media, students can learn more easily without time and place restrictions and without the need to bring books and laptops.

Based on observations conducted at SMK PEMDA Rantauprapat from October to November 2023, it was found that students still have difficulty learning the Basics of Algorithms and Programming material due to several factors, one of which is the lack of additional learning media as independent learning media outside of school. The school-provided textbooks are very limited in their use and can only be used within the school environment. In addition to the textbooks provided by the school, students are expected to have notes in their own notebooks. Not many students can afford to buy textbooks, so when exams come, they struggle to find sources and materials to study. Another issue is that many students are not focused on learning because they are too busy with their phones, which they use for social media and gaming. Most students already have smartphones with the Android operating system, but they have not been maximized as effective learning tools.

Based on interviews with the Basic Programming subject teacher, Mrs. Ani Dwi Rohmani, S.Pd, it was stated that students' interest and motivation in learning are still lacking. This can be seen from students who do not pay attention to the teacher during class. The lack of interest and motivation in learning is partly caused by the lack of varied learning media. Moreover, according to previous research (Sesmiarni & Iswantir, M, 2023), it was stated that at SMK Negeri 1 Baso (Computer and Networking Engineering), there are still some students who can only achieve the minimum passing grade (KKM). The common problems are the lack of interest and study habits at school, some students never study at home, and they are lazy to study and do homework. The research suggests that teachers should use varied learning media to cultivate students' interest and study habits.

Building on these issues, it is necessary to implement learning media that can enhance students' activity, creativity, and ability to learn, which is expected to stimulate students' interest and motivation to learn and provide ease in studying material with interactive media. Therefore, in this study, the author plans to develop Android-based learning media on the Basics of Algorithms and Programming for 10th-grade students at SMK PEMDA Rantauprapat.

The formulated research problems are:
1. How is the development of Android-based learning media products on the Basics of Algorithms and Programming for 10th-grade students at SMK PEMDA Rantauprapat?
2. What is the feasibility of Android-based learning media on the Basics of Algorithms and Programming for 10th-grade students at SMK PEMDA Rantauprapat?

Literature Review

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Media

Media, in the perspective of education, is a very strategic instrument that contributes significantly to the success of the teaching and learning process. Its presence directly influences the dynamics of learners (Arsyad A, 2019). The term media is often associated with mass communication, the embodiment of which can be seen in the form of newspapers, magazines, radio, video, television, computers, the internet, intranet, and so on. Various opinions converge to conclude that media is a tool that serves as an intermediary or connector between the sender and receiver in information delivery. Media consists of various types, one of which can be used in the learning process (Purbohastuti, 2017).

Learning Media

In line with the development of science and technology (S&T), especially in the field of education, the use of learning aids or media has become increasingly extensive and interactive, such as computers, the internet, and mobile phones (Munthe, 2020).

The traditional view of learning suggests that knowledge is the main role in human life, and it can be acquired through learning. In the modern view, changes in human behavior, observable through interactions with the environment, are also the result of learning. Individuals who previously did not know something can understand it through learning (Singh & Hashim, 2020).

Development of Learning Media

Activities in the development of learning media include the preparation of learning materials, including curriculum development, syllabi, and lesson plans. The preparation of these materials is accompanied by the development of teaching aids in the learning process, namely the creation of learning media. If the variety of available learning media is limited, educators need to develop them individually, in groups, or involve other parties to achieve efficiency and mutual benefits (Septiasari & Sumaryanti, 2022).

Products, in the form of learning designs with the ADDIE approach, which stands for Analysis, Design, Development, Implementation, and Evaluation. Analysis involves analyzing or identifying any problems found in a specific environment, leading to ideas or concepts in determining the product to be developed (Priyanto, 2019). The purpose of the analysis step is to identify possible causes of performance gaps.

Definition of Learning Modules

Learning with modules allows learners with high learning speeds to complete one or more basic competencies faster than other learners (Mytra et al., 2022). As one form of teaching material, modules serve the following functions:
a. Independent learning material
b. Substitute for teaching functions
c. As an evaluation tool
d. As a reference material for learners

Definition of Multimedia

Multimedia is a combination of art, video, sound, animation, images, and text manipulated digitally and delivered and controlled interactively. In the field of communication, multimedia can be interpreted as channels, connecting media, and communication tools. The elements in multimedia are integrated into applications to form a harmonious application. Multimedia can be understood as the use of several different media to combine and deliver information in the form of animation, audio, text, graphics, and video (Masrizal et al, 2016).

Definition of Android

The development of technology such as smartphones has been widely used by almost everyone due to their affordability (Pratama & Hermawan, 2016). Android has become a very popular operating system due to its effectiveness and efficiency compared to other similar programs, making it popular for educational purposes due to its ease and flexibility. Learning that adopts mobile systems and devices further, (Researches & Nano-coatings, 2020).

The Android operating system also has a unique code name assigned to each version of Android. Android Studio is an IDE (Integrated Development Environment) software used to develop Android applications. Android Studio uses Java and Kotlin programming languages as used in the Android operating system., (Ii & Teori, 2019).

Basics of Algorithms and Programming for 10th-grade students at SMK PEMDA Rantauprapat in the odd semester of 2022. The feasibility of learning media in the study will be assessed by expert judgment, namely media experts to assess media aspects and subject matter experts to assess content aspects, as well as by 10th-grade students majoring in Computer Networking Engineering at SMK PEMDA Rantauprapat using a structured questionnaire. The framework can be illustrated by the following diagram:
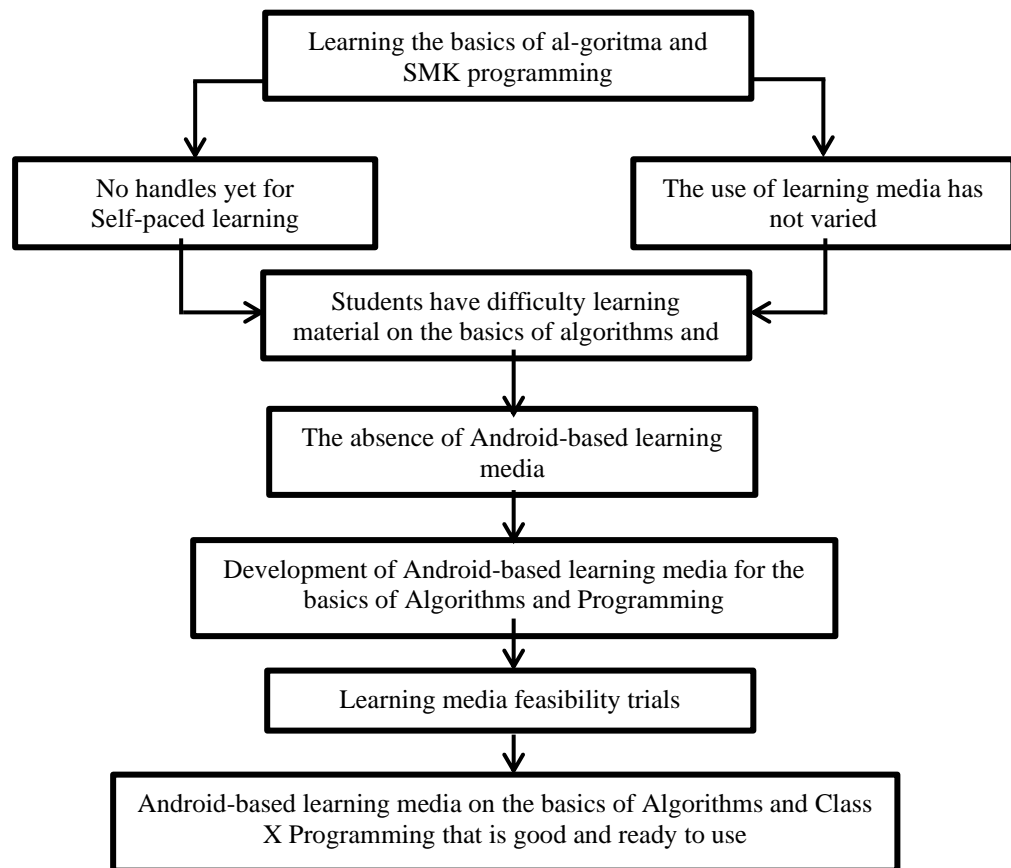
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┌─────────────────────────────────────┐
│   Learning the basics of al-goritma  │
│          and SMK programming          │
└─────────────────────────────────────┘
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┌─────────────────────┐          ┌─────────────────────────┐
│ No handles yet for  │          │ The use of learning     │
│ Self-paced learning │          │ media has not varied    │
└─────────────────────┘          └─────────────────────────┘
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┌─────────────────────────────────────┐
│    Students have difficulty learning │
│ material on the basics of algorithms and │
└─────────────────────────────────────┘
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┌─────────────────────────────────────┐
│  The absence of Android-based learning │
│                media                  │
└─────────────────────────────────────┘
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┌─────────────────────────────────────┐
│ Development of Android-based learning │
│ media for the basics of Algorithms    │
│          and Programming              │
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┌─────────────────────────────────────┐
│     Learning media feasibility trials │
└─────────────────────────────────────┘
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┌─────────────────────────────────────┐
│ Android-based learning media on the basics of Algorithms and Class │
│ X Programming that is good and ready to use │
└─────────────────────────────────────┘
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Figure 1 Conceptual Framework

RESEARCH METHOD

This study examines the "Development of Android-Based Learning Media for the Basics of Algorithms and Programming for 10th Grade Students at SMK PEMDA Rantauprapat", located at JL. KH. Dewantara, No. 104, Rantauprapat, Sioldengan, Kec. Rantau Sel., Kab. Labuhanbatu, North Sumatra 21419. The purpose of using a quantitative approach is to test the hypotheses proposed in the study using numbers and statistical analysis. According to Sugiyono (2017:165), the Likert Scale is widely used in questionnaires to measure perceptions, attitudes, or opinions of individuals towards a developed product. The responses to each item on the Likert scale vary from very positive to very negative, namely: (1) Strongly Agree, (2) Agree, (3) Uncertain, (4) Disagree, and (5) Strongly Disagree.

Instrument Grid for Media Experts

This instrument is aimed at media experts to test the developed product. This instrument contains points related to Android-based learning media.

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Instrument Grid for Subject Matter Experts

Before being used for research, the quality of the content in learning media needs to be reviewed by subject matter experts. This assessment also uses a non-test questionnaire instrument that includes points to assess the quality of content in this Android-based learning media.

Instrument Grid for Users

This instrument is aimed at learning media users, namely students. Points in this instrument cover aspects of ease of use and navigation, clarity of presentation, aesthetics, and instructional quality.

In validating this instrument, experts are asked for their opinions on the instrument that has been prepared, which can lead to decisions: (1) the instrument can be used without modification, (2) the instrument can be used with modification, and (3) the instrument needs to be revamped. After tabulating the data, validation testing of the instrument is continued with item analysis, by correlating the score of each item with the total score, which is the sum of each item score (Sugiyono, 2017:194). The correlation technique used is the Product Moment correlation with the following formula:

$$r_{xy} = \frac{n(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{\{n(\Sigma X^2) - (\Sigma X)^2\}\{n(\Sigma Y^2) - (\Sigma Y)^2\}}}$$

Information :
Rxy   = correlation coefficient between variables x and y
N   = number of respondents
ΣX = sum of item scores
ΣY = sum of total scores
ΣXY = sum of the product of item scores and total scores

The reliability of the instrument can be calculated using the Alpha formula according to Arikunto (2013) in his journal (Arikunto suharsimi, 2019) as follows:

$$r^{11} = \left(\frac{k}{(k-1)}\right)\left(1 - \frac{\Sigma ab^2}{a^{12}}\right)$$

Information :
r_{11} = instrument reliability
k   = number of item questions
Σab^2 = sum of item variances
$Ab_1{}^2$ = total variance

After the scores are determined, the data are applied in calculations to assess the feasibility in the form of a percentage, which can be briefly described with the following formula:

$$\text{Persentase Kelayakan (\%)} = \frac{Skor\ yang\ diperoleh}{Skor\ Maksimum\ Ideal} X100$$

(Purwanto, 2016)

The feasibility percentage obtained is then converted into sentences to assess the feasibility of the media. Below is the table guideline for media feasibility

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percentage criteria according to Arikunto and Jabar (2016) in the journal by (Rimbani, 2017).

RESULT AND DISCUSSION

Storyboard design contains the initial design of the appearance, layout, and determination of content in learning media, such as navigation buttons, page layout, text placement, and things contained in learning media.

a. Storyboard Design

Start page The start page is a mandatory page in a learning software. The initial page is designed in the form of a *splash screen* containing information on the title of the learning media and the identity of the creator as shown in Figure 1.

Figure 1 *Start page* storyboard

b. Menu *Page Storyboard* Design

The menu page storyboard contains the main menu layout of the learning media. In Figure 2, it is shown that there are several menu buttons, namely the hint menu, basic competence menu, destination menu, material menu, video menu, program sample menu, practice question menu, glossary menu, and developer menu. On the upper right side there is an application exit button.
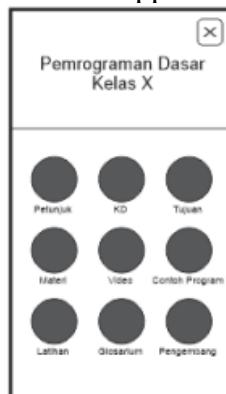
Figure 2 *Storyboard* of the menu page

c. Design *Storyboard* Instruction Page

The design of this page contains text to present instructions for using the application. At the bottom there is a home button to return to the main menu. As in figure 3 below:
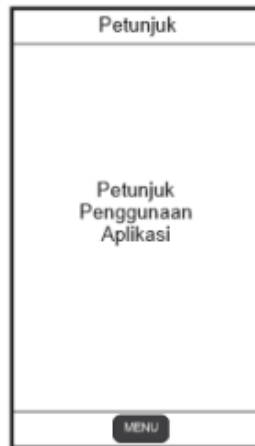
Figure 3 *Storyboard* instruction page

d. Storyboard Design for Basic Competency and Objective Page

The design of this page contains text to display the basic competencies and objectives included in the learning media. At the bottom there is a home button to return to the main menu. Can be seen in figure 4.
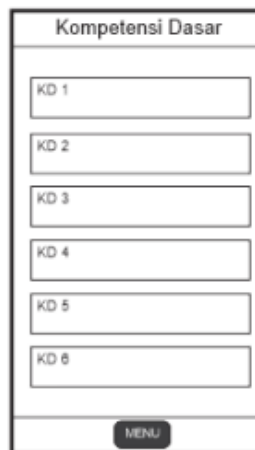
Figure 4. Storyboard for basic competency and objective page

e. Storyboard Design for Material Page

Figure 5 and Figure 6 show the storyboard for the material page designed by presenting buttons for specific materials. When a button is pressed, it will lead to the material page containing the provided material content. At the bottom of the material content page, there is a back button to return to the material menu, and at the bottom of the material page, there is a home button to return to the main menu. An example image can be seen below:
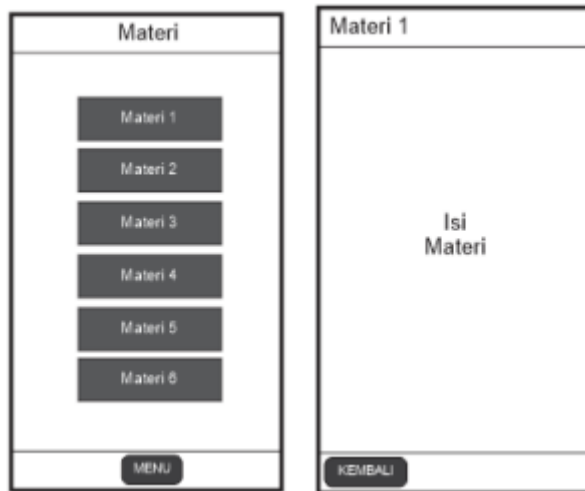
Figure 6. *Contents page* storyboard

Figure 5. Storyboard for material submenu page

f. Storyboard Design for Video Page

The video storyboard contains a layout of video options, which when a button is pressed, will display the video content. The image can be seen in Figure 7 below:



Figure 7. Storyboard for video page

g. Storyboard Design for Example Program Page

The storyboard design in Figure 8 shows the arrangement for displaying Pascal example programs. The box area is where the program code is displayed, then there is a result button at the bottom to display the results of the example program code. The illustration can be seen in the image below:

Figure 8. Storyboard for example program page

h. Storyboard Design for Exercise Page
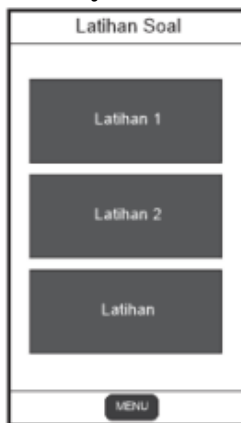
There are three types of practice questions to be presented, each grouping of material. Therefore, on this storyboard, there are three buttons which are submenus of practice questions.

Figure 9. Storyboard for exercise submenu page
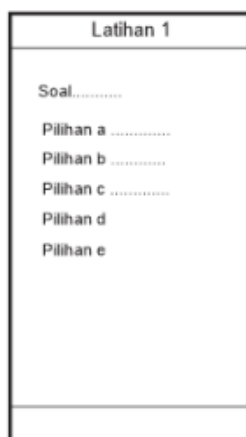
Design of the practice question menu in Figure 10. contains a button that, when clicked, will go to the exercise work page. On the page, the layout of the question placement and answer choices are determined.

Figure 10. Storyboard for exercise content page

i. Storyboard Design for Glossary Page

The glossary page storyboard contains the glossary content layout and menu buttons used to return to the main menu page. The illustration can be seen in Figure 11 below:

Figure 11. Storyboard for glossary page

j. Storyboard Design for Developer Page

Figure 12. Storyboard for developer page

The developer page storyboard design displays what information will be included in the developer data. The storyboard design that has been created is then implemented into a real display or interface design to make it more attractive and user-friendly. The results of the interface design are displayed in the image below:
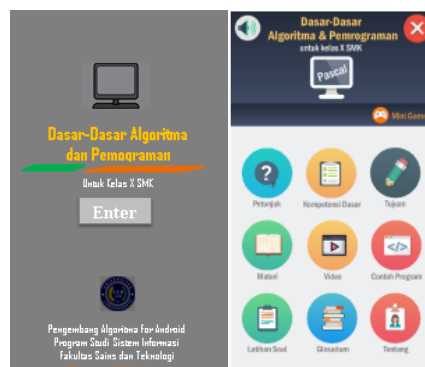

Figure 13. Splash screen and main menu

The splash screen page is the first page executed when the user opens the application. Inside, there is an Enter button to start learning and enter the menu page. To ensure that every element in the application functions properly, a program script needs to be provided.

Figure 14. Instruction page

The instruction page shown in Figure 14. is a page that displays instructions for using the application, so that users can understand how to use this application.
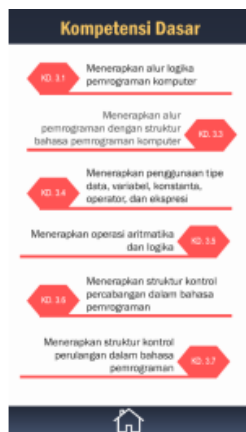

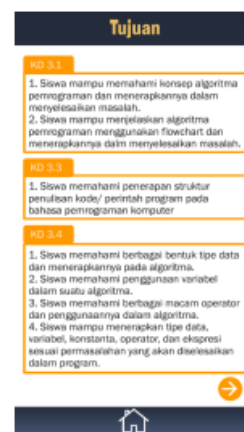Figure 15. Basic competencies page

Figure 16. Landing page

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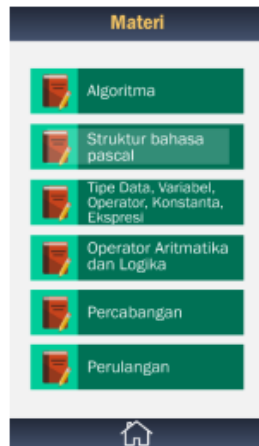
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Figure 17. Material submenu page

Figure 18. Content page
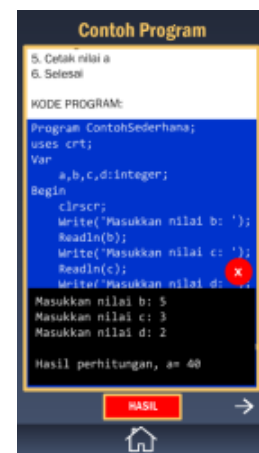

Figure 19.
Video submenu page

Figure 20.
Video display page

Figure 21.
Program sample page

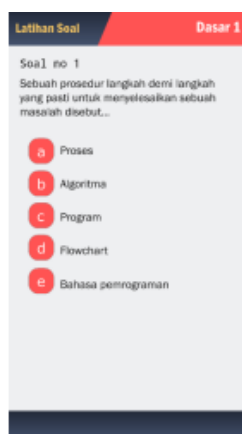Figure 22.
Practice questions menu page
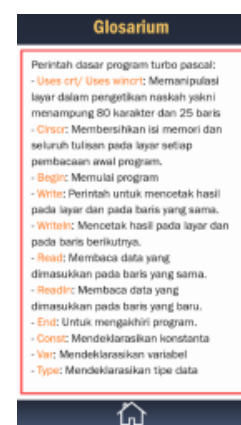

Figure 23.
Practice pages

Figure 24.
Glossary questions

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Figure 25 Developer Profile

This testing was conducted using cloud-based application testing infrastructure, namely Firebase Test Lab. Below are the results of testing the application with this software on 10 devices with different Android versions:

Eksekusi uji	Durasi	Lokal	Orientasi	Masalah
LG G3, Tingkat API 19	3 mnt 19 dtk	Indonesia (Indonesia)	Potret	–
Galaxy J7 (SM-J710MN), Tingkat API 23	5 mnt 12 dtk	Indonesia (Indonesia)	Potret	–
Xperia Z2, Tingkat API 21	5 mnt 8 dtk	Indonesia (Indonesia)	Potret	–
Samsung Galaxy S3, Tingkat API 18	5 mnt 23 dtk	Indonesia (Indonesia)	Potret	–
LG G6 LGUS997, Tingkat API 24	5 mnt 8 dtk	Inggris (Amerika Serikat)	Potret	–
Samsung Galaxy S9+ (US), Tingkat API 26	5 mnt 6 dtk	Inggris (Amerika Serikat)	Potret	–
Nexus 9, Virtual, Tingkat API 25	5 mnt 21 dtk	Inggris (Amerika Serikat)	Potret	–
Nexus 6, Tingkat API 22	5 mnt 9 dtk	Inggris (Amerika Serikat)	Potret	–
Huawei P8 lite, Tingkat API 21	5 mnt 13 dtk	Inggris (Amerika Serikat)	Potret	–
Xperia XZ1 Compact, Tingkat API 26	5 mnt 6 dtk	Inggris (Amerika Serikat)	Potret	–

Figure 25. Compatibility test results

Based on Figure 25, it is found that the testing of the Android-based learning media application on various versions did not encounter any issues in running the application. Therefore, the developed learning media application achieved the Compatibility aspect up to Android version with API level 26, which is up to Android Oreo.

The data from the testing by media experts, subject matter experts, and students were then processed to determine the product's feasibility level. Data analysis was conducted by scoring the responses chosen by evaluators or respondents from the alternative answers using a Likert scale interval from 1 to 5.

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Table 1: Results of Media Expert Assessment Analysis

No	Assessment Aspect	Feasibility Percentage	Score Obtained
1	Ease of Use and Navigation	96%	Very Feasible
2	Aesthetic or Beauty	92.85%	Very Feasible
3	Media Integration	95%	Very Feasible
4	Technical Quality	97.5%	Very Feasible
Final Average		**95,34%**	**Very Feasible**

Source: SMK PEMDA Rantauprapat 2023

Based on the data from Table 1, the feasibility score of the media from the aspects of ease of use and navigation is stated to be very feasible with a feasibility percentage of 96%. The aesthetic aspect is stated to be very feasible with a feasibility percentage of 92.8%, media integration is stated to be very feasible with a feasibility percentage of 95%, and technical quality is stated to be very feasible with a feasibility percentage of 97.5%. The final score obtained is 95.34%, indicating that the Android-based learning media on the Basics of Algorithms and Programming falls under the "Very Feasible" category. The graph of the media expert assessment analysis data can be seen in Figure 27.
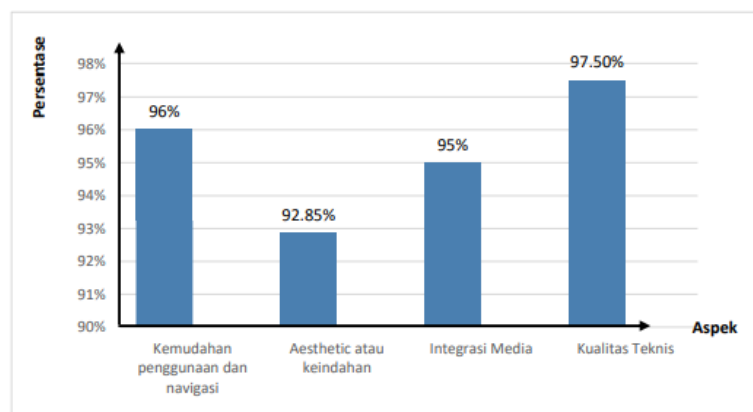

Figure 27. Graph of material expert assessment data analysis results

The assessment of the feasibility of material on Android-based learning media is reviewed from 3 aspects, namely ease of use and navigation, *aesthetic* or beauty, media integration, and technical quality. The results of the material expert assessment are listed in Table 2 below:

Table 2 Results of Media Expert Assessment Analysis

No	Assessment Aspect	Feasibility Percentage	Score Obtained
1	Suitability	90%	Very Feasible
2	Content and Objective Quality	93.3%	Very Feasible
3	Instructional Quality	82.5%	Very Feasible
Final Average		**88,6%**	**Very Feasible**

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Based on the data analysis results in Table 2, the feasibility percentage of the suitability aspect is stated to be very feasible with a percentage of 90%, the content and objective quality aspect is stated to be very feasible with a percentage of 93.3%, and the instructional quality aspect is stated to be very feasible with a percentage of 82.5%. The total percentage is 88.6%, indicating that the material in the learning media is categorized as "Very Feasible" to use. The graph of the data analysis on the material assessment results can be seen in Figure 28.
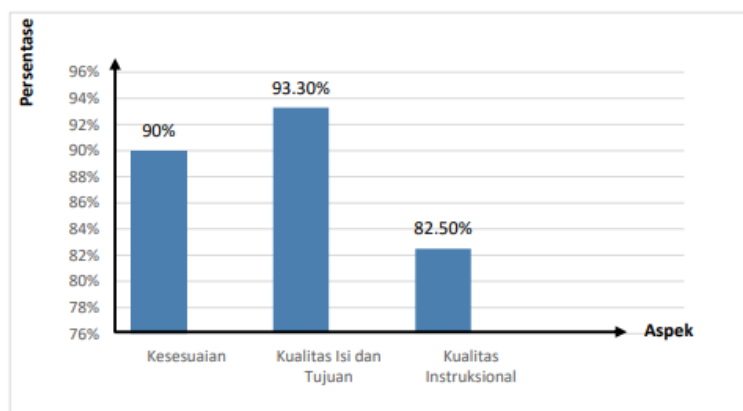

Figure 28. Graph of material expert assessment data analysis results

The assessment of Android-based learning media by students includes aspects of ease of use and navigation, aspects of clarity of presentation, aspects of aesthetic or beauty, and instructional aspects. Table 3 shows the results of assessment by students.

Table 3. Results of Student Trial Analysis

No	Assessment Aspect	Feasibility Percentage	Score Obtained
1	Ease of Use and Navigation	84.4%	Very Feasible
2	Aesthetic or Beauty	82.2%	Very Feasible
3	Media Integration	84%	Very Feasible
4	Technical Quality	78.25%	Very Feasible
Final Average		**82,47%**	**Very Feasible**

Based on the results in Table 3, the feasibility percentage of the ease of use and navigation aspect is stated to be very feasible with a percentage of 85.4%, the clarity of presentation aspect is stated to be very feasible with a percentage of 82.2%, the aesthetic aspect obtained a feasibility percentage of 84%, thus stated as very feasible, and the instructional quality aspect is considered feasible with a feasibility percentage of 78.25%. The overall average obtained is 82.47%, indicating that the Android-based learning media on the Basics of Algorithms and Programming is categorized as "Very Feasible" to use. The graph of the feasibility test results of Android-based learning media can be seen in Figure 29.
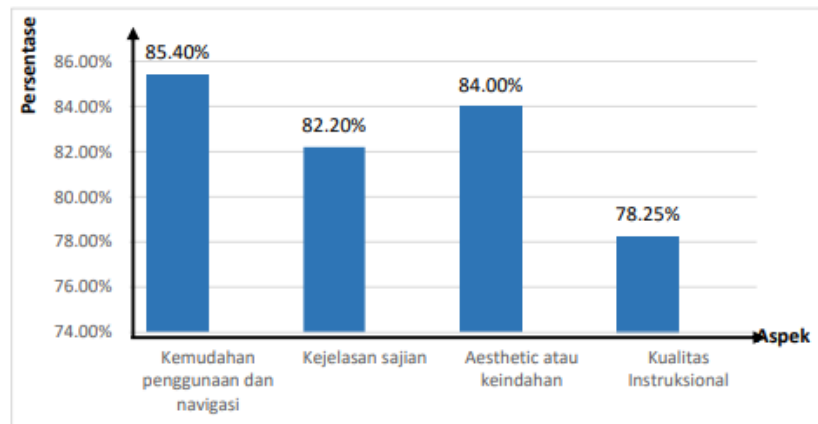
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Figure 29. Graph of the results of due diligence data analysis by students

CONCLUSION

The conclusion drawn from the results of this development research are as follows: 1. The development of Android-based learning media on the Basics of Algorithms and Programming for 10th-grade students at SMK Pemda Rantauprapat was carried out using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). The product successfully developed in this development is an application that supports classroom learning as well as self-learning, utilizing Android-based smartphones and has been tested compatible with various Android versions. In this application, there are features that have been tailored to the needs, namely user guide features, learning materials, sample programs, instructional videos, practice questions, and mini-games. 2. Android-based learning media on the Basics of Algorithms and Programming for 10th-grade students at SMK Pemda Rantauprapat has been tested for its feasibility by media experts, with an overall average of 95.34% with the category "Very Feasible". Meanwhile, the results of testing by subject matter experts obtained an overall average of 88.6% with the category "Very Feasible". The results of feasibility testing by students are 82.47%, which falls into the category of "Very Feasible". Therefore, overall, it can be concluded that the developed learning media is highly suitable for use.

REFERENCES

Arikunto suharsimi. (2019). Metodologi Penelitian (Tehnik Pengambilan Sampel. *Jurnal Math Educator Nusantara: Wahana Publikasi Karya Tulis Ilmiah Di Bidang Pendidikan Matematika*, *1*, 50.

Arsyad A. (2019). *Konsep Dasar Media Pembelajaran*. 23–35.

Ii, B. A. B., & Teori, L. (2019). *Tahapan Perkembangan Android*. 7–13.

Masrizal et al. (2016). *Perancangan Aplikasi Game Dalam Pengenalan Pancasila Menggunakan Adobe Flash CS6*. *01*(1), 1–23.

Munthe, I. R. (2020). *Ali Akbar Ritonga 1) , Masrizal 2) , Ibnu Rasyid Munthe 3)*. *8*(3).

Mytra, P., Asrafiani, A., Budi, A., Hardiana, H., & Irmayanti, I. (2022). Implementasi Teori Belajar Behavioristik dalam Pembelajaran Matematika. *JTMT: Journal Tadris Matematika*, *3*(2), 45–54. https://doi.org/10.47435/jtmt.v3i2.1253

Pratama, N. A., & Hermawan, C. (2016). Aplikasi Pembelajaran Tes Potensi Akademik Berbasis Android. *Jnteti*, *6*(1), 1–6.

Priyanto, D. (2019). Pengembangan Multimedia Pembelajaran Berbasis Komputer. *Iqra*, *14*(1), 1–13.

Purbohastuti, A. W. (2017). Efektivitas Media Sosial Sebagai Media Promosi. *Ekonomika*, *12*(2), 212–231.

Researches, R., & Nano-coatings, N. S. (2020). *Sistem Informasi Geografis Untuk Pemetaan Homestay di Lombok Timur Berbasis Android*. *34*(1), 15–19.

Rimbani, R. M. (2017). *Merode Penelitian Tehnik Pengambilan Sampel*. 20–32.

Septiasari, E. A., & Sumaryanti, S. (2022). Pengembangan tes kebugaran jasmani untuk anak tunanetra menggunakan modifikasi harvard step test tingkat sekolah dasar. *Jurnal Pedagogi Olahraga Dan Kesehatan*, *3*(1), 55–64. https://doi.org/10.21831/jpok.v3i1.18003

Sesmiarni, Z., & Iswantir, M, C. (2023). Jurnal Perancangan Media Pembelajaran Menggunakan Android Pada Mata Pelajaran Dasar-dasar Algoritma Dan Suasana Pembelajaran Yang SesuaiDengan Karakteristik Mereka Masing-masing. *Jurnal Fakultas Keguruan Dan Ilmu Pendidikan*, *3*(2), 1143–1149.

Singh, P. K. P., & Hashim, H. (2020). Media Pembelajaran (Kajian terhadap Langkah-langkah Pemilihan Media dan Implementasinya dalam Pembelajaran). *Creative Education*, *11*(03), 262–274. https://doi.org/10.4236/ce.2020.113020

Arikunto suharsimi. (2019). Metodologi Penelitian (Tehnik Pengambilan Sampel. *Jurnal Math Educator Nusantara: Wahana Publikasi Karya Tulis Ilmiah Di Bidang Pendidikan Matematika*, *1*, 50.

Arsyad A. (2019). *Konsep Dasar Media Pembelajaran*. 23–35.

Ii, B. A. B., & Teori, L. (2019). *Tahapan Perkembangan Android*. 7–13.

Masrizal et al. (2016). *Perancangan Aplikasi Game Dalam Pengenalan Pancasila Menggunakan Adobe Flash CS6*. *01*(1), 1–23.

Munthe, I. R. (2020). *Ali Akbar Ritonga 1) , Masrizal 2) , Ibnu Rasyid Munthe 3)*. *8*(3).

Mytra, P., Asrafiani, A., Budi, A., Hardiana, H., & Irmayanti, I. (2022). Implementasi Teori Belajar Behavioristik dalam Pembelajaran Matematika. *JTMT: Journal Tadris Matematika*, *3*(2), 45–54. https://doi.org/10.47435/jtmt.v3i2.1253

Pratama, N. A., & Hermawan, C. (2016). Aplikasi Pembelajaran Tes Potensi Akademik Berbasis Android. *Jnteti*, *6*(1), 1–6.

Priyanto, D. (2019). Pengembangan Multimedia Pembelajaran Berbasis Komputer. *Iqra*, *14*(1), 1–13.

Purbohastuti, A. W. (2017). Efektivitas Media Sosial Sebagai Media Promosi. *Ekonomika*, *12*(2), 212–231.

Researches, R., & Nano-coatings, N. S. (2020). *Sistem Informasi Geografis Untuk Pemetaan Homestay di Lombok Timur Berbasis Android*. *34*(1), 15–19.

Development Of Android-Based Learning Media On The Basics Of Algorithm And Programming For Class X Students Of Rantauprapat Regional Vocational School

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Rimbani, R. M. (2017). *Merode Penelitian Tehnik Pengambilan Sampel*. 20–32.

Septiasari, E. A., & Sumaryanti, S. (2022). Pengembangan tes kebugaran jasmani untuk anak tunanetra menggunakan modifikasi harvard step test tingkat sekolah dasar. *Jurnal Pedagogi Olahraga Dan Kesehatan*, *3*(1), 55–64. https://doi.org/10.21831/jpok.v3i1.18003

Sesmiarni, Z., & Iswantir, M, C. (2023). Jurnal Perancangan Media Pembelajaran Menggunakan Android Pada Mata Pelajaran Dasar-dasar Algoritma Dan Suasana Pembelajaran Yang SesuaiDengan Karakteristik Mereka Masing-masing. *Jurnal Fakultas Keguruan Dan Ilmu Pendidikan*, *3*(2), 1143–1149.

Singh, P. K. P., & Hashim, H. (2020). Media Pembelajaran (Kajian terhadap Langkah-langkah Pemilihan Media dan Implementasinya dalam Pembelajaran). *Creative Education*, *11*(03), 262–274. https://doi.org/10.4236/ce.2020.113020