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DEVELOPMENT OF ANDROID-BASED INTERACTIVE MEDIA FOR CLASS X STUDENTS IN INFORMATICS SUBJECTS AT SMKN 1REJOTANGAN

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***Abstract*— Learning at SMKN 1 Rejotangan is still dominated by conventional approaches which cause students to be less active and not very interested in digital learning media which allows students to learn independently and interactively, exacerbating students disinterest. The minimal use of interactive learning media, as well as the of digital generation students. In addition, limited time in face-to-face activities result in the material not being conveyed optimally. The media currently used still use teaching modules and Power Point. To overcome these problems, this study aims to create an Android-based interactive learning media that will be used to teach Informatics to grade 10 students at SMKN 1 Rejotangan. This media was developed using the GDevelop application and implemented for grade 10 students at SMKN 1Rejotangan. The research method used is Research and Development (R&D) with the ADDIE development model which includes the stages of Analysis, Design, Development, Implementation, and Evaluation. Data collection techniques are carried out through observation, interviews, and questionnaires. The result of validation by media expert and material experts show that this learning media is very suitable for use in the learning process with a feasibility percentage og 90% and 100%. To create this interactive media product, carried out in stages through small group trials of 10 students resulting in a feasibility og 88% and a resulting group trials of 25 students resulting in a feasibility of 91% in class X TKJ, a total of 35 students.**

Keywords*— Interactive media, android, information, development, and SMK.

I. INTRODUCTION

Whith the development of new technology marking the era of revolution 4.0 and 5.0, this development cannot be avoided because it has intered the field of education [1] The many sources of information available in the community are also evidence of advancements in technology. This is due to the many innovations and advanced phone models, which make them attractive to everyone [2].

Education is crucial for creating a quality generation, especially in the rapidly developing field of information technology. Vocational high schools (SMK) face the challenge of adapting their curriculum. However, many students

struggle to understand informatics materials, particularly those related to programming techniques and abstract concept. [3]. Although technology can improve education, some problems still often occur in the classroom, such as the limited availability of interesting and interactive learning resources. As a result, students have less understanding of what is being taught [4].

The development of technology in the field of education is not a new thing, the use of technology in education, especially in the teaching process combined with technology, can make it easier for teachers to convey information and knowledge to their students. Technological advances have been evidence that the application of ICT can accelerate the learning process [5].

Because the abstract material requires practical understanding, informatics education in grade X of vocational high schools ruqires an innovative learning approach. With interactive features such as video tutorials, quizzes, and direct feedback, Android-based learning resources are expected to increase student participation. During the learning process, students who where previously passive due to not understanding the lesson can become active [6].

Based on the problems above, the use of interactive educational resources as expected can become more active and achieve educational goals, and can determine how the use of learning media influences student's learning method.

II. LITERATURE REVIEW

A. Instructional Media

The word "media" comes from the Latin "medist", which means "middle" or "introduction"[7] Media is any form of channel that may be used to communicate [8].

Kemp & Dayton's [9] Research states that learning is a deliberate and systematic process to facilitate the acquisition of knowledge, skills, and attitude. During this process, interactions occur between students, teachers, and teaching materials.

Brown, Roediger III 7nMcDaniel [10] Everything that can be used to improve student's thoughts, feelings, attention, and abilities to encourage the learning process.

The characteristics of learning media according to Arsyad [11] include :

1) Educational media is now colled hardware, for example media that can be observed, felt, noticed, or seen by the five senses.
2) Software is a non-physical educational medium, which includes the content that is to be conveyed to students.
3) Focus on audio and visual media for education.
4) Educational resources function as tools available inside and outside the classroom.
5) During the learning process, educational media are used for information and interaction between teachers and students.

Learning media differs from other media because it is specifically designed to support learning. Here's the axplanation :

1) Main objective

   Learning media is created specifically for educational purposes, according to Arifin [12] educational resources muse have the ability to broaden student's understanding of certain subject matter by using systematic and organized method.

2) Educational content :

   To be effective, learning media must have content that is relevant to the curriculum and designed to help students learn, as explained by Nugroho [13].

3) Interactivity and engagement :

   Interactivity in learning media provides students with the opportunity to actively participate in the learning process. According to Rahmawati [14] interactivity in learning media can increase student's interest and desire to acquire knowledge.

4) Evaluation measurement :

   Educational media typically have tools to measure student progress, such as quizzes or texts. Santoso [15] states that good learning tools should have evaluation method to measure how students understand the material and develop.

5) Relevance to the curriculum :

   Learning media are designed to support educational objectives and unsure that the material presented support those objectives. Sudirman [16] stated that alignment with the curriculum is crucial for effectively enhancing faith, piety, and noble morals, as well as fostering student's creativity, sense of humor, and desire to become lifelong Pancasila learners.

B. Android

Android is a Linux-based mobile device operating system that includes on operating system, middleware, and applications [17] According to Alda, [18] Android has 4 characteristics, namely :

1) Open
   Android is designed to be completely open, so it can be freely used with new, more advanced technologies.
2) All apps are created equal
   All apps are designed to access phone functions equally and offer a variety of services to customers.
3) Troubleshooting applications
   Development of new and creative applications.
4) Fast and easy new app creation developers can increase productivity when creating apps with multiple Android tools.

Some of the main features of Android include :

1) User Interface : Utilizing android's touch-based interface, users can interact with the device via swipe, tap, and pinch.
2) Apps : Google Playstore provides access to thousand of apps that can be installed and used on Android devices.
3) Personalization : Users can interact with the device via swipe, tap, and pinch throught the android touch-based interface.
4) Security : Android has various security features such as 6-digit password, Quick Share, and extended accessibility.

C. Informatics Subject

Informatics is the science that encompasses the use of ICT to process, store, and transmit information, as well as the study of the social and ethical impacts of this technology. It also encompasses the study of the theories, concept, and techniques for developing information systems, network, and computer applications, as well as the use of information to improve the quality of life and solve complex problems.

D. Product Developer

Gdevelop is an open-source platform that doesn't require advanced programming skills to develop interactive games and applications. Supporting multiple platforms, including Android, it enables developers to create interactive learning resources with a user-frendly visual interface and an event-based system that simplifies the creation of application logic [19].

III. Research Methodology

A. Development Model

This application development research uses the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The ADDIE research method is a development method consisting of five stages. The first stage is the analysis stage, where the needs and development objectives are analyzed. The second stage is the design stage, where the product or system to be developed is designed. The third stage is known as development, where the product or system is developed according to the initial design. The fourth stage is implementation and testing. The fifth stage is the evaluation

stage, where the developed product or system is evaluated to determine its success.

B. Research Prosedures

1) Analyze
requirements analysis is the process of collecting technical data operational procedures, and data about customers and users of desired software. Both software developers and customers are actively involved in this process. The software designer uses customer data. This stage establishes the requirement for each piece of software to be created. It also specifies the required software, the software system's capabilities for scheduling the project, identifies resources (software, human, and hardware), and estimates the software development costs.

2) Design
Design is a stage of the learning material development plan that includes creating learning scenarios, selecting teaching materials, planning interface designers, data and procedures. After conducting a system requirements analysis, we can determine what is needed for the development of interactive media as a tool to provide assistance to students in learning informatics in class X TKJ 3. This will ensure that the system created will meet ecpectations and be suitable for use.

3) Development
In the ADDIE development model, the development phase is the third stage. In this stage, the process of creating interactive media product using Android is being carried out by concentrating on the evaluation material for informatics subjects in TKJ 3 SMKN 1 Rejotangan class X.

4) Implementation
Implementation is the fourth stage of the ADDIE development model. Grade X TKJ 3 student in informatics at SMKN 1 Rejotangan underwent a trial phase. The trial phase was conducted after the Android-based interactive learning media was declared suitable for use in research by material and media experts. The purpose of this trial was to determine student reactions after interacting with the interactive media. This was done to evaluate the media's quality based on student assessment result.

5) Evaluation
To ensure that the interactive media created functions effectively, the final stage is evaluation. Research data is obtained after teachers and students evaluate the interactive media. Afterward, the data is analyzed quantitatively. The purpose of this analysis is to draw conclusions about whether the learning toll is suitable for use in teaching.

a. *Product Trial*

1. *Trial Design*
Trial testing is a crucial step in developing learning tools to ensure their effectiveness and reliability. The trials in this study involved media experts and subject matter experts related to Android-based learning media. This trial process aims to ensure that the product meets quality standards before being used by students.

2. *Test Subject*
This trial was conducted at SMKN 1 Rejotangan. This study focused on developing a learning platform using Android. This study included lecturers from the Information Technology Education Study Program as media experts and informatics teachers at SMKN 1 Rejotangan, and class X TKJ 3 student as research subjects for the learning media assessment. The testing will be conducted in two stages :

1) Trial on a small group consisting of 10 class X TKJ students to test the feasibility and effectiveness of learning media.
2) A large group trial, which included 25 students from class X TKJ, as a sample to obtain broader data regarding students' acceptance and ability to understand this material.

During this trial, students will be given access to the learning media and asked to provide feedback via a questionnaire. Direct observations will also be conducted to assess student interaction with the created media. The information gathered will be used to refine and improve the learning media before further implementation.

3) Data Type
The data collection methods used in this study and development consist of both quantitative and qualitative data.

4) Data Collection Technique
1. Observation : this method is applied to collect information by directly observing the learning activities taking place in class X TKJ 3 SMKN 1 Rejotangan, both for students and teachers, using an Android-based learning platform created for HAKI material.
2. Interview : this data collection method is used for interaction throught questions and answer with teachers or related parties, to explore opinions and input regarding the effectiveness of the Android-based learning media that has been created.
3. Questionnaire: This method is used to obtain data indirectly by giving questionnaires to teachers and students to find out to what extent the learning media helps students understand the material.

In the data analysis process, researchers applied statistical formulas to measure the level of validity of the multimedia learning media developed.

$$\text{Hasil } \frac{Skor\ hasil\ yang\ diperoleh}{\text{Skor maksimal}} x\ 100\%$$

Sumber : (Purwanto,2011)

Furthermore, the results of the quantitative analysis will be compared against the score interpretation table. Based on the study by Rustandi as cited in [20] the percentage criteria for the feasibility of learning media can be classified as follows:

No	Skor dalam presentase	Kategori
1.	0% - 20%	Sangat Kurang Layak
2.	21% - 40%	Kurang Layak
3.	41% - 60%	Cukup Layak
4.	61% - 80%	Layak
5.	81% - 100%	Sangat Layak

IV. RESEARCH RESULTS

At this point, the researcher conducted a problem analysis within the Informatics education process at SMKN 1 Rejotangan. After obtaining the necessary information, the researcher was able to help resolve the problem. Evaluation was conducted using two methods: observation and interviews.

The research method used is research and development (R&D) through the ADDIE stages. These stages include: analysis, design, development, implementation, and evaluation.

Based on initial observations at SMKN 1 Rejotangan, the first step in developing Android-based learning media, the researcher conducted observations by supervising learning both inside and outside the classroom, while indirect observations were conducted by observing through social media. After conducting observations, the researcher interviewed the Informatics teacher at SMKN 1 Rejotangan about the learning process.

The second stage, design planning, involves preparing a development design. Android-based learning media for informatics subjects were created using the GDevelop platform. first step in creating a design:

a. *Selection of product font design*
   To create an Android-based interactive educational platform, most people choose Times New Roman because :
   1. *Legibility* : Times New Roman is a popular, easy-to-read, classic serif font that is safe for long texts or important information.
   2. *Familiarity & commonness* : Times New Roman creates a professional and trustworthy impression because it is the default font in many operating systems and software.
   3. *Contability* : Times New Roman is generally supported across platforms, although GDevelop allows the use of custom fonts. This reduces the likehood of display issues.

b. *Selection of colors for product*
   Dark blue and orange work well together to create a strong and effective contrast. The blue hues convey technology and professionalism, while the orange draws attention to important elements like headings and interactive buttons. Other darker colors support a theme of formality and authority, which is appropriate for topics like intellectual property and professionalism [21] .

c. *Selection of theme for product*
   This theme is highly effective because it combines visual representations of technology and informatics with symbols of law and justice. This directly reflects the title and content of the learning material on "Intellectual Property Rights and the Informatics Profession." This creates an engaging interface for the audience.

d. *Creating product background designs*
   Determining the background is a crucial component needed to enhance the product interface and enhance its appearance. Canva is a software program used to create product backgrounds.
   This background design focuses on technology and law. Symbolizing technology (informatics) and law (intellectual property rights), it seeks to combine representations of innovation, connection, and data with representations of protection, justice, and exclusive rights to create a story about how law protects and regulates progress in the digital world.

e. *Selection of product supporting assets*
   Asset creation begins by selecting a button and adding the algorithms that will be used in the product. Once the assets are ready, the background and algorithms are added to ensure the application runs.

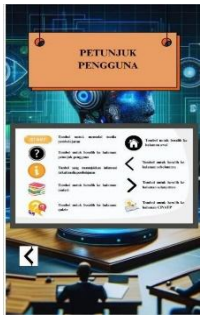
f. *Storyboard Design*
   Interface design is done by creating a storyboard as a reference for creating learning media.

g. *Learning media user flow*
   The user flow of learning media is useful for describing the flow that will be carried out when using learning media.

At the development stage, the learning media previously designed using the GDevelop platform has been refined. The homepage features a background image combining law and informatics, symbolizing the rapid digital development that raises issues such as data privacy, cybercrime, intellectual property rights, and ethical technology use. This combination is crucial for creating fair regulations and legal protection in the digital age.

Homepage Image

Main Menu Page



User Manual Page

Information Page

Learning Outcomes Page

Flow of Learning Objectives

On the content presented along Therefore, this internet page, the material is with explanations. media requires a stable connection.

Material Page

In developing this media, pages were added to provide quizzes to support optimal learning. This product will then undergo an evaluation phase by media and content experts to validate its feasibility before being implemented with students at SMKN 1 Rejotangan.

Page on the Quiz

In the the developed implementation stage, learning media were tested. An initial evaluation was then conducted to obtain feedback for improvements in the next stage. The small group trial yielded a score of 88%. According to the results

of trials conducted on a smaller group, 88% met the “Very Feasible” criteria.

learning outcomes of 10th grade students in Informatics at SMKN 2 Tulungagung. The sample size for this study was 10% of the total 740 students, resulting in 74 students. The validity test used in this study was conducted on Grade 10 Office Management Class 1, with 34 students, minus 3 students selected as the sample, resulting in 31 respondents.

In the large-group trial, the media achieved a score of 91%. Based on the large-group trial, the feasibility percentage of 91% falls within the "Very Feasible" criteria.

The next stage is product evaluation, where the developed product is assessed. This stage determines whether the product meets the identified expectations and needs. If deficiencies are found, improvements will be made to ensure the product effectively meets those needs.

Tabel Hasil Uji Ahli Media.

No	Pernyataan	Skor	Skor Maksimal
1.	Media dapat dilihat dengan jelas	4	5
2.	Media dapat didengar dengan jelas	5	5
3.	Media dapat diraba/digunakan dengan mudah	5	5
4.	Aplikasi dapat diinstal dijalankan dengan baik	5	5
5.	Media dapat dijalankan di *smartphone* android	5	5
6.	Materi dapat dipelajari kapan saja dan dimana saja	4	5
7.	Media menyajikan materi yang sesuai tentang HAKI	4	5
8.	Penyampaian materi mudah dipahami siswa	4	5
9.	Media mempermudah siswa memahami materi	4	5
10.	Materi sesuai CP/ATP	4	5
11.	Tersedia evaluasi berupa quiz	5	5
12.	Media dapat digunakan secara individu	5	5
13.	Media dapat digunakan secara berkelompok	5	5
14.	Evaluasi dapat dikerjakan secara individu maupun kelompok	4	5
	Jumlah Skor	**63**	**70**

$$\text{Hasil} = \frac{\textit{Skor hasil yang diperoleh}}{\text{Skor maksimal}} x\ 100\%$$

$$\text{Hasil perhitungan} = \frac{63}{70} x\ 100\%$$

$$= 90\%$$

Based on the calculations presented in the previous table, the validation score obtained from the first trial with media expert 1 reached 87%. This percentage indicates that the initial product is not yet suitable for use as an Android-based interactive learning medium with several modifications. Therefore, the media expert must conduct a revalidation test.

Tabel Hasil Uji Ahli Materi

No	Indikator	Skor	Skor Maksimal
1.	Materi sesuai CP/ATP	5	5
2.	Materi Hak Atas Kekayaan Intelektual dan Profesi Bidang Informatika	5	5
3.	Terdapat evaluasi belajar berupa quiz	5	5
4.	Terdapat umpan balik dari latihan soal	5	5
	Jumlah Skor	**20**	**20**

$$\text{Hasil} = \frac{\textit{Skor hasil yang diperoleh}}{\text{Skor maksimal}} x\ 100\%$$

$$\text{Hasil perhitungan} = \frac{20}{20} x\ 100\%$$

$$= 100\%$$

This score indicates that the product is excellent for student testing. The result was 100%, which falls within the "Very Suitable" criteria. The percentage obtained shows that the product is very suitable for use as an interactive learning medium without modification.

Tabel Uji Coba Kelompok Kecil

No	Pernyataan	Skor	Skor Maksimal
1.	Media dapat dilihat dengan jelas	48	50
2.	Media dapat didengar dengan jelas	43	50
3.	Media dapat diraba/digunakan dengan mudah	41	50
4.	Aplikasi dapat diinstal dijalankan dengan baik	46	50
5.	Media dapat dijalankan di *smartphone* android	45	50
6.	Materi dapat dipelajari kapan saja dan dimana saja	46	50

7.	Media menyajikan materi yang sesuai dengan HAKI	44	50
8.	Penyampaian materi mudah dipahami siswa	42	50
9.	Media mempermudah siswa memahami materi	44	50
10.	Materi sesuai CP/ATP	44	50
11.	Tersedia evaluasi berupa quiz	46	50
12.	Media dapat digunakan secara individu	44	50
13.	Media dapat digunakan secara berkelompok	44	50
14.	Evaluasi dapat dikerjakan secara individu maupun kelompok	43	50
	Jumlah skor	**620**	**700**

$$\text{Hasil} = \frac{\textit{Skor hasil yang diperoleh}}{\text{Skor maksimal}} x\ 100\%$$

$$\text{Hasil perhitungan} = \frac{620}{700} x\ 100\%$$

$$= 88\%$$

Based on the results of the analysis of small group trial data, the score was 88%. Evaluation by researchers after the trial conducted on small groups showed that the media functioned well and met the learning objectives.

Tabel Hasil Uji Coba Kelompok Besar

No	Pernyataan	Skor	Skor Maksimal
1.	Media dapat dilihat dengan jelas	116	125
2.	Media dapat didengar dengan jelas	110	125
3.	Media dapat diraba/digunakan dengan mudah	114	125
4.	Aplikasi dapat diinstal dan dijalankan dengan baik	116	125
5.	Media dapat dijalankan di *smartphone* android	118	125
6.	Materi dapat dipelajari kapan saja dan dimana saja	115	125
7.	Media menyajikan materi yang sesuai dengan HAKI	108	125
8.	Penyampaian materi mudah dipahami siswa	112	125
9.	Media mempermudah siswa memahami materi	113	125
10.	Materi sesuai CP/ATP	112	125
11.	Tersedia evaluasi berupa quiz	116	125
12.	Media dapat digunakan secara individu	115	125
13.	Media dapat digunakan secara berkelompok	114	125
14.	Evaluasi dapat dikerjakan secara individu maupun kelompok	117	125
	Jumlah Skor	**1.596**	**1.750**

$$\text{Hasil} = \frac{\textit{Skor hasil yang diperoleh}}{\text{Skor maksimal}} x\ 100\%$$

$$\text{Hasil perhitungan} = \frac{1.596}{1.750} x\ 100\%$$

$$= 91\%$$

Based on the results of the large-group trial data analysis, the product achieved a score of 91%. This percentage indicates that the product is highly suitable for use as a learning medium at SMKN 1 Rejotangan.

IV CONCLUSION AND SUGGESTION

CONCLUSION :

1) In this research related to interactive media development, researchers developed Android-based media using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. The development process used the GDevelop application to create interactive media products and Canva to design visual elements such as additional backgrounds, making it highly suitable for use in this learning medium.
2) The trials were conducted in stages, with small and large group trials involving media and material experts, with 90% of the participants in the very appropriate category and 100% in the very appropriate category, respectively. The smaller group trials resulted in 88% in the very appropriate category, and the large group trials resulted in 91% in the excellent category.

SUGGESTION :

1) For future researchers, the use of contrasting but eye-friendly colors, attractive illustrations, and animations that support understanding of the material are some of the

visual elements of Android-based interactive learning media that researchers should pay further attention to.

2) For students, interactive media may be used as an additional tool for learning.
3) For teachers, this learning media application can be used to help with Informatics lessons at SMKN 1 Rejotangan.
4) For schools, as an engaging digital learning innovation that aligns with technological advancements, they must support the development of Android-based interactive learning media. Schools should facilitate teacher training, provide supporting devices, and encourage cross-subject collaboration to create contextual, creative, and student-centered content.

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