The Development of Android-based Computer and Basic Network Learning Media

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Abstract: This research aims to produce valid and practical android-based learning media. Learning methods that are not yet optimal and the absence of android-based learning media can be used as a medium to support the learning process. This research uses the Research and Development (R&D) method with the ADDIE development model. The subjects of this study were 20 students as samples. The data collection technique used a questionnaire with a Likert scale. The results showed that the average value of the media expert validity test was 0.68 with a valid category and the material expert was 0.67 with a valid category. For the practicality test, the teacher's response reached 83.33% with a very practical category and for student responses it reached 90.92% with a very practical category. Based on the assessment and input from media experts and material experts as well as the results of field trials, this Android-based learning media is suitable for use.

Keywords: Learning Media, Android based, Valid and Practical, Research and Development, ADDIE Model

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1. Introduction

Education is a need for every human being, education is a process of forming human character which is very important to increase intelligence, skills and competencies in accordance with identity and environmental conditions (Berková et al., 2023; Samala et al., 2023; Tetteh et al., 2023). With education, the knowledge that we have will increase, the insight that we have will be wider, so that we can think in a more futuristic and rational way. In Law No. 20 of 2003 it is stated that national education functions to develop capabilities in producing national character and civilization that are useful in the context of educating the nation's life, aiming to develop the potential of students to become human beings who believe and fear the Almighty God, as democratic and responsible citizens.

Currently mobile devices, especially Android smartphones, have spread in various circles of society, ranging from adults, small children, among business people, students, and students, because Android smartphones can help do some important work or needs and make it easier to find and get information (Papadakis et al., 2021). Learning media is an important component of learning material, the existence
of learning media determines the success of learning, technological developments facilitate the use of learning media, and media design also becomes easier (Isnaeni et al., 2021).

Android is an operating system for developing Linux-based mobile phones that includes operating systems, middleware, and applications. Android is an operating system for Linux-based mobile phones that provides an open platform that gives developers the freedom to create their own applications (Erlin Eveline et al., 2019; Lisana & Suciadi, 2021). Android-based learning media which is a teaching delivery system that presents text material, images, videos, audio recordings with computer control to students who not only hear and see video and audio, but also provide active feedback so as to determine the speed and sequence of presentation.

App Inventor is an open-source web application originally developed by Google and currently maintained by the Massachusetts Institute of Technology (MIT) (Jain et al., 2023). App Inventor allows novice computer programmers to create applications for the Android operating system (Mir & Llueca, 2020). App Inventor uses a graphical interface, which allows users to drag-and-drop visual objects to create applications running on Android devices. MIT App Inventor is visual-based programming, even this programming is done simply by dragging and dropping on the tools provided, App Inventor is a web-based software that is shown for all Android developers, this software is easy to use because we don’t need to write any programming or coding languages, we only need to arrange the available coding components such as putting together a puzzle (Adiono et al., 2019).

The advantages of MIT App Inventor are that it is more practical, simple and does not require coding, only logic and a drag system (Sangeetha et al., 2022), even so, there are some disadvantages of MIT App Inventor, namely, there are several components that are incomplete, much different from Eclipse which is more flexible, and there are credits from MIT. MIT App Inventor or an extension of the Massachusetts Institute of Technology is a platform that is used to create android applications without using a programming language (Top & Gökbulut, 2022), or web-based applications where in making learning media there is no cost but free and only by connecting to the internet to create an Android application (Adiono et al., 2019; Sarkar et al., 2019).

Computer and basic network subject teachers and several students of class X TKJ SMK Negeri 1 Lubuk Basung, information was obtained that in general the learning methods used by teachers when learning were conventional methods such as delivery of material in the form of lectures, so that students do not understand the material conveyed by the teacher during the learning process, this can be seen from the practice scores and student test scores which are still low. It can be concluded that learning media is an access to offline and online learning processes that can help teacher performance and student learning processes in teaching and learning activities. From some of the research problems, the research objectives can be explained as follows:

a. This research produces valid android-based learning media.
b. This research produces practical android-based learning media.

c. The benefits of this research are:
  a. Can improve the quality of learning in achieving the developed curriculum
  b. Can facilitate teachers in the learning process
  c. As a media or tool in maximizing the delivery of learning material
d. As an independent means and clarify students' understanding of learning material

2. Methods

This study uses the research and development (R&D) method with the ADDIE development model (Abdul-Rahman Al-Malah et al., 2020; Nadeem et al., 2022). Research and Development is a research
method used to produce certain products, and test the effectiveness of these products (Prasetya, Fajri, et al., 2023; Prasetya, Syahri, et al., 2023; Wils et al., 2021). Research and development (Research and Development) as a type of research aims to produce new products through a development process that is integrated with research activities. This study will use the ADDIE research model (Analysis-Design-Develop-Implementation-Evaluate) which is a generic learning or lesson design model which has 5 stages of development including Analysis, Design, Development, Implementation and Evaluation (Nita et al., 2022).

Android-based learning media is very important when the learning process takes place with the existence of Android-based learning media that can help students in teaching and learning activities, especially students in general already have smartphones, with Android students can repeat learning anytime and anywhere, and Android is one of the supporting tools the learning process by using it as a learning medium in basic computer and network subjects (Eliza et al., 2019a, 2019b; Fitria, 2023).

Figure 1: ADDIE Development Model

a. Stage Analysis a needs analysis is carried out for the learning media that will be developed
b. Design Stage for planning android-based learning media to be developed, determining competency standards and basic competencies to be developed
c. Development Stage will provide materials for students and teachers in accordance with the specific products to be developed
d. Implementation Stage is carried out by deploying Android-based learning media, which at this stage will prepare learning equipment and a well-conditioned environment, after everything is available the designer can implement the products that have been designed and then developed into the learning process activities in class.
e. Evaluation Stage is carried out on the use of learning media after being tested on the subjects studied. This evaluation is intended to determine the quality and feasibility of the product being developed. The evaluation phase begins with the validation of each product by media experts and material experts then input is obtained for media improvement
Data collection techniques are the most strategic steps in research, because the main purpose of research is to obtain data (Roberts, 2020). In this study used data collection techniques in the form of a questionnaire. Questionnaire is a data collection technique used to ask questions to get answers from respondents. The data analysis technique used in this study is one of the main procedures used in data analysis by collecting all the necessary data (Abdul-Rahman Al-Malah et al., 2020), namely the results of the validity of media experts and material experts as well as data from the practicality of media whether or not a media is appropriate is determined by judgments made by experts. Practicality test analysis is used to test whether the media is practical or feasible. Practicality testing is done by using a questionnaire. The questionnaire used uses a Likert scale. The material expert instrument contains aspects related to learning media material which includes material, language and evaluation (Khaeroningtyas et al., 2016). The following is a grid for the learning material expert instrument. The media expert instrument contains points about aspects related to learning media. The following is a grid for the learning material expert instrument. To get the results of the validity of the material and media, the Aiken’V formula is used as follows:

\[ v = \frac{\sum s}{n(c - 1)} \]

Description:
- \( S = r - \text{Lo} \)
- \( \text{Lo} = \text{The lowest validity rating score (in this case } = 1) \)
- \( C = \text{The highest validity rating score (in this case } = 5) \)
- \( R = \text{Number given by an appraiser} \)
- \( N = \text{Number of Validators (Experts)} \)

<table>
<thead>
<tr>
<th>No</th>
<th>Achievement Level</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 - 0.666</td>
<td>Invalid</td>
</tr>
<tr>
<td>2</td>
<td>( \geq 0.667 )</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Practical Instruments the practicality questionnaire grid of Android-based learning media for teachers and students (Novra, Ricky & Asmara, 2021). The formula used to calculate the practicality tests of teachers and students is as follows:

\[ \text{Practicality Value } p = \frac{f}{n} \times 100\% \]

Description:
- \( P = \text{Practicality Value} \)
- \( f = \text{Score Acquisition} \)
- \( n = \text{Maximum Score} \)

<table>
<thead>
<tr>
<th>No</th>
<th>Percentage Value</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81-100%</td>
<td>Very Practical</td>
</tr>
<tr>
<td>2</td>
<td>61-80%</td>
<td>Practical</td>
</tr>
<tr>
<td>3</td>
<td>41 – 60%</td>
<td>less practical</td>
</tr>
<tr>
<td>4</td>
<td>21-40%</td>
<td>Impractical _</td>
</tr>
</tbody>
</table>

3. Results and Discussion

The results in this study were Android -based learning media and Android learning media products created and designed by researchers, with the aim of being used as a teacher’s tool in the learning process and as a source of independent learning used by students at home or at school.
Development of android-based learning media on computer and basic network materials in subjects applying computer assembly using Research and Development (R&D) products to be developed in the form of android-based learning media. The development model used in this research is ADDIE (analysis, design, development, implementation, evaluate) (Chatwattana et al., 2023). Android-based learning media is made using the MIT App Inventor platform. The development of android-based learning media is the use of android learning media that is run so that it runs as expected, how to install learning media software first so that it can run on Android. The following are the stages of developing Android-based learning media:

a. Initial View

This initial display is equipped with a welcome to basic computer and network subjects, besides that the researcher also uses a button to play / enter the next page. The initial appearance of the learning media can be seen below:

![Figure 2: Media Home Screen](image)

b. Main Menu Display

The main menu display is the menu page android-based learning media, this menu has 7 button to connect the menu to the next menu ie instructions, basic competencies, absences, materials, videos, exercises and remedial main menu display can be seen below
c. **Hint display**

This screen contains instructions for using Android-based learning media. Here students can learn how to use Android-based learning media and help students use media and understand learning. The display instructions are shown in the image below.

![Figure 3: Media Main Menu display](image)

**Figure 3: Media Main Menu display**

![Figure 4: Display instructions](image)

**Figure 4: Display instructions**

d. **Basic Competency Display**

Basic competency display is a display that contains basic competencies 3.2 and 4.2 applying computer assembly and assembling a computer. Basic competency displays can be seen below.
e. Absence Display
The attendance display contains the full name of the student and the class where the student took attendance there.

f. Material view
Display material is material that contains lessons learned by students in this display contains 2 materials, namely theory and practice that will be studied by students, namely implementing computer assembly and assembling computers, the material menu display can be seen in the image below.
g. Video View
The video display of assembling a computer is in the video display of assembling a computer, it contains a learning video on how to assemble on a computer, which can be seen in the image below.

h. Training View
This display contains 10 multiple choice questions that will be filled in by students and the display of the exercise can be seen in the image below.
Figure 9. Exercise Display

i. Remedial Display

This display contains 3 essay choice questions which will be filled in by students and the remedial display can be seen in the image below.

Figure 10. Remedial view

In the development of Android-based learning media, the authors have carried out data collection techniques by distributing questionnaires that have been distributed to media experts, material experts, teacher responses and student responses, which results from this study will produce a level of validity.
and practicality of Android-based learning media, which has been made. Based on the data analysis that has been carried out on the validators of media experts and material experts as well as the practicality of teachers and students. Table 1. Media validation results based on the development of learning media in computer and basic network based android subjects at SMKN 1 Lubuk Basung below;

**Table 3. Media Validation Results**

<table>
<thead>
<tr>
<th>No</th>
<th>Assessment Aspects</th>
<th>Validators</th>
<th>Amount</th>
<th>Validity Results</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>V1</td>
<td>V2</td>
<td>V3</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Visual Aspect</td>
<td>3</td>
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<td>2.75</td>
<td>8.25</td>
</tr>
<tr>
<td>2.</td>
<td>Appearance Aspect</td>
<td>3</td>
<td>2,5</td>
<td>2.67</td>
<td>8,17</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td>0.68</td>
</tr>
</tbody>
</table>

Based on the results of data analysis of Android-based learning media, the instructional aspects and display aspects assessed by the media expert validator are declared "valid" because the validity category in learning media ≥ 0.667 is declared "valid" while 0 - 0.666 is declared "invalid" from the table above which stated that the results of the media validation value of 0.68 were declared "valid" and suitable for use as learning media. Table 2. Material Validation Results based on the development of learning media in computer and basic network based android subjects at SMKN 1 Lubuk Basung.

**Table 4. Material Validation Results**

<table>
<thead>
<tr>
<th>No</th>
<th>Assessment Aspects</th>
<th>Validators</th>
<th>Amount</th>
<th>Validity Results</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>V1</td>
<td>V2</td>
<td>V3</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Content Eligibility</td>
<td>3</td>
<td>2,4</td>
<td>2,4</td>
<td>7,8</td>
</tr>
<tr>
<td>2.</td>
<td>Presentation Eligibility</td>
<td>3</td>
<td>2,6</td>
<td>2,8</td>
<td>8,4</td>
</tr>
<tr>
<td>3.</td>
<td>Language Eligibility</td>
<td>3</td>
<td>2,33</td>
<td>2.67</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td>0.67</td>
</tr>
</tbody>
</table>

Based on the results of the analysis of android-based learning media on the content (material) and instructional aspects assessed by the material expert validator are declared "valid" because the validity category in learning media ≥ 0.667 is declared "valid" while 0 - 0.666 is declared "invalid" from the table above which stated that the results of the validation of the material value of 0.67 were declared "valid" and suitable for use as learning media. The results of the practicality of the teacher’s response based on the development of learning media in computer subjects and basic android-based networks at SMKN 1 Lubuk Basung can be seen in table 4. Following;

**Table 5. Teacher Response Practicality Test Results**

<table>
<thead>
<tr>
<th>No</th>
<th>Practicality Aspect</th>
<th>(%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Visual aspect</td>
<td>87.5</td>
<td>Very Practical</td>
</tr>
<tr>
<td>2.</td>
<td>Content aspect</td>
<td>90</td>
<td>Very Practical</td>
</tr>
<tr>
<td>3.</td>
<td>Aspects of language and writing</td>
<td>87.5</td>
<td>Very Practical</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>88.33</td>
<td>Very Practical</td>
</tr>
</tbody>
</table>

Based on the results of the analysis and the percentage level of practicality of computer and basic network learning media assessed by the computer teacher and basic network "very practical" because the practicality category of 81-100% is declared "very practical" because in the table of results the practicality of the teacher’s response above states that it has a percentage of 88.33% in the "very practical" category Good as a learning medium. Table 4. The results of the practicality of student responses based on the development of learning media in computer subjects and basic android-based networks at SMKN 1 Lubuk Basung are as follows.

**Table 6. Student Response Practicality Test Results**
Based on the practicality table of teacher responses and student responses, it can be concluded that the android-based learning media that has been made has an average teacher practicality value of 88.33% in the very practical category and an average student response practical value of 90.92% in the very practical category.

4. Conclusion and Suggestion

Based on the results of research and discussion of the development of android-based learning media in Computer and Basic Network subjects at SMKN 1 Lubuk Basung. This study uses the Research and Development (R&D) method, which is research that is used to produce certain products and test the effectiveness of these products. It can be concluded that: Learning media has been produced in basic computer and network based android subjects using the MIT App Inventor software in making learning media. The Validity Test of Android-based learning media was carried out by 3 validators, namely the media validator and the material validator, for the media validator it was carried out by 3 lecturers, while the material validator was carried out by 2 lecturers and 1 teacher who taught computer subjects and basic networks at SMKN 1 Lubuk Basung. The validity for media experts is 0.68 with a valid category, material validity is 0.67 with a valid category. Thus, it can be concluded that from the results of the validation of media experts and material experts on Android-based learning media, they are declared valid. Thus, it can be concluded that the response of teachers and students is that Android-based learning media is very practical to use in the learning process at school.

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Declarations

Author contribution

Aisah Sunari Sansi as research implementer, designing media and collecting data. Faiza Rini as research and article concept designer. Thomson Mary as research and article concept designer. Tee Tze Kiong as article writer and proof-reader.

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Competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References


