Development of Android-Based Learning Media in Information Communication Technology (ICT) at Senior High School

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Article Information	Abstract
	Android-based learning media is one of the media that is easy to use by teachers and students in achieving learning objectives. This study aims to produce valid, practical, and effective learning media used for learning. The method used is Research and Development (R&D) with a 4-D development model (four D models). This study used an instrument in the form of a questionnaire. The questionnaires were divided into validation questionnaires, practicality, and effectiveness questionnaires. For data analysis, researchers used Aiken's formula and Gain Score. The validation sheet is filled out by 4 validators consisting of 2 material validators and 2 media validator. The practicality sheet is filled out by 30 students and 2 teacher. For effectiveness data used questions filled out by students. The questionnaire data obtained a validity level of 0.95 which indicates that the developed media is valid. For practicality, the result is 90% with the very practical category. The effectiveness of the developed media is seen from the value of students. After using the media, 100% of students had scores above the minimum completeness criteria, while from the gain score test, they got a value of 0.75 which means that the learning media developed can be said to be effective. Based on these data it can be concluded that android-based learning media in Information and Communication Technology (ICT) subjects is valid, practical, and effective for use as learning media.

A. Introduction

Education as we know it today lives in the media world, as we know today's learning activities are expected to reduce the delivery system of material using the lecture method. Currently the learning system is expected to be student-centered or what is commonly called student-centered learning. One of the efforts to carry out learning that is centered on students is by means of learning using media. Media in the learning process is needed by students as learning facilities. Creatively designed learning using multimedia will increase the possibility for students to learn to be more active. [1]

As we know that education is a conscious effort that is deliberately designed to achieve a certain goal that was previously set. Education plays a very important role in creating quality human beings, which will later affect the progress of the country. With the existence of quality human beings will produce great people who are intelligent, because education greatly affects a country. [2]

Currently technology is developing very quickly. As we now know, a lot is discussed about Industry 4.0. The world of education is also required to be able to keep up with technological developments that occur. Because the world of education will not be separated from technology. It is time for us to use technology in the learning process. For example, like using a media in learning. [3]

Media is one of the supporting factors for achieving learning objectives. This is related to the use of appropriate and varied media in the learning process which can increase learning motivation and can reduce students' passivity [4]. Based on the understanding of media described earlier, using learning media will help teachers explain subject matter, as well as students will find it easier to understand a material with the help of learning media. Media is only used as a tool to assist in the learning process, and the teacher still needs to guide students in the learning process, because the role of the teacher cannot be replaced by the media.

The problem that occurs in learning at Senior High School 1 Ranah Batahan now is that learning resources for students provided by the school are still limited, such as the textbooks used are incomplete. In the learning process sometimes the teacher uses slides from power point when giving material. The power point that was made was only a slide explaining simple material. This power point media includes media that students like in the learning process, but sometimes students are also bored with this learning media.

Technology-based learning media used in the learning process has not varied. Media based on technology used in learning is in the form of material in power point using computers and projectors. As for the use of other technology-based media, for example, interactive CDs and Android media, not yet. Even though in the era of the use of Android media in schools it has been used and has had a good impact on learning.[5]

Existing technological advances must be utilized for the benefit of the world of education. Rapid technological advances will have a good impact and will support the world of education. Especially now that technology is urgently needed in the world of education, as we all know that not only Indonesia but the world has been hit by a virus, namely Covid-19 which has had an impact on all areas of life, including the world of education.[6]

West Pasaman is one of the districts that has been assigned the status of a green zone from Covid-19, so the local government issued a policy for the high school level to continue carrying out the learning process face-to-face or directly to school as usual. However, the government has issued a policy of reducing class hours from usual, 1 hour of study is usually counted as 45 minutes, because of the Covid 19, the 1 hour lesson has been changed to 30 minutes. This of course resulted in reduced study hours and had an impact on the learning process. Educators must teach existing material with little learning time. This will certainly result in difficulties for the teacher to complete the material to be taught. Based on the explanation of this problem, it is felt that a media is needed which is expected to be able to facilitate educators and students when carrying out learning. In this Android-based learning media, there is all material for class X ICT subjects. So that students can study independently material that has not been taught by their teachers at school.

During this time the teaching that is mostly done is teaching with a method that is centered on the lecture and question and answer method. The lecture method is only able to hold the attention of about 10% of the students in the class [7]. People are only able to remember 20% of what they see and 30% of what they hear. But people are able to remember 50% of what they see and hear and 80% of what they see, hear and do simultaneously.[8]

Based on the results of observations and interviews, which were held on Wednesday 15 July 2020 at Senior High School 1 Ranah Batahan with the school principal and ICT subject teachers, technology-based learning media such as Android had never been used before. ICT teachers usually use power point, but there are still many students who do not take notes when displayed in power point. The android media that will be made is expected to be able to assist in teaching and learning, because in Android learning media subject matter is provided which is presented in the form of theory, pictures, videos related to ICT teaching materials, and which is also equipped with competency tests such as practice questions so that you can see abilities possessed by students.

From the results of interviews with ICT subject teachers and school principals, it can be concluded that they support and agree in making this Android-based learning media and used as research, which is expected to later help the learning process and increase participant motivation to learn, and not get bored while studying.

Android learning media can be used by students to study at home, if there is material that has not been explained at school by the teacher, then students can study on their own at home with the help of this android learning media.[9]

Based on the questionnaire given to class X IPS 2 students on Saturday, July 18 2020 at Senior High School 1 Ranah Batahan, it was found that most of the students already had an Android smartphone.

Based on the problem of the learning process that occurs at Senior High School 1 Ranah Batahan, it is important to conduct research with the title "Development of Android-Based Learning Media in Class X High School Information and Communication Technology Subjects".

B. Research Method

The type of research used is Research and Development (R&D), namely research that produces certain products [10]. The subjects of this research were students who studied ICT in class X as much as one class. The object of this research is android-based learning media in information and communication technology subjects for Class X High School". The development model used is the 4-D model (Four D models). This 4-D model consists of 4 main stages, namely: (1) define, (2) design, (3) develop and (4) disseminate [11]. The implementation of the research starts from the define stage. The steps in the define stage include front end analysis, student analysis, task analysis, concept analysis and learning objectives analysis. The second stage is design. At the design stage what is done is to design the learning media that is developed. The third stage is the develop stage namely validity test, practicality test and effectiveness test. The fourth stage is the disseminate stage. In the context of developing learning media, researchers at the disseminate stage limit it to the socialization stage of learning media through distribution in limited quantities to teachers and students. This distribution is intended to obtain a response, feedback on the learning media developed. If the target response, the use of learning media is good, then printing in large quantities and marketing will be done so that the learning media can be used by a wider target. However, researchers did not do large quantities of printing and marketing due to time and cost constraints. The instruments used in this study were validation sheets, practicality sheets, and pretest and posttest questions. The formula used to process validity data is as follows:

$$V = \frac{\Sigma S}{[n(c-1)]}$$

Information:
s = r – lo
lo = lowest validation score
c = the highest validation rating score
r = the number assigned by an assessment
n = amount of data or number of validators

Table 1. Learning Media Validation Level Category

No	Achievement Level	Category
1	≥ 0,667 – 1,00	Valid
2	≤ 0,667	Invalid

Data from the practicality of learning media were obtained from questionnaires for teachers and students. The data obtained was analyzed using the following formula:

$$Value = \frac{\Sigma Obtained\ Score}{\Sigma Maksimum\ Score} \times 100\%$$

Table 2. Learning Media Practicality Categories

No.	Achievement Level (%)	Category
1.	81 – 100	Very Practical
2.	61 – 80	Practical
3.	41 – 60	Pretty Practical
4.	21 – 40	Less Practical
5.	0 – 20	Impractical

Sumber: Riduwan, 2010

Technique Analysis of the effectiveness of interactive learning media based on Android is carried out to see the results of the effectiveness of the media that has been used in the learning process. To test the effectiveness, this study uses the Pretest and Posttest methods. The Pretest and Posttest research designs are as follows:

$$X = O1 \times O2$$

Information :
X = Treatment
O1 = Pretest Value
O2 = Posttest Value

Students are given the first treatment, namely the application of Android-based learning media. Further analysis is carried out as follows:
a. Give a test, namely the posttest, from the posttest it can be seen how student learning outcomes are used to measure student learning outcomes and are analyzed.
b. Obtained student learning completeness data. Furthermore, determining the number of students who achieve completeness, if ≥ 65% of students answer correctly, it can be said that they have fulfilled completeness [6].
c. The next step is to determine classical completeness, if 85% of students in one class meet completeness then it can be said to have fulfilled classical completeness. Determine student completeness using the following formula [7].

$$\text{Classical Mastery} = \frac{\text{Number of Students Completed}}{\text{Total number of students}} \times 100\%$$

d. The final step is to enter the data into the gain score formula in Hake (1999).

$$g = \frac{S\ Post - S\ Pre}{100 - S\ Pre} \times 100\%$$

Information :
g = Gain Ccore
S post = Score Posttest
S pre = Score Pretest

The pretest and posttest scores will be used as indicators of the level of effectiveness in learning which is commonly called the Gain score. The Gain Score category is:

Table 3. Category Gain Score

No.	Gain Score	Interpretation
1.	($<g>$) > 0,7	Tall
2.	0,7 > ($<g>$)>0,3	Currently
3.	($<g>$)<0,3	Low

C. Result and Discussion

Based on the objectives and research procedures that have been carried out, an android-based learning media is produced for class X ICT subjects. This research was designed using a 4-D learning device development model, namely with the following stages.

1. Define

The first analysis is that this analysis is used to find and determine the problems experienced by teachers and students in learning ICT subjects for class X. From the results of interviews with teachers, it was found that some of the obstacles experienced by teachers and students were that the teacher felt that the media used at this time was not effective. because it takes a lot of time and accessing media is too difficult for students. So that teachers and students feel the need for learning media that is more effective and easy to access. Analysis was also carried out to determine smartphone ownership of each student. Almost all students have smartphones and students also prefer to learn using smartphones.

The second analysis is the stages carried out by the author in the analysis of students, namely by conducting interviews with teachers regarding representation, learning motivation and the age of students. The characteristics of students in learning can be described as below. 1) academic abilities are heterogeneous, 2) Students like things that have attractive pictures and designs and are easy to use. 3) Students aged 15-17 years.

The third analysis is this analysis is carried out by analyzing the Basic Competencies in ICT learning subjects. Next is the formulation of indicators. The fourth analysis is a concept analysis carried out to identify the main concepts that will be used and to identify supporting concepts that are relevant and related to Information Communication Technology (ICT). The main concepts in Information Communication Technology (ICT) subjects. is that students can understand about some of the most common or most frequently used software. 1) The final analysis is to analyze the material that students will learn in this module: Applying logic and algorithms, 2) Applying the Petaminda method, 3) Microsoft Word, 4) Microsoft Excel, 5) Microsoft Power Point, 6) How to presentations, 7) E-books.

2. Design

This learning media was developed using Adobe CS6 software. Media is designed to be used on Android-based smartphones with offline and online

modes. This media consists of several display pages which can be described as follows. This learning media consists of a start page which can be seen in Figure 1, this page will be displayed for a few seconds as an opening and will go directly to the login page.

Figure 1. Homepage & Login Page

On the login page students are asked to fill in their name, class and school origin as shown in the image above. After students fill in the data and click the login button, students will be directed to the main menu page. On the main menu page there are 5 menus, namely the instructions menu, syllabus menu, material menu, evaluation menu and profile menu. This main menu can be seen in the image above.
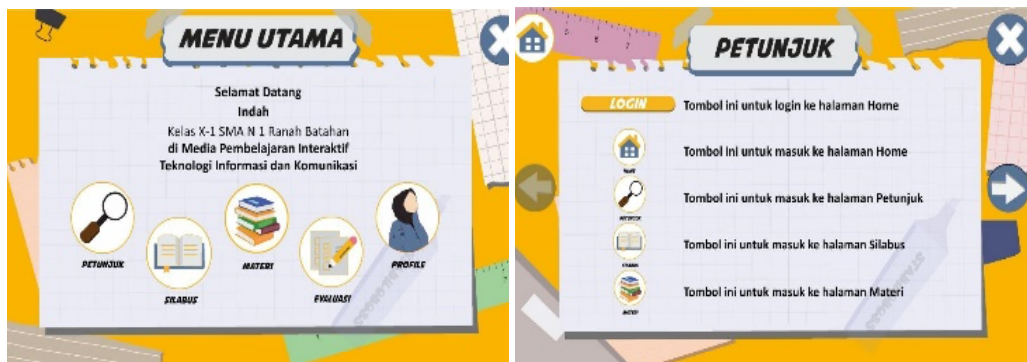
Figure 2. Main Menu Page & Instructions page

The instructions button on the main menu page serves to provide guidance to users, both students and teachers, on how to use and the functions of the buttons on this developed media. The instruction page consists of 4 pages, where one of the pages can be seen in Figure 2.
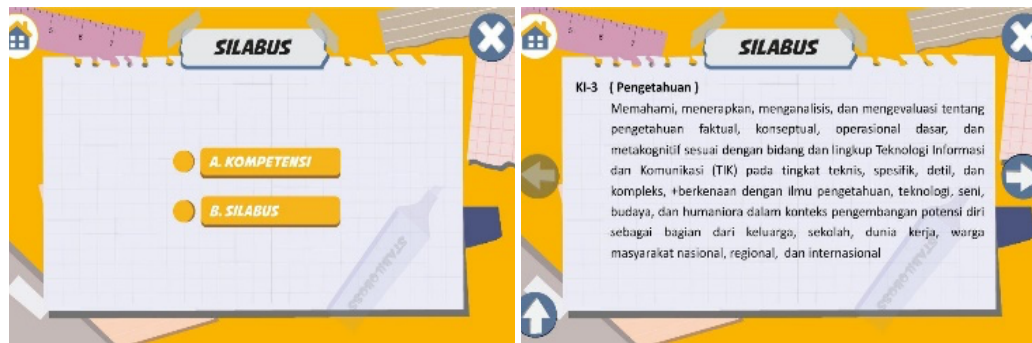
Figure 3. Sylabus Menu Page & Syllabus page

Furthermore, students click the syllabus button on the main menu, students will be taken to the competency and syllabus pages, which can be seen in Figure 3. On the syllabus page there are two buttons, namely competency and syllabus buttons. When the competency button is clicked, a page will appear containing the Core Competencies which consists of two pages.
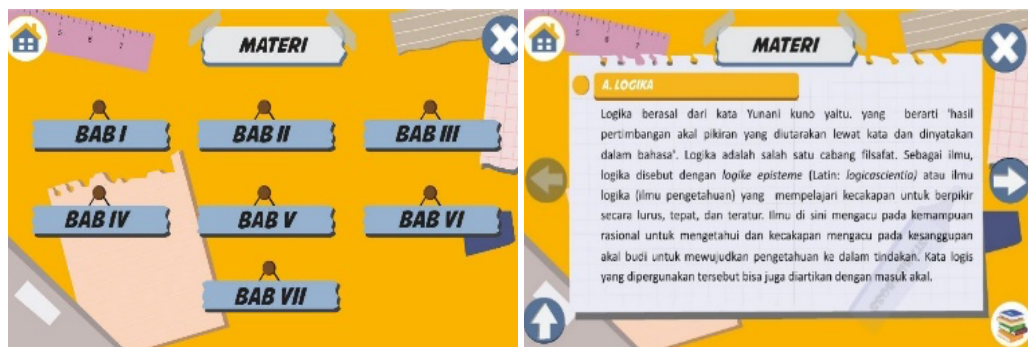

Figure 4. Main Material Page & Material Page

For the material button after it is clicked, the next page will appear which contains seven buttons for the material that can be studied in this media as shown in Figure 4. If the button for one of the materials is selected, buttons will appear containing sub-chapters of the material to be described as well as buttons for learning videos. When students select one of the sub-material buttons, a description of the material will be displayed. For the learning video button, if clicked, a page will appear containing the video title that students can watch.
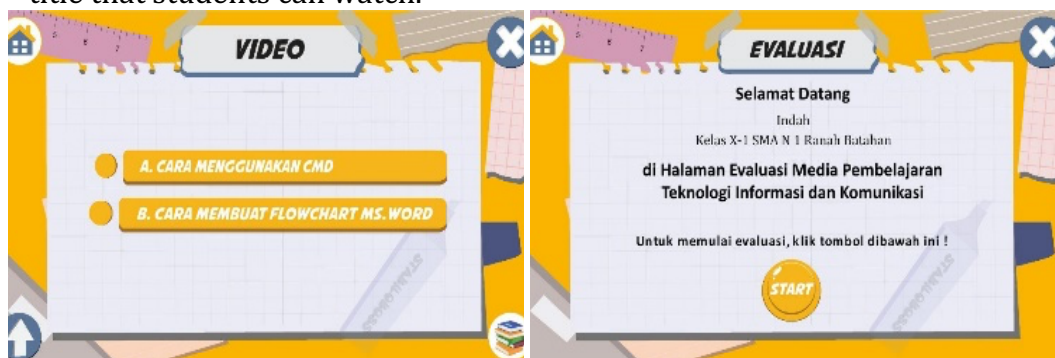

Figure 5. Video Title Page & Evaluation Start Page

After that, if students click on the video button, the YouTube application will immediately open to present the selected video on the previous page. On the main menu there is also an evaluation button, which if clicked wil open a page like Figure 5. When students click the START button, the evaluation sheet that must be answered will appear in the form of a Google form. Students can answer and the results of these answers will be visible to the teacher.

Figure 6. Profile Page

The last button on the main menu is the profile button. If the profile button is clicked, a page will appear containing the researcher's profile as shown in Figure 6.

3. Develop

At this development stage, research is carried out on media that has been previously designed. There are two tests carried out at the development stage, namely the validity test and the practicality test. The results of the two tests are described as follows.

a. Validity Test

At the validity testing stage, the developed media was assessed by 4 experts, namely 2 experts as material validators and 2 experts as media validators. The instruments used at this stage are material and media validation sheets.

The overall results of the analysis of the validation test of the developed Android-based learning media can be seen in table 4.

Table 4. Overall Validation Test Data

No	Aspects Assessed	Assessment	Category
1	Material Validation Test	0,92	Valid
2	Media Validation Test	0,97	Valid
	Average	**0,95**	**Valid**

Of the 4 experts as validators of the developed Android-based learning media, an average value of 0.95 was obtained in the valid category. After the developed media was declared valid by the validator, a second test was carried out, namely the practicality test.

b. Practicality Test

   The purpose of the practicality test is to determine the level of practicality and usability of the developed learning media. The practicality test was tested on teachers and students using practicality sheet instruments.

Table 5. Overall Practicality Test Data

No	Aspects Assessed	Assessment	Category
1	Teacher Practicality Test	94%	Very Practical
2	Student Practicality Test	86%	Very Practical
	Average	90%	**Very Practical**

   The practicality test of the Android-based learning media that was developed was carried out by 2 teachers and 29 students.

c. Effectiveness Test

   Testing the effectiveness of using the developed Android-based learning media is reviewed in two ways, namely by looking at the achievement of the Minimum Completeness Criteria classically and through the Gain Score Test, for more details can be seen in the following explanation.

   Classical completeness is seen from the percentage of the number of students who complete or who score equal to or exceed the minimum completeness criteria.

Table 6. Results of Effectiveness Analysis Based on Standard Value

No	Standard Value	Number of students	%
1	< 75	0	0%
2	≥ 75	30	100%
	Jumlah	**30**	**100%**

   The standard value of ICT learning that has been set by the teacher is 75. Analysis of classical completeness data can be seen in. From the table above it can be seen that 100% of students scored above the minimum completeness criteria on the posttest. This shows that the learning media developed are effective for use in the learning process.

   Furthermore, the gain score test is carried out by analyzing the pretest and posttest scores that have been done by students.

Table 7. Gain Score Test Results

Number of Samples	Gain Score	Interpretation
30 people	0.75	High

   From the table above it can be seen that the gain score obtained from the developed learning media is 0.75 with the High category. So that the developed android-based learning media is declared feasible to be used in improving learning outcomes in ICT subjects.

4. Disseminate

This stage aims to make the resulting product usable by others. However, the disseminate stage was not carried out in this study. Researchers only socialize learning media based on android applications through distribution in limited numbers to teachers and students. This distribution is intended so that this Android application-based learning media can be used as a learning aid for students.

D. Conclusion

Based on the results of the research that has been done, it can be concluded that the developed Android-based learning media has been declared valid after being validated by 4 validators, 2 people for media validation and 2 people for material validation. The results of teacher and student responses to the practicality of the developed learning media have a very practical category. The results of the effectiveness test of android-based learning media in the class X Information and Communication Technology subject have an effective category as evidenced by the increased student learning outcomes.

E. Acknowledgment

F. References

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