Development of Interactive Learning Media in Media and Telecommunication Network Subjects at Vocational High School

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Abstract

This research aims to develop Android-based interactive learning media that can improve student learning outcomes in MJT subjects at SMKN 4 Payakumbuh. This research uses a research and development method with a 4-D model (Define, Design, Develop, Disseminate). Data was collected through a questionnaire distributed to class X TJKT students. The research results show that the use of Android-based interactive learning media can improve student learning outcomes. From the paired sample t-test, a sig (2-Tailed) value of 0.000 <0.05 was obtained, indicating that there is a significant influence of interactive learning media on student learning outcomes. Apart from that, the practicality test shows that this interactive learning media is practical and can be well received by students and teachers. The development of interactive learning media was carried out in accordance with the MJT material taught to class X TJKT students. The validity of this interactive learning media is high, with an average validity value of 0.85. The practicality test shows that this media is practical with a percentage of 82% of teachers and 85.7% of students. The effectiveness of this media can also be seen from the percentage of completeness of student learning outcomes which reached 75.86%. This Android-based interactive learning media helps students to learn independently and improve their understanding of MJT subject matter. The development of Android-based interactive learning media is effective in improving student learning outcomes in MJT subjects at SMKN 4 Payakumbuh. This media is valid, practical, and well received by students and teachers. Thus, this interactive learning media is an effective solution to overcome low student learning outcomes and limited computer facilities in schools.

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INTRODUCTION

Vocational secondary education is a form of education organized by the government to produce quality people, so that graduates are expected to be able

to enter the workforce and develop professional attitudes in accordance with their respective fields.

This is in line with the aim of vocational education in Indonesia as outlined in Article 26 paragraph 3 PP 19 of 2005 as education to improve intelligence, knowledge, personality and noble morals in addition to skills for living independently and pursuing further education. according to his profession.

In order for the curriculum to be achieved, schools must implement a good learning process so that the educational goals stated in the curriculum can be achieved in accordance with expectations. Learning activities are designed to encourage students to actively participate in achieving learning goals. In accordance with Government Regulation Number 32 of 2013 article 19 concerning National Education Standards that learning is carried out interactively, motivating students to participate actively during learning activities, be fun and so on.

Learning media is one way to create interactive learning. According to Hamalik (Arsyad, 2014) the use of media in learning activities can increase motivation, interest in learning and provide psychological influence.

Interactive media is an example of media that can stimulate student activity to participate in learning. Interactive media is media that can receive and provide feedback for students to interact with the media (Smaldino et al., 2011)

The advantage of interactive media is that it combines multimedia elements such as text, audio, images, animation, navigation buttons and video. In the era of the industrial revolution 4.0, students are in the millennial generation which is in line with advances in Android application-based technology, students prefer interesting media in learning, appropriate media is interactive media for example: Android Interactive Learning Media such as our class application, Quipper online learning application, teacher's room application, UN Tryout, Star Chart and others. Therefore, teachers must be ready to face these technological advances (Indartiwi et al., 2018)

Educators play an important role in providing facilities supported by technology such as providing learning media and involving students in learning activities. Therefore, researchers distributed a Google Forms questionnaire regarding the learning media needs of class X TJKT SMKN 4 Payakumbuh students. Based on survey responses, teachers often use learning media such as power points, electronic modules, learning videos and learning audio. As many as 92.9% thought the media used by teachers was interesting, but 7.1% thought it was less interesting.

Regarding understanding of the material, 71.4% of students felt they had no difficulty understanding the material and 28.6% still found it difficult to understand the material. After explaining interactive learning media, 98.8% agreed and 100% were willing if teaching materials were developed and provided in learning such as interactive learning media to make it easier to understand the basics of computer network engineering and telecommunications.

This is also supported by the results of observations made by the author at SMKN 4 Payakumbuh in the Media and Telecommunications Network (MJT) subject in class X Computer Network and Telecommunications Engineering (TJKT). It is known from the results of interviews with MJT subject teachers that

teachers have not optimally developed interactive media as an alternative learning resource. This is also supported by the average student learning outcomes in the Media and Telecommunication Networks subjects which are still below the criteria for achieving learning objectives (KKTP), along with data on student learning outcomes in Table 1.

Table 1. Percentage of Learning Outcomes for Odd Semester MJT Subjects for Class

No	Class	The number of students	Completeness			
			Score ≥75		Value <75	
			Amount	%	Amount	%
1	X TJKT1	33	12	36,36%	21	63,63%
2	X TJKT2	33	10	30,30%	23	69,69 %
3	X TJKT 3	33	4	12,12%	29	87,87%

Source: MJT subject teacher

Based on table 1. in class So, more than half of the students still get grades below the KKTP. in class 87% of students do not meet the KKTP. This shows that students' learning completeness in the Media and Telecommunications Network subject class X TKJT SMKN 4 Payakumbuh in the 2023/2024 academic year is still low.

The limited number of computers is also an obstacle to the learning process, the school only has 20 computers with 33 students so students have to take turns using each other. The Deputy Principal for facilities and infrastructure at SMKN 4 Payakumbuh revealed that the completeness of facilities and infrastructure for technology and information media at SMKN 4 Payakumbuh still needs to continue to be improved, in order to adapt to developments in the world of work. However, the limited facilities and infrastructure currently available should be able to give rise to creative ideas from teachers to create learning media based on information technology devices by taking advantage of various situations and conditions in the school environment. For complete facilities and infrastructure, see table 2.

Table 2. TKJ Labor Facilities and Infrastructure Equipment

No	Laboratory TJKT	Equipment	Amount
1	Laboratory TJKT 1	Computer	25 unit
2	Laboratory TJKT 2	Computer	20 unit
3	Laboratory TJKT 3	Computer	20 unit

Source: Archives of facilities and infrastructure at SMKN 4 Payakumbuh

Based on the results of observations in the field, all students in class X TJKT SMKN 4 Payakumbuh have *smartphone android,* However, this phenomenon has not been utilized by teachers to make it happen *smartphone* as a learning medium. However, with its high level of portability and ability to display images, audio, animation and video, it is very possible *android* used as an interactive learning medium that students can use anywhere and at any time, so that learning can occur anywhere and at any time.

Interactive media is media that is equipped with a controller that can be operated by the user, so that the user can choose what they want for the next process (Daryanto, 2013). So interactive media can overcome the problem of differences in students' levels of understanding, because students can choose the material they will study. Ability *android* displaying multimedia such as images,

photos, videos, sound and text simultaneously can be used to display learning material more concretely so that learning is not boring.

Learning carried out using interactive learning media can meet the standards of an educational process that is carried out in an interactive, inspiring, fun, challenging manner, motivating students to participate actively. The preparation of learning plans needs to be carried out to carry out an effective and efficient learning process, so that graduate competency standards are achieved which are packaged interactively in the form of text, animation, images, *video* learning and exercises that can be used by students as material in media and telecommunications network lessons.

Based on the phenomena that have been explained, the author feels it is necessary to contribute so that media and telecommunications network learning can improve. One solution to the problem is the development of interactive learning media in media and telecommunications network subjects at SMKN 4 Payakumbuh.

METHODS

The type of research used is development research (*research and development*). Development research aims to produce certain products and test the effectiveness of these products (Sugiyono, 2012). The development of interactive learning media for media and telecommunications network subjects uses the 4-D (four-D) model. This model was chosen because it has a simple and systematic procedure, which is in accordance with the development research steps carried out by researchers. The procedure for developing learning media in media and telecommunications network subjects uses a 4-D (four-D) development model. The development process consists of 4 stages, namely (1) Definition; (2) Design; (3) Development (Develop); (4) Dissemination (Thiagarajan, 1974)

Data was collected using questionnaire techniques. A questionnaire is a data collection technique by providing questions or statements that are distributed to research targets to be answered. In collecting data, questionnaires are distributed directly in writing. The questionnaire used is a confidential or closed questionnaire with the aim of finding out students who have low learning self-efficacy.

Questionnaires or questionnaires are distributed to research subjects during the pretest so that they will get a satisfactory score or the lowest score from the research subject. From the data from the pretest results, the research subjects will be given the Development of Interactive Learning Media in Media and Telecommunication Network Subjects at SMK Negeri 4 Payakumbuh.

The data was then processed using the SPSS application to see the effectiveness of learning media on student learning outcomes for Media and Telecommunications Network subjects.

RESULTS & DISCUSSION
Sample Testing

Testing of differences Testing the effectiveness of learning media on student learning outcomes for Media and Telecommunications Network subjects. using the paired sample t-test. Results of statistical hypothesis testing carried out after

administering treatment using the Paired Samples T Test. The research hypothesis is as follows:

1. Work (Ha): the effectiveness of learning media can improve student learning outcomes for Media and Telecommunications Network subjects.
2. Null Hypothesis (H0): the effectiveness of learning media cannot improve student learning outcomes for Media and Telecommunications Network subjects.

Decision making and drawing conclusions regarding hypothesis testing were carried out using a paired sample t-test at a significance level of 5% which was analyzed using the SPSS version 23 program. The results are presented in the table below:

Tabel 3. Paired Samples T Test

| | | | | Paired Differences | | | | |
| | | | | 95% Confidence Interval of the Difference | | | | |
		ean	td. Deviation	td. Error Mean	ower	pper	f	ig. (2-tailed)
air 1	RETEST - POSTEST	22.061	5.170	.641	27.440	16.682	8.354	2	000

Source: data processed by researchers in 2024

When making decisions, refer to the provision that if the 2-tailed sig value is <0.05 then there is a significant influence. It can be seen that the sig (2-Tailed) value is 0.000 < 0.05, this means that Ha is accepted and H0 is rejected. So it can be concluded that there is a significant influence between the effectiveness of learning media on student learning outcomes for Media and Telecommunications Network subjects. Thus the hypothesis put forward is accepted.

Discussion

1. Spread Level (*Disseminate*)

The dissemination or dissemination stage is carried out by implementing this interactive learning media in the teaching and learning process on media and telecommunications network subjects. Dissemination is also carried out by promoting media to other schools in classes that have the same subjects as class X TJKT at SMKN 1 Tanjung Baru. During the dissemination process, students seriously listened to the explanation of how to use the media, students also seemed enthusiastic about installing and using it *android* respectively, students do not hesitate to ask questions regarding media use.

Dissemination is also carried out to colleagues by sharing good practices at the TJKT teacher community meeting at SMKN 4 Payakumbuh and the TJKT Subject Teachers' Conference (MGMP) at the West Sumatra Province Level

The results of this distribution are relevant to research conducted by Rizky Ema (2016), the results of the distribution carried out can be accepted and used well by more users and can increase student learning activities by 73.3%. So, judging from the results of the distribution that has been carried out, the media can be well

received by users and can be used for the basic computer and network learning process.

Interactive learning media is designed to improve student learning outcomes, where students are given direction to use interactive learning media so that students can carry out learning independently.

a. Development of Interactive Learning Media

Interactive learning media was developed in accordance with the material in the subject Media and Telecommunication Networks which was taught to students in class X semester I TJKT SMKN4 Payakumbuh. The development of interactive learning media was carried out using the 4D development model, by implementing several stages of interactive learning media development *define, design, develop, and disseminate.* In development, applications are used *Adobe Animate CC* with a combination of writing, images, animation, video, audio, color and designed with an appearance that attracts students' interest.

b. Validity of Interactive Learning Media

Based on the overall validation results carried out by the validator regarding the content, interest, media and language aspects of interactive learning media, it can be seen that interactive learning media has fulfilled the material aspect with a validity value of 0.80, and the media aspect with a validity value of 0.86, both aspects. If you add up the validity score obtained from each validator, you get an average validity value of 0.83. The value obtained is in the valid validity level category.

c. Practicality of Interactive Learning Media

The results of the practicality test of interactive learning media by teachers and students were carried out through teacher and student response questionnaires. The practicality test of interactive learning media by teacher responses showed a level of practicality with a percentage of 82.33% in the practical category, while the practicality test of interactive learning media by student responses showed a level of practicality with a percentage of 85.7% in the very practical category.

In accordance with the opinion of Nana and Ahmad (2009) that learning media must have practical and simplicity values so that they can be used easily to achieve learning goals.

The results of this assessment are also relevant to the results of previous research conducted by Maharani (2019) which showed a practicality value of 0.97 in the very practical category for teacher responses, and 0.83 in the very practical category for student responses. So seen from direct observation, teacher responses and student responses to interactive learning media show that interactive learning media can be used well by students to improve understanding of subject matter.

d. Effectiveness of Interactive Learning Media

The effectiveness of interactive learning media in this research is seen from the ability of interactive learning media to activate students in learning and make it easier to understand learning material. According to Hamak (2014) "the use of teaching materials will really help the effectiveness of the learning process and conveying messages at that time".

In this research, the effectiveness test was carried out by looking at the percentage of students' classical learning completion, based on grades *posttest* which was attended by 33 students, there were 23 students with scores above the KKTP and 10 students with scores below the KKTP. Thus, the percentage of students who achieve the KKTP is 69.70%, this is in the good range in terms of the level of achievement of complete learning outcomes (Riduwan, 2010). So it can be concluded that interactive learning media in MJT subjects is effective.

Low learning outcomes are caused by many factors, both internal and external to students. As is known through research results, interactive media has a relationship in influencing learning outcomes. This makes it possible that there are many other factors that can be related to student success in studying Media and Telecommunications Network subjects.

This is in accordance with what was stated by Slameto (2015) regarding student success in learning, these factors can come from within themselves such as interest, motivation, learning discipline, learning methods, student creativity in learning, physical health and intelligence as well as other things that originates from within the student, while other factors that originate from outside the self are family factors and learning environment factors at school such as media use, the way teachers teach, environmental interactions and other things that influence from outside the student.

The results of this research and the results of relevant research state that interactive learning media can be used in various fields of science, by adapting the learning materials to be developed with the designed interactive. So it can be concluded that this Interactive Media is a valid, practical and effective learning media to be used in the learning process for media and telecommunications network subjects majoring in Computer Network and Telecommunication Engineering class X odd semester 2023/2024 Academic Year

Advantages and Disadvantages of Interactive Learning Media

This interactive learning media has advantages and disadvantages, the advantages of this interactive learning media are as follows:

1. This interactive learning media can facilitate students as a means for independent learning.
2. This learning media is equipped with animation interesting on the material, so it is hoped that it can make students more motivated in learning.
3. This designed learning media has material and assessment pages in the form of objective questions and essays which are used to measure students' abilities and then end with reflection. The next material will only be open if students have completed the material and assessments in the previous material menu.
4. This interactive learning media is equipped with learning videos using an interruption pattern where at certain minutes the video will stop automatically and students are required to answer the questions that appear on the screen first before continuing to play the video.

Disadvantages of interactive media-based learning *android* these are as follows:

1. In this interactive learning media there is not all the material about the basics of computer networks and telecommunications.
2. This interactive learning media was only developed for class X vocational school students in the TKJ area of expertise

Research Limitations

This research was carried out with great care, but the implementation was not free from the following limitations:

1. Due to researchers' limited time in developing interactive learning media, the material presented in this interactive learning media is only one element.
2. The research did not carry out comparisons between the classes that were used to test the product, the researchers only conducted it on one class, namely class X TJKT1 at SMK Negeri 4 Payakumbuh
3. In determining the effectiveness of media, researchers only look at students' cognitive learning outcomes after learning using media.
4. Validation of content and media design is only carried out by experts while validation from students is not carried out.

CONCLUSION

Interactive learning media was developed in accordance with the material in the subject Media and Telecommunications Networks taught to students in class X semester I TKJT SMK Negeri 4 Payakumbuh. The development of interactive learning media was carried out using the 4 D development model.

This development research resulted in an interactive learning media that meets the material aspect with a validity value of 0.80, and the media aspect with a validity value of 0.86. When these two aspects are added up the validity score obtained from each validator results in an average validity value of 0.86. 0.85, the value obtained is in the valid validity category.

The results of the paired sample t test show that there is an influence of the effectiveness of learning media on learning outcomes. When making decisions, refer to the provision that if the 2-tailed sig value is <0.05 then there is a significant influence. It can be seen that the sig (2-Tailed) value is 0.000 < 0.05, this means that Ha is accepted and H0 is rejected. So it can be concluded that there is a significant influence between the effectiveness of learning media on student learning outcomes for Media and Telecommunications Network subjects. Thus the hypothesis put forward is accepted.

The results of the practicality test of interactive learning media by teachers and students were carried out through teacher and student response questionnaires. The practicality test of interactive learning media by teacher responses showed a level of practicality with a percentage of 82% in the practical category, while the practicality test of interactive learning media by student responses showed a level of practicality with a percentage of 85.7% in the very practical category.

The effectiveness of interactive learning media can be seen from the percentage of completeness of students' classical learning outcomes, from grades *pretest-posttest* which was attended by 33 students, there were 22 students with

scores above the KKM and 7 students with scores below the KKM, thus the percentage of students who achieved the KKTP was 75.86%. So it can be concluded that using interactive learning media in MJT subjects is effective.

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