The Mobile Application Development to the Android-based Interactive Learning of 2D Animation Technique in SMK Negeri 1 Sonder

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Abstract: The objective of this study is to develop the mobile application of android-based interactive learning with 2D animation technique in SMK. The method is used the Research and Development (R&D) as well as models used in the development process of interactive learning media of 2D animation techniques using Multimedia Development Life Cycle (MDLC) model through 6 stages. Data sources are the quantitative data as primary data, and qualitative data as additional data in the form of suggestions from respondents through a poll with the subjects are a student of XI Multimedia class study at SMK Negeri 1 Sonder. The data analyzed using qualitative descriptive statistics. It's found that the development of android-based 2D animation interactive mobile learning application through the concept stage, designing, material collection, manufacture, testing and distribution, and application feasibility to interactive mobile learning android-based 2D animation techniques are categorized an excellent, and based on student/respondent trials is in the top category with an average overall score of 3.62 with a percentage Media quality 75.2%. This 2-dimensional interactive learning media is worth using to support the teaching and learning activities of students of XI Multimedia class at SMK Negeri 1 Sonder.

1 INTRODUCTION

In the educational world, the utilization of learning media in teaching and learning activities both inside and outside the hours of teaching and learning activities are still very lacking. Teaching and learning is the process of communication, which is the process of delivering messages from a message source through a particular intermediary. In the learning activities of teaching the message in the form of learning materials delivered by educators, while the intermediaries used are media. Therefore, media learning as an essential means to create dynamic communication between educators and learners in teaching and learning activities so that the learning materials can be delivered quickly by the teacher and can be Received easily by learners. Besides, with the use of media learning as an innovation of learning is expected to increase the interest and absorption of students to the learning materials delivered. Expressed by Peter Shea in Munir (2008) that the capture power is possessed by learners, 10% of what is read, 20% of what is heard, 30% of what is seen, 50% of what is seen and heard, 70% of what is said, 90% of what is PES Learners do.

Media Learning, as one means of improving the quality of education, is critical in the process of differentiation. The use of learning media can heighten the learning process of students in the learning process, which in turn can enhance the learning outcomes. The development of multimedia brings a significant impact on various areas of life, one of which is the field of education or learning. In the learning process, the computer has been involved as a means of learning. Nowadays, it has evolved the learning media of mobile learning. Mobile learning has a role as a media helper or supporting in the learning process or commonly known as learning-

based mobile learning. In implementing Multimedia development Program learning in 2D animation techniques requires material mastery also application as supporting to be able to study well. One of the ways to do this is to use Mobile Learning.

In the process of teaching and learning, how to teach teachers in SMK is still less varied in the teaching and learning process, especially in 2D animation technique subjects. Students not only observe but also listen to the descriptions of the teacher, perform and demonstrate. But teachers are required to be able to make learning the 2D animation technique more exciting and innovative. Learning the 2-dimensional animation technique is one of the subjects that must be pursued by students who take multimedia skills program at SMK Negeri 1 Sonder. In 2-dimensional animation technique materials, learners will be taught many things about the world of animation. To create exciting and more interactive teaching and learning activities in the subject of 2-dimensional animation techniques, especially in SMK Negeri 1 Sonder, it will be done development of learning media supporting learners to be active in Learn, because the learning media comes with a control tool that can be oped by users so that users can choose what they want to interact with the media. This media provides a wide range of media that consists of text, graphics, photographs, audio, video, animation, music, narrative and interactivity programmed based on learning theory.

Based on the results of observations and interviews of researchers with the speaker Raymond Senduk, S. Pd. As a multimedia teacher at SMK Negeri 1 Sonder found some problems in teaching-learning activities especially in the subjects of animation techniques 2 Dimensions, among others: teaching and learning activities are still less varied and educators are still a learning center (teacher-centred learning), yet there is no student handbook for subjects of 2-dimensional animation techniques or in other words The limited source of student learning, lack of interest or students ' interest in the material taught by educators impacted the less active learners in exploring the information, learners have difficulty Understand the 2-dimensional animation technique lesson material so that the time used in teaching and learning activities often used to deepen the same subject matter, then the low quality of learning media that has been in use In the teaching and learning activities at SMK Negeri 1 Sonder, and the unavailability of interactive learning media such as Mobile Learning in 2-dimensional animation technique subjects.

The development of multimedia brings a significant impact on various areas of life, one of which is the field of education or learning. In the learning process, smartphones have been involved as learning facilities. Nowadays, it has evolved the learning media of mobile learning. Based on the results of observations done in SMK Negeri 1 Sonder in particular 11th grade, almost all learners have an Android smartphone with advanced features. However, the use of smartphones among its average students is limited to gaming and social media. Mobile learning has a role as a media helper or supporting in the learning process or commonly known as learning-based mobile learning. Thus based on the background of the above problem, then the author is interested in researching on: "Development of Mobile Applications Learning Interactive Android-based technique of 2D animation techniques in SMK".

This research aims to develop interactive learning media. Based on these objectives, Research and Development (R&D) methods are used for the development of such learning media to meet quality standards. Sugiyono (2014) states that Research and Development is a study used to produce a specific product and test the effectiveness of the product.

2 METHODOLOGY

The development model used in this study was the multimedia development model of Luther's version. According to Luther in Iwan Binanto (2010), the multimedia development model consists of six stages, namely concept, design, material collecting, assembly, testing, and distribution
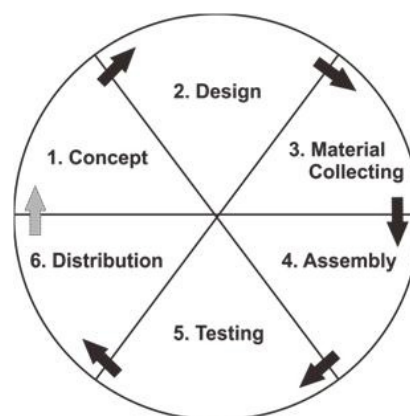
3 RESULTS AND DISCUSSION

3.1 Data Description

Testing instruments in this study using validity tests and reliability tests. Instrument analysis is done qualitatively to several students who have the same characteristics as the students who will be tested with the instrument (Majid, 2006). The test subjects of this research instrument are XI Multimedia graders at SMK Negeri 1 Sonder with a total of 31 students. The following are the results of the validity test and instrument reliability test.

3.1.1 Validity of Instruments

Analytical instruments in this study are conducted in two ways: qualitative analysis and quantitative analysis. Qualitative analysis is an analysis done by a validator that Has the expertise by the instruments made (Majid, 2006). The validator instrument in this study was two lecturers of UNIMA Informatics Engineering Education Study Program. The instrument validity test is performed quantitatively using the product correlation calculation Moment where the correlation calculation uses the help of Software Microsoft Excel 2016. Based on the result of the validity calculation of the instrument for students, 20 instruments used in this study are valid. Therefore all item items in the instrument can be used in data analysis. Summary results of the validity of instrument items for students can be seen in table 1.

Table 1: The calculation result of instrument validity for students

No. Item	r Value Count	Description
1	0,319	Valid
2	0,455	Valid
3	0,307	Valid
4	0,311	Valid
5	0,398	Valid
6	0,417	Valid
7	0,453	Valid
8	0,53	Valid
9	0,413	Valid
10	0,357	Valid
11	0,355	Valid
12	0,599	Valid
13	0,437	Valid
14	0,337	Valid
15	0,684	Valid
16	0,712	Valid
17	0,784	Valid
18	0,67	Valid
19	0,527	Valid
20	0,699	Valid

3.1.2 Reliability of Instruments

The instrument's reliability test in the study used the Cronbach Alpha formula. The calculation of this reliability test uses the help of Software Microsoft Excel 2016 (Table 2).

Table 2. Reliability Statistics

Reliability statistics	
Cronbach's Alpha	N of Item
0.791	20

Overall the instrument is reliable if the Alpha value approaches index 1, the closer the index 1 level of reliability is increasing. Based on the data above the Alpha value of 0,791, it can be concluded that the research instrument is reliable with a correlation coefficient is very strong.

3.2 Data Analysis

3.2.1 Alpha Testing Analysis

Alpha testing is done to get the learning medium that is worth using. These tests are conducted by media experts and material experts.

A) Data and Media expert analysis

The media experts in this study are two lecturers of UNIMA Informatics Engineering Education study Program who are experts in the field of learning media. The validation done by media experts includes four aspects, i.e. ease of navigation, media integration, artistic and aesthetic, overall functionality, Media Expert assessment results. This aspect of navigational ease can be seen in table 3, the media integration aspect of Table 13, the artistic and aesthetic aspects of table 4 as well as the results of the overall aspect of function assessment in table 5.

Table 3: Media Expert assessment Results Data from the ease of navigation.

No	Valuation Item	Expert Media 1	Expert Media 1	Total	average
1	Consistency of shape and navigation in the media	4	5	9	4,5
2	User Navigation Help	4	4	8	4
3	Easy navigation in material selection	4	4	8	4
4	Easy navigation in operation	5	4	9	4,5
5	Ease of program Management	4	5	9	4,5
6	Smooth media when executed	4	5	9	4,5
7	The convenience of interactive Learning media operation 2-dimensional animation technique	4	4	8	4
8	Precise navigation with the desired menu	5	5	10	5
	Amount		70	35	
	Mean/average			4,37	

Table 4: Media Expert assessment Data from Media integration aspects.

No	Valuation Item	Expert Media 1	Expert Media 1	Total	average
9	Knowledge introduction of 2-dimensional animation techniques to users	5	5	10	5
10	An independent attitude to users	4	5	9	4,5
	Amount		19	9,5	
	Mean/average			4,75	

Table 5: Media Expert assessment Data from artistic and aesthetic aspects.

No	Valuation Item	Expert Media 1	Expert Media 1	Total	average
11	Text usage, graphics and proportional animations	4	4	8	4
12	Text compatibility, graphics and animations add user motivation	4	4	8	4
13	The accuracy of colour selection, writing type and writing readability enhances user comfort	4	5	9	4,5
14	Conformity visualizations with animation techniques learned material 2-dimensional animation techniques	5	4	9	4,5
15	Media Visualization Help for understanding	4	5	9	4,5
16	Visualization support for the subject of 2-dimensional animation techniques	4	4	8	4
	Amount		51	25,5	
	Mean/average			4,25	

Table 6: Media Expert Rating Data from Overall Functional Aspects.

No.	Valuation Item	Expert Media 1	Expert Media 1	Total	average
17	Minimal specification achievement in Media development	5	4	9	4,5
18	Media suitability Interactive learning techniques of 2-dimensional animation with user capabilities	4	5	9	4,5
19	Direct response (feedback) on user stimulus	5	4	9	4,5
20	Self-reliance	4	4	8	4

	Learning users in learning the subject of two-dimensional animation techniques				
21	The comfort of learning atmosphere created interactive Learning Media 2-dimensional animation techniques	4	4	8	4
	Amount		43	21,5	
	Mean/average			4,30	

From the results of future media experts, the data is converted into qualitative data with media expert validation score conversion guidelines. The media expert's validation score conversion guidelines can be seen in table 7, and the validation results of converted media experts can be viewed in table 8.

Table 7: Media Expert validation score conversion guidelines.

Formulas	Score	Category
Mi + 1.80 SBi < X	4,206 < X	Excellent
Mi + 0,60 SBi < X ≤ Mi + 1,80 SBi	3,402 < X ≤ 4,206	Good
Mi – 0,6 SBi < X ≤ Mi + 0,60 SBi	2,598 < X ≤ 3,402	Good enough
Mi – 1,80 SBi < X ≤ Mi – 0,6 SBi	1,794 < X ≤ 2,598	Not good
X ≤ Mi – 1,80 Sbi	X ≤ 1,794	Very less good

Table 8: Media Expert Validation Results.

No.	Valuation Item	Mean/Average	Criteria
1	Ease of navigation	4,38	Excellent
2	Media Integration	4,75	Excellent
3	Artistic and aesthetic	4,25	Excellent
4	Overall function	4,30	Excellent
	Overall average	4,42	Excellent

Based on the data tables of each aspect of the assessment by the media experts, the quality of the overall assessment can be seen in the form of percentages with the following results.

Quality Percentage (%) =
$$\frac{Results\ of\ observation\ score}{Expected\ score} \times 100\%$$

$$= \frac{70+19+51+43}{21x5x2} \times 100$$

$$= \frac{183}{210} \times 100\% = 87,14$$

Comments and suggestions by media experts became the basis for revising the interactive learning media of the 2-dimensional animation technique developed. The data obtained in the form of comments and advice by the media experts including (1) The home section is filled with an introduction to the animation media, and (2) numb typo can be repaired.

b) Data and analysis of expert materials

The material experts in this study are two multimedia teachers of SMK Negeri 1 Sonder who are experts in the field of material animation Engineering 2 dimensions. The validation performed by the material specialists includes two aspects of content and information presentation. The results of the expert assessment of the content of the material aspect can be seen in table 9 and for the aspect of presenting the information can be seen in table 10.

Table 9: Expert Assessment Result Data from Cognition Content Aspect.

No.	Valuation Item	Expert Material 1	Expert Material 2	Total	Average
1	The subject conformity of two-dimensional animation techniques with the material presented	4	4	8	4
2	Submission of material using simple, communicative language	4	4	8	4
3	Availability of evaluations for users to self-assessment	4	5	9	4,5
4	Availability of evaluation for material mastery level measurement of 2-dimensional	5	4	9	4,5

No.	Valuation Item	Expert Material 1	Expert Material 2	Total	Average
	animation techniques				
5	Full presentation of material description	4	4	8	4
6	Material submission of 2 dimensional animation technique presented	4	3	7	3,5
7	Easy understanding of 2-dimensional animation technique materials in interactive learning media	4	4	8	4
8	Evaluation for material understanding of 2-dimensional animation techniques	5	4	9	4,5
	Amount			66	
	Mean/average				46

Table 10: Expert Assessment Result Data from the Information Presentation Aspect.

No.	Valuation Item	Expert Material 1	Expert Material 2	Total	Average
9	Clarity of material on the interactive Learning Media 2-dimensional animation technique	5	4	9	4,5
10	Clarity evaluation on interactive Learning Media 2-dimensional animation techniques	4	5	9	4,5
11	Easy understanding of 2-dimensional animation technique material concept by user	4	4	8	4
12	2-dimensional animation engineering material delivery meets the needs of users	4	4	8	4
13	Ordered material presentation	3	4	7	3,5
14	Systematic material Writing	5	4	9	4,5
15	Material layouts are known to teachers	4	5	9	4,5
16	Practical teachers in delivering material	4	4	8	4
17	Material relation with KI/KD	5	4	9	4,5
18	Relation to material	4	5	9	4,5
19	Accuracy of material coverage of 2-dimensional animation techniques in interactive learning media	4	3	7	3,5
20	Truth and recency of material 2-dimensional animation techniques	4	4	8	4
	Amount			100	50
	Mean/average				4,17

Based on the data tables of each aspect of the assessment by the subject matter, it can be seen the quality of the overall assessment in the form of percentages with the following results.

$$Quality \quad Percentage \quad (\%) \quad = \frac{Results\ of\ observation\ score}{Expected\ score} \times 100$$

$$= \frac{100+66}{20 x 5 x 2} \times 100\%$$

$$= \frac{166}{200} \times 100\% \quad = 83,00$$

Comments and advice by material experts became the basis for revising the interactive learning media of the 2-dimensional animation technique developed. The data obtained in the form of comments and suggestions by material experts include (1) The writing is enlarged and defined (2) complete the material with the image and (3) the material needs to be added.

3.2.2 Beta Testing Analysis

Beta testing was conducted by students of XI Multimedia class at SMK Negeri 1 Sonder with a total of 31 people. The test aims to evaluate students ' reaction to learning media and to know how much media feasibility level learning is 2-dimensional

animation technique. An assessment conducted by respondents includes five aspects, namely content cognition, presentation information, ease of navigation, artistic and aesthetic, overall function. The result of the assessment of the cognition content aspect can be seen in table 11, the information presentation aspect in Table 12, the ease of navigation aspect of Table 13, the artistic and aesthetic aspects of table 14 and for the overall aspect of functions can be seen on Table 15.

Table 11: Student Assessment Data from cognition content aspects.

No.	Valuation Item	Total Score 31 Students	Average
1	This learning Media facilitates me in learning 2-dimensional animation techniques	136	4,39
2	This learning Media makes me quick to understand the subject matter	128	4,13
3	This learning Media makes it easy for me to accomplish tasks effectively	131	4,23
4	The material in this learning media helped me in completing the Task/evaluation	140	4,52
Amount		535	17,26
Mean/average			4,31

Table 12: Student Assessment Data from the information presentation aspect.

No.	Valuation Item	Total Score 31 Students	Average
5	This media of learning presents the material clearly	129	4,16
6	This learning medium makes it very easy to find the information needed	125	4,03
7	This learning Media facilitates my understanding of the concept of 2-dimensional animation techniques	134	4,32
8	This learning Media enhances My Learning motivation	126	4,06
9	This learning medium presents two-dimensional animation technique materials in sequence	131	4,23
10	This learning medium conveys material with communicative and straightforward language	134	4,32
Amount		779	25,13
Mean/average			4,19

Table 13: Student Assessment Data from the ease of navigation.

No.	Valuation Item	Total Score 31 Students	Average
11	This learning Media uses simple navigation	132	4,26
12	This learning Media provides clear instructions	135	4,35
13	This learning Media provides navigation that allows me to choose the material presented	132	4,26
14	Learning Media navigation facilitates me in media operation	127	4,10
	Amount : 526		16,97
Mean/average			4,24

Table 14: Student Assessment Data from artistic and aesthetic aspects.

No.	Valuation Item	Total Score 31 Students	Average
15	This learning Media has an exciting look	132	4,26
16	This learning Media uses text, graphics, animation, audio and video to support 2-dimensional animation technique material	135	4,35
	Amount : 267		8,61
Mean/average			4,31

Table 15. Student appraisal Data from overall function aspect

No.	Valuation Item	Total Score 31 Students	Average
17	I feel comfortable using this learning media	129	4,16
18	This learning Media creates a fun learning atmosphere	129	4,16
19	This learning Media covers all the functions and materials I need	130	4,19
20	I feel satisfied with this learning media	139	4,48
Amount		527	17
Mean/average			4,25

Based on the data table of each aspect of the assessment by the student, it can be seen overall assessment quality in percentage form with the following result.

Quality Percentage (%) = $\frac{Results\ of\ observation\ score}{Expected\ score}$ x 100%

$= \frac{535+799+526+267+527}{20x5x35}$ x 100%

$= \frac{2634}{3500}$ x 100% = 75,25

Interactive learning Media This 2-dimensional animation technique is developed using Android Studio's main program. Research and development of this learning media refer to the model of Multimedia development Life Cycle (MDLC) by Luther consisting of 6 stages of development of concept, design, material collecting, assembly, testing and distribution. This development resulted in an interactive learning media with the title "Interactive Learning Media 2 dimensional animation technique". Alpha Testing is further conducted to test media learning by media experts and material experts. This learning media is validated by the media experts who are two lecturers of UNIMA Informatics Engineering Education Program, and two material experts are teachers of Multimedia skills Program of SMK Negeri 1 Sonder.

After the learning media has been validated, learning media is tested to students of XI Multimedia class at SMK Negeri 1 Sonder. Data obtained from media experts, media experts and respondents using a media feasibility questionnaire with a Likert five scale. The media validation learning by experts took place in March 2019. Instruments for the validation of media experts include easy navigation aspects, media integration, artistic and aesthetic, and overall functionality. Based on data analysis, it is known that the aspect of ease of navigation in excellent categories with an average of 4.38, aspects of media integration in excellent categories with an average of 4.75, artistic and aesthetic aspects of entry in the category are very Well with an average of 4.25. The overall aspect of functionality entered in an excellent category with an average of 4.30. Overall according to the media experts shows that the media is in an excellent category with an average of 4.42 and a percentage of media quality of 87.14% so that this learning medium is worth using to support students ' learning activities XI Multimedia class at SMK Negeri 1 Sonder.

The material validation by the expert was implemented in March 2019. Instruments for material expert validation include the content aspect of cognition and presentation of information. Based on the data analysis, it is known that the aspect of the cognition in the category is well with an average of 4.12 and the aspect of presenting the information in the category is very good with an average of 4.16. Overall, according to material experts, the media is in an excellent category with an average of 4.14 and a percentage of media quality of 83.00% so that this learning medium is worth using to support students ' learning activities XI Multimedia class at SMK Negeri 1 Sonder. Following Alpha Testing by media experts and material experts, Beta Testing was subsequently conducted by students as respondents to evaluate the reaction of students using interactive learning media in 2-dimensional animation techniques. The test involved 31 students of XI Multimedia classes at SMK Negeri 1 Sonder. Testing conducted on Monday, March 18, 2019, in the computer laboratory room of SMK Negeri 1 Sonder. At the time of testing, students are required to use the media, study the material in its entirety and perform the evaluation. After that, students are required to provide their responses by completing the provided poll.

The instruments for respondents include aspects of content, information presentation, navigational ease, artistic and aesthetic, and overall functionality. Based on the data analysis is known that the content aspect of cognition entered in the good category with an average of 4.31, the aspect of presenting information in the good category with an average of 4.19, the aspect of ease of navigation entry in the good category with an average of 4.24, Artistic and aesthetic aspects entered in a good category with an average of 4.31, the overall aspect of a function entered in a good category with an average of 4.25. Overall according to class XI Multimedia students SMK Negeri 1 Sonder shows that the media is in the good category with an average of 4.26 and media quality percentage of 75.25% so that learning media is worth using to support activities Learn to teach students of XI Multimedia class at SMK Negeri 1 Sonder.

4 CONCLUSION

Based on the results of research and discussion on the interactive learning media The two-dimensional animation technique that has been developed can be concluded as follows: The application of Mobile Leariel animation techniques 2-dimensional Android-based for XI Multimedia graders at SMK Negeri 1 Sonder has been built with six stages

namely: (1) the concept (concept), (2) designing (Design), (3) material collection (material Collecting), (4) manufacture (assembly), (5) testing (testing), (6) distributions (distribution). The concept phase generates objectives, types, media concepts, learning materials, usability and user goals. The design phase generates flowcharts and media storyboards. At the material collection stage, researchers gather material materials in the form of text, images, animations, audio, video and so on. The build stage generates learning media according to the designed flowcharts and storyboards. At the testing stage, researchers conducted a media test with two stages: Alpha Testing (Media expert and expert) and Beta Testing (Student/respondent). And at the distribution stage generates interactive learning media in the form of APK files. The interactive mobile learner's application of Android-based 2-dimensional animation techniques are built to its flexibility in Alpha Testing and Beta Testing. Learning feasibility test results based on the media experts in the category are excellent with an average overall score of 4.42 and a percentage of media quality of 87.14%. Based on material experts in the category is excellent, with an average overall score of 4,14 and, the percentage of material quality is 83.00%. Based on student/respondent trials, this learning medium is in a good category with an average overall score of 4.26 with a percentage of media quality of 75.25% so that this learning medium deserves to be used to support learning activities Taught students of XI Multimedia class at SMK Negeri 1 Sonder.

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