DEVELOPING INTERACTIVE LEARNING MEDIA ON TRIGONOMETRY SUBJECT FOR STUDENTS IN GRADE X

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ABSTRACT

In the learning process, multimedia has not yet been used much. Interesting multimedia is required to enhance the learning process. Teachers need additional multimedia to assist them in delivering trigonometry teaching materials. This study aims to develop interactive learning media on trigonometry subjects for grade X. Besides; this study is also aimed at knowing the multimedia properness in terms of material and media and the student's responses to multimedia. This study belongs to developmental research employing the ADDIE model that consists of five stages: analysis, design, development, implementation, and evaluation. The study's subject includes students of State Senior High School (SMA Negeri) 1 Imogiri and Senior High School (SMA) Muhammadiyah Imogiri. The data used in this study are qualitative and quantitative, which were collected through observation, interview, and instrument. The assessment result from the material expert is 88.33 and categorized as excellent. The media expert's score is 85.33 and categorized as excellent, and the score of the students is 83.48 and categorized as excellent (based on trial). Thus, it can be concluded that developing interactive learning media on trigonometry subjects for grade X is appropriate to use in the learning process.

Keywords: Learning Multimedia, Trigonometry, Adobe Flash CS6, ADDIE

INTRODUCTION

Education is a benchmark in determining the quality of a person and the progress of a nation. Education is also a preparation for facing the future. Therefore at this time, many people are competing to take the highest level of education. Quality education is the key to achieving success. According to Muhibin (2014: 10), education is defined as a process with specific methods to gain knowledge, understanding, and ways of behaving by needs. Education is also a stage in developing the abilities, behaviors, and processes of using life experiences. Muhibin (2014: 11) argues that education can occur informally and informally and formally, such as in schools, madrasas, and other institutions. PISA (Program for International Student Assessment) is a world-class assessment held every three years to evaluate students' abilities and knowledge in academic fields. Mathematics is one of the fields tested in PISA. It is undeniable that mathematics plays a role in developing science and technology (science and technology) because mathematics is a universal science.

Mathematics is still a frightening specter for students, so many students lose their confidence and interest in learning mathematics because the material they learn is considered too difficult. Many students tend to be lazy and have low motivation to study mathematics both classically and independently at home. Students who tend to be lazy and have low motivation in learning mathematics, many students whose learning outcomes are less than the minimum completeness criteria (MCC).

Based on the interviews and observations made at SMA Negeri 1 Imogiri and SMA Muhammadiyah Imogiri, it is known that learning still uses books and does not use interactive multimedia. In the learning process carried out is still centered on the teacher. Many students are less active in learning mathematics because students assume that mathematics is a tricky subject. Hamalik in Arsyad (2017: 19-20) suggested that instructional media in the teaching and learning process can arouse new desires and interests, arouse motivation and stimulation of learning activities, and bring psychological influences on students. In addition to arousing student motivation and interest, learning media helps students increase understanding, present exciting and reliable data, facilitate data interpretation, and condense information. The selection of appropriate learning media can be influential in realizing the achievement of learning objectives.

Interactive learning media has great potential to stimulate students to respond positively to the learning material delivered. In addition to positive responses to learning material with interactive learning, media students can be active in learning activities.

Based on this background, the following problems can be formulated: 1) How to develop interactive learning multimedia subject matter in class X trigonometry? 2) How is the feasibility of interactive learning multimedia subject matter trigonometry class X?. The objectives of this research are: 1) Develop interactive learning multimedia subject matter of trigonometry class X. 2) To find out the feasibility of interactive learning multimedia subject matter trigonometry class X.

METHODS

This research is one of the research forms of development research. This study aims to produce interactive learning multimedia with trigonometric subjects. To produce good media, researchers use one model of learning media development that has been widely used in development research, the ADDIE model. In developing a learning media development model or media development procedure that aims to produce quality media. Five stages must be passed in developing a learning media with the ADDIE model as quoted from Personal (2009: 127-137), are as follows:

1. Analysis
   The analysis step consists of two stages, as follows:
   a. Performance Analysis
      Job analysis in this study was carried out by analyzing the school environment's situation, which included observing students' learning process in the classroom and then conducting interviews with the mathematics teacher in question.
   b. Requirements Analysis
      Requirement Analysis is a step that is needed to determine the abilities or competencies that need to be learned by students to improve learning performance or achievement. Therefore, this analysis phase relates to what kind of assistance or method needs students to get out of problems when teaching and learning activities occur in the classroom.
2. Design
   Design is the second step in the ADDIE model. At this design stage, the researcher determines the elements included in the learning media that will be developed. In this sense, designing instructional media that will be made so that the systematics or flow of media travels is more directed and produces good media. After working on the design, the tools used also need to be determined, such as audio, video, computers, the internet, etc. In addition to designing learning media, this stage also designed research instruments.
3. Development
   Development is the third step in implementing the ADDIE learning system design model. At this stage, the researcher continues to make media based on the designs that have been made. Also, things to include: typing in material and script about practice, making animation, drawing, navigation buttons, and giving music. After instructional media development produces initial products, material experts and media experts validate the media to assess the developed learning media's feasibility. After that, a revision is made according to the material experts' input and media experts' validation process.
4. Implementation
   Implementation is the fourth step in the ADDIE learning system design model. The implementation step is often associated with the application of learning media itself. This step does have the meaning of conveying learning material from researchers to students using instructional media prepared and validated by experts. Then students who follow the implementation or application of filling the instrument respond to learning media.
5. Evaluation

The fifth step of the ADDIE learning system design model is evaluation. Evaluation of instructional media conducted in this study was based on the results of the media response instruments given to students who took part in the implementation. Then, the response instruments' results were evaluated on the quality of interactive multimedia and student responses to instructional media.

Data analysis techniques were performed on data from the material expert instruments, media experts, and student responses. Critics and advice given by material experts and media experts will improve the product being developed before the trial process. The stages of data analysis techniques are as follows.

1. Instrument Analysis Process

   Data obtained through the instrument by-product trials and usage trials, which are qualitative values, will be converted to quantitative values by referring to the following Table 1:

Table 1. Rules for Scoring

Answer Choice	Statement Score
SS (Strongly Agree)	5
S (Agree)	4
RG (Hesitation)	3
TS (Disagree)	2
STS (Strongly Disagree)	1

Sugiyono (2015:135)

From the data collected, the average is calculated using the formula:

$$\bar{X} = \frac{\sum_{i=1}^{n} Y_i}{n}$$

Information:

$\bar{X}$: The average score on item *i*

n: Many respondents

Y_i: Scores obtained by respondents *i*

Furthermore, the data obtained from material experts, media experts, and students are converted into qualitative values based on the ideal assessment criteria, as in table 2 below.

Table 2. Ideal Assessment Criteria

No	Formula	Category
1.	$\bar{X} > \overline{X}_i + 1{,}8\ SB_i$	Very good
2.	$\overline{X}_i + 0{,}6\ SB_i < \bar{X} \leq \overline{X}_i + 1{,}8\ SB_i$	Good
3.	$\overline{X}_i - 0{,}6\ SB_i < \bar{X} \leq \overline{X}_i + 0{,}6\ SB_i$	Enough
4.	$\overline{X}_i - 1{,}8\ SB_i < \bar{X} \leq \overline{X}_i + 0{,}6\ SB_i$	Less
5.	$\bar{X} \leq \overline{X}_i - 1{,}8\ SB_i$	Very less

Eko P. Widoyoko (2017: 238)

Information:

$\overline{X}_i$ = Average Ideal

= $\frac{1}{2}$ × (ideal maximum score + ideal minimum score)

sb_i = Ideal Standard Deviation

= $\frac{1}{6}$ × (ideal maximum score - ideal minimum score)

$\bar{X}$ = Empirical Score

Ideal maximum score = Number of items criteria × the highest score

Ideal minimum score = Number of items criteria × the lowest score

RESULTS AND DISCUSSION

Based on the data analysis technique used, the data obtained from three assessments, namely, media experts, material experts, and student responses, are assessed.

1. Product analysis is based on an assessment conducted by material experts, namely Drs Edi Prayitno, M.Pd, a UAD mathematics lecturer, Rusmilah S.Pd, a mathematics teacher SMA Negeri 1 Imogiri, and Suryadi S.Pd, who is a mathematics teacher at SMA Muhammadiyah Imogiri. The results of the calculation of the material experts' score assessment are presented in the following Table 3.

Table 3. Results of Calculation of Eligibility Instruments by Material Experts

No	Evaluator	Score	Quality criteria
1.	Drs Edi Prayitno, M.Pd	92	Very good
2.	Rusmilah S.Pd	86	Very good
3.	Suryadi S.Pd	87	Very good
Average		88,33	Very good

From Table 3, it can be seen that the average score of the material expert judgment is 88.33. These results indicate that the media developed in terms of material included in the category of Very Good. Based on the three material experts' assessments, all multimedia aspects have very good criteria equal to 88%.

2. Product analysis based on an assessment conducted by media experts, namely Syariful Fahmi, M.Pd who is a mathematics lecturer at Ahmad Dahlan University, Wagimin, S.Pd is a teacher of Information and Communication Technology (ICT) at SMA Negeri 1 Imogiri, Seno Adhi.N, S.Pd is a teacher of Information and Communication Technology (ICT) SMA Muhammadiyah Imogiri. The calculation results from the assessment scores by media experts are presented in the following Table 4.

Table 4. Calculation of Questionnaire for Media Experts

No	Evaluator	Score	Quality criteria
1.	Syariful Fahmi, M.Pd.	87	Very good
2.	Wagimin, S.Pd	84	Very good
3.	Seno Adhi.N, S.Pd	85	Very good
Average		85,33	Very good

Table 4 shows that the average score of media expert ratings is 85.33. These results indicate that the media developed according to media experts are included in the excellent category. Based on the three material experts' assessments, all multimedia aspects have very good criteria equal to 85%.

3. Product quality analysis is based on an assessment conducted by students of SMA Negeri 1 Imogiri and SMA Muhammadiyah Imogiri. Total Calculation results from the module's quality by student responses in the trial can be seen in Table 5 below.

Table 5. Calculation of Student Response Questionnaire

No.	Evaluator	Score	Quality criteria
1.	SMA Negeri 1 Imogiri	82,67	Good
2.	SMA Muhammadiyah Imogiri	84,3	Very good
Average		83,48	Good

From table 5, it can be seen that students' responses to the media. Good is shown with an average score of 83.48 and is suitable for use in the learning process. Based on students' assessment, all aspects of multimedia have good criteria equal to 83%.

CONCLUSION

Based on the results of research on the development of interactive learning multimedia subject matter of trigonometry in class X high school that has been done, the conclusions that can be drawn are as follows:

1. Produced interactive multimedia learning subject for trigonometry in class X with the ADDIE development model.
2. Multimedia that is developed is suitable for learning according to the results of the assessment given by material experts, media experts, and students' responses in SMA Negeri 1 Imogiri and SMA Muhammadiyah Imogiri. The multimedia assessment results by material experts obtained an average score of 88.33 with very good criteria. Media experts obtained an average score of 85.33 with very good criteria, and the total assessment by students from the trial obtained an average score of 83, 48 with good criteria. Based on the instrument, learning using interactive learning multimedia subject matter of trigonometry in class X can increase motivation to learn, attract, and facilitate learning trigonometry.

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