

Development of Interactive Multimedia-based Mathematics Learning Media for Class XI SMA

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Abstract

Mathematics is the science that studies quantity, structure, spatial shapes, and changes in numbers. Mathematics has an important role in discipline and developing the human mindset as a student. Many people find mathematics difficult, so many avoid studying mathematics. For this reason, using multimedia learning methods is an alternative to help understand the material concretely, even in multimedia learning it helps make the learning atmosphere more enjoyable with attractive graphics, animations, videos and sounds. With this multimedia-based learning, it can help teachers to broaden their students' insight and knowledge and increase students' enthusiasm for studying mathematics. Interactive multimedia-based learning can increase motivation, learning independence and be a solution to make mathematics learning interesting and easy to understand.

Keywords: *Multimedia; Interactive; Study; Adobe Animate; Mathematics*

1. Introduction

Mathematics is the science of quantity, structure, space, and change. This science studies abstract and universal objects, and plays an important role in discipline and the development of human thinking power. The mathematical mindset is deductive, starting from general objects to important conclusions, which enable the next step in problem solving. Mathematics lessons at school are often avoided by many students because they are considered difficult and complicated. Ruseffendi [13] noted that math is often an unpopular subject. The higher the school level, the more difficult mathematics lessons become and student interest decreases. Many students do not understand simple mathematics and often misunderstand basic concepts, thus reinforcing the view that mathematics is a complex and confusing science.

Multimedia learning is an effective alternative learning method to conventional learning by teachers in the classroom. Multimedia-based learning helps students understand the material concretely through graphics, animation, video, and sound, which makes learning more engaging and less boring. Multimedia is still underutilized by many teachers, even though devices are already available in schools. During learning, students are subjects and objects, with academic achievement as one of the main goals. Teachers must use approaches, methods, strategies, and techniques that actively involve students both mentally, physically, and socially [1]. The use of learning media can create new interests and motivate students [14].

The author developed a math learning medium using Adobe Animate, a multimedia software for creating animations, which can be used for video design, websites, web applications, and even video games. This interactive learning media is expected to help teachers broaden students' horizons and help them explore lessons, as well as increase interest and motivation in learning mathematics. For example, grade 11 materials such as Linear, Row and Row Programs, Geometric Transformations, and Limit Functions can be related to daily life [2][3][4][5][6][7][8][9] [10][11] in accordance with the basic competencies of analyzing, explaining, generalizing, and solving problems related to these four materials. Learning math in grade 11 is important as the basis for college entrance tests and for lectures and jobs.

Tambun & Stephani [12] showed that interactive multimedia-based learning media using Adobe Flash Professional CS6 was valid and attracted students' attention to class X Trigonometry material. Interviews with students at Bekasi City High School showed that the long lecture method made students bored and

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less interested. Some teachers who use PowerPoint are still less interactive. Meanwhile, interactive multimedia is able to stimulate student and teacher responses, increase motivation, and train student learning independence. The solution to make math learning interesting is with interactive multimedia-based materials, so that students can learn comfortably and easily.

2. Research Methods

The research method used is detailed research and development with the aim of producing relevant and practical interactive-based mathematics learning media.

This method is depicted in the Activity Flow Chart This method consists of 8 stages, namely Potential and Problems, Data Collection, Product Design, Design Validation, Design Revision, Product Trial, Product Revision and Results. The flow of the diagram can be seen in Figure 1.

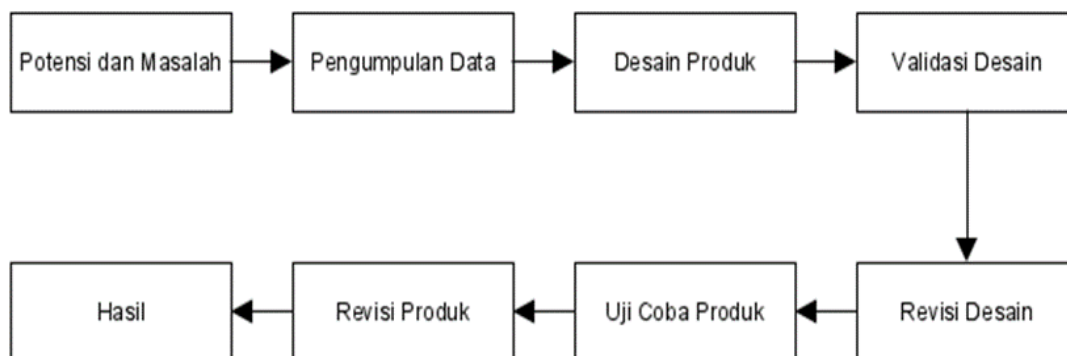


Figure 1. Flow Diagrams

2.1. Potential and Problems


Activities carried out by finding out the surrounding situation regarding what problems occurred and conducting interview sessions with several students for what problems high school students like to experience with lessons can be seen in Appendix 8-10. As well as understanding the overall system that will be developed by matching the material to be used with the design of the interactive media display based on the input of potential users.

2.2. Data Collection

The data/materials used are based on the source of the Mathematics package book for SMA/MA Grade 11 Curriculum 2013 Revision 2016 and take several materials sourced from the internet such as Mathematics Index, Linear Program, Geometry Transformation, Rows and Sequences and Limit Functions. As well as collecting other materials such as sound and video.

After the data has been collected, continue to create a storyboard which is the core flow of interactive learning media which contains the main menus, such as home, material, video material, quiz and profile can be seen in table 1.

Table 1 Storyboard

Storyboard	Information
	<p>Action This loading will rotate and then head to the next Scene at the beginning of the material entry</p> <p>SFX Dubbing</p> <p>Duration 11 s</p>

**Action**

This is the starting menu that leads to other scenes

SFX

Film.mp3

Duration

-

**Action**

Contains *the profile* of the creator

SFX

-

Duration

0.5 s

**Action**

Contains material menus

SFX

Sound effect Wavecont-Upbeat-Inspiring-Corporate-Full-Length.mp3

Duration

2.5 s

**Action**

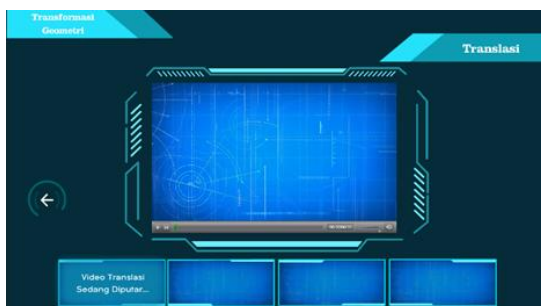
Contains subject matter

SFX

None

Duration

None

**Action**

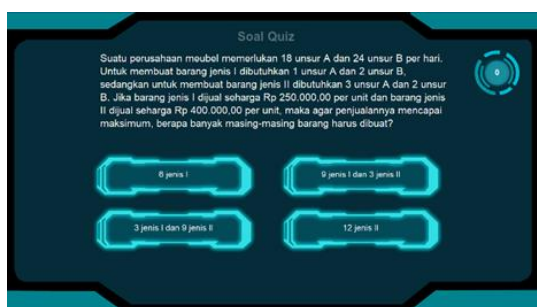
Contains *video* subject matter

SFX

None

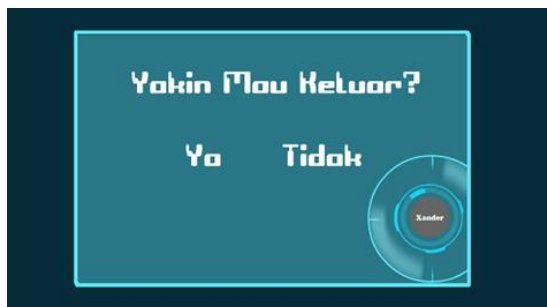
Duration

None



Action
Soal-soal Quiz
SFX
None

Duration
None



Action
This exit is given a motion classic and given an alpha
SFX
None

Duration
1.0 s

3. Results and Discussion

Interactive Media has been developed from the results of research obtained from the testing process and practicality. Testing and Trial carried out on Interactive Media include supporting information, core competency points, basic competencies, indicators and learning objectives according to the 2013 curriculum.

This Interactive Multimedia Learning Media in Mathematics was developed using Adobe Animate, Adobe Audition and Adobe Premiere software. The following are the results of the Development of Multimedia-based Mathematics Interactive Media:



Figure 2. Home Menu Display



Figure 3. Intro Loading Display

Figure 3 is in the form of the initial loading intro starting to enter the learning media. Figure 2 contains the main menu consisting of the Video Material menu, the Material menu, Quiz, Profile and Quit.



Figure 4. Material Menu Display



Figure 5. Display of the Material Explanation Content Menu

Figure 4 consists of material chapters to be presented such as Linear Programs, Geometry Transformation, Arithmetic Lines and Sequences and Function Limits. Figure 5 contains the content of the explanation of the material equipped with voice dubbing, exercises and discussion of questions that can help students understand the subject matter.



Figure 6. Quiz Menu Display

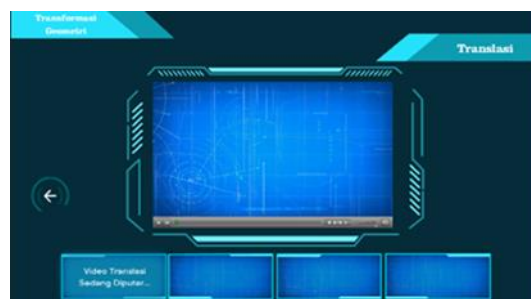


Figure 7. Display of the Material Video Content Menu

Figure 6 contains a simulation of practice questions, which trains students to test how well they understand the material they have learned. This menu is equipped with score results and also the highest score board that allows to foster competition between other students so that students are enthusiastic about learning it. Figure 7 contains a video explanation of the possible questions that can help students understand the material.

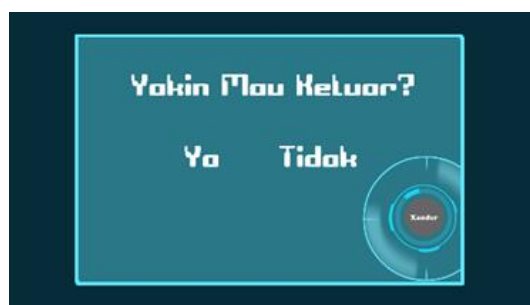


Figure 8. Exit Display



Figure 9. Profile Menu Display

Figure 8 shows the display to exit the learning media. Figure 9 shows information about the interactive media blinder.

Based on operational testing of Multimedia-based Mathematics Learning Media using Adobe Animate software, this is done by running the program from start to finish, then trying every menu, sound, video and navigation buttons where the script is located.

Testing is carried out for each media menu that has been generated from the loading intro screen, main menu, material selection menu, discussion material menu, video selection menu, discussion video menu, quiz menu. After the test is completed, improvements will be made, then a validation test of the practicality of the Mathematics Learning Media as a whole by experts is described in Table 2.

Table 2. Feasibility Assessment of Learning Media

Validator	Value	Information
Material Expert	84	proper
Design Expert	88	Highly Worthy
Average	86	Highly Worthy

Based on the data, the average calculation results that have been given by experts are 86. Although the media can be used without the testing of experts, but to create a better learning media, the author continues to do it based on the advice of experts. After the test is complete, only then can the learning media be tested on students.

Table 3. Data Analysis of Questionnaire Response to the Practicality of Learning Media

Student Name	Score	Information
Jaggery Afriani	90	Highly Worthy
Abitirta Pangestu	80	Proper
Holy Ramadan	70	Quite Decent
Ronald Ramadhan	90	Highly Worthy
Mutia Ayuningtias	80	Proper
Average	82	Proper

Based on the analysis of student response data, it can be seen in Table 5 that the results are obtained with an average score of 82 and are included in the Eligible category.

4. Conclusion

This High School Grade XI Mathematics Learning Media is very feasible and practical to use according to the needs of students. According to the score of the experts' opinions, which is 86 and the assessment of the usefulness and ease of use in the learning process for students about the average level of student response with a score of 82.

The advantage of this Interactive Learning Media is that it has an attractive display form accompanied by pictures, videos, animations, sounds and quizzes along with a Quiz score board so that it can make it easier to learn and understand mathematics and can motivate and increase students' competitiveness in the spirit of learning.

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