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Developing android-based arabic-Clock Angle game for eighth-grade mathematics at MTs YMI Wonopringgo Pekalongan

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Abstract. The use of media in MTs YMI Wonoringgo Pekalongan is still not optimal, especially in a mathematic lesson. It causes student difficulty in understanding the concepts conveyed by the teacher and low motivation so that students are less able to solve problems in studying. Thus, it is hoped that through Arabic angle o'clock game media, students can more easily understand angle math concepts and mastering Arabic vocabulary of o'clock material. The purpose of this study is to produce an android-based Arabic angle o'clock game media in learning mathematics to eighth grade at MTs YMI Wonopringgo Pekalongan. The research method uses the waterfall model (Analysis, Design, Implementation, Testing, and Maintenance). The research subjects were students of eighth grade at MTs YMI Wonopringgo Pekalongan. The sampling technique uses cluster sampling. The result of this study are Arabic angle o'clock game media with the result of the media expert validation with a percentage of 89%, the results of the material expert validation of were 90%, and student responses 88,14% with very suitable/very feasible criteria. Thus, this product is appropriate to use as mathematics learning media in angle o'clock material and increase student to mastering Arabic vocabulary about o'clock in MTs YMI Wonopringgo Pekalongan.

1. Introduction

In the last few years, communication technology has witnessed an enormous revolution. Moreover, education benefitted to a great extent from this revolution allowing teachers to teach their students using through one of the many available smartphone applications (apps) [1]. As a teacher, the development of technology must be made a challenge to create a condition for learning that is more interactive, innovative, and motivates students by utilizing media developments. However, there are still many teachers who not maximal the use of technology for learning media. Such as teachers, especially mathematics teachers at MTs YMI Wonopringgo Pekalongan, do not maximize the use of technology for learning. It can affect do not maximal to the result of student examination and student learning motivation. Much less, students in eighth grade at MTs YMI Wonopringgo Pekalongan have commonly struggled with angle lesson problems. One such media that can be integrated into learning and assessing is an android-based Arabic angle o'clock game media. Using a game application on learning can facilitate teachers in transferring knowledge to students more effectively efficiently [2].

Learning models that are deemed appropriate and appropriate to support students' mathematical learning outcomes are the Computer Assisted Instruction learning model and the Computer Based Instruction learning model. "Computer Assisted Instruction, it is rather a device which provides students



with interactive involvement with instructional materials” [3]. In this model the computer can display learning using various types of media (text, images, sound, video), provide quiz learning activities and atmosphere or by providing interaction from students, evaluating student answers, providing feedback and determining student learning styles so students can interact actively learning independently [4].

Digital game-based learning is a form of gaming that is usually designed for other purposes, like for entertainment [5]. Conventional game-based learning comprises of different forms of strategy-based entertainment board games. Digital game-based learning shares many features with other instructional media. Studies have reported that digital game-based learning could enhance teaching and learning, and the use of digital games in learning has gauged the interest of many researchers [5]. Digital game-based learning combines entertainment and education to serve an educational purpose. This concept is known as edutainment. Digital game-based learning is a form of gameplay aimed to help teachers achieve learning outcomes [3]. In this study, digital game-based learning refers to the adoption of android-based learning media to bring an element of fun and entertainment to achieve an educational outcome.

In addition to learning models, to attract students’ interest in learning mathematics teachers need to provide innovation in the learning process. One of them is by using appropriate and effective learning media. “One of the ways to introduce modern technologies in class is through gamification items that allow applying gaming elements and principles in academic and working environments” [6]. This is a game made by Adobe Flash Professional CS6, is a animated animation software that can create graphic objects and animate them so that we can directly create design objects without having to use supporting graphics software such as Illustrator or Photoshop [7]. Adobe Flash Professional CS6 is an animated animation software that can create graphic objects and animate them so that we can directly create design objects without having to use supporting graphics software such as Illustrator or Photoshop [8]. The new thing found in Adobe Flash CS 6 is the development of the previous version. Besides being able to support AIR 3.4 and Flash player 11.4, this version also has features that can improve iOS and Android [9].

Moreover, to attract students’ interest in learning mathematics, teachers need to provide innovation in the learning process. One of them is by using effective and efficient media. Android-based Arabic angle o’clock media game can be used as an alternative in the choice of mathematics media because it is quite impressive, easy to use, and efficient. This media game was completed by Arabic angle o’clock material to help students to understand angle material easily and assessment material to assessing the result of students in mathematics lessons by explaining what correct answer. Besides that, the Arabic angle game media can use student independently with unlimited time. By using proper media, it is expected to be able to improve student learning outcomes.

2. Methods

This research includes development research, and this research method is a method used to produce a certain product, in this case, to develop Arabic angle o’clock game media, while testing the validity and effectiveness of the product. The subject of this study were students of eighth-grade MTs YMI Wonopringgo Pekalongan. The development procedures using the waterfall model are 1) analysis, 2) design, 3) implementation, 4) testing and 5) maintenance [10]. Through media animation presentation, it is expected that eighth-grade MTs YMI Wonopringgo Pekalongan can understand what the essence of mathematics subject matter is well not dull and fun. The watrfall learning design model done in this study can be seen in figure 1.

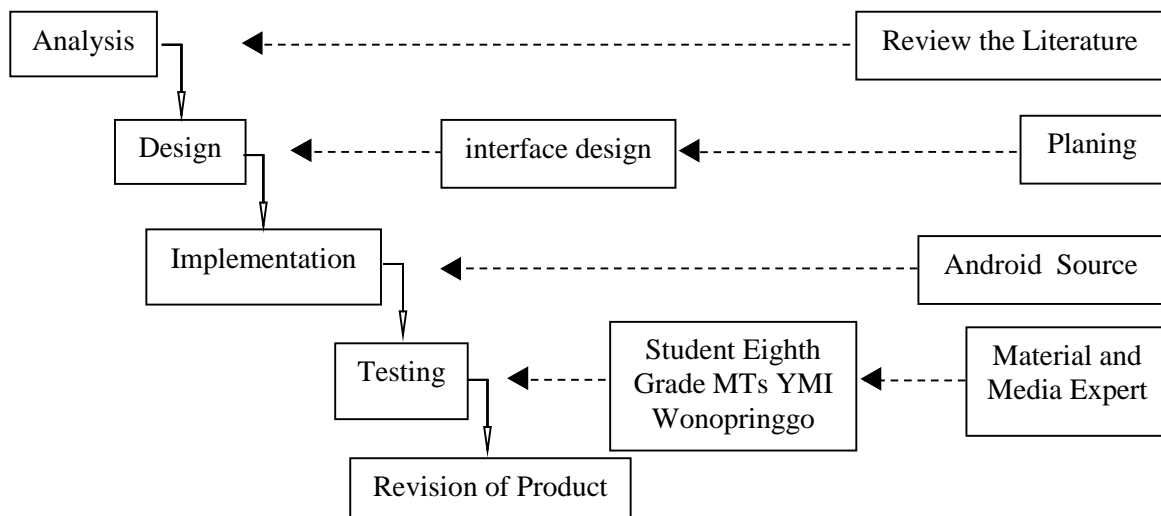


Figure 1. The waterfall learning design model.

3. Results and Discussion

Based on the waterfall development model procedure, the stage of conducting this research are as follows :

3.1. Analysis

This step was conducted to search for information on how is important the product will be developed. The need analysis of students' is the most crucial point in conducting a design-based research model. It becomes the starting step in developing the product. Students' need analysis includes students' problems faced in the learning process. Not only students' needs but students' potentials are also analyzed whether it can be developed in this moodle. The mathematics teacher is also involved in giving information about students' needs and problems faced in the classroom. This step was undertaken by using interviews and questionnaires given to students in the eighth grade at MTs YMI Wonopringgo Pekalongan and mathematics teacher at MTs YMI Wonopringgo Pekalongan. The final need analysis step is to know the importance of developing android-based Arabic angle o'clock game media to teach mathematics to increase students' mastery of the angle material, and they're enthusiastic about game media. One of the effective technology-based learning media is the android-based Arabic angle o'clock game media.

3.2. Design and implementation

Design is the process of planning and problem solving for a software solution based on the result of the analysis that has been done in the previous step. One type of procedure is interface design. It would be created interface design of android-based Arabic angle o'clock game media. Then, the implementation step refers to the realization of business requirements, and design specification includes multimedia components, images, animations, and sounds. Display media can be seen in figure 2.



Figure 2. Design of an android-based angle clock to angle interface with (a) clock to angle material, (b) example problem, and (c) evaluation of angle material.

3.3. Testing

It is also known as verification and validation, which is a process for specifications, and it accomplishes its intended purpose. It is a validation expert (material and media expert) and students response results of android-based Arabic angle o'clock game media. The results of the validation will be described below.

3.3.1. Material Validation. Development products evaluated by material experts are an android-based Arabic angle o'clock using a questionnaire that must be filled out by material experts. The questionnaire filled out by material experts has the following criteria as seen in table 1.

Table 1. Score category.

Scores	Categories	Value Range
4	Very Feasible/Very Suitable	86 – 100
3	Feasible/Suitable	71 – 85
2	Less Feasible/Less Suitable	56 – 70
1	No Feasible/No Suitable	41 – 55

There are four aspects of the validation assessment criteria, namely the content eligibility, presentation eligibility, contextual, and language eligibility. The results of the validation and assessment from the learning material experts for each aspect are presented in table 2.

Table 2. Validation and assessment results from material experts.

No.	Assessment Aspects	Expected Score	Evaluation Score	Appropriateness
1.	Content Eligibility	56	51	92.26%
2.	Presentation Eligibility	28	25	88.37%
3.	Contextual	24	22	93.05%
4.	Language Eligibility	40	36	90.00%

In the next stage, the researcher analyzes the overall results of the assessment by material experts. With Σ (the answer \times the weight of each choice) is 134, n is 37, the highest weight is 4, and calculated using equation (1). The percentage of feasibility based on an android-based Arabic angle o'clock material was 90.54% by the material expert. After being converted to a scale conversion table, an android-based Arabic angle o'clock material is in the range of 86% - 100%. So placing the position on the criteria is very feasible/very suitable.

$$\text{Percentage} = \frac{\sum(\text{the answer} \times \text{the weight of each choice})}{n \times \text{highest weight}} \times 100\% \quad (1)$$

3.3.2. Media Validation. Development products evaluated by media experts, namely, android-based Arabic angle o'clock material using a questionnaire that must be filled out by media experts. The questionnaire filled out by media experts has the following criteria, as seen in table 1. There are four aspects of the validation assessment criteria that are software engineering-based, communication, audio, and visual aspect. The results of the validation and assessment by media experts for each aspect are presented in table 3.

Table 3. Validation and assessment results from media experts.

No.	Assessment Aspects	Expected Score	Evaluation Score	Appropriateness
1.	Software Engineering Based	20	19	95,00%
2.	Communication	20	18	90,00%
3.	Audio	12	12	100,00%
4.	Visual	28	23	82,14%

In the next stage, the researcher analyzes the overall results of the assessment by media experts. With Σ (the answer \times the weight of each choice) is 72, n is 20, the highest weight is 4, and calculated using equation (1). The percentage of feasibility based on an android-based Arabic angle o'clock material was 90.00% by the media expert. After being converted to a scale conversion table, an android-based Arabic angle o'clock material is in the range of 86% - 100%. So placing the position on the criteria is very feasible/very suitable.

Media expert comments (validation of media expert assessments) in general, which is android-based Arabic angle o'clock game media is an exciting medium for eighth-grade mathematics learning. Comments and suggestions from instructional media experts are taken into consideration for improving the design of an android-based Arabic angle o'clock.

3.3.3. Student Response Results. After the results of the android-based Arabic angle o'clock game media were validated to material experts and media experts, the next was the android-based Arabic angle o'clock game media with the sample model. Students agree that the android-based Arabic angle o'clock game media model is through a questionnaire. It is done so that researchers know that the android-based Arabic angle o'clock game media is used for students. There are three student response indicators, namely: respondent's interest in media, ease of use of media, the usefulness of media use. It is related to a previous study that android game media can interest the student [5]. Also, I can be used in android

[9], so the student easily uses this media everywhere. Students can get feedback from media so they can evaluate themselves [4]. The results of student responses are presented in table 4.

Table 4. Results of students' responses to android-based Arabic angle o'clock game media.

No.	Indicators	Expected Score	Evaluation Score	Appropriateness
1.	respondent's interest in media	104	101	97.11 %
2.	ease of use of media	104	98	94.23%
3.	the usefulness of media use	104	102	98.07%

From the above calculation, the average percentage of feasibility based on android-based Arabic angle o'clock game media was 96,47% by students. After being converted to a conversion table, the scale is in the range of 86% - 100%. So placing the position on the criteria is very feasible/very suitable.

4. Conclusion

Android-based Arabic angle o'clock game media has been produced on exponential material. The product validation results are 90.54% by material experts and 90.00% by media experts. The student responses at 96.47%. It means the android-based Arabic-angle clock game media it's worth using it in eighth-grade MTs YMI Wonopringgo Pekalongan.

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