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DEVELOPMENT OF CONTEXTUAL MATHEMATICS LEARNING VIDEOS FOR JUNIOR HIGH SCHOOL STUDENTS

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Abstract
Technological developments in the 21st century require the education system in Indonesia to be able to adapt to the times to improve the quality of education. One form of adjustment is to change the conventional learning system to be more flexible. Efforts to adapt to the times are by presenting learning videos. This study aims to determine the process and results of developing a contextual-based mathematics learning video for junior high school students that is valid and practical. The research was conducted with the Thiagarajan 4D development model covering definition, design, development and deployment. Based on these results, it can be concluded that the learning videos developed are valid and practical. The expert validation stage obtained very good criteria with a percentage of 91.83% suitable for use. The results of practicality testing with students obtained a practicality level with a positive percentage of 87.5% which is very practical. Meanwhile, the students obtained the level of practicality with a positive percentage of 80.85% which is very practical.
***Keywords**: video development, learning video, contextual, 4D models*

INTRODUCTION

The development of technology in the 21st century requires the education system in Indonesia to be able to adapt to current developments as an effort to improve the quality of education. One form of adjustment is to change the learning system from being conventional to being more flexible (Etistika, 2016: 264). This means that education in the future will not only be oriented in school buildings, but will also be determined by technology and information networks that can be accessed anytime and anywhere (Haris, 2017: 32-33). Efforts to achieve educational goals will be obtained if the education system can adapt to the increasingly developing era and master many fields of science, including mathematics.

The Covid-19 pandemic has certainly had an impact on the learning process, where the information and knowledge conveyed by teachers cannot be understood optimally.The results of the researcher's initial observations at SMPN 8 Banda Aceh showed that the learning carried out at the school, especially online learning, was not yet effective. This is because the content of the material and assignments given by the teacher, both e-books and sent to class groups via WhatsApp, are not yet interactive so that they cannot provide a comprehensive and in-depth understanding to students. Providing material content like this makes it difficult for students to understand the mathematics material given by the teacher, so that students' interest and learning outcomes decrease from before. This is known from the statement of a mathematics teacher at SMPN 8 Banda Aceh who stated that students' interest in learning online is not the same as their interest in learning offline and even decreases, this of course results in low learning outcomes. In this situation, teachers are required to be more creative and innovative in the learning process during Covid-19. One creative solution to online learning is to present learning videos during the learning process. Learning videos provided during the learning process can actually support the implementation of learning because learning videos can attract students' interest in learning (Muhammad, 2020: 264). Learning videos are also needed in the learning process so that students do not consider mathematics as a difficult subject to learn, understand and boring (Kamarullah, 2017: 21-22). Learning videos will make it easier for students to understand the material because it is presented in the form of simple and fun animations, so that learning videos look interesting and not boring and have an impact on increasing student interest and learning outcomes. Thus, learning videos are a solution to online learning because they can increase student interest and learning outcomes.

Learning videos can improve students' interest and learning outcomes, because the material provided can be absorbed by students using two types of senses, namely the sense of sight and the sense of hearing. The results of research conducted by Zaenal showed that learning using learning videos can improve students' memory from 14% to 38% (Zaenal, 2012). The study proves that providing learning videos can be an effective solution to improve students' interest and learning outcomes. Learning videos have several advantages, including being able to attract students' attention, saving time, being able to see moving objects more closely, being able to obtain information clearly and the delivery of messages from learning videos is not too verbalistic (Netriwati, 2017: 114-115). If learning videos are combined with the concept of contextual learning, it will create an interactive learning atmosphere.

The development of good contextual-based mathematics learning videos will be developed by referring to teaching materials and the development of interactive, structured videos that contain all the information needed in the learning process such as core competencies, basic competencies, competency achievement indicators, learning objectives, contextual and interactive learning materials and questions that can assess students' understanding of the material that has been presented. The learning process using learning videos has many benefits, including being able to replace the surrounding environment and showing objects that cannot be seen by students, being able to describe a process accurately, being able to be viewed repeatedly and increasing students' interest and motivation to learn (Arsyad, 2011: 49). This contextual-based mathematics learning video is also in the form of animation so that students can easily understand the material because the presentation of the material is contextual (related to everyday life) in the form of simple animation. Thus, this contextual-based mathematics learning video is one of the technological developments that can be used for the digital revolution, so that students can learn independently and flexibly so that learning objectives will be achieved optimally. Meanwhile, the solution to online learning that is currently being implemented is to develop the Q-MOVIK learning model.

The Q-MOVIK learning model is a learning model that is...*on line*which was developed with the aim of improving students' understanding of mathematical concepts.The Q-MOVIK model stands for "Initial Quiz, Final Quiz, Material, Online, Video, Interaction and Communication". This model is specifically designed for distance learning using the Google Classroom application, Zoom Cloud Meetings and Google Meet, where educators prepare learning tools in the form of RPP, materials, videos, LKPD and Quizzes in online form. Previously, all of these learning tools were arranged in such a way using a contextual approach so that students could easily understand them so that students could learn independently without depending on their parents. Then students can also interact and communicate with teachers during the learning process.

Based on the Q-MOVIK model that has been explained, the researcher focuses more on the research on the Development of Contextual Mathematics Learning Videos for Middle School Students.

RESEARCH METHODS

Types of research

This study uses the Research and Development (R&D) research method which is a research method that produces a certain product. In this study, a contextual-based mathematics learning video will be developed using the 4D model consisting of Define, Design, Develop and Disseminate.

Time, Place and Subject of Research

This research was conducted from January to June 2021. The subjects of the product development trial were 25 class VII students of MTsN 1 Banda Aceh City.

Research Procedures

At the definition stage, the learning requirements are determined and defined, consisting of initial-final analysis, student analysis, concept analysis, task analysis, and specification of learning objectives (Tito, 2016:28). At the design stage, the aim is to design contextual-based learning video media that can improve the ability to understand mathematical concepts. Activities at this stage are the pre-production stage, production stage, and post-production stage. At the development stage, a revised learning video is produced based on input from the validator. The learning video that has been designed will be consulted with the supervising lecturer to get input and suggestions on the video to be developed, after which the learning video will be consulted with the validator to be validated and get input again to produce a good and feasible contextual-based mathematics learning video. Validators consist of media experts and mathematics teachers. Furthermore, the learning video will be tested in the field using a practicality sheet by the teacher and a practicality sheet by the students. At the dissemination stage, the aim is to implement the media that has been developed on a wider scale. This stage is carried out by uploading the results of the development of learning videos to social networks, such as including them on the web or YouTube through the mathematics education study program or creating a blog so that the resulting product can be used by others.

Data Collection Techniques, Instruments and Data Analysis Techniques

Data collection techniques are carried out with validation and practicality sheets. The instruments used in this study are validation sheets and practicality sheets. Validation data from all validators are calculated for their validity value using the formula:

$$V\ total = \frac{\sum x_i}{Skor\ Maks} x100\%$$

If the validation results show an achievement level of > 60%, the developed learning video can be declared valid and researchers do not need to make improvements to the developed product. If improvements are still needed, then what should be improved is the part that is considered necessary. If the validation results show an achievement level with an average of 60%, then the product is declared invalid and researchers need to make improvements to the learning video that will be developed (Agustina, 2016: 96).≤

Practicality data analysis was carried out by analyzing student and teacher practicality data obtained through practicality sheets distributed to students and teachers analyzed using the formula:

$$Kepraktisan\ (\%) = \frac{Jumlah\ skor\ tiap\ pernyataan}{Jumlah\ responden} \times 100\%$$

Learning videos are said to be practical if at least the practicality criteria show an achievement level of >60%. If it is less than the established criteria, it needs to be revised and retested (Azwar, 2010: 32).

RESEARCH RESULTS AND DISCUSSION

Research result

This research is a development research to produce a product in the form of a contextual-based mathematics learning video for junior high school students. The development of this question was carried out by following all the stages of the 4D research described above perfectly starting from definition, design, development and distribution.

The details of the results of each stage of the development research carried out are as follows:

1. Define Stage

   At the definition stage, an interview was conducted with a teacher at one of the schools, from his statement the teacher stated that the learning materials at the school concerned were sent online to the Whatsapp group and students were required to understand the material without any more detailed explanation from the teacher, so that they could not provide a comprehensive and in-depth understanding to students. At this stage, a more specific objective was also formulated, namely to develop contextual-based mathematics learning videos for junior high school students.

2. Design Stage

   At this stage, it is divided into three, namely the pre-production stage, the production stage and the post-production stage. At the pre-production stage, materials are prepared in accordance with KI and KD in the form of Cartesian coordinate materials to then formulate scenarios in learning videos. This stage also includes making images in learning videos using CorelDRAW Graphic Suite 2020 software.

   After going through the pre-production stage, the next stage is the production stage which includes the process of animating the scenario that has been prepared in the pre-production stage using Adobe After Effect software and the final process is the first rendering using Adobe Media Encoder software to produce animated videos without sound.

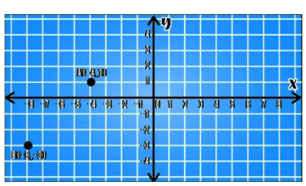
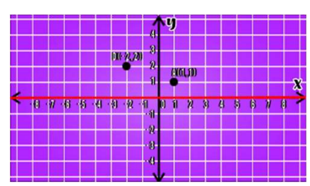
   The last stage in the design stage is the post-production stage. At this stage all the videos that have been made and the audio that has been recorded at the production stage will be combined, given sound effects and backsound and then after that the second rendering process is carried out and produces a complete contextual mathematics learning video that is ready to use.

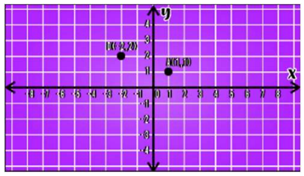
3. Development Stage (Develop)

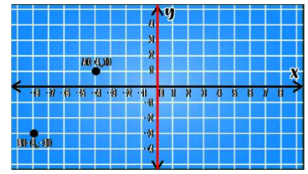
   The development stage is divided into two, namely validation by the validator and field trials (Developmental Testing). The validators at this stage consist of 3 (three) learning media experts, 1 (one) learning media expert teacher and 1 (one) mathematics subject matter expert teacher.

Before going through the validation process by the validators, the developed learning videos underwent several improvements until a valid learning video was produced based on the validator's assessment. The following is an example of suggestions for improving the developed learning videos.

Table 1.1. Suggestions for Improving Learning Videos

Initial Results	Improvement Suggestions	Repair Results
The video shows the word grab in the video section. 	It is better to consider not promoting certain commercial products in the developed learning videos. For example, the mention of the word grab should be censored or replaced with "online food delivery service".	The video was revised by changing the pronunciation of the word grab to online food delivery service. 
Videos that contain reflections on a particular axis (e.g. the x-axis) have the same color as the y-axis, namely black. 	It is better if the part of the video that contains reflections on a certain axis (for example the x-axis) gives the axis a different color/animation to make it easier to understand in which direction a point is reflected.	The video was improved by adding color and animation to make it easier to understand the reflection material. 





Based on table 1.1, it is clear that the video before revision is different from the revised questions. Based on the assessment of the validator, the developed learning video is valid in terms of function and benefits with a validity level of 86.67%, from the visual media aspect 93.6%, from the audio media aspect 87.2%, from the typography aspect 93.3%, from the language aspect 96%, from the programming aspect 92% and from the aspect of material suitability 94%. Based on these seven aspects, the validation value of the learning video I was obtained by 4 (four) validators with an average of 91.83%. This means that the learning video that has been developed is valid with very good qualifications. The learning video that has been produced is then tested in the field on teachers and students at the trial school using a practicality sheet. The trial using the practicality sheet is carried out in two stages, namely practicality by teachers and students.

Practicality by teachers conducted to 1 respondent obtained the learning video that has been developed has a percentage of practicality with an average score of positive teacher responses of 87.5%. Meanwhile, practicality by students conducted to 22 respondents obtained the learning video that has been developed has a percentage of practicality with an average score of positive student responses of 80.85%.

After conducting interviews with students who gave responses with a value of disagree. Based on the statement given by S10 during the interview, he stated that he did not like the appearance of the learning video presented, this was because the video was not beautiful according to his eyesight such as blurry, unclear and the image size of the learning video was not appropriate. He said that he could not see the images in the learning video clearly, this was because when he tried to play the video, the network in his place was unstable so that the video displayed was not clearly visible, then in line with the above, the video displayed could not be seen clearly the movements and images in the learning video. Based on the statement from S21, he was not motivated to learn mathematics after watching the learning video, because basically he did not like mathematics at all, he also stated that even though the teacher presented various learning models he still felt that mathematics was a bugbear for him so he was not the least bit motivated to learn. Furthermore, because he was not motivated to learn mathematics, it would be difficult for him to understand the material given in the learning video presented. From the beginning, S21 stated that he did not like learning mathematics, when asked he also clearly stated that he did not like the appearance of the video given. Then because he did not like the material given in the learning video, indirectly he could not understand the language in the learning video because from the beginning he did not pay attention to the video given properly. Based on the case of S21, it can be concluded that when a student does not like mathematics lessons, the student will always look for loopholes or reasons to continue to dislike it even though the teacher has provided learning with various models such as providing contextual-based mathematics learning videos. S22 stated that he could not see the movements and images in the learning video clearly because just like S10, he experienced network interference where when he tried to play the video given, the network in his area was not good, so the movements and images in the learning video could not be seen clearly. In addition, he stated that he did not like hearing the sound of music in the learning video, because the sound of the music with the video presented was not in line, sometimes the video was faster then followed by sound or vice versa, this was caused by an unstable network in the area where S20 played the learning video given. Furthermore,The colors in the video also look dark because, as mentioned earlier, the network is unstable, so he cannot understand the language presented in the learning video, which causes him to dislike mathematics lessons after watching the video presented and he feels bored watching the learning video because the learning video cannot be played properly.

Practicality by teachers and students meets the criteria of very good and can be used by teachers to be given to students in the learning process.

4. Dissemination Stage (Disseminate)

   At this stage is the implementation stage of media that has been developed on a wider scale. This stage is carried out by uploading the results of the development of learning videos to social networks such as entering them into the web or YouTube so that the resulting products can be used by others, this activity was carried out on July 7, 2021.

Discussion

Based on validation by the validator and field trials, a valid, practical and feasible learning video was obtained for use in the learning process. The results of validation by the validator showed that the developed learning video was valid with a percentage of 91.83% with very good criteria. Agustina stated that the learning device in this case is a learning video is said to be valid and feasible to use if the validation achievement level is >60% (Agustina, 2016: 96). This means that the learning video developed by the researcher is feasible to use in the next stage.

Field trials were conducted to assess the level of practicality of using learning videos by teachers and students. Based on the results of the calculation of practicality by teachers, the percentage of practicality obtained a positive value of 87.5%. Heni stated that if the practicality data has a minimum value of good, then the device that has been prepared can be used (Heni, 2017: 39). In this study, the minimum good means that the minimum positive response that must be given is 50%. While the percentage of practicality by students obtained a positive value of 80.85%. This practicality criterion is the same as the practicality criterion in the practicality sheet points assessed by the teacher.

CONCLUSION

The development of contextual-based mathematics learning videos for junior high school students by following the 4D model has been successfully carried out by following all stages of development and receiving a very good response from the research subjects. With the results of the study in the form of a product of developing contextual-based mathematics learning videos for junior high school students with a validation percentage of 91.83%, practicality by teachers with a positive value of 87.5%, practicality by students with a positive value of 80.85% so that it is worthy of use.

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