

Article

Development of Interactive Multimedia on Set Materials in Online Learning

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Abstract: The spread of the corona virus presents its own challenges for educational institutions in Indonesia. This causes learning activities to be carried out online. With the learning media, it is expected to make it easier to convey learning material. The purpose of this study was to determine the feasibility, student responses, and the effectiveness of learning media. This research is development research that adapts the ADDIE model which consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. The subjects of this study were 15 students of class VII SMP Muhammadiyah 2 Gamping. The data analysis technique used is the validity of the media, the practicality of the media, and the effectiveness of the media. In this study, the results obtained: 1) media eligibility was obtained from the validation of media experts and material experts with an average score of 3.0 for media experts and 3.3 for material experts, both obtained valid criteria. 2) student responses were obtained from practicality questionnaires based on a total average score of 3.15 obtained practicality with practical criteria. 3) the effectiveness of the media obtained from the results of the evaluation test, from the evaluation test as many as 13 students out of 15 students reached the KKM so that the percentage of students' completeness was 77.66%, then the effectiveness was obtained with good criteria.

Keywords: Development, Learning Media, Interactive Multimedia, Conceptual

1. Introduction

The spread of the corona virus or COVID-19 has presented its own challenges for educational institutions in Indonesia. To anticipate the spread of the virus, the government issued policies such as social distancing and physical distancing. This condition requires people to always work at home. As a result of this policy, educational conditions such as schools and universities stop the face-to-face learning process. Instead, the learning process is carried out online which can be carried out from their respective homes. In accordance with the Circular of the Minister of Education and Culture Number 4 of 2020 concerning the implementation of education policies in the time of the spread of emergency (COVID-19),

it is recommended to carry out the learning process from home through online learning. Readiness on the part of service providers or students is a demand for the implementation of online learning. The application of online learning requires supporting devices such as electronic devices, namely computers or laptops, mobile phones, and other aids as intermediaries for delivering learning materials that may require an internet connection to access them (Dewi, 2020). Both parties, namely students and teachers, should have at least a mobile phone and internet connection supporting devices (Ria Yunitasari, 2020). With the help of these supporting devices, it can make it easier for teachers to prepare learning media and arrange learning steps that will be applied.

One of the learning resources that help teachers to enrich students' insight also serves to assist teachers in conveying learning messages is the internet (Rafidha Mustafa, 2021). The internet also serves as a resource in developing learning media. Currently, the learning media spread on the internet and YouTube are already diverse and growing. Teachers can take advantage of learning media scattered on the internet without the difficulty of making their own learning media. Teachers can also take advantage of applications such as zoom, google meet, Skype, and so on that can display the teacher's face so that learning is more interesting, and the teacher looks active in delivering the material. The use of the WhatsApp application can also be applied in learning, for example, it is used to discuss through WhatsApp Groups to find out which students are active during learning. Evaluation activities are usually carried out by teachers after carrying out learning, one of which is by holding quizzes, this activity can be done using learning media such as online quiz making applications such as google form, quizizz, kahoot, and many more.

Learning media is one component that has an important role in the learning process (Sri Mulyati, 2020). Streamlining the achievement of learning objectives in the learning process can be done by utilizing learning media that must be paid more attention to by teachers in several parts of learning (Nuril Wildan Maghfiroh, Askhabul Kirom, 2019). During the pandemic, the learning process that took place in schools experienced a change from what was previously done in person or face-to-face, but now becomes online. This also greatly affects the teacher in compiling or designing learning activities, including the media used. According to Fitri Andayani et al, efforts to solve mathematical problems will be easier with the existence of learning media (Andayani et al., 2021). From the opinion above, it can be concluded that the learning media in its use will be very beneficial for students and teachers. The benefits of learning media include learning that will be more effective, increase the attractiveness and interest of students, and increase students' learning motivation. Another benefit for teachers is as a tool in the learning process, time effective, and attracts the attention of students so that they are enthusiastic about learning.

One component of the teaching system that can be used to support the teaching process is multimedia. The definition of multimedia is very diverse, one of which is in the scope of technological development. Multimedia has the meaning as a combined use of several media in conveying information in the form of text, graphics, audio, moving images and allows users to navigate, interact, create, and communicate (Sefina

Samosir et al., 2021). Multimedia learning can be interpreted as a multimedia application that can be used in the learning process, or it can also be said as the distribution of messages in the form of knowledge, skills and attitudes as well as increasing a sense of desire to learn so that the goals of learning can be achieved (Pebrianto, Herpratiwi, 2021). According to Asnawi, interactive multimedia is a system that uses more than one presentation media such as text, audio, images, and video simultaneously and links the user's participation to give orders, organize and manipulate (Research & Religion, 2018).

The importance of using gadgets in learning has an impact on student learning. The use of learning media is one way to attract students to follow the learning delivered by the teacher. Therefore, the development of learning media is considered important to do. The urgency of developing multimedia-based learning media is that teachers must innovate such as developing multimedia-based media to facilitate the process of achieving learning goals (Maisarah, Try Annisa Lestari, 2022). In addition to the use of learning media that can help students understand the material presented, contextual learning can also make it easier for students to understand the material because it is directly related to everyday life.

The development of science, concepts constructed by students through a question-and-answer process in the form of discussion is a learning process that is in accordance with a contextual approach. Contextual learning is learning that begins by telling events in the real world of everyday life experienced by students and then brought into the mathematical concepts discussed (Andri Afriani, 2018).

Mathematics is considered a difficult and boring subject so that it causes students to be lazy to learn (Septian & Gustiana, 2022). Mathematics is one of the important subjects in everyday life. Therefore, mathematics is important to be taught by every student where it aims to make students think logically, theoretically, rationally, and confidently in solving everyday problems (Sri Mulyati, 2020). However, most students consider mathematics a difficult material to understand because there are many formulas and calculations that function as solutions. With the Covid-19 pandemic adding to the difficulty of students in understanding the material, this is because students can only understand the material through supporting devices. The set is one of the important materials in learning mathematics.

But students' understanding of the set material is still lacking. This is based on the results of initial observations, namely students still have difficulty working on Venn diagrams. The difficulty of these students is possible because of the lack of description in the explanation of the Venn diagram. Therefore, students need learning media that are in accordance with the material that they feel is less mastered.

From these problems I conducted an interview with a mathematics teacher at SMP Muhammadiyah 2 Gamping. Through interviews about the teacher's role in carrying out mathematics learning in the COVID-19 pandemic situation and about the learning media used during the online learning process. The results of the interview can be concluded that in the Covid-19 pandemic situation learning activities experienced many obstacles, including students finding it difficult to understand the material

presented by the teacher. Not only that, the teacher also does not know whether the students are working according to their own abilities or not. In this situation he uses learning media in the form of WhatsApp Groups and Google Forms.

Based on the statement above, it can be said that learning mathematics requires learning media that can facilitate students in understanding the material presented. Therefore, the researcher wants to carry out research with the title "Development of Interactive Multimedia in Contextual Nuanced Association Materials in Online Learning".

2. Materials and Methods

The type of research used is Research and Development with the model used is the ADDIE development model (Sugiyono, 2016) and the research method used is to produce certain products, and test the effectiveness of these products. which consists of five stages

Analysis

Stages of analysis include four things, namely analysis of set learning, characteristics of students, situation and media analysis. This analysis was carried out by observing the teacher to find out what problems were encountered in online group learning. The learning problems of this set include the way the teacher conveys the material, media and methods used by the teacher during the learning process. From the analysis of the characteristics of students, it will be known that the psychological development of students and the stage of thinking that have been achieved by class VII students of SMP Muhammadiyah 2 Gamping, so that the development of learning media can be adjusted to the ability and level of thinking of students. Situation analysis is used to determine the situation of students such as whether students have smartphones and a stable internet network. As well as the analysis of the use of learning media aims to determine the extent to which the use of media in learning mathematics.

Design

At this design stage, the researcher determines the elements that will be included in the learning media that will be developed. In addition, other things that are done include: typing material and practice question texts, making animations, drawings, navigation buttons and giving music.

Development

At this stage, researchers continue to make media based on the designs that have been made. In the early stages of making this media, researchers consulted experts for revision and follow-up step by step. The media that has been compiled is then reviewed by several reviewers, namely media expert lecturers and material expert lecturers. The validator consists of two media experts and two material experts. The selection of this validator is

based on the background, namely: *Media expert validator*, the first validator is a lecturer and YouTube content creator who has shared various educational content the second validator is a lecturer at Klaten. He has expertise in the field of educational technology and mobile-learning besides that he is also an editor or editor in *Leksema: Journal of Language and Literature*, IAIN Surakarta | Sinta 3 since 2/10/2019 – now. *Material expert validator*, the two material experts are lecturers who teach in the field of mathematics education.

Implementation

This stage is intended to determine the effectiveness of the operation of interactive multimedia-based mathematics learning media, student responses to the media used, and whether the mathematics learning media is appropriate for dissemination. Student responses were carried out by filling out practicality questionnaires filled out by students via google form (<https://forms.gle/AY7Zxm8r6UhpMb8J6>) with a filling range of 10 minutes.

Evaluation

Evaluation is a process to see whether the media being built is successful, in accordance with initial expectations or not.

This research was conducted at SMP Muhammadiyah 2 Gamping with 15 students as research subjects. Subject selection was carried out by mathematics tutors based on the criteria of superior students compared to other classes.

3. Results and Discussion

This study uses the ADDIE development model which consists of several stages that must be carried out including analysis, design, development, implementation, evaluation.

Analysis

In the analysis, there are several things that need to be done including analysis of set learning, analysis of student characteristics, situation analysis, and media analysis. Analysis of set learning is done through observation to find out the problems that occur related to the learning process. Information obtained that the teacher's way of delivering the material is monotonous so that students feel bored. the media used only uses WhatsApp groups and the method that is often used in learning is the question-and-answer method, this is considered less effective because students are passive in responding to the teacher.

The analysis of the characteristics of students from observations explains that the academic abilities, maturity, motivation of subjects, experience, skills, psychomotor, cooperative abilities, and social skills of class VII B students are superior to other classes.

Furthermore, the situation analysis obtained information that most of the students already had smartphones to participate in teaching and learning activities, only a few students who did not have smartphones because they lived in Islamic boarding schools which did not allow these students to bring smartphones.

The last analysis is media analysis. In this media analysis, the researcher conducted a discussion with the mathematics teacher to find out the advantages and disadvantages of learning media. The advantage of this learning media is that it can be accessed easily so that all students can participate in learning activities without any difficulties. In addition, another advantage is that students can repeat which part of the material they feel cannot be understood. Not only the advantages contained in this learning media, but there are also shortcomings in the manufacture of this learning media, namely in the playback of multimedia learning media, images and sound will continue to run but this can be overcome by stopping the video. Another disadvantage of using multimedia learning media is that not all students are able to follow the information conveyed through multimedia learning media.

Design

At this stage, the researcher is designing interactive multimedia-based learning media that will be developed. In this stage, reference collection and content design are carried out which include learning objectives, illustrations, sample questions, conclusions for each student's learning activities, simulations, practice questions and evaluations.

Development

At this stage the researcher develops according to the design that has been made previously. In the initial media creation stage, the researcher made templates and collected pictures that matched the material in it. After the template has been created, then take a video using a smartphone and continue with the PPT screen record that has been made. After both are done the next step is to combine the explanation video and screen record and insert music.

After it is deemed sufficient in the development of the media, the next stage is to validate the learning media to the validator that has been determined. The validation results from each validator are as follows: for material experts, an average score of 3.3 is obtained with valid criteria. Furthermore, for media experts obtained an average score of 3.0 with valid criteria. After the media has been validated, several inputs and suggestions are obtained which will then be used as a benchmark in revising the media. Revisions were made by adding a conceptual approach and visual display, including: the duration of more than 10 minutes has been revised to ± 7 minutes, reduced text and increased visual content.

Implementation

After the learning media is declared valid by media experts and material experts, then this learning media can be implemented in student learning activities. This trial was conducted online using a WhatsApp group with 15 class VII students as research subjects. The trial was carried out by giving

evaluation questions and distributing student response questionnaires via google form to determine the level of practicality of the learning media.

Evaluation

At the evaluation stage, an analysis of the effectiveness of the media is carried out. Based on the evaluation test, the percentage of students' completeness was 77.66% with good criteria. This shows that the learning media is effective to use. The next stage in this evaluation is to revise the product of phase II, based on the results of interviews with teachers, as well as filling in students' practicality questionnaires during the trial run, there are no parts of the learning media that need to be improved.

Media feasibility is obtained from validation by media expert validators and material experts (Aditya, 2018). The validator of the feasibility of interactive multimedia is using an instrument that is filled out by two lecturers, material experts and media experts, respectively. Before using the instrument, it was researched by experts. Experts provide input and suggestions to make the instrument better. The instrument tests the feasibility of learning media using an assessment score of 1 to 4. The results of the assessment of each validator are then averaged so that they get a score of 3.0 for media experts and 3.3 for material experts. Based on the assessment guidelines in table 4, both obtained valid criteria. Therefore, the media is feasible to be used by students. The average score and total assessment of the media expert and material expert validation sheet can be seen in Tables 1 and 2.

Table 1. Data on the results of media assessments by media experts

No	Aspects Assessed	Average Score	Criteria
1	Software engineering	3,3	Valid
2	Visual communication	2,8	Sufficiently valid
Total average score		3,0	Valid

Table 2. Data on the results of media assessment by material experts

No	Aspects Assessed	Average Score	Criteria
1	Content Eligibility	3,2	Valid
2	Feasibility of presentation	3,4	Valid
3	Language eligibility	3,5	Very valid
4	Contextual feasibility	3,3	Valid
Total average score		3,3	Valid

The responses of students and teachers can be seen from the acquisition of practicality questionnaires filled out by students and interviews with teachers (Rasyid et al., 2016). Student responses seen from the practicality questionnaire instrument used an assessment score of 1 to 4. The results of the assessment were based on a total average score of 3.15 obtained practicality with practical criteria. While the results of the interview the teacher's response to the use of interactive multimedia

learning media is the media used to make students more interested in learning because the delivery method is appropriate for the age of the students. The presentation of the material is also considered to be in accordance with the existing lesson plans and some real examples in everyday life. The response of students in learning mathematics is also good and can follow the lesson carefully.

The effectiveness of this multimedia learning media can be obtained through student learning outcomes on learning media. Mastery of learning with media is showing that students reach the minimum completeness criteria (KKM) of 72 (maximum score is 100). From the results of the evaluation test as many as 13 students from 15 students have reached the KKM. Thus, the percentage of completeness of students is 77.66% so that effectiveness is obtained with good criteria.

This is reinforced by the results of research conducted by Maghfirah Rasyid, Andi Asmawati Aziz, and Andi Rahmat Saleh in 2016 entitled "Development of Multimedia-Based Learning Media in the Concept of Sensory Systems in Class XI High School Students" indicating that this multimedia-based learning media is valid and can be used in learning (Rasyid et al., 2016). Furthermore, research conducted by Prihayuda Tatang Aditya in 2018 entitled "Development of web-based mathematics learning media on circle material for class VIII students" shows that the use of learning media can attract students to take part in learning (Masykur et al., 2017).

While the difference between this study and previous research lies in the learning media used, namely in this study the researchers used interactive multimedia learning media. While the learning media used in previous studies are very diverse, this is evidenced by the results of a study conducted by Diah Wulandari, I Nyoman Arcana, and Krida Singgih Kuncoro in 2022 entitled "Development of Instagram Reels for Learning Main Line Equations for Junior High Schools" shows that social media such as Instagram Reels can be used as learning media and have been tested for feasibility (Wulandari et al., 2022). Furthermore, research conducted by Fitri Andayani, Sri Adi Widodo, and Denik Agustito in 2021 entitled "Designing Pop Up Book Learning Media for Achieving Mathematical Problem-Solving Skills in Social Arithmetic Materials" shows that learning media by using Pop Up Books on material social arithmetic is feasible to use to improve the achievement of systematic problem-solving abilities (Andayani et al., 2021). It can be concluded that the use of learning media that has been declared valid by the validator will make it easier for teachers to deliver material and have a positive impact on learning.

4. Conclusions

Based on the results of research and discussion of the developed learning media, an average score was obtained. The feasibility of the media obtained from validation by media expert validators and material experts obtained 3.0 for media experts and 3.3 for material experts. Based on the assessment guidelines in table 4, both obtained valid criteria. The responses of students and teachers can be seen from the acquisition of practicality questionnaires filled out by students and interviews with teachers. Student responses from the acquisition of a practicality

questionnaire based on a total average score of 3.15 obtained practicality with practical criteria. And the teacher's response to the learning media seen from the interviews obtained good results, there are only a few that need to be improved. Mastery learning with media shows that students reach the minimum completeness criteria (KKM) of 72 (maximum score is 100). From the results of the evaluation test as many as 13 students from 15 students have reached the KKM. Thus, the percentage of completeness of students is 77.66% so that effectiveness is obtained with good criteria. Based on the results of this study, to develop learning media, it is hoped that there will be follow-up from other researchers to develop computer-based interactive learning media with a contextual approach to set material that is better than before, both in terms of material content and media display quality.

Conflicts of Interest: The authors declare no conflict of interest.

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