DEVELOPMENT OF LEARNING MEDIA BASED ON ANIMATION VIDEO IN MOMENTUM AND IMPULSE TOPICS

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ABSTRACT

This study aims to develop momentum and impulse learning media using animated videos that are feasible to be applied as distance learning media and to find out that the development of video-based animated video learning media can support distance learning activities. This study uses a 4D (Define, Design, Develop, Disseminate) development research method with video media development using Animaker.com, Bandicam.com and Filmora. The technique of collecting data using a questionnaire / questionnaire. Define stage to determine objectives by conducting document studies. Design stage by designing until the stage of making the media. The Develop stage is to determine the feasibility assessment based on topic experts, media experts, and students. Disseminate stage by uploading videos to YouTube and in the form of CD / DVD for teachers. The feasibility of the video was based on the assessment of the topic expert with a percentage of 91% with a very feasible category, a media expert with a percentage of 79% with a very feasible category, and a student feasibility test with a percentage of 93% with a very feasible category.

Keywords: *Learning Media, Animated Videos*

INTRODUCTION

Nowadays science and technology develop rapidly. This development has an increasingly open impact and the spread of information and knowledge from and to all over the world through the boundaries of distance, place, space and time. Its influence extends to various lives, including the field of education. In the field of education, information and communication technology is utilized for distance learning. Remote learning implements a learning system that does not take place in a classroom, so there is no direct face-to-face interaction between the teacher and the learner.

With the development of information and communication technology, interaction between instructors and learners can be done, both in the form of real time or a real time. This interaction is very possible to be carried out by using various kinds of learning media so that it is easy for the learner to reach in learning material or other information, such as computer media and the internet. Interactions in the form of real time (synchronous) that can be done include direct interaction online meetings, real audio or real video, Facebook and chatrooms. Whereas real time (synchronous) interaction can be done with mailing lists, discussion groups, new groups, and bulletin boards. With

real time interaction makes the interaction between instructors and learners can look forward to direct interaction face to face, though not completely (Munir, 2009).

The learning media used by the teacher in the learning process carried out must be able to support the achievement of specified competencies. Factors that must be considered in media selection include the appropriateness of material, effectiveness, and suitability with the prevailing education system. The use of media in learning theory will certainly be different from the media used in practical learning. Therefore a teacher must be able to choose and make appropriate learning media for students. Learning media can be in the form of teaching aids, simulation tools, pictures, anniversaries, audio, and other media.

The use of instructional media is used to help facilitate students' understanding of an idea or theory. The media is an intermediary or introduction to the message source with the recipient of the message. So the learning process will be more interesting if using with video-based media, because students not only hear, experience but also see events that occur. By observing directly students will have the opportunity to compare theories with reality. Video-based media is a medium that presents audio and visuals that contain learning messages that contain concepts, principles, procedures, to help understanding the learning material (Daryanto, 2017).

The world is currently rife with coronavirus outbreaks. Coronavirus itself is a large family of viruses that cause diseases ranging from mild symptoms to severe sambai. There are at least two types of corona viruses that are known to cause diseases that can cause severe symptoms. Coronavirus Disease 2019 (COVID-19) is a new type of disease that has never been identified before in humans. Common signs and symptoms of COVID-19 infection include symptoms of acute respiratory distress such as fever, coughing, and shortness of breath.

Learning done during COVID-19 is online learning / distance learning through parental guidance. Online learning is the use of the internet network in the learning process.

With online learning students have free time to study, can learn whenever and wherever. Students can interact with the teacher using several applications such as classroom, video converence, telephone or live chat, zooming or through whatsapp groups. This learning is an educational innovation to answer the challenges of the availability of varied learning resources. The success of a model or learning media depends on the characteristics of the students.

Various obstacles also arise in the application of online learning. Learning via the internet is difficult in certain areas with inadequate networks. The use of internet quota also raises new expenses which can be a problem for some students who are experiencing financial difficulties. The success of implementing online learning also depends on the readiness of the organizing school and the teaching teacher. Not all teachers are able to convey all material optimally through online learning systems (Fonna, 2019).

The application of learning policies at home makes some students feel anxious and depressed. The large number of assignments given by the teacher makes many students feel stressed while undergoing online learning. Not only are many, assignments given by the teacher are also considered burdensome and have a very short processing time so that makes students confused in completing their assignments. With so many assignments given, students usually spend time from morning to night just to complete various online assignments. This condition did not occur when teaching and learning activities were still carried out at school (Octawirawan, 2020).

The video-based demonstration method is expected to make it easier for teachers to deliver material to online learning. Learning also becomes more fun because of the visualization compared to just reading books, taking notes, doing a lot of assignments and listening to lectures from the teacher. With video-based demonstration methods, students can directly observe the process of something happening, think critically, and be able to draw conclusions and hopefully students are motivated to be able to prove the truth directly both in practical activities at school and outside

school (Susilana and Riyana, 2007). Therefore a video-based demonstration method that is stimulus and is expected to support distance learning activities in the ongoing COVID-19 pandemic and can be used in distance learning going forward.

RESEARCH METHODS

The research activities were conducted from May to September 2020. The research site was SMA Negeri 1 Tanjung Tiram of A. Y 2019/2020. The population and sample in this study were 27 students of class XII-IPA 2 SMA N 1 Tanjung Tiram.

The type of research used in this research is Research and Development (R&D). Development research is a type of research that produces a product that is used in the world of education through a scientific process that ends with the stage of distributing the product that has been developed. The product to be developed is an animated video-based learning media. This development research refers to the 4D model (Define, Design, Develop, and Disseminate) (Thiagarajan, et al, 1974).

Define is done in physics. At this stage data will be obtained in the form of curriculum and syllabus which will be used as a guide for media development, in addition it will also be carried out an assessment of the topic of momentum and impulses, media making tools, and media usage.

At this stage, the material collected is then designed in a video animation based learning media. Media design is adapted to the conditions of distance learning that are being carried out, the design of instructional media here includes: making storyboards, structuring the material in the media includes the layout used, making learning scenarios, preparation of material that refers to the contextual model and visualized by the use of animated videos.

At this stage the design that has been done is then developed according to the instructional media based on animated video which is expected to go through the product validation process. The validation process is carried out by material expert lecturers and media expert lecturers and physics subject

teachers. This validation uses a questionnaire assessment sheet. After being validated the learning media developed were tested on several students. The results of several students' trials were then revised by experts.

This stage is the stage of using devices that have been developed on a broader scale. In this final stage, the final product of the learning video will be disseminated in various ways. First, by distributing learning video products to teachers in the form of soft files on CD / DVD. Second, by distributing learning video products to high school students in the form of soft copies. Third, disseminating videos to the internet, like YouTube and other social media.

Research instrument in the development of animation video-based learning media in the form of a checklist. The lowest score on the instrument is 1 and the highest score on the instrument is 4. The instrument used is a questionnaire / questionnaire given to media experts, material experts, physics subject teachers, and some students as respondents.

In research the development of animation video learning media using descriptive and quantitative data analysis techniques. Learning media testing will obtain data obtained from filling out a questionnaire conducted by material experts, media experts, teachers, and some students. Arikunto (2006) explained that in order to find out the final rating for the item concerned, the total value must be divided by the number of respondents who answered the questionnaire.

$$Persentage = \frac{Total\ Score}{Score\ Maximum} x 100\%$$

The data obtained is processed by rating-scale raw data obtained in the form of numbers and then interpreted in a qualitative sense (Sugiyono, 2017). Table 1 is the eligibility category based on the rating scale.

Table 1. Determination of media eligibility categories

Scale	Score in Percent	Eligibility Category
1	0-25	Not Feasible
2	>25-50	Less Feasible
3	>50-75	Feasible

4	>75-100	Very Feasible

RESULT AND DISCUSSION

a. Research Results

1. Define

Activities carried out at the define stage aim to establish and define development requirements. In the define stage, the researcher analyzes the curriculum. Curriculum analysis was carried out by reviewing the 2013 curriculum. This was done so that the products produced in the animation video media development research did not deviate from the learning research. The process of analyzing the syllabus is used as a guide in determining the basic competencies that will be used in instructional media products in the form of animated videos to be developed. Determination of basic competencies was then consulted with the physics subject teacher to synchronize it with student needs. After going through the analysis process, the basic competencies were chosen, namely the concepts of momentum and impulse.

2. Design

The production process for developing this animated video uses several applications, namely, Animaker.com, Bandicam, and Filmora Wondershare. All components have their respective functions that are useful for supporting video creation.

Animaker.com is used for making animated videos and for inserting posts containing momentum and impulse material. Making video animation using Animaker. com can be seen in Figure 1. Bandicam functions to record laptop screens used to make animated videos, because Animaker.com cannot save videos. The process of recording a laptop screen using Bandicam.com can be seen in Figure 2. While Wondershare Filmora is used for the animation video editing process so that it can be used in MP4 format. The editing process using Wondershare Filmora can be seen in Figure 3. The three components used in this editing process are integrated with each other. So it is very helpful and simplifies the video development process.

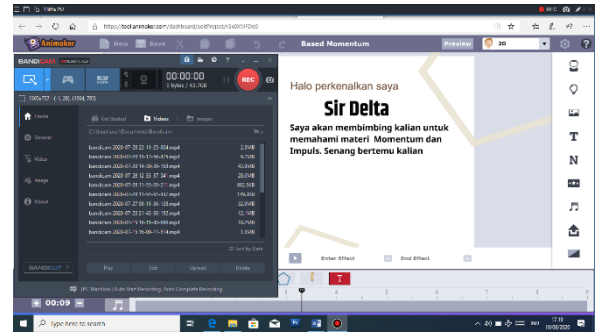**Figure 1.** Animaker.com for making animated videos
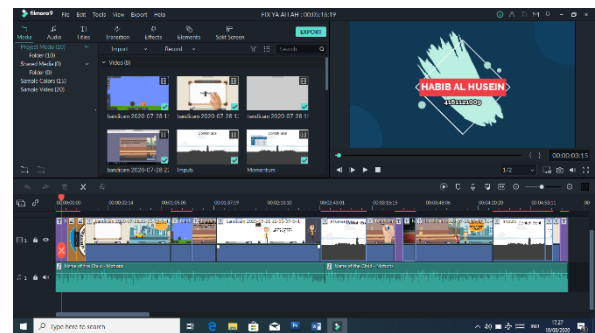

Figure 2. Bandicam for recording Laptop screen

Figure 3. Wondershare Filmora for the animation video editing process

3. Develop

At the develop stage, the learning videos that have been developed will be validated by experts in order to find out the deficiencies and mistakes in the video. Experts will rate and provide comments or useful suggestions to make the video even better.

Validation / assessment of media experts aims to determine the feasibility of media which includes aspects of purpose, visual, audio, use, and benefits. Expert assessment is carried out by 1 expert in his / her field, including the lecturer of the Physics Education Study Program, namely Dr. Ridwan Abdullah Sani, M.Si. Assessment of media development using a questionnaire with a scale of 1-4.

In the assessment questionnaire for media experts, there are 4 aspects, namely the objective aspect, the visual aspect, the usage aspect, and the benefit aspect. In the objective aspect, there are five statements made to find out whether the media made can simplify and clarify the material, and overcome the limitations of space and time, and ease of operation. In the visual aspect, there are eight statements made to find out whether the animated video media that has been made has good visualization. In the use aspect, there are four statement items made to find out whether the media created can be used anytime and anywhere for both independent and classical learning. In the aspect of benefits, there are 8 statement items made to find out whether animated video-based learning media can increase student motivation and concentration, provide new learning experiences, make it easier for students to understand the material and support distance or online learning activities. The following in table 2 is the result of recapitual validation from media experts.

Table 2. Results of media expert validation recapitulation

Aspects	∑ score results	∑skor max	Percentage (%)	Eligibility Level
Purpose	16	20	80	Very Feasible
Visual	25	32	78	Very Feasible
Use	13	16	81	Very Feasible
Benefits	24	32	75	Very Feasible
Total			314	**Very Feasible**
Average			79	

Validation / assessment of material experts aims to determine the appropriateness of the material contained in the video media from material aspects, benefits aspects, usage aspects and media suitability aspects. Expert evaluation of the material is carried out by experts in their fields, including Lecturers of the Physics Education Study Program, Mr. Sabani, S.Pd., M.Pd.

In the material expert assessment questionnaire, there are 4 aspects, namely material aspects, benefits aspects, usage aspects, and media suitability aspects. In the material aspect, there are five statement items made to determine whether the clarity of the material is good and the explanation of the material is coherent. On the benefit aspect, there are five statement items made to find out whether the animated video being developed can increase student motivation and concentration, provide new learning experiences and make it easier for students to understand the material. In the aspect of use, there are seven statement items that are needed to find out whether the use of learning videos can be used anywhere and anytime both independent and classical learning and distance learning. In the aspect of media suitability, there are three points of statement made to determine whether the video developed is in accordance with the material, student learning styles and suitability with distance learning. Data from topic expert validation can be seen in table 3.

Table 3. Results of topic expert validation recapitulation

Aspects	∑ score results	∑skor max	Percentage (%)	Eligibility Level
Topics	18	20	90	Very Feasible
Benefits	19	20	95	Very Feasible
Use	25	28	89,29	Very Feasible
Media Suitability	11	12	91,67	Very Feasible
Total			365,95	**Very Feasible**
Average			91,49	

The feasibility test is a stage of assessment carried out to students. In this case, the selected subject is a class XII student of SMA Negeri 1 Tanjung Tiram. The due diligence stage is the final assessment stage before the product is distributed to a wider audience (general public). In the feasibility test stage, students are given an explanation of the instructional video media that is being developed before they use the media. Assessment is carried out by sending

videos to students via the class group Whatsapp, then they fill out an online questionnaire that has been given using the link with a scale of 1-4.

In the assessment questionnaire for students, there are 5 aspects, namely material aspects, benefits aspects, usage aspects, media suitability aspects, and visual aspects. In the material aspect, there are five statement items made to find out whether the content of the material presented is good and the explanation of the material is coherent. On the benefit aspect, there are five statements made to find out whether the animated video being developed can increase student motivation and concentration, provide new learning experiences and make it easier for students to understand the material. In the use aspect, there are seven statement items made to find out whether the use of instructional videos can be used anytime and anywhere, whether for independent learning, classical learning or distance learning. In the aspect of media suitability, there are two statements made to determine whether the animated video developed is in accordance with the material and learning style. In the visual aspect, there are five statements made to determine whether the visualization in the animated video is correct. In table 4 the following is the result of the recapitulation of the due diligence assessment.

Table 4. Results of Feasibility Test Recapitulation

Aspects	∑ score results	∑skor max	Percentage (%)	Eligibility Level
Topics	434	480	90,416	Very Feasible
Benefits	451	480	93,958	Very Feasible
Use	616	672	91,666	Very Feasible
Media Suitability	179	192	93,229	Very Feasible
Visual	521	576	90,451	Very Feasible
Total			459,72	Very Feasible
Average			91,944	

4. Disseminate

The disseminate stage is the stage where learning videos that have been validated by experts and users will be distributed to a wider subject. Dissemination is carried out by uploading instructional videos into the YouTube channel owned by the researcher and on CD / DVD pieces given to physics subject teachers.

b. **Final Product Discussion**

The final product developed is an animated video based learning video on the topic of moments and impulses. After going through the revision process, then proceed to the video making process and the editing process. The process of making animated videos is done through the website www.animaker.com. The editing process is carried out with 2 applications, namely Bandicam and Wondershare Filmora.

The next stage after obtaining the final results, namely the momentum and impulse animation video, is validation for experts and users to get suggestions, input and assessment to determine the feasibility level of the animated video-based learning media developed.

The feasibility of animated video-based learning media was assessed by media experts using a Likert scale with a scale of 1-4. There are 4 aspects that become indicators in the feasibility assessment, namely the objective aspect, the visual aspect, the use aspect and the benefit aspect. In the objective aspect, the score percentage is 80% which is very feasible. The objective aspect is said to be very feasible if the developed video can simplify and clarify the material, and overcome the limitations of space and time. Learning media is the delivery of information, stimulates the mind, and encourages an interesting learning process and learning process and learning objective are achieved easily (Rahmat and Arnawa, 2019). In the visual aspect, it was obtained a score percentage of 78.1% with the very feasible category. The visual aspect can be declared very feasible if the visualization in the animated video is correct. In the use aspect, the percentage score was 81.2% with the very feasible category. The aspect of use can be declared very feasible if the use of instructional videos can be used anytime and anywhere for both independent and classical learning. This is also the same as research from Kuntarto (2017)

which states that the use of media that supports distance learning provides new experiences that are more challenging than conventional learning. In the benefits aspect, a percentage of 75% is obtained with the very feasible category. The benefit aspect can be declared very feasible if the animated video-based learning media can increase student motivation and concentration, provide new learning experiences, make it easier for students to understand the material and support distance or online learning activities. According to Riyono and Retnoningsih (2015) students try to find information about the images presented. Presentation of material in the form of images is a way that ensures student interest in the material and can stimulate student motivation. From the four existing aspects, the average final result is 79% with the very feasible category. Thus, animated video-based learning media can be used as a medium for learning physics.

The feasibility of animated video-based learning media was assessed by material experts using a Likert scale with a scale of 1-4. Aspects that become indicators in the assessment of material feasibility include 4 aspects, namely material aspects, benefits aspects, usage aspects and media suitability aspects. In the material aspect, the percentage score is 90% with the very feasible category. This aspect is declared very feasible if the clarity of the material is good and the explanation of the material is coherent. In the aspect of benefits, the percentage score is 95% with the very feasible category. This aspect is declared very feasible if the animated video can increase student motivation and concentration, provide new learning experiences and make it easy for students to understand the material. In the aspect of use, it was obtained a score of 89% with a very decent category. In the aspect of use, it is stated that it is very feasible if the use of learning videos can be used anywhere and anytime, both independent and classical learning and distance learning. In the media suitability aspect, a score of 91.7% was obtained with the very feasible category. The media suitability aspect is declared very feasible if the video developed is in accordance with the material, student

learning styles and suitability with distance learning. In line with this, DePotter in Rijal and Bachtiar (2015) states that a person's learning style is a combination of absorbing information easily and then organizing and processing that information. From the four existing aspects, the final result is 91% with the very feasible category. Thus, animated video-based learning videos can be used as a medium for learning physics.

The feasibility of animated video-based learning media in terms of 23 students of class XII SMA Negeri 1 Tanjung Tiram using a Likert scale with a scale of 1-4. There are 6 aspects that become indicators in the feasibility assessment, namely material aspects, benefits aspects, usage aspects, media suitability aspects, and visual aspects. In the material aspect, the percentage was 94% with the very feasible category. The material aspect can be declared feasible if the content of the material presented is good and the explanation of the material is coherent. The benefit aspect is obtained a percentage of 94% with the very feasible category. The benefit aspect can be stated very feasible if the animated video can increase student motivation and concentration, create new learning experiences and make it easier for students to understand the material. The usage aspect obtained a percentage of 91% with the very feasible category. The aspect of use can be declared very feasible if the use of instructional videos can be used anytime and anywhere both for independent study, classical learning and distance learning. The media suitability aspect obtained a percentage of 92% with the very feasible category. The media suitability aspect can be declared very feasible if the animated video is in accordance with the material and learning style. In the visual aspect, it was obtained a score percentage of 90% with a very decent category. The visual aspect can be declared very feasible if the visualization in the anumation video is correct. Based on the results of the assessment of the video based learning videos, the final result is 93% with a very feasible category. So it can be concluded that the animation video based learning video can

be used as a distance learning media for physics subjects.

In video-based learning media animation is divided into 3 parts, namely the opening part, the core part and the closing part. The opening part of the video is a welcome greeting accompanied by an introduction by the video guide named "Sir Delta". Furthermore, after trifling by the video guide is to give opening questions to motivate students to start learning. At the core of the momentum and impulse animation video consists of an explanation of the concept of momentum, illustrations of momentum in everyday life, the concept of impulses, illustrations of impulses in everyday life, and the relationship between momentum and impulse. In the closing section of the video consists of examples of questions and questions and thanks. Questions can be used to determine the level of student understanding of the discussions that have been delivered at the beginning of the video. The duration of this animated video-based learning media is 5 minutes 30 seconds.

CONCLUSIONS AND SUGGESTIONS

Feasibility of animated video-based learning media is obtained from the validation process of material experts and media experts then a feasibility test is carried out on students. The validation assessment carried out by media experts obtained a percentage of 79%. The validation assessment conducted on material experts obtained a percentage of 91%. In the feasibility test conducted on 23 students of class XII IPA at SMA N 1 Tanjung Tiram obtained a percentage of 93%. Obtaining these data shows that the making of animated video-based learning media is very suitable for use for distance learning in physics subjects.

Based on the research and the limitations of the research that have been described, the making of this animated video learning media still has many shortcomings and weaknesses. Therefore, some suggestions for the use and manufacture of the required products, namely: (1) For researchers in further research, it is hoped that they can test the effectiveness of instructional media based on video animation to determine the effect of using the media being developed on physics lessons, (2) making animated video media is expected not only on the topic of moments and impulses, but can be developed on other topics, (3) Research on making animated video instructional media can continue to be improved because the results of this study indicate that animated video is suitable for use as an interesting learning video.

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