

Development of Animation Video on the Blood Circulatory System Materials as Self Study Media

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Abstract: This study aims to develop animated video products, determine the quality of animated video products, and determine student responses to animated video products developed as a form of self-study media on the material of the blood circulatory system. This research is a research and development research and development (R&D) with a development model developed by Sugiyono by following six steps, namely: potential and problem analysis, data and information collection, product design, design validation, design revision and product testing. The assessment instrument used is a questionnaire sheet to determine product quality and student responses to animated videos on the material of the blood circulatory system. Products were assessed by 1 material expert, 1 media expert, 5 reviewers, and 1 biology teacher. The product trial was limited to 15 high school students in class XI to determine student responses. Based on product quality assessments from material experts, the ideal percentage results are 91.1% with very good category, media expert assessments get 80% ideal percentage results in good categories, assessments from peer reviewers get ideal percentage results of 89.7% in very good categories, Biology teacher's assessment got the ideal percentage result of 92.3% with very good category. The assessment of all reviewers of the animated video learning media on the blood circulatory system material shows an average ideal percentage of 88.9% which is included in the very good category, while product trials on student responses get an assessment percentage of 99.6% with the category strongly agree. Thus, the results of this study indicate that the animated video on the circulatory system material that has been developed is feasible to be used as a self-study media.

Keywords: Animated video, self-study media, the blood circulatory system.

Introduction

The development of information technology is increasingly rapid in the current era of globalization, its influence on the world of education is unavoidable. Global demands require the world of education to always and constantly adapt technological developments to efforts to improve the quality of education, especially in the learning process. Technology-based learning activities are currently being implemented throughout Indonesia due to the impact of the Covid-19 pandemic. The current covid-19 pandemic requires students and teachers to adapt, so that learning activities are carried out from home or online (Jundu et al., 2020).

The results of the analysis of student needs carried out by researchers through interviews with

several biology teachers and several students at schools in Yogyakarta, it is known that the problems faced by students in the biology learning process are that students have difficulty in learning and understanding the material of the circulatory system, because the concept of learning complex and the material is abstract, as well as the absence of practicum activities during the pandemic carried out in school laboratories causing limited knowledge gained by students, plus the use of learning resources that are less varied and still conservative. cannot be used fully in explaining the complex processes that occur in the circulatory system, so with these students need learning tools/media that can help to clarify the material of the circulatory system. But currently there are still many schools, especially teachers who have not

been able to take advantage of technology. The number of learning aids at this time (especially modern media) even the mental burden of teachers is getting heavier because they have not been able to use them, on the other hand teachers are not looking for solutions, such as the teacher's lack of creativity in making teaching aids or making learning media. self-developed. The challenge of the globalization era for teachers is how teachers can design and utilize technological developments in learning activities (Fuad et al., 2020).

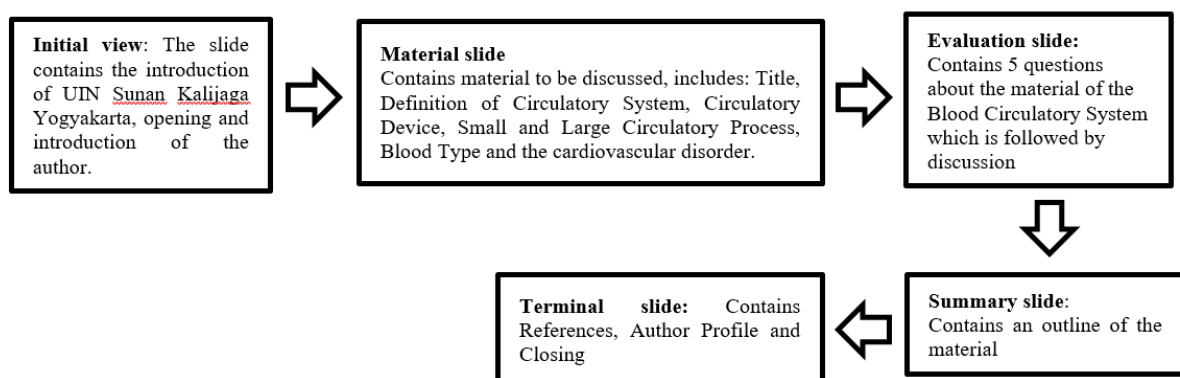
Not all types of media can be applied to the implementation of learning activities, so with this problems, as educators, teachers must be able to analyze various types of appropriate and appropriate media uses to be applied in learning activities based on the characteristics of the learning materials (Wulandari et al., 2020). One type of effective media used in this online learning state is animated video-based learning media (Chan, 2013; Arini et al., 2017; Yusuf et al., 2017; Ritonga et al., 2019). Animated video media is a learning media in which there is a combination of images, text, audio, and video components containing learning materials information (Furoidah, 2019). Video provides more flexible medium for support student learning activities, be able to explain concepts related to the mechanism or process, can be repeated and stopped according to the students need (Rudi & Riyana, 2009; Hwang, et al., 2012). Video can also engage students' attention in class, clarify idea and illustrate

concepts so that students can get long term memory of the material (Moreno & Ortecano-Layne, 2008; Cardoso et al al., 2009). Economically, video is relatively cheaper than printing materials both in price and in operation (Putri, 2012). Along with technological development, animated video is able to provide a stronger visual appearance of various phenomena and abstract information to improve the quality of learning process and learning outcomes (Hegarty, 2004).

Research Methodology

Procedures

This research is a type of development research or known as Research and Development (R&D). Research and Development to produce learning material and to evaluate the effectiveness of that product, Sugiyono (2016). According to sugiyono, the research and development procedures which are used: 1) Potential and Problems, 2) Data Collection, 3) Product Design, 4) Design Validation, 5) Design Revision, 6) Product Trial, 7) Product Revision, 8) Potential and Problems, 9) Product Revision, 10) Mass Production. Design animation videos, This animated video-Based Learning Media was created using three applications, namely SuperMii, PixelLab and KineMaster. With the following concept description:



Product trial of the animated video development on the material of the circulatory system is media expert and material expert, five peer reviewers, biology teacher and fifteen

students. The data was collected by questionnaire and analyzed by a Likert scale. Assessment scores criteria are Very Good (VG)= 5, Good (G)= 4, Adequate (A)= 3, Deficient (D)=2, Very Less (VL)= 1

and student responses Strongly Agree (SA)= 5, Agree (A)= 4, Adequate Agree (AA)= 3, Disagree (D)= 2, Strongly Disagree (SD)= 1

Data analysis

Data from the validation results of all reviewers were analyzed descriptively with the following steps:

1. Qualitative data from the reviewer's assessment, is converted into quantitative data with a Likert scale as follows (Sugiyono, 2013)

Description	Score
Very Less (VL)	1
Deficient (D)	2
Adequate (A)	3
Good (G)	4
Very Good (VG)	5

2. Calculate the average score with the following formula

$$\bar{x} = \frac{\sum x}{N}$$

Description:

$\bar{x}$ = average score of each aspect

$\sum x$ = total score

N = total reviewer

3. Changing the value of the criteria aspect for each media component into a qualitative value (interval data) with a scale of five. The reference for changing the score to a scale of five according to Sukardjo (2010) is as follows:

No	Score range (i) quantitative	Value	qualitative category
1	$X > \bar{x} + 1,80 S_{bi}$	A	Very Good
2	$\bar{x} + 0,60 S_{bi} < X \leq \bar{x} + 1,80 S_{bi}$	B	Good
3	$\bar{x} - 0,60 S_{bi} < X \leq \bar{x} + 0,60 S_{bi}$	C	Adequate
4	$\bar{x} + 1,80 S_{bi} < X \leq \bar{x} - 0,60 S_{bi}$	D	Deficient
5	$X \leq \bar{x} - 1,80 S_{bi}$	E	Very Less

Description:

X = actual score (achieved score)

$\bar{x}$ = ideal score average

S_{bi} = $(1/2)$ (ideal highest score + ideal lowest score)

= standard deviation of ideal score

= $(1/2)(1/3)$ (ideal highest score - ideal lowest score)

The highest ideal score = $\sum$ criteria item x highest score

The lowest ideal score = $\sum$ criteria items x lowest score

For the ideal percentage used the calculation formula:

$$\text{assessment percentage} = \frac{\text{study result score}}{\text{ideal maximum score}} \times 100\%$$

To determine the quality of the product developed, then use the product rating scale as follows:

Average Score Range (%)	Category
81-100	Very Good
61-80	Good
41-60	Adequate
21-40	Deficient
0-21	Very Less

Results and Discussion

Product Development Results

The result of this development research is the formation of Animated Videos on Circulatory System Materials as Independent Learning Media which was developed using three applications, namely SuperMii, PixelLab and KineMaster.

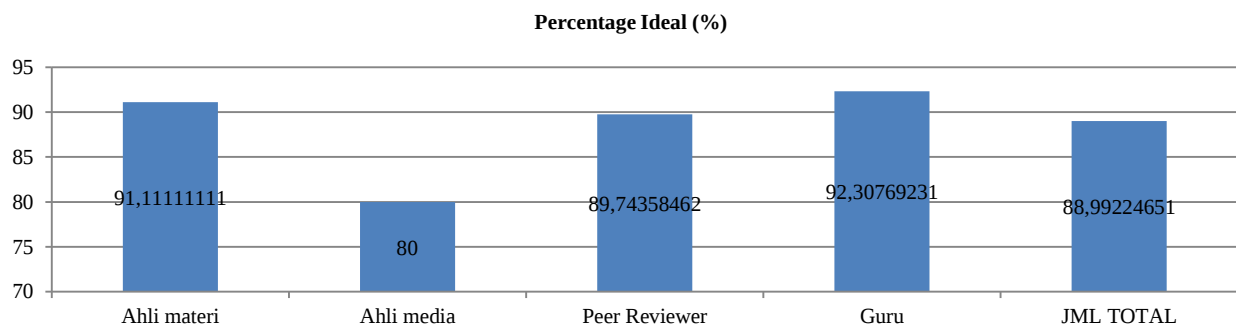


Product Assessment Results Data

1. Ratings from all Reviewers

Total number of assessments from all reviewers namely material experts, media experts, peer reviewers and biology teachers is presented in the following table:

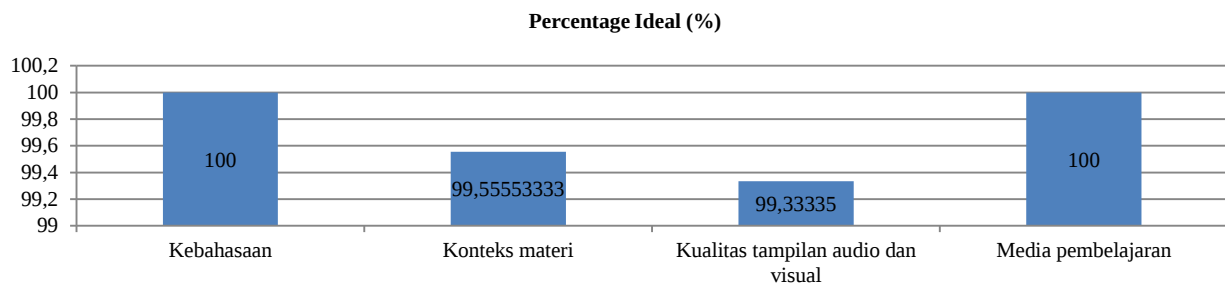
No.	Reviewers	Score		Average	Percentage Ideal (%)	Qualitative Category
		Highest	Lowest			
1	Material expert	45	9	41	91.1	VG
2	Media expert	40	8	32	80	G
3	Five peer reviewers Biology	65	13	58.3	89.7	VG
4	teacher	65	13	60	92.3	VG
Total		215	43	191.3	88.9	VG



The table above shows that the assessment of material experts obtained an ideal percentage of 91.1%, media experts 80%, peer reviewers 89.7% and biology teachers 92.3%. Overall, the assessment results from all reviewers obtained a percentage of 88.9% which was included in the Very Good (VG) category.

2. Assessment Results from Students

No.	Aspect	Score		Average	Percentage Ideal (%)	Qualitative Category
		Highest	Lowest			
1	Language	10	2	10	100	SA
2	Material context	15	3	14.9	99.5	SA
3	Display quality	20	4	19.8	99.3	SA
4	Learning media	5	1	5	100	SA
Total		50	10	49.8	99.6	SA



The table above shows that the language aspect has an ideal percentage of 100%, the context of the material is 99.5%, the audio and visual display quality is 99.3%, and the learning media is 100%. Overall the results of the assessment from the experts obtained a percentage of 99.6% which was included in the Strongly Agree (SA) category.

Animated video learning media on Circulatory System Material as an Independent Learning Media developed by researchers, following the steps of research and product development according to Sugiyono (2012). This research and development has reached the sixth stage of the ten stages in R & D research, namely the limited trial stage. The method used is in the form of a product quality assessment questionnaire sheet for reviewers and student response questionnaires.

The purpose of developing this product is as an interesting form of independent learning media so that it is easier for students to learn and use. Complementing the student experience, eliciting stimuli in the form of motion and pictures, influencing attitudes, being fun, emotional and enthusiastic about learning, fostering a sense of creativity and student skills, and can be used anytime and anywhere. This is in line with Ronald Anderson (1987) that the purpose of using video in learning is to be able to develop students' cognitive abilities by providing stimulation in the form of motion and sensation, affective abilities affect students' attitudes and emotions and psychomotor abilities get visual feedback so that students are able to try the skills they use. It's in the learning video. By using animated videos as learning media, students will be motivated and enthusiastic to learn because they are supported by pictures, sounds, videos, background music and animations,

so that the learning process will feel fun and the learning materials will be easier to understand.

The video animation development that has been completed is then validated by experts, namely material experts and media experts. Validation is done by filling out a lift sheet that contains several aspects. In this validation process there are suggestions and input from experts. After being declared suitable for use as a learning medium, the next stage is product quality testing and limited trials.

Product quality trials were carried out by 5 peer reviewers who were biology education students and 1 biology teacher. Meanwhile, a limited trial was conducted by 15 students of class XI MIPA at SMAN 1 Pekalongan, to determine student responses. The quality of the animated video product on the material of the circulatory system as an independent learning medium can be seen from the results of the assessment by material experts, media experts, peer reviewers, biology teachers and student responses. Assessments, suggestions and input from all reviewers are used to improve and determine the feasibility of the animated video product being developed.

Based on the assessment of material experts, the Animated Video developed has a Very Good (VG) category in all aspects with an average ideal percentage of 91.1%. The highest ideal percentage is in the aspect of the material context with an ideal percentage of 93.3%. In the assessment questionnaire for material experts, in the aspect of the context of the material there are three assessment indicators, namely the depth of the material, the truth or accuracy and suitability of the material presented with biological concepts and indicators of the feasibility of the content of the material. While the lowest ideal percentage is in

the linguistic aspect, material presentation and implementation aspects, as well as learning media aspects with the same ideal percentage of 90%, although these three aspects are included in the lowest percentage in the assessment of material experts but are still in the Very Good category (VG). In the assessment of linguistic aspects, there are assessment indicators, namely the language used is communicative which includes clear, easy to understand, interconnected and simple and does not cause multiple interpretations or double meanings. In the aspect of material presentation and implementation there are also indicators that are systematic, easy to understand and in accordance with student development. This is in accordance with BSNP (2013) Good language in a learning media can be seen from several indicators, including according to the level of student development, communicative, straightforward and in accordance with the correct language rules. And according to Padmo (2004) the presentation of learning media must be attractive and use appropriate language and must pay attention to the maturity level of students.

The assessment from media experts for the Animated Video developed has a Good category (G) in all aspects with an average ideal percentage of 80%. The percentage of ideality in all aspects, namely the readability aspect (includes text quality indicators and the use of language/writing does not cause double meaning), the audio and visual display quality aspects (includes screen display indicators, use of illustrations, voice control and sound effects) and the learning media aspects are the same is 80%. The indicators of the aspects above in the assessment of media experts are in accordance with Urbanger & Kometz (2014) namely that a good audio-visual display quality is media that is able to display a simulation of a process with communicative language.

The peer reviewer assessment for the Animated Video developed has an average ideal percentage value of 89.7% in the Very Good (VG) category. The highest ideal percentage is in the linguistic aspect, which is 100%. This shows that according to peer reviewers the language used in this learning video product is in accordance with the level of student development, communicative,

straightforward and in accordance with the correct language rules. While the lowest ideal percentage is in the aspect of the material context, which is 84.4%. In his assessment, peer reviewers also provide input and suggestions, namely on the background and on the material for abnormalities in the circulatory system, which have subsequently been corrected by the author.

The assessment from the biology teacher for the Animation Video that was developed has an average ideal percentage value of 92.3% in the Very Good (VG) category. The highest ideal percentage is in the aspect of learning media, which is 100%. This shows that according to the biology teacher, the animated video product on the circulatory system material is very suitable to be used as an independent learning medium because it can be used as a learning medium by students and the general public either alone or in groups, anytime and anywhere. While the lowest ideal percentage is in the linguistic aspect, the material presentation and implementation aspects, and the audio and visual display quality with the same ideal percentage, which is 90%.

Limited trials were conducted to determine student responses or responses to the developed animated video. This limited trial was conducted by 15 students of class XI MIPA at SMA N 1 Pekalongan using a questionnaire with a Likert scale. The student assessment questionnaire contains 10 statements which are grouped into 4 aspects, namely, the linguistic aspect which includes 2 statements getting a 100% percentage result in the Strongly Agree (SA) category, the material context aspect which includes 3 statements getting a 99.5% percentage result in the Strongly Agree category (SA), the aspect of display quality includes 4 statements getting a percentage result of 99.3% in the Strongly Agree (SA) category, and the learning media aspect only 1 statement getting a 100% percentage result in the Strongly Agree (SA) category.

Overall, students gave a very good response and Strongly Agree (SA) with an average ideal percentage of 99.6%. The highest ideal percentage is in the linguistic aspect and the learning media aspect, which is 100%, this happens because according to students the language used in the

media is clear and does not cause double meaning, so that the material presented can be understood easily and the learning media developed can be used as independent learning media anytime and anywhere, especially in a pandemic situation like now. This is in accordance with the opinion of Jundu et al., (2020) that the current covid-19 pandemic requires students and teachers to adapt, which requires the learning process to be carried out from home. While the lowest ideal percentage is in the aspect of audio and visual display quality, which is 99.3%, based on the input and suggestions submitted by students, the above happened because according to students, the background should be replaced with a plain one so that it is more clearly seen and the backsound/sound effect should be better. which is used more slowly so that the material presented is more clearly heard and easy to understand, the input and suggestions that have been conveyed by these students have subsequently been improved by the author.

Based on the results of filling out the questionnaire according to students' opinions, overall the learning media developed was very good, not boring, animated pictures support and clarify the content of the material so that students more easily understand the material presented, especially during the current pandemic, which requires students to learn from home. This learning media is very helpful because it can be studied independently, anytime and anywhere.

The results of product validation or assessment show that the Animation Video on the Circulatory System Material as an Independent Learning Media that was developed has a very Good quality (VG) with an average ideal of all reviewers is 88.9% and student responses are 99.3% with category Strongly Agree (SA). The assessment of each validator shows the ideal percentage of Very Good (VG) and Good (G). The highest average ideal percentage was given by students, which was 99.6% and the lowest percentage was given by media experts, namely 80%. The ideal percentage given by material experts is 91.1%, peer reviewers are 89.7%, and biology teachers are 92.3%. The results of the assessment were obtained from the results of filling out a questionnaire sheet with indicators of certain components and aspects. The

type of data taken is in the form of qualitative data which is then converted into quantitative data using a Likert scale. All inputs and suggestions from all reviewers make material for product improvement that has been developed.

Conclusion

1. Animated videos on the material of the circulatory system as an independent learning medium were made using the R&D research method. The final product is an animated video on the circulatory system material as an independent learning medium which was developed using three applications, namely SuperMii, PixelLab and KineMaster.
2. All reviewers including material experts, media experts, biology teachers and peer reviewers gave a great evaluation, 88.9% which was very good (VG) category.
3. Students gave a positive response to animated video products of the blood circulatory system as an independent learning medium. It has 99.6% which was strongly agree (SA) category.

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