

Development of Microbiology Learning Animation Videos for Biology Students at Padang State University

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Abstract – Along with the development of era , science knowledge and technology are also experiencing growth. There for a media learning is a means or a tool that is used by educators to convey a message of learning to students. This study aims to produce a learning media product in the form of an animated video on a microbiology course on the basic concepts of microbiology. Subject Test try on research this is a student of biology S1 Faculty of Mathematics and Science Knowledge Natural (Natural Sciences), University of Negeri Padang (UNP) half of July to December 2020 . The results showed that the learning media products in the form of animated videos were validated and in the very valid category. Classically the results of validation by experts (material, media and language experts) on the didactic aspect were 95.83% , on the construct aspect, the value was 93.75% , on the technical aspect, the validation value was 91.66% and the validation value on the graphic aspect gets a value of 100% . The practicality test that was tested on lecturers who taught basic microbiology courses and tested on students got very practical results. In the practicality test, the subject lecturer got a score of 92.50%, the practicality test for small group students got a score of 90.53% and the practicality test for large group students got a value of 91.06%.

Keywords – Animation Video, Microbiology, Development.

I. INTRODUCTION

Biology, according to the education curriculum in Indonesia, must be given to students to accommodate learning activities with a systematic step through scientific approach. Those approach should be supported by interactive learning process, as stated in Minister of Education and Culture Decree No. 24 of 2016 on Process Standards that the learning process should be interactive, inspiring, fun, challenging, motivating learners to participate actively, and providing sufficient space for initiative, creativity and independence in accordance with talent, interest, and learner physical and psychological development.

According to Maryani (2009) Learning material, as subject matter that is systematically arranged to be used by teachers in learning, is one of the learning tools that can support the process standard of curriculum. Due to the current technological developments, learning materials used must be able to accommodate printed materials and digital materials. Suartama (2010) effectiveness of digital material is better than the textbook in learning. Digital material combine the computer program consisted of texts, graphic, sound and images and animations (Hamidi, et al., 2011; Islam, et al.,2014).

Along with the times, science and technology are also experiencing developments. The development of science and technology which from day to day is becoming increasingly sophisticated, directly or indirectly giving a considerable influence on several aspects of human life. One aspect of human life that has been influenced by the development of science and technology is the aspect of education.

According Hwang, et al (2012) video provides more flexible media to support students learning activities, able to explain concept related to mechanism or process, can be repeated and stopped according to the students need.

According Cardoso, et al (2009) video can also engage the students' attention in class, clarify the idea and illustrate the concept so that students can get long term memory of the material. Putri, (2012) Economically, video relatively cheaper than printed materials both in price and in operation). One kind of good video in learning is animation. Ainsworth (2008) also added, animation videos can enrich students' experience and competence on a variety of learning materials. According to Hegarty (2004) 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.

According Dahar (2011) basic microbiology courses are a requirement for taking advanced courses such as biotechnology, and other applied microbiology courses, such as soil microbiology, medical microbiology, food microbiology, and industrial microbiology. Meaningful learning in science, especially microbiology, requires students to understand and relate a concept, and apply these concepts to support other scientific concepts. This process aims to direct students to associate experiences, phenomena, and new facts into their knowledge structure. So it is necessary to have learning media to support student knowledge in the learning process.

Education and learning media have a very close relationship, the learning process will not run smoothly without the right learning media. Media is an intermediary or messenger from the giver to the recipient of the message. According to AECT (1977), media are all forms and channels that people use to transmit messages or information. The use of appropriate media is able to convey information and the message conveyed by the messenger can be received clearly by the recipient of the message. Likewise, when the media is used in the learning process in the classroom, the information conveyed by the lecturer as a messenger in class can be received clearly by students as message recipients in class.

Learning media is a means or tool used by educators to convey learning messages to assist in the teaching and learning process so that students can absorb the information conveyed by the lecturer properly. Learning media must be able to provide motivation to students, stimulate students to what they have learned and stimulate learning to what will be learned and be able to encourage students to provide feedback, feedback, and encouragement to do good practices. According Djamarah (2010) argues that media play a role in the learning process, because in the event the obscurity of the material presented can be helped by presenting the media as an intermediary. Besides, learning media also helps learners improve understanding, presents data with interesting and reliable, facilitate interpretation of data, and compact information.

One of the learning videos that can be used for the learning process is an animated video. In the Big Indonesian Dictionary by John M. Echols and Hassan Sadily quoted by Prakoso (2010) animate means that which is alive, has soul: (1) animates, animates, inflames, enlivens, Animated: (1) which is fun, (2) life.

Based on the results of preliminary observations, information was obtained that students said the microbiology course was an interesting subject to study because it was related to everyday life, but students also stated that microbiology courses were abstract subjects or could not be seen directly with the eye without using a microscope. The results of interviews with lecturers who teach microbiology courses are some of the obstacles faced in microbiology lectures, namely supporting media for deepening the material which is done by presenting the material with PowerPoint (PPT) but not maximally like video, it has not been maximally obtained by students to support understanding of the material later. Based on those, authors will conduct a research to develop a learning media that is valid, practical, and effective to facilitate college student understanding ability.

With regard to the results of observations and interviews obtained, it is necessary to develop learning media that can increase student attractiveness in microbiology learning. Based on the problems raised, the author will conduct research "Development of Learning Animation Videos to Support Microbiology E-Module on the Topic of Basic Biology Concepts in Biology Students, Padang State University".

II. RESEARCH METHODS

The type of research that will be used is development research (R & D) conducted at the Padang State University (UNP). Sugiyono (2009) states that research development (Research and Development) is a research method used to produce a particular product, and test the effectiveness of the product. The test subjects in this study were undergraduate biology students of the Faculty of Mathematics and Natural Sciences (FMIPA), Padang State University (UNP) July-December 2020 semester.

Plomp and Nieveen (2013) this research design uses the developer of the Tjeerd Plomp model, namely the preliminary research phase, the development or prototyping phase, and the assessment phase.

Data collection techniques were carried out by means of observation and questionnaires. Expert validation data analysis was obtained from the assessment of media experts, material experts and linguists. Analysis of data from the animated video validity assessment sheet that was developed in terms of didactic, construct, technical and graphic aspects based on the questionnaire given.

The validation data is calculated using the formula:

$$\text{Value} = \frac{\text{The number of scores obtained}}{\text{The highest number of scores}} \times 100\%$$

Table 1 Animated video validity value

0% - 20%	= invalid
21% - 40%	= not valid
41% - 60%	= valid enough
61% - 80%	= valid
81% - 100%	= very valid

modification of Riduwan (2009)

To test the practicality of instructional video animation media in the practicality trial of teaching lecturers, small groups and large group trials with the formula:

$$F = \frac{\text{The number of scores obtained}}{\text{The highest number of scores}} \times 100\%$$

F = Percentage of practicality

Table 2 The practical value of animated videos

0% - 20%	= impractical
21% - 40%	= not practical
41% - 60%	= practical enough
61% - 80%	= practical
81% - 100%	= very practical

modification of Riduwan (2009)

III. RESULTS AND DISCUSSION

The result of this research is that the product of microbiology learning animation video is ready to be validated by experts, namely media experts, material experts and linguists, data analysis from the animated video validity assessment sheet developed in terms of didactic, construct, technical and graphic aspects as well as the practicality test on the lecturer, small group test and large group test. The following is an explanation of the presentation and analysis of the data from the assessment results by validation of experts, the practicality test of lecturers, the small group practicality test and the large group practicality test.

3.1. Expert Validation (Media, Material, Language)

3.1.1. Didactic Aspects

In the didactic aspect, the microbiology learning animation video was declared valid by the validator with a validity value of 95.83% with very valid criteria. Based on the criteria on the didactic aspect, it is known that the animation video developed is in accordance with the syllabus and student characteristics. The developed microbiology learning animation video can support the lecture process, help students understand the material, and improve student understanding of concepts.

Table 3 The validation value of the didactic aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			total	Score	Criteria
			1	2	3			
1	Didactic	1	4	4	4	12	95.83	Very Valid
		2	3	4	4	11		
	Total		8	8	7	23		

The didactic aspect of the microbiology learning animation video on the basic concepts of microbiology was declared very valid by the validator. The validation results indicate that the subject matter of lecture activities contained in the learning animation video is in accordance with the syllabus used. Didactic requirements are requirements relating to the process of determining the correct concepts according to the syllabus and learning outcomes. According to Lufri (2007) validation extends to the accuracy, meaning and usefulness of a conclusion made by the researcher. This didactic requirement regulates the use of instructional animation videos on the basic concept material of universal microbiology that can be used well for students with low, medium, and high abilities.

3.1.2. Construct Aspects

In the construct aspect, the microbiology learning animation video is stated valid by the validator with a validity value 93.75% with very valid criteria. Based on the criteria in the construct aspect, it can be stated that the developed microbiology learning animation video has an identity, it is concluded that it is equipped with a clear identity and is systematically structured. Based on the use of language, the animated video developed is in accordance with the rules of Indonesian that are good and correct and the terms used in the textbook are correct.

Table 4 The validation value of the construct aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			total	Score	Criteria
			1	2	3			
2	Construct	1	4	3	4	11	93.75	Very Valid
		2	4	4	3	11		
		3	4	3	4	11		
		4	4	4	4	12		
	Total		15	14	16	45		

The construct aspects of the microbiology learning animation video on the basic concepts of microbiology were stated to be very valid by the validator. Based on this, it can be concluded that the microbiology learning animation video on the basic concepts of microbiology already uses language that is easily understood by students, uses language that is in accordance with the rules of Indonesian that is good and correct and is in accordance with enhanced spelling (EYD), and has clear sentences. . Animated microbiology learning videos on the basic concepts of microbiology have been presented systematically in accordance with the learning outcomes in the syllabus.

3.1.3. Technical Aspects

On the technical aspect, the microbiology learning animation video was declared valid by the validator with a validity value 91.66% with very valid criteria. Trianto (2012) terms or criteria for technical aspects related to writing, images, and appearance in the manufacture of a product [16]. Based on the criteria on the technical aspect, it can be stated that the animated video developed uses a type and size of letters that can be read clearly, and the use of punctuation marks is correct.

Table 5 The validation value of the technical aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			total	Score	Criteria
3	Technical		1	2	3		91.66	Very Valid
		1	4	4	4	12		
		2	4	3	4	11		
		3	4	2	4	10		
		4	4	4	3	11		
		5	4	3	4	11		
		6	4	3	4	11		
		7	4	4	3	11		
Total		26	23	28	77			

The assessment of the technical aspects assessed by experts on the microbiology learning animation video on the basic concepts of microbiology was stated to be very valid by the validator. The validation results indicate that all components in the technical aspects including written, visual, and audio have been fulfilled properly. Very valid values are given by the validator based on several indicators.

3.1.4. Graphic Aspects

On the technical aspect, the microbiology learning animation video was declared valid by the validator with a validity value 100% with very valid criteria.

Table 6 The validation value of the graphic aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			Total	Score	Criteria
			1	2	3			
4	Graphics	1	4	4	4	12	100	Very Valid
Total			4	4	4	12		

The assessment of the graphic aspects assessed by experts in the microbiology learning animation video on the basic concepts of microbiology was stated to be very valid by the validator. graphics that can be seen from the display design in the animated video being developed. Color in the animation video and the display of the microbiology learning animation video on the material basic concepts of microbiology can make readers interested in knowing about the material being discussed, this is because of the attractive color combination and good color combination. According to Trianto (2009) the technical requirements are related to writing, pictures, and appearance in the making microbiology learning animation on the basic concepts of microbiology.

3.2. Practicality Test

3.2.1. Practicality Test by Lecturers of Microbiology Subjects

The practicality test conducted by a lecturer who teaches microbiology courses on the topic of basic concepts of microbiology is Dr. Dwi Hilda Putri, M.Biomed. the results of the analysis of practicality test data by the lecturer who were able to get a percentage value of 92.50% which was stated in the very practical category.

Table 7 The value of practicality by a lecturer who teaches microbiology courses

No.	Aspect	Score (%)	Category
1.	Ease of Use	87.50	Very Practical
2.	Animation Video Efficiency	100	Very Practical
3.	Attractiveness	87.50	Very Practical

No.	Aspect	Score (%)	Category
4.	Easy to Interpret	100	Very Practical
5.	Has Equivalence	87.50	Very Practical
Total		462.50	
Average		92.50	Very Practical

3.2.2. Small Group Practicality Test

The small group trial involved 6 students with low, medium and high abilities obtaining a percentage of 90.53% which was stated in the very practical category.

Table 8 Small group practicality value (Small Group)

No.	Aspect	Score (%)	Category
1.	Ease of Use	89.58	Very Practical
2.	Animation Video Efficiency	95.83	Very Practical
3.	Attractiveness	91.66	Very Practical
4.	Easy to Interpret	83.33	Very Practical
5.	Has Equivalence	95.83	Very Practical
Total		239	
Average		90.53	Very Practical

3.2.3. Large Group Practicality Test (Field Test)

The large group trial involved 30 students who were studying the microbiology course in semester 3. The results of the practicality analysis in the large group obtained a percentage of 91.06% which was stated in the very practical category.

Table 9 Large group practicality value (Field Test)

No.	Aspect	Score (%)	Category
1.	Ease of Use	91.54	Very Practical
2.	Animation Video Efficiency	95.00	Very Practical
3.	Attractiveness	91.25	Very Practical
4.	Easy to Interpret	86.66	Very Practical
5.	Has Equivalence	92.50	Very Practical

Total	1202	
Average	91.06	Very Practical

IV. CONCLUSION

Based on the results of data analysis, discussion and results of developing microbiology learning animation videos on the basic concepts of microbiology with the Tjeerd Plomp development model, it can be concluded that, 1) the animation video of microbiology learning on the basic concept material of microbiology has been validated by experts, namely media experts, material experts and linguists get an overall percentage of 93.45% in the very valid category. 2) the microbiology learning animation video on the basic concept material of microbiology has been practiced by the microbiology subject lecturer getting an overall percentage of 92.50% including in the very practical category. 3) the video animation of microbiology learning on the basic concepts of microbiology has been put into practice by small group student tests with an overall percentage of 90.53% so that it is included in the very valid category. 4) the video animation of microbiology learning on the basic concepts of microbiology has been put into practice by the large group student test getting an overall percentage of 91.60% including in the very practical category.

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