Development of Animation-Based Learning Videos for Respiratory System Materials

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Abstract: Education in the 21st century is a learning system that aims to prepare a generation that prioritizes technological progress to be able to keep up with the times, one of which is to develop animated learning videos as learning media. in the development of this animated video, it makes it easier for teachers and students to deliver learning and can make learning more interesting while also making it easier for students to understand biology lessons, especially in the respiratory system material. This study aims to create a learning media in the form of an animated video that is feasible and practical. This research uses the R&D Research method. The research model is a 4D model, the research design was modified into four namely descriptions, design, development, and dissemination. Ratings on animated videos by media experts are 93.00%, material experts are 96.00%, and practitioners are 88.00%. Student assessments were obtained from a limited trial of 83.00% and a broad trial of 82.00%. Each assessment is in the product category very suitable for use in the learning process.

Keywords: Video animation; Alight motion; 4D; Respiration system

Introduction

The development of the era of globalization in modern times, competition between countries is getting stronger, this triggers the emergence of new challenges, especially the governments authorized to advance the nation for the better, including the education system (Vegatama, 2018; Suprapto, 2020). The challenges that must be overcome by teachers in the era of globalization are in terms of learning design and how a teacher's ability to master the class course also utilizes technology in learning (Fuad et al., 2020). Technology-based learning process activities are currently being carried out by developed countries and in Indonesia currently also requires teachers and students to adapt to technology-based learning process activities (Jundu et al., 2020). Technology-based learning must foster the spirit of educators to continue working to develop education. a teacher who is creative, innovative, and productive is very important in planning and designing learning. Learning activities are learning by using the assignment method or using the modules and learning materials provided. However, teachers also need to apply various methods of learning process activities so that students do not feel bored or bored when participating in learning activities, one of which is in science.

Science is one of the sciences whose focus of discussion includes the universe and various parts of that nature are explained clearly in science. Science deals with natural facts, natural phenomena, schemes, or principles that cover parts of nature. In the era of globalization that is growing rapidly today, technology can no longer be avoided. The development of science or technology continues to grow rapidly in stages and is

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increasingly advanced so this triggers the use of this situation as an ingredient in the world of education as well. By developing science or technology, modernization will develop rapidly in the world of education and consequently will be even better (Arsyad, 2015).

In the world of education today, students are required to play an active and energetic role in participating in learning and various established systems. The teacher's position is not the only facilitator of accurate information, but at this time technology is one of the facilitators. Teachers in the current era function to straighten and complement the results obtained by students from various learning sources. To master Biology lessons, understanding through theory alone will not be sufficient to increase students' understanding. Moreover, if students are faced with theory, of course, they prioritize reading diligently in order to be able to understand. But in reality, not all students have a strong interest in reading. In the 2013 curriculum, especially in learning the basic competencies of the respiratory system material needed in the material.

One model of technology utilization that can be used is to use of animated learning videos. Animation is a visual media that is able to move and can be used to describe material that is not properly described and presented conventionally (Utomo et al., 2020; Chan et al., 2013; Lehman, 2019). The favorite media that is a choice for presenting material in biology lessons is animation. With the use of animation in the delivery of learning, it can make the learning process more interesting and increase students' enthusiasm for learning to understand the lesson, and strengthen memory about the lessons presented so that learning objectives can be met to the fullest. Animated video media is a learning media in which there is a combination of images, text, audio, and video components that contain information on learning materials (Rihatno et al., 2020).

The use of interesting animated videos can make students easily master a concept in learning. The application of media also helps in understanding difficult material, especially on respiratory system learning materials, because the animated video media presented will be made concisely coupled with text and audio which makes students more relaxed in learning activities (Fakhri et al., 2019; Semaan & Ismail, 2012). 2018), the use of animated video media can also affect increase in students' learning enthusiasm (Febriani, 2017).

The use of animated media has advantages, including in this animated video it combines several elements such as moving images, text, audio as sound, or videos that support learning. because of this, animation creates its own interest for students (Maulida

et al., 2019; Safitri et al., 2021). Besides being used for learning, animated videos can be used for entertainment, inspirational media, or other purposes (Putri , 2016). The use of animated videos is a very good and interesting choice and is efficiently used for students because there are many benefits in it, namely: 1) students become more focused on paying attention 2) the appearance of the material presented looks more beautiful and attractive 3) can organize learning more systematically 4) students can also more easily understand the material 5) with animated videos, material that looks difficult to explain will be easier if it is delivered using animated video media (Ayuningsih, 2017; Kasih, 2017).

The use of animated video media is very suitable for students who like various types of anime and cartoons. This animated video is packaged in such a way as to convey material in the learning process,so that seeing the interesting things from the learning video raises the enthusiasm for student learning to be better (Fyfield, 2019; Anzalna et al., 2022). The purpose of this research is to create animated videos that are packaged in such an attractive way at the high school (SMA) level as a medium of learning. In addition, it aims to create a new breakthrough, namely animated videos, especially in Biology with a discussion of the respiratory system (breathing) in humans. This research is also intended to reinforce students' understanding of what is most needed in supporting the life of every human being to carry out various daily activities, namely breathing by inhaling oxygen and exhaling carbon dioxide. Breathing is a process that cannot be separated from human life and the result of that breathing is oxygen which is circulated throughout the body (Mair & Supriadi, 2017).

Therefore, it is expected that students can have enthusiasm for participating in teaching and learning activities. From the various explanations listed above, it is revealed that this research has the main goal of making better learning media by developing animation-based learning video media such as videos of the human respiratory system in Biology lessons. Based on the explanation described above, developing this media is expected to create good learning work as a learning medium for students.

Method

This research uses the R&D (Research & Development) method. This type of research is often used as a process of creating and developing an existing product to be even better and more useful for the learning process by developing a 4D (Four-D) concept which includes Define, Design, Development, and Disseminate (Sugiyono, 2019). As for designing something in this R&D research, one must look at the following Scheme:
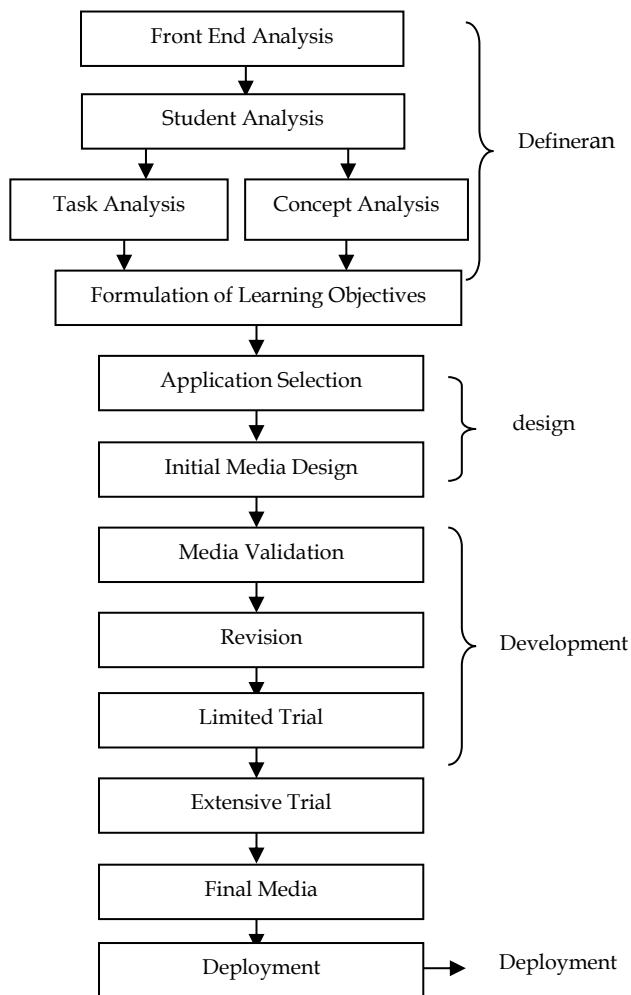
Image 1. Research Flow Schematic

In the use of this R&D method, it is closely related to evaluation and revision after developing something. The research focused on students of class XI SMA Negeri 4 Bangko Pusako, Rokan Hilir, RIAU. The timing of the research coincided in April 2022 at SMAN 4 Bangko Pusako. Subjects consisted of experts in the field of Biology, namely field practitioners, lecturers as material experts and learning media experts, and class XI science students with a limited trial of 15 students and a broad trial of 55 students.

In the process of analysis, researchers assess the character of students, individual competencies, learning facilities, and the state of the school environment. And at the design stage, researchers determine the software needed to create animated videos for learning such as the Alight Motion application for video editing and the Dolby On application as a sound support application, then create an animated video concept map. The

development of the animated video is then added to the process of making the characters needed in learning such as images, text, and audio-visual support.

The instruments used in the research were first grouped according to their respective portions and according to various steps when developing the desired results in the study. This study uses a questionnaire, a questionnaire used with an open model specifically to interview the educators, and an observation sheet used to carry out development which is given in the form of a questionnaire.

This study uses descriptive analysis techniques based on quantitative and qualitative. As for data in the form of quantitative, it contains numbers from the results of questionnaires filled out by students on a scale of 1-5 and the validity of the validator with the same score, which is between the range of 1-5. The data that has been collected, especially the results from the analysis of students, is sought for the average value. The acquisition of these numbers will be discussed in words and finally, the data acquisition is then presented in words qualitatively. The data from the assessment results will be processed with the following formula:

$$AN = \frac{j}{p} \times 100 \qquad (1)$$

Information:
AN   : Score percentage
j   : Total score obtained
p   : Total score max
(Afkar & Hartono, 2017)

The data from the feasibility assessment are then presented in the form of descriptive qualitative data according to the media eligibility criteria as shown in Table 1 below:

Table 1. Eligibility Assessment Criteria

Percentage	Criteria	Category
80-100	Very Valid	Very worth using without revision
60-79	Valid	Proper to use with a little revision
40-59	Quite Valid	Decent enough used with multiple revisions
20-39	Less Valid	Not worth using too many revisions
01-19	Invalid	Not worth using

Sugiyono, (2015)

To obtain qualitative data requires direct interviews with resource persons while making observations, asking for suggestions and comments from validators and field experts, and students. In analyzing qualitative data, this study uses the concept of Miles and Hubermen

who say that if you do a study, the data collection process is carried out interactively and continuously until the data obtained is saturated and does not find anything new (Sugiyono, 2019).

Result and Discussion

This research is an attempt to develop a new breakthrough or product that is useful for the learning process. Where the result is an animated video about the respiratory system. Animated video media is a learning media that contains audio, video, and image media containing learning material (Ningsih et al, 2021). Media development carried out by researchers is Animation-Based Learning Video. The results of the animated video media made by researchers are shown in Figure 2 and Figure 3.
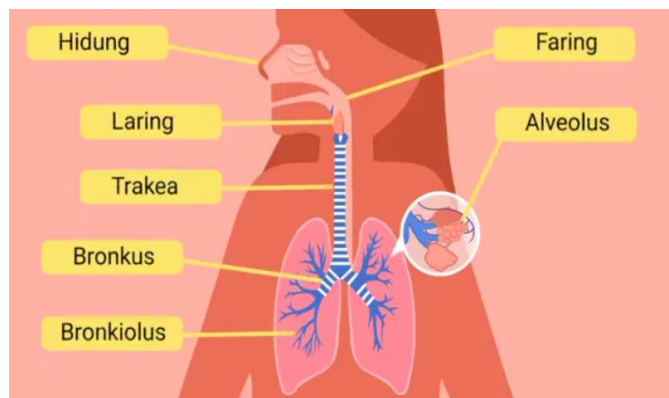

Figure 2. Content in Animated Videos

Figure 3. Content in Animated Videos

In accordance with the research objectives, namely the feasibility test of learning media which consists of assessment indicators on media expert validation, material validation, practitioner validation, and product testing. The following is the analysis of the results of the assessment of each feasibility test for animated videos.

Validation media expert

The results of this study are animated video products that have been tested for validity by a validator learning media lecturer assessing the balance of text, image, sound, and video composition, Color Selection, Physical Criteria, Practicality, and Use Long-term. Clear validation results served the following.

Table 2. Results Recapitulation Validation expert media

Aspect	%
Balance the composition of text, images, sound, and video	100
Color Selection	86.67
Physical Criteria	80.00
Practicality	100.00
UseLong-term	100.00
Percentage	93.33
Category	Very Worthy

Based on table 2 above, it can be seen that the value obtained for each indicator shows a good category or animated video media is very feasible to use.

Material expert validation

The material expert validator on the animated video is validated by a single dose of a material expert. Evaluation of this media material includes learning, Push Curiosity, Supporter Presentation, Accuracy Materials, and Student Involvement. Results material validation served on Table 3.

Table 3. Results Validation Recapitulation expert Theory

Aspects	%
Learning	100.00
PushCuriosity	100.00
Serving Support	100.00
Material Accuracy	80.00
Student Involvement	100.00
Percentage	96.00
Category	Very Worthy

Based on results validation analysis material experts noted that score whole included in the good category, this showing learning media based on videos animation on Theory the respiratory system is very worthy and can be used in learning without revision.

Expert validation practitioners

Expert validator partition on animated videos validated by one expert lecturer. Evaluator Practitioners in this media include material, language, and presentation. Validation result practitioner presented on the Table 4.

**Table 4**. Results Validation Recapitulation expert practitioner

Aspect	%

Theory	80.00
Language	95.00
Presentation	90.00
Percentage	88.33
Category	Very Worthy

Based on results validation analysis expert practical it is known that the value of whole included in the good category, this is showing video-based learning media animation on the respiratory system material is very practical or very feasible and can be used in learning without revision.

Limited Trial

Products that have been made based on input and expert advice media will small groups tested for determine the response of students to the developed media. The overall assessment of the student's responses to the animated video includes material, language, and presentation product. Student response data is class XI IPA at SMA Negeri 4 Bangko Pusako with amount 15 students with 14 questions. The description of the results of the student response questionnaires is presented in Figure 4.
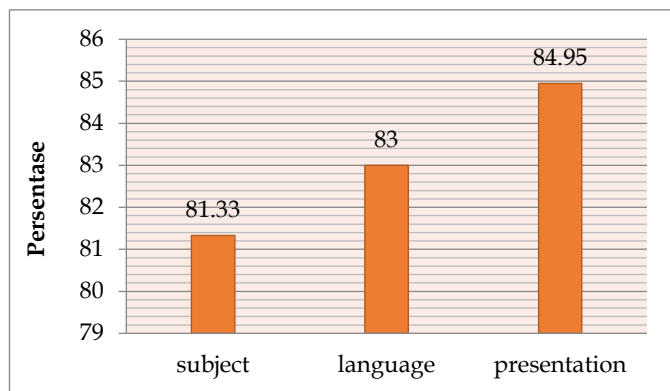
Figure 4. Recapitulation of Small Group Responses

Extensive Trial

Product which has tested on group small and revised based on input and suggestion experts will then be tested on a broad group to determine the response students to the developed media. The overall assessment of the student's responses to the animated video includes material, language, and presentation product. Student response data are students of class XI IPA at SMA Negeri 4 Bangko Pusako with a total of 55 students with 14 questions. The description of the results of the student response questionnaires is presented in Figure 5.
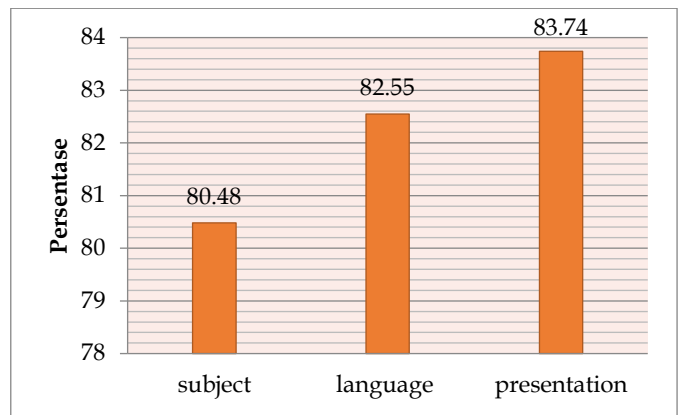
Figure 5. Recapitulation of Group Response Results Area

Based on the student questionnaire table, it can be seen that the average value of student responses reaches 80.00% by category very worthy, thing this show media video learning animation on the respiratory system material at SMAN 4 Bangko Pusako is valid, practical, and feasible and can be used in learning without revision.

An important role in using animated videos as a learning medium is the ability to visualize material that students cannot see or imagine. Animated video learning media makes it easier for teachers to deliver the material. In line with Munir's statement (2015) some of the advantages of using animated videos are (a) the level of effectiveness and speed in delivering material is higher, (b) repetition of certain discussions can be done, (c) videos can describe a process and event in detail. and real, (d) the ability to turn objects or materials that are abstract into concrete, (e) durable and low level of damage so that they can be applied repeatedly, (f) the ability of teachers to operate technology is needed, (g) improving basic skills and adding new experiences for students. (h) This animated media is relevant to the learning objectives and curriculum that focuses on student learning activities.

Based on research and development result obtained, then can be concluded that media learning which developed in the form of media learning animated videos on the topic of the respiratory system is very valid, practical, and feasible. The final product of this development is an animated video that can be opened using Android, on various platforms such as WhatsApp or Telegram. The animated video that has been developed has been validated which consists of validation expert media, materials, practitioners, and student responses. Validation expert, this study was conducted to determine the validity and practicality of the animated video. Meanwhile, student responses were carried out to determine the feasibility of the animated video.

Conclusion

Valid animation video practitioner and worthy of used as media learning. Validity is obtained from the results validation of media experts and material experts, practicality obtained from practicing experts namely biology teachers and feasibility obtained from students, scores obtained from validation were categorized as very feasible, trial response students against media learning including in category very worthy. It is recommended that the product developed could use as alternative mediation learning biology so that the learning process can done with fun. Learning products or media can be used as a new reference for support process study teaching. Besides that, it is recommended to create media which is more interesting and further research will conduct an effectiveness test to better see the effectiveness in the use of animation-based learning video media, especially in biology learning.

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