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Research Paper

The Impact of Animated Video Material Interaction of Living Things with The Environment on Scientific Literacy of Junior High School Students

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Abstract: This research aims to examine the impact of animated video on scientific literacy of junior high school students. Using a quasi-experimental research design with a non-equivalent control group design. The research was carried out at Wonomerto 1 state junior high school, with a population of class VII students in the even semester of the 2021/2022 academic year. The research sample consisted of the experiment class and the control class. Techniques and instruments of data collection using tests, observations, interviews, and documentation. The data analysis technique used a normality test, Independent T-test, and right-hand t-test. The results of the Independent Sample T-test of students' scientific literacy abilities obtained a significance value (2-tailed) of 0.000 and the results of the right-hand t-test that the $t_{count} > t_{table}$ value was 5,345 > 1,684. The results showed that learning science using animated videos had a significant effect on scientific literacy for junior high school students.

Keywords: Science; Animated Videos; Scientific Literacy.

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INTRODUCTION

Education is an educator's effort to create a good learning atmosphere for students in order to produce quality students (Ristiono, 2019). According to Juharti (2021), education is the most important part for the progress of the nation, especially in the moral development of the state. UU number 2 of 1989 confirms that the intellectual life of the nation and the development of all Indonesian people are the goals of national education (Sujana, 2019). Education in Indonesia has undergone curriculum changes from 1945 to the present. The curriculum used for learning activities is the 2013 revised 2017 curriculum (Mawaddah, 2019).

The most important educational activity of the entire educational process is learning activities. The educational goal of success is determined by the learning process that occurs (Ubabuddin, 2019). The nature of learning according to Pane and Dasopang (2017) is defined as an educator's effort to foster connections between students and learning resources, so that knowledge and knowledge can be obtained. Learning activities are said to be successful if in teaching and learning activities, students play an active role (Amral and Asmar, 2020). Science learning requires students to actively participate directly in the exploration and observation of the natural surroundings to provide direct experience for the development of creativity and competence (Meryastiti, 2022). Learning by involving students directly can also be useful in applying the concepts that students have learned in everyday life (Oktaviana, 2020).

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Therefore, students must master 21st century skills to meet future opportunities. One of them is scientific literacy skills (Pratiwi, 2019 and Hikmawati et all., 2021).

Science literacy skills are one of the skills that must be possessed by students to face the 21st century learning process, one of which is science learning. Scientific literacy utilizes natural science in decision making (Pratiwi, 2019). Utilizing scientific insights, identifying questions, and drawing evidence-based conclusions to understand and help make decisions based on events that occur is scientific literacy (Fibonacci, 2020). Students who have scientific literacy skills can solve problems based on facts in everyday life (Sutrisna, 2021).

Facts that occur in the field, science learning does not train students' scientific literacy skills. The learning process that is not in accordance with the demands of PISA is one of the causes. Science learning in schools takes place conventionally by ignoring the importance of scientific literacy such as the ability to read and write science, interpreting graphs/tables, and scientific literacy test questions (Fuadi et al, 2020). Science learning in schools is dominated by teachers while passive students make learning that takes place less meaningful (Rahmawaty, 2019 and Velly, 2021). Less involvement of students during the learning process causes the learning process to tend to be boring and student learning outcomes to be low (Adriani, 2018 and Hasanah, 2020).

Difficulties experienced by students at the junior high school level in studying science material. Related to this, it is marked by low student achievement. Indeed, students think that science is abstract, there are many scientific and Latin terms, so students have difficulty understanding it (Amaliyah, 2021). The interaction of living things with their environment is one of the science materials that is difficult for students to understand (Rahmawaty, 2019). According to Fazlina et al, (2019) the material for the interaction of living things with their environment is difficult because of the large amount of material to be studied, a lot of memorization, and the need for deep understanding in order to be able to correlate material concepts with the surrounding environment. The difficulty of the material is also marked by the low learning outcomes of students. So, we need innovation when learning activities take place. According to Mahardika et al (2020) the need for learning innovations is in line with the impact of the development of all aspects of the 21st century. Animated video media is one of the innovations that can be applied in science teaching and learning activities.

Utilization of learning media is useful in increasing scientific literacy skills and student learning outcomes (Istigfarini, 2022). According to Wahyuni (2022), learning media functions as a channel of information or messages to students effectively. One of the media that can be used to improve scientific literacy and student learning outcomes is animated video (Agustien, 2018). Animated videos are learning media that can visualize material accompanied by moving and sound illustrations and are projected to form characters that are almost the same as the original object and seem alive (Wismawatisiti, 2021). Learning using animated videos can facilitate understanding, strengthen memory, attract students' interest, and can relate material concepts to the surrounding environment, so that the learning process is more meaningful and can support students' scientific literacy skills (Wulandari, 2019). Maryanti (2017) states, students will focus on following the learning process and will not feel bored when using animated video media. The high interest and enthusiasm of students can help in understanding the material.

METHOD

This research was carried out at Wonomerto 1 state junior high school, Probolinggo Regency from March 1st week to 3rd week of the even semester of the 2021/2022 school year. This research was conducted at the time of learning the subject of the interaction of living things with their environment in a learning period of 7 lesson hours, where 1 lesson hours is equal to 30 minutes. The current learning time is different from before the COVID-19 pandemic, before the COVID-19 pandemic 1 lesson hours was equal to 40 minutes, so now students are required to study 10 minutes independently. This is in accordance with the policy of the Probolinggo City Education Office.

The implementation of this research uses a quantitative approach and the type of research design is Quasi Experimental Design, with a Non-equivalent Control Group Design research design. This type of research involves two classes, namely the experiment class and the control class, given a different treatment. The following table of research design Non-equivalent Control Group Design can be seen in Table 1.

Table 1. Research design Non-equivalent Control Group Design

Class	Pre-test	Treatment	Post-test
Experiment	O_1	X	O_2
Control	O_3	-	O_4

In the experiment class, learning is implemented based on animated video media, while in the control class, learning takes place without using animated videos but using book media. Pre-test was given in both

classes to determine the initial ability of students. Learning activities take place by applying group discussions to determine students' scientific literacy skills. After the learning was over, it was continued with post-test activities in the control class and experiment class. The following stages of the research can be seen in Figure 1.

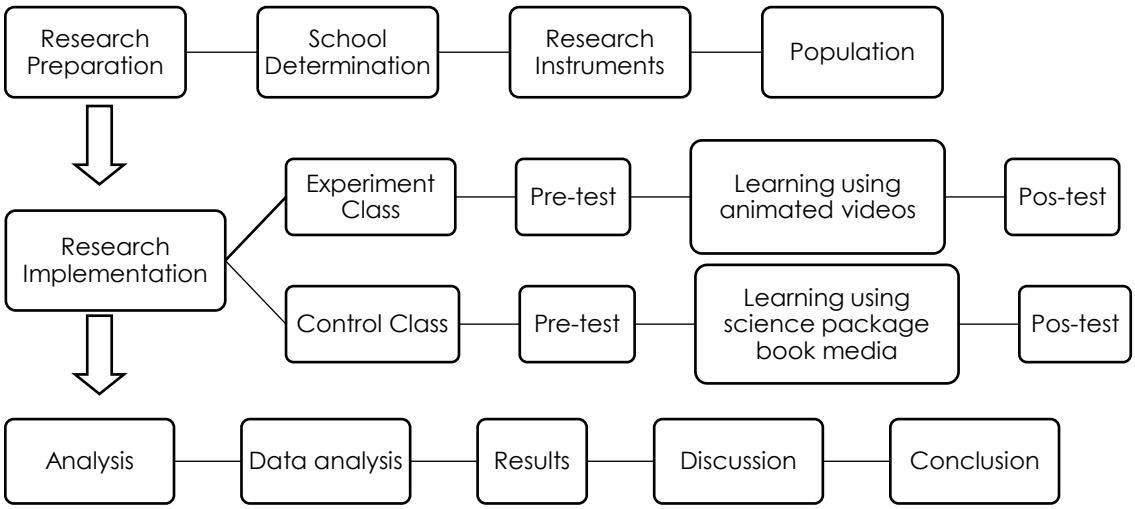

Figure 1. Research procedure

Techniques and instruments of data collection in this research include the main techniques and instruments as well as techniques and supporting instruments. The main technique and instrument is the test. The test consists of a scientific literacy test with 14 items for essay questions. Meanwhile, the techniques and instruments to support this research include interviews, observation and documentation.

The data analysis technique in this study used the normality test to determine whether the research data was normally distributed or not. If the research data is normally distributed, then a parametric test is carried out, namely the Independent Sample T-test, on the other hand, if the research data is not normally distributed, then the data is tested using a non-parametric test, namely the Mann Whitney U-Test.

Scientific literacy data analysis.

Qualitatively, the scientific literacy score can be calculated using:

$$\text{Science literacy scores} = \frac{scores\ obtained}{maximum\ score} \times 100 \quad (1)$$

Determination of the success of students in practicing scientific literacy skills is categorized based on the criteria of Table 2.

Table 2. Criteria for scientific literacy ability

Interval level	Predicate	Criteria
86-100	A	Very good
72-85	B	Good
58-71	C	Enough
43-57	D	Low
≤43	E	Very low

RESULT AND DISCUSSION

The scientific literacy ability of students can be improved through science learning assisted by animated videos so that students are trained and assisted. The positive impact is that students gain more meaningful knowledge and can increase interest in learning so that it is easy to adapt to the times (Wulandari, 2019). The instructional video used in this study is an animated moving image video that has been created and used during learning activities. The first learning activity is doing attendance, with the teacher calling the students one by one, followed by the opening of learning and giving apperception, then studying the material through videos that are displayed and discussion in groups and finally closing the lesson by drawing conclusions and reminding students to review the material presented. presented

and discussed.

The learning activities took place in three meetings. The animated video-assisted learning takes place in the experiment class and in the control, class applying the science-assisted learning media package. Animated videos are shown live to students at each meeting by utilizing existing LCD and projector facilities. The following is a table of data recapitulation of students scientific literacy values can be seen in Table 3.

Table 3. Data recapitulation of students' scientific literacy scores

Component	Experiment Class		Control Class	
	Pre-test	Post-test	Pre-test	Post-test
Highest score	27	91	25	82
Lowest score	13	52	15	42
Average	19	75,29	19	59,97

Table 3. shows the pre-test and post-test scores of students' scientific literacy skills in the experiment class and the control class. Before the teaching and learning activities were carried out, the experimental class and control class students had the same scientific literacy skills. This can be seen from the absence of a difference in the average pre-test score between the experiment class and the control class. In contrast, after teaching and learning activities were carried out, there was a difference shown in the post-test mean scores of students in the experiment class and the control class. Teaching and learning activities using animated video learning media in the experiment class support this difference. 75.29 is the post-test average value of the experimental class which has a difference in the post-test average value with the control class, in which the control class gets a post-test average score of 59.97. From the difference in the average post-test scores, it shows that the scientific literacy ability of the experiment class students is better than the control class. Figure 2. and Figure 3. show the differences in the scientific literacy scores of students in the experiment class and the control class.

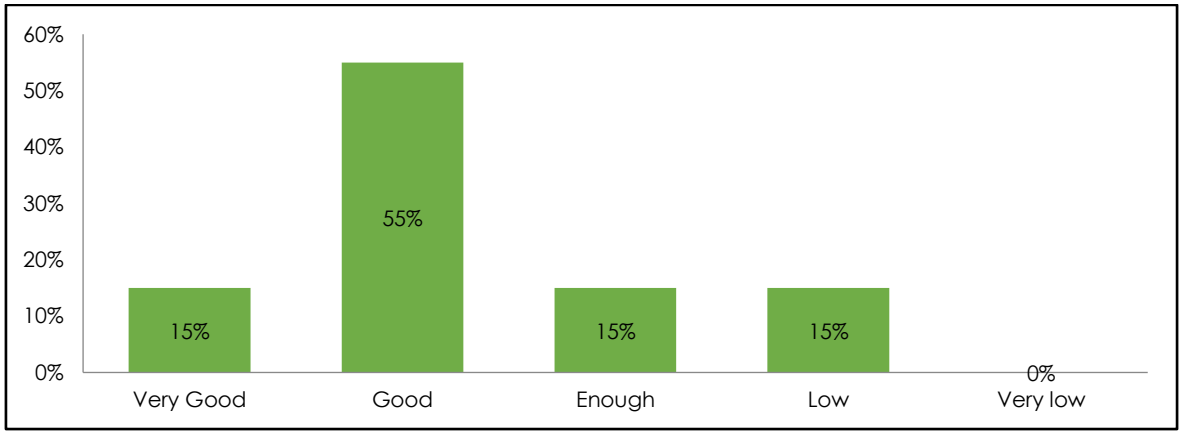

Figure 2. Achievement of scientific literacy of experiment class students

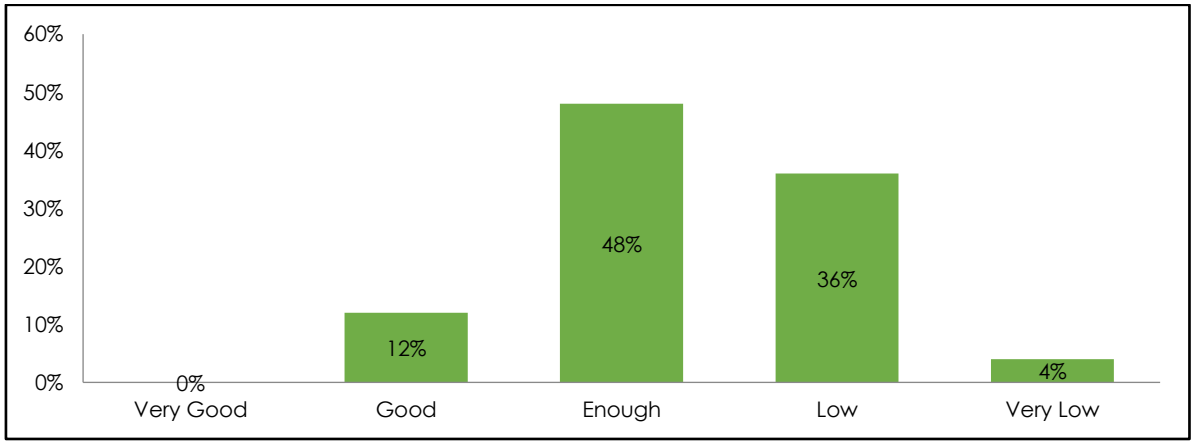

Figure 3. Achievement of scientific literacy of control class students

The analysis of scientific literacy data for the first time used the normality test to find out whether the students' scientific literacy value data were normally distributed or not. If the scientific literacy value data is normally distributed, then the data is then tested using the Independent Sample T-test and the right-hand t-test. It is different if the data that will be obtained is not normally distributed, then use the Mann-Whitney U-Test test for data analysis. The first step is to use the normality test, namely the Shapiro-Wilk test. The results of the Shapiro-Wilk scientific literacy test of students are shown in Table 4.

Table 4. The results of the Shapiro Wilk scientific literacy test of students (Normality Test)

	Class	Shapiro-Wilk		
		Statistic	Df	Sig.
Scientific Literacy Ability	Pre-test Experiment	0.962	26	0.425
	Post-test Experiment	0.927	26	0.064
	Pre-test Control	0.975	25	0.779
	Post-test Control	0.991	25	0.997

Table 4. shows the average value of students' scientific literacy skills from the Shapiro-Wilk test. Sequentially the experiment class and control class obtained a significance value of pre-test and post-test, namely 0.425 > 0.05; 0.064 > 0.05; 0.779 > 0.05; 0.997 > 0.05. All data on students' scientific literacy scores were normally distributed, because the significance value obtained by both classes was > 0.05. Then the data analysis continued with the Independent Sample T-Test test in Table 5. for the Independent Sample T-Test test pre-test scientific literacy ability and Table 6. for the Independent Sample T-Test test post-test scientific literacy ability.

Table 5. Test results Independent Sample T-Test pre-test scientific literacy ability

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference
Scientific Literacy Ability	Equal variances assumed	0.662	0.420	-0.194	49	0.847	-0.195
	Equal variances not assumed	0.662	0.420	-0.195	48.163	0.846	-0.195

Table 5. shows the acquisition of a significant value as evidence that the data of the two classes are homogeneous or not. A significance value of 0.420 > 0.05 was obtained so that the data on the value of students' scientific literacy skills was homogeneous. The results of the T-Test test with homogeneous data using the Equal variances assumed column of 0.847 > 0.05 as the significance value (2-tailed). H_0 is accepted and H_a is rejected in accordance with the acquisition of a significance value (2-tailed) > 0.05. This shows that prior to the implementation of learning there was no difference in the average value of the scientific literacy of students between the experiment class and the control class. The initial scientific literacy abilities of the experiment class and control class students are the same.

Table 6. Test results Independent Sample T-Test post-test scientific literacy ability

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference
Scientific Literacy Ability	Equal variances assumed	0.842	0.363	5.345	49	0.000	15.271
	Equal variances not assumed	0.842	0.363	5.365	48.014	0.000	15.271

The data on the scientific literacy value of the experiment and control class students can be identified whether the variance is homogeneous or not by reading Table 6. in Levene's Test for Equality of Variances column. 0.363 is the significance value obtained where, 0.363 > 0.05 so that the data on the scientific literacy value of students has a homogeneous variant. To read the results of the t-test of homogeneous

data using the Equal variances assumed column. The significance value (2-tailed) is 0.000 < 0.05. The significance value (2-tailed) < 0.05 with that, the results of the hypothesis obtained are H0 is rejected and Ha is accepted. This shows that experiment class students have different scientific literacy average scores with control class students, where experiment class students have better scientific literacy skills than the control class. The right-hand t-test shows the level of difference in the average value of scientific literacy between the experiment class and the control class, which is shown in Table 7.

Table 7. The results of the right-hand t-test of students' scientific literacy abilities

Class	Average	t_{count}	t_{table}
Experiment	75	5.345	1.684
Control	59		

The t-table value obtained from the right-hand t-test using a significance of 0.05, which is 1.684, while the t-value obtained from the data analysis using the Independent Sample T-Test test is 5.345. Table 7. shows the calculation results of 5.345 > 1.684, meaning that the value of $t_{count} > t_{table}$. Based on the results of the hypothesis and the results of the right-hand t-test obtained, H_0 is rejected and H_a is accepted. Thus, the scientific literacy value of the experimental class students is better than the scientific literacy value of the control class students. Therefore, learning using animated video media is better than learning using book media.

The data from the research before the learning was carried out showed that there was no difference in the value of scientific literacy between the experiment class and the control class. From the results of the study, it was concluded that the experimental class and control class students had the same initial scientific literacy abilities. In contrast to the research data after the learning activities took place, there was a difference in the scientific literacy value of the experiment class students and the control class students. This can be seen clearly through the results of the students' scientific literacy intervals, namely the experiment class achievement was 15% very good, 55% good, 15% quite good, and 15% not good. While the achievement of scientific literacy in the control class is 12% good, 48% quite good, 36% not good, and 4% very poor.

Not only the achievement of scientific literacy interval results, but the Independent Sample T-test test also proved a significant difference between the experiment class and the control class. The significance value (2-tailed) of 0.000 was obtained from the results of the Independent Sample T-test. Then it was reaffirmed by analysis of the right-hand t-test data so that the value of $t_{count} > t_{table}$ is 5.345 > 1.684. These results prove that the experiment class students have better scientific literacy skills than the control class students.

The results of data analysis using SPSS are also strengthened from the results of observations of student activities. The level of activeness of the experiment class students is different from the activity of the control class students, in terms of the level of enthusiasm, focus, questions asked, opinion submission, and in making conclusions. When learning activities utilize animated video media >80% of experiment class students are able to generate enthusiasm and focus on learning. In addition, >80% of experiment class students were able to submit opinions, make questions, and formulate conclusions based on the learning activities that had been carried out. Experiment class students actively participate in discussion activities so that learning activities become interactive. In contrast to the control class, only about 60%-≤80% of students have enthusiasm and focus during learning activities. Likewise, during discussion activities only about 60%-80% of students are able to express their opinions, ask questions and draw conclusions from learning activities. The conclusions obtained from the application of animated videos in learning activities show a significant influence, so that the animated video media on the interaction of living things with their environment in science learning can improve students' scientific literacy skills.

The success of learning activities in the experiment class certainly cannot be separated from the use of animated video media. In accordance with Kusumahwardani's research (2022), animated video media can help learning activities take place better, which is indicated by the enthusiastic attitude and response of students during the learning process. Animated video media also supports educators in providing stimulus to students, so that they can stimulate students' attention, thoughts, feelings, and interests. In addition Rahmayanti (2018), expressed his opinion that using animated videos can increase the experience and knowledge of students.

The results of this study are in line with Juniati's research (2020), that the implementation of learning assisted by multimedia learning in the form of animated videos has a positive effect in training and

encouraging students' scientific literacy. Animated videos consist of various combinations of sound, text, images, and moving images and are inviting students to communicate and interact so that students can focus on studying the material provided. This supports animated videos in helping, training, and developing students' scientific literacy skills.

CONCLUSION

Significance value (2-tailed) 0.000; $t_{count} > t_{table}$ that is 5,345 > 1,684. These results prove that animated videos in science learning material interaction of living things with their environment have a significant influence on the scientific literacy of seventh-grade junior high school students.

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