

The Effect of Using Water Cycle Animation Videos on the Scientific Literacy and Cognitive Learning Outcomes of Elementary School Students

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ABSTRACT

This research aimed to determine whether there was an effect of using water cycle animation videos on scientific literacy and learning outcomes for class V students at SDN 01 Klopoduwur. This type of research is quantitative, that was experimental research (pre-experimental design) using a one group *pretest-posttest* design, that was an experiment which in its implementation only involves one class as the experimental class. The independent variable in this research was an animated video of the water cycle, while the dependent variable was students' cognitive learning outcomes. The population in this study were all students at SDN 01 Klopoduwur with a total of 149 students, while the sample was class V with a total of 30 students. The data collection techniques used are documentation and tests in the form of essays and multiple choices whose validity has been tested. Data analysis uses descriptive analysis techniques and inferential analysis techniques. The results of descriptive statistics show that the average student scientific literacy *pretest* score is 60.43 and the average student literacy *posttest* score was 83.27 with an average *N-gain* score of 0.57 and an average *pretest* score for student cognitive learning outcomes of 52.77 and experienced an increase after being given treatment with the average *posttest* score for students' scientific literacy being 52.77 and the average *posttest* cognitive learning outcome for students was 74.30 with an *N-gain* value of 0.43. The results of statistical analysis by conducting hypothesis testing using *linear*

regression found a positive and significant influence, so a significance level of 0.05 was required and comparing *Tcount* with *Ttable* so that it could be concluded that the use of water cycle animation videos had a significant effect on scientific literacy and cognitive learning outcomes for students V SDN 01 Klopoduwur.

Keywords: Animation Video, Water Cycle, Science Literacy, Cognitive Learning Outcomes.

INTRODUCTION

Science learning is mandatory in the educational curriculum which is often connected with the way to know nature systematically, so science is not just about mastering knowledge such as principles, concepts and facts but also about the process of discovery (Rahmayanti & Istianah, 2018). Natural science is theoretical knowledge that is obtained specifically. Science is a science that is used as a provision to face challenges in the global era.

The results of observations carried out at SDN 01 Klopoduwur, Banjarejo District, Blora Regency, showed several problems in science learning, they were: 1) The media used as a learning resource was less interesting because it used textbooks. 2) students' skills, that is explaining phenomena and designing investigations as part of scientific literacy, can be said to be quite low.

The first problem regarding media which is considered less attractive to students' attention can be overcome by creating animation-based water cycle media. The second problem is that science is still oriented towards increasing scientific literacy. Low scientific literacy in Indonesia is known according to the results of PISA (program for international students assessment) from several participating countries which were carried out in 2000, 2003, 2006, 2012, 2015 and most recently 2018. Indonesia got unsatisfactory results and most recently in 2018 it was ranked 62nd. 78 participants (Cahyono & Ardhyantama, 2020). Factors that cause low scientific literacy are learning, curriculum and assessment which tend to emphasize aspects of the content dimension rather than context and process (Yaumi, 2017).

Learning media really helps children's mental development, apart from that, the use of media to foster experience can also provide meaningful experiences for students (Supriyono, 2018). Learning is the occurrence of communicative interactions between teachers, students and learning resources spontaneously or non-spontaneously (Rusman, 2011). In an effort to realize a learning process that runs effectively and efficiently, there must be factors that are able to support learning activities, that is in the form of learning media.

Learning media are animated videos that is a display that combines audio and visuals. (Setiawan, 2019) states that the learning process will be more meaningful if it uses animated visual media. Meanwhile (Wardani, 2022) states that animated visual effects are created through the process of creating movement of an object, creating color changes or creating changes in shape to attract students' attention. The use of animated visual media in learning can facilitate understanding, strengthen memory, attract students' attention, and can relate the material to everyday life.

This research will use animated video media. By utilizing interesting teaching media and teaching aids, science learning, which was initially difficult, becomes easy (Widiyatmoko, 2013). Video media can also overcome students' boredom and boredom while studying at home (Ridha & Kastolani, 2021). Animated learning videos are very interesting and real and make students better understand the material the teacher wants to convey. Students not only imagine in their minds but students can see directly so that animated learning video media is one media that can show real objects for students' understanding. When students are interested in animated learning video media, it is easy for students to understand.

Previous research by (Jannah, 2017) stated that the use of audio-visual media in the form of animated videos has a significant influence. In line with research (Hendra, 2017) states that the application of learning videos can increase students' interest in learning science. This is also the same as research (Rajenia, 2018) concluding that there is a significant influence of the application of science learning videos on science learning outcomes. The use of animation media in the learning process can have a good influence on student learning outcomes. This has been proven by several existing studies, such as research by Sunami & Aslam, (2021) stating that the use of animation media has a significant effect on students' science learning outcomes. Also, research by (Maknun & Kamila, 2022) states that the use of animation media in science learning in elementary schools can improve student learning outcomes. This is in line with research by (Ramadhan, 2020) which states that animation media has a significant influence on the science learning outcomes of class IV students. And based on the results of observations in the science learning process which were carried out as initial observations on 27-28 July 2023, in class V of SDN 01 Klopoduwur, Banjarejo District, Blora Regency, it was seen that teacher activities did not pay enough

attention to the use of media in the learning process and teachers did not even use media. learning during the learning process. For this reason, science learning takes place monotonously or lacks variety so that the learning provided by the teacher cannot focus students' attention and causes students to be less enthusiastic about participating in the learning process.

Another obstacle is that student independence is quite low. It can be observed through student initiative, there is no student preparation before learning resulting in students behaving passively during learning (Sugandi et al., 2022). Low independence causes unsatisfactory cognitive learning outcomes.

Teachers need professional development in the application of teaching and skills to improve teaching and learning (Robertson, 2019). In an effort to realize a learning process that runs effectively and efficiently, there must be factors that are able to support learning activities, that is in the form of learning media.

Learning media are animated videos in which there is a display that combines audio and visuals, whereas (Nurdin et al., 2019) states that animated visual effects are created through the process of creating movement of an object, creating color changes or creating changes in shape to attract students' attention. The use of animated visual media in learning can facilitate understanding, strengthen memory, attract students' attention, and can relate the material to everyday life.

The use of animation media in the learning process can have a good influence on student learning outcomes. This is in line with research by Purwanti, (2020) which states that animation media has a significant influence on the science learning outcomes of fourth grade elementary school students. And based on the results of observations in the science learning process which were carried out as initial observations on 27-28 July 2023, in class V of SDN 01 Klopoduwur, Banjarejo District, Blora Regency, it was seen that teacher activities

did not pay enough attention to the use of media in the learning process and teachers did not even use media. learning during the learning process. For this reason, science learning takes place monotonously or lacks variety so that the learning provided by the teacher cannot focus students' attention and causes students to be less enthusiastic in participating in the learning process.

Learning outcomes are the abilities that students have after receiving. success achieved by students, that is student learning achievements at school which are expressed in the form of numbers (Kurniasari et al., 2021). Learning outcomes determine the level of student success which can be seen from the presentation of the values obtained through the learning process, changes in attitudes and behavior that manifest in students, so that students can be said to be successful in learning (Kamil et al., 2021). Learning outcomes are changes in a student's actions because of good learning such as knowledge, interpretation, skills and attitudes which usually involve cognitive, affective and psychomotor (Khasanah et al., 2021)

This has an impact on student learning outcomes in science subjects in class VA, where the average student score obtained from the class teacher is that 35% or only 9 students were able to achieve the KKM target (72). This means that as many as 65% or 13 students have not achieved the set KKM target. Therefore, to overcome this problem, prospective researchers will apply and study the effect of implementing learning videos through research entitled *The Effect of Using Science Learning Videos on the learning outcomes of class V students at SDN 01 Klopoduwur, Banjarejo District, Blora Regency.*

Referring to the problems above, researchers will develop animated video media on the water cycle. According to researchers, the use of animated learning video media in this case can make it easier for educators and students to achieve learning objectives. By using animated

videos, the water cycle learning material can be conveyed smoothly and can be played repeatedly, with this, students will more easily understand the stages and memorize the terms that occur in the water cycle process. The learning video in the form of a water cycle animation is packaged nicely and uses light language so that it can attract students' attention.

MATERIALS & METHODS

The research approach used is a quantitative approach because we want to know whether there is an influence of the application of water cycle animation videos on science literacy and cognitive learning outcomes for class V students at SDN 01 Klopoduwur. This research uses an experimental type of research. The design used in this research is One-Group *Pretest-Posttest* Design. The group was given a *pretest* to determine the initial condition of the students before being given treatment. After being given a *pretest*, then given treatment, then carried out a *posttest*. Finally, compare the *pretest* scores with the *posttest* to find out the results of the treatment. Data collection was

carried out by spreading 10 essay questions and a cognitive learning outcomes test in the form of multiple choice questions with 20 questions.

The research instrument was carried out by validating the test questions with an expert validator, then after that the test questions were tried out on 20 class VI students at SDN 01 Klopoduwur to analyze the validity, reliability, level of difficulty and different strengths of the questions. Based on the results of the validity, reliability, level of difficulty and distinguishing power of the questions, there were 5 questions that were discarded because they were invalid, that was questions number 13, 17, 19, 21, 23 and 20 questions that were used to test students' cognitive learning outcomes.

The data processing technique is by carrying out a prerequisite test, the normality test with Shapiro-Wilk using the SPSS version 24 program. The results of the normality test for scientific literacy and learning and cognitive learning outcomes for class V students at SDN 01 klopoduwur is shown in Tables 1 and 2 below.

Table 1. Results of SPSS version 24 Scientific Literacy Normality Test

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Scientific Literacy <i>pretest</i>	.121	30	.187	.956	30	.174
Scientific Literacy <i>posttest</i>	.121	30	.189	.972	30	.462

Based on Table 1, the results of the normality test using SPSS 24 with the Shapiro-Wilk method, the *pretest* significance results were $0.174 > 0.05$ and *posttest* $0.462 > 0.05$, the *pretest* and *posttest* values were normally distributed.

Table 2. Results of SPSS version 24 Normality Test of Learning Outcomes

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Learning Outcomes <i>Pretest</i>	.142	30	.057	.944	30	.063
Learning Outcomes <i>Posttest</i>	.142	30	.057	.949	30	.088

Based on table 2, the results of the normality test using SPSS 24 with the Shapiro-Wilk method, the *pretest* significance results were $0.063 > 0.05$ and *posttest* $0.088 > 0.05$, the *pretest* and *posttest* values were normally distributed.

Tabel 3. Hasil SPSS versi 24 Uji Hipotesis Literasi Sains

Coefficients ^a						
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta			
1 (Constant)	27.715	16.842		1.646	.111	
Science Literacy	.375	.199	.335	1.883	.001	

Based on these calculations, it seen that the $t_{count} 1,883 > t_{table} 1,701$. Based on criteria, if $t_{count} > t_{table}$ then H_0 rejected and H_a accepted, This means that there was a positive and significant influence of water cycle animation videos on students' scientific literacy.

Table 4. SPSS version 24 results Hypothesis Testing Learning Outcomes

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	37.687	5.220		3.576	.001
	Learning Outcomes	.293	.137	.374	2.133	.042

Based on these calculations, it seen that the $t_{count} 2,133 > t_{table} 1,701$. Based on criteria, if $t_{count} > t_{table}$ then H_0 rejected and H_a accepted, This means that there was a positive and significant influence on the water cycle animation video on cognitive learning outcomes.

RESULT

The description of the data in this research is a general description of each variable which functions as support for the following discussion. The general picture that will be described, will show the results of the initial conditions and the results of the final conditions for each variable that has been studied. In the research, researchers obtained data from the results of multiple-choice tests and *pretest-posttest* essay

questions conducted in class V. Researchers focused on three variables with variable X being an animated video of the water cycle. Y1 is scientific literacy and Y2 is students' cognitive learning outcomes. Researchers are looking for the effect of using animated videos related to water cycle material in fifth grade elementary school. The problem formulation was divided into 2 formulations with data obtained from giving multiple choice tests and essay test questions to students.

Student scientific literacy data was obtained from filling in the scientific literacy essay test questions given to students. The scientific literacy results are obtained by adding up each statement item and can be seen in Table 5.

Tabel 5. Rata-rata Literasi Sains

No	Literacy Science Indocator	Pretest	Posttest	N-gain	Category
1	Knowledge	65,44	85,66	0,58	Medium
2	Context	61,66	86,33	0,64	Medium
3	Competency	56,44	80,44	0,55	Medium
4	Science Manner	58,16	80,66	0,53	Medium
	Average	60,43	83,27	0,57	Medium

Table 5 showed that the highest *n-gain* value for the scientific literacy indicator in class V is for the context indicator at 0.64 in the medium category and the lowest is for the science attitude indicator at 0.53 in the medium category. The overall average *N-gain* is 0.57 in the medium category.

Descriptive statistical results provide a general picture of student learning outcomes in the initial test (*Pretest*) and final test

(*Posttest*). Research data on the cognitive aspect was obtained at the beginning before being given the material (*pretest*) and at the end after being given the material (*posttest*). Cognitive Learning Outcomes consist of C1 (Remembering), C2 (Understanding), C3 (Applying), C4 (Analyzing), C5 (Evaluating), C6 (Creating). The average cognitive learning outcomes for class V can be seen in Table 6.

Table 6. Average cognitive learning outcomes

No	Indicator	Pretest	Posttest	N-gain	Remark
1	Memorizing C1	43,33	72,22	0,50	Medium
2	Understanding C2	57,77	83,33	0,60	Medium
3	Applying C3	40	70	0,5	Medium
4	Analyzing C4	70	79,16	0,30	Medium

5	Evaluating C5	60	64,44	0,41	Medium
6	Creating C6	45,55	76,66	0,57	Medium
	Average	52,77	74,30	0,43	Medium

Based on Table 6, the highest n-gain value of the cognitive learning outcome indicator in class V is the C2 (Understanding) indicator of 0.60 in the medium category and the lowest is the analyzing indicator of 0.30 in the medium category. The overall average n-gain for class V is 0.43, which was in the medium category. Based on Table 4.2, the category $n\text{-gain} > 0.70$ was included in the high category, and $0.30 < N\text{-gain} < 0.70$ is included in the medium category.

DISCUSSION

This research was conducted in three meetings. The first meeting involved giving an initial test (*pretest*), while at the second and third meetings, treatment was carried out in the form of teaching using animated videos on the water cycle material. The activity continued at the fourth meeting with the final test (*posttest*).

At the second meeting, learning material was delivered using the Problem Based Learning (PBL) model. The application of this learning model created a scientific attitude in students, develops problem-solving abilities, and increases attitudes that care about the environment. The teacher does not directly answer students' questions, but rather provides feedback that directs them to recognize the initial concepts they already have. Group discussions are carried out by providing discussion sheets to students to improve understanding of concepts. During this process, students work together and interact, discuss the problems in the Student Worksheet (LKPD), and then present them in front of the class. At the final *posttest* meeting, the *pretest* and *posttest* questions were arranged based on indicators of scientific literacy, they were aspects of knowledge, competence, context and attitudes of science as well as cognitive learning outcomes arranged based on indicators of learning outcomes. This research uses a simple linear regression

effect test according to the criteria if $t_{\text{count}} > t_{\text{table}}$ then H_0 is rejected and H_a is accepted, meaning that there is a positive and significant influence on the water cycle animation video on scientific literacy and cognitive learning outcomes on the water cycle material in class V elementary school. This increase in scientific literacy and cognitive learning outcomes is also influenced by several factors from animated videos, that was involving students in the learning process, development of critical thinking skills, discussion stimuli and good communication.

The Effect of Using Water Cycle Animation Videos on Students' Scientific Literacy

The results of descriptive statistical analysis showed that the *pretest* and *posttest* scores were different. This can be proven from the average value of the results *pretest* learning which is significantly different from the average value of *posttest* learning results. The average *pretest* value was 0.052, while the average *posttest* value increased much more, that was 0.056. The results of the descriptive analysis show that students' scientific literacy after being given treatment in the *posttest* has increased compared to before being given treatment in the *pretest*. This is because the animated video treatment can attract and focus students' attention and not be lazy in doing their assignments. There are 4 indicators of scientific literacy, they were knowledge, context, competence, scientific attitude.

The knowledge aspect which previously had an average of 65.44 during the *pretest* increased to 85.66 during the *posttest* with an *N-gain* value of 0.58, so it has medium criteria. The context aspect which previously had an average of 61.66 during the *pretest* increased to 86.33 during the *posttest* with an *N-gain* of 0.64 in the medium category. The competency aspect which previously had an average of 56.44

during the *pretest* increased to 85.44 during the *posttest* with an *N-gain* value of 0, with a medium category and a science attitude of 58.16 during the *pretest* increased to 80.66 during the *posttest* with an *N-gain* value 0.53 with the medium category. The *N-gain* results from the four aspects of scientific literacy have a range of medium criteria, none of which are low criteria. Based on table 5, it is known that the context aspect has the highest *N-gain* value, while the science attitude aspect is the lowest compared to the other aspects. The increase in average scores and *N-gain* results in the knowledge aspect shows that students' ability to explain and understand concepts, facts and theories that form scientific knowledge has increased. The use of water cycle animation video media helps students understand better and not easily forget the material, information, concepts or learning theories that have been obtained. This is in line with previous research conducted by This is in line with previous research conducted by (Johari et al., 2016) stating that animated media can increase scientific literacy because animated video media is a learning media in the form of audio-visual media equipped with images or frames that move alternately and are equipped with audio as a complement make it easier for students to understand the material to increase their scientific literacy.

Aspects of competence, students' ability to identify issues and use scientific evidence is quite good, but students have a little difficulty in explaining the results of their understanding of scientific phenomena. Based on the research that has been carried out, it can be concluded that the advantages of learning using water cycle animation video media were (1) providing a new atmosphere in learning, (2) students can understand the concept more optimally, (3) Able to increase students' scientific literacy supported by existing LKPD provided, (4) able to increase students' interest in reading (5) The teacher as a facilitator in the learning process means students are active in the learning process, (6) This media is

welcomed by students because it seen from the activities in the learning process.

The Effect of Using Water Cycle Animation Videos on Cognitive Learning Outcomes

Influence is the power that arises or exists from something that helps shape a person's beliefs, actions or character. In this study, what meant by influence is an increase in the mean score of the *pretest* and *posttest*. There was a significant difference in mean scores in students' cognitive learning outcomes as shown by the test scores when giving the *pretest* and giving the *posttest*. The influence was analyzed from the *pretest* and *posttest* score data which were compiled based on cognitive learning outcome indicators. The results of descriptive statistical analysis showed that the *pretest* and *posttest* scores were different. This can be proven from the average value of the *pretest* learning results which is significantly different from the average value of the *posttest* learning results. The average *pretest* score was 52.77, while the *posttest* average score increased much more, that was 74.30.

The results of the descriptive analysis show that student learning outcomes after being given treatment in the *posttest* have increased compared to before being given treatment in the *pretest*. This is due to the use of water cycle animation videos which can attract and focus students' attention and not be lazy in the learning process and doing assignments. There are 6 indicators of cognitive learning outcomes, that was memorizing, understanding, applying, analyzing, evaluating and creating. Students' cognitive learning outcomes experienced the highest increase in indicator C2 (understanding), that was identifying the process of the water cycle. The results of other research using animated videos conducted by Santia et al., (2020) state that the learning process will be more meaningful if using animated visual media because the creation of animated visual effects aimed to attract students' attention

by changing the shape of an object, making color changes, or make changes to form.

An analysis of the *pretest* and *posttest* score data was carried out and it was found that the percentage of students' cognitive learning outcomes had increased quite significantly. The use of media in learning aims to make it easier for students to understand the concepts being studied. The use of media in learning can make it easier to understand the material, encourage students to be active in learning activities and increase learning motivation. The influence of water cycle animation media is shown by increasing students' understanding of the material, which is seen by differences in cognitive learning outcomes before giving *pretest* and *posttest* questions.

Hypothesis testing with the help of SPSS is carried out in two ways, by comparing t_{table} with t_{count} and compare the significance probability values. Based on value t_{table} for $N(28) = 1,701$ and t_{count} around 1.883, a comparison is gained $t_{count} > t_{table}$. On the other hand, to see the significance probability value, the independent sample t-test statistical test was used using the SPSS program. The scientific literacy hypothesis test shows that the value $t_{count} 1,883 > t_{table} 1,701$ then it meets the criteria H_0 rejected and H_a accepted, meaning there was a positive and significant influence of the water cycle animation video on scientific literacy. Hypothesis testing of cognitive learning outcomes showed value $t_{count} 2,133 > t_{table} 1,701$. According to the criteria if $t_{count} > t_{table}$ then H_0 rejected and H_a accepted, meant that there was a positive and significant influence on the water cycle animation video on the cognitive learning outcomes of class V students at SDN 01 Klopoduwur, Blora Regency.

CONCLUSION

Based on the research results, the following conclusions were obtained:

1. The application of the water cycle

animation video to scientific literacy related to systems material in class V has a demonstrable effect before learning the average score was 60.43 then after learning the average score is 83.27.

2. The application of the water cycle animation video to cognitive learning outcomes in class V had an influence, the *pretest* average score was 52.77, then after being given treatment, the *posttest* average score increased by 74.30. This is proven by hypothesis testing with a significance result of 0.000, which meant the significance is smaller than 0.05. The average score of the students' initial test (*pretest*) and final test (*posttest*) increased after being given treatment.

Declaration by Authors

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