USING ANIMATED VIDEO BASED ON SCIENTIFIC APPROACH TO IMPROVE STUDENTS HIGHER ORDER THINKING SKILL

Adri HT[1], **Yudianto SA**[2], **Mawardini A**[3], **Sesrita A**[4]

[134]*Faculty of Teacher Training and Education, Djuanda University, Bogor Indonesia*
[2]*Faculty of mathematics and science education, Indonesian Education University, Bandung Indonesia*

E-mail address: helmifkip@unida.ac.id

Abstract: This research background is the desire to make a change to conventional ways of learning by providing variations in science learning for students, where so far learning has been fixated on old media that are not relevant to the demands of innovation in education namely skill-based learning in the 21st century and the industrial revolution 4.0. The purpose of this study was to determine the effect of the use of video animation based on a scientific approach to the high-level thinking skills of students. The sample in this study were students majoring in Primary teacher education programs in science education, which were determined by cluster random sampling techniques. The study used an experimental methodology with a pretest-posttest control design. T-test results from the results of the analysis of high-level thinking skills scores of students showed a significance value of 0.002 <0.05, proving that the final ability of the experimental class group was significantly higher than the control class. This indicates that the use of scientific animated video approaches influences students' high-level thinking skills.

Keywords: Scientific Approach; Animated video; HOTS

1. INTRODUCTION

Nowadays, students' thinking abilities are sometimes not the focus of educators in the learning classes they enter. Sometimes the teacher's concentration is only on the ability of students to master the understanding of concepts according to what has been targeted in the curriculum. The ultimate goal that many teachers pursue is the target of content-filled achievements so that sometimes ignores the students' deep understanding of all the material presented. Growing the ability to think for students is an important task for educators, where currently, more educators do not require students to master deep thinking skills (Gao, 2016). The ability to think at a high level is one of the abilities students must have to be able to endure any changes that occur continuously in the world of education. (Skidmore, 2004; McConkey & Mariga, 2011; Rose & Howley, 2007) (Anders et al., 2011).

1.1. High-level thinking

1.1.1. Thinking Skills

skills are the ability to combine attitudes, knowledge, and every expertise that enables a person

to be able to shape his environment to be more effective (Anjarsari, 2014). Bloom's statement about thinking skills can be a reference; he states that powers are divided into two parts. The first part is the lower / lower level skills used in the learning process, including remembering, understanding, and applying, and the second group of skills is classified into higher-level thinking skills in the form of expertise to analyze, evaluate, and create (Krathwohl et al., 1964).

1.1.2. Higher Order Thinking Skills

Thinking Skills (HOTS) is an ability possessed by students to be able to think at a higher level than most thinking skills mastered by many people, where students can analyze, evaluate, and create innovations in solving environmental problems (Ichsan et al., 2019). High-level thinking skills, according to Resnick (1987), is a complex thought process for breaking down material, drawing conclusions, to build representations, conduct analysis, and build a relationship involving even the lowest mental activity. Higher-order thinking skills consist of 2 skills: analytical thinking skills and creative thinking skills. Analytical thinking skills include ordering, comparing, evaluating, and choosing. Creative thinking skills involve finding problems (identifying problems), efficiency (generating lots of ideas), flexibility (generating various ideas), originality (generating ideas that are not common), and elaboration (Raiyn & Tilchin, 2016). High-level Thinking Skills are thinking skills that make students able to think critically, analytically, think creatively on a particular problem or situation or information to find a solution (Barratt, 2014). Critical thinking skills are divided into five qualifications, including 1. Elementary clarification, including focusing questions, analyzing arguments, challenging problems, and answers. 2. Essential support, including considering source credibility and making observational considerations. 3. Concluding, including doing and thinking deduction, doing and feeling induction, doing and recognizing the value of the decision. 4. Further clarification, including identifying terms and considering definitions, and identifying assumptions. 5. Strategies and tactics, including determining an action, interacting with others (Nitko, 1996). While other researchers divided HOTS into three categories, namely critical thinking, analysis, and creativity. Indicators of thought in the report are being able to find opinions that are acceptable or logical, being able to distinguish between appropriate material and those that are not suitable that does not match view, can explain more about existing problems, can detect facts and opinions, classify various aspects into domains, as well as questioning the views or opinions of others (Asari et al., 2019). The indicator category of high-level thinking ability is based on the idea of Brookhart (2010) there are several aspects, namely: 1) Analysis, 2) synthesis, 3) Creative thinking, 4) Logical reasoning, 5) critical thinking,) 6) Evaluation

1.2. Scientific Approach

In the context of learning, the scientific process is an integral part. Science as a process becomes absolute to be able to lead students to a deep and sophisticated understanding. When a teacher gives knowledge to students, the scientific method will proceed to provide natural and contextual learning.

1.2.1. Knowledge as Science

In language, the word science is defined as knowledge. The term science comes from scio, scire from the Latin language, which means to know. Likewise, science also comes from the word alim 'from Arabic, which also means to know. So, both science and science etymologically both

say knowledge. In terms of meaning, science is defined as natural science or natural science consisting of sciences and life sciences. Science as a collection of knowledge that conducts a study of empirical facts where the empirical facts intended are facts that are directly experienced by every individual who uses his five senses. Where the conditions that must be met by every knowledge contained in the science are logical, systematic arrangements, and obtained by scientific processes (Suriasmantri, 1985).

1.2.2. Scientific Approach in Learning Scientific

the approach is a learning model that uses scientific principles that contain a series of data collection activities through observation, asking questions, experimenting, processing information or data, then communicating (Kemendikbud, 2014). A country must ensure that scientific knowledge is valuable and must become broad knowledge in society, the state must ensure that public school education reflects and transmits the knowledge generated from a scientific approach (Jensen, 2019). Nowadays, the practice of science education has focused on developing scientific thinking skills related to scientific inquiry rather than memorization skills (Bogar, 2019). Every educator wants a scientific process and a scientific approach to be used in learning, even though prospective teachers and professional teachers differ in terms of practice (Sakin, 2020). The scientific-mind factor consists of two indicators, including scientific attitude and attitude towards science. The scientific perspective consists of nine indicators. The symbol with the highest factor loading value creatively works with others. Attitudes toward science contain four indicators. The sign with the highest factor loading value is the awareness of the importance of science (Chokchai & Pupat, 2018). In scientific investigations, socio-scientific issues can be used to support perceptions and achieve success in line with scientific literacy targets (Lederman, Antink & Bartos, 2012). Scientific inquiry is closely related to a scientific process. It dramatically contributes to the ability to improve student skills such as observing, making conclusions, classifying, predicting, measuring, conducting investigations, interpreting, and performing data analysis (Memis & Cevik, 2017).

1.3. Video Animation

The 21st-century skill era and the 4.0 industrial revolution made technology one of the essential indicators of the skills or abilities that a person must have to be able to keep abreast of all the time. This also becomes a burden for teachers to be able to apply their implementation in each learning activity. Using technology is an integral part of the teaching and learning process that is emphasized to every teacher today. Teachers who cannot teach using technology will be considered outdated and backward in learning. Although the essence of knowledge does not fully require technology, the demands of the outside world on the profile of graduates of an educational institution require students to understand technology.

1.3.1. Learning Media

Media is a tool to convey knowledge to students so that learning is easier to understand and more enjoyable. Media is the maximum utilization of all system components and learning resources to achieve specific learning goals (Miftah, 2013). In learning, concepts are the main thing; mastery of topics/concepts is the basis and prerequisites for understanding other ideas (Rohaeti et al., 2019). It can be concluded that to understand students about the correct concept, a media or tool is needed to convey the idea so that students easily understand it. Also, the media is required so that the concepts that are given can be memorable and adhere firmly to students' thinking. The right media will greet messages that are easy to digest and can visualize abstract things become more real. 1.3.2. Animation Video as a Science Learning Media The

implication of every condition that requires technology is that it will demand the world of education to be more adaptive in developing various learning tools and media by involving information technology so that the entire learning process will be able to run more effectively (Muchlas, 2018).

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2. METHODS

This research uses quantitative research types with experimental methods. Experiments do not focus on what happened in the past, but what is being given to students, and then we evaluate it (Repko, 2008). Experiments were carried out on 42 students in elementary school teacher education courses in science education courses in primary schools with the material "Important concepts in science learning"22 students as the treatment class and 20 students as the Control class. Data is taken by using pre-post test questions in the form of HOTS questions. The items given are arranged based on indicators of the content of the material and indicators of high-level thinking skills. The application of scientific video animation using media is assessed using the observation instrument of the implementation of learning activities.

3. RESULTS AND DISCUSSION

Results

Results Data from the research results were obtained using HOTS questions on basic material concepts of science. The results of the experimental data show that the average mastery of the concepts of innovative class students is higher than the average value of students in the control class. The difference in the average cost of students can be seen in Table 1

Table 1 Standard Deviation

Group Statistics

	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Hasil IPA	Kelas A	22	80.6909	8.28176	1.76568
	Kelas B	20	70.9000	10.51265	2.35070

Table 1 above shows that the average difference in posttest students is at a difference of 9.70. This difference indicates that the mastery of the concepts of the experimental class students is superior to the control class. While based on the independent sample T-test on the average value of students can be seen in Table 2

Table 2 Independent Sample T-Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil IPA	Equal variances assumed	2.946	.094	3.369	40	.002	9.79091	2.90655	3.91654	15.66527
	Equal variances not assumed			3.330	36.093	.002	9.79091	2.93997	3.82891	15.75291

Table 2 can be seen that the results of the Independent sample T-test, sig. It is 0.002, where this value is less than 0.05. This shows that there are differences between the classes that are treated using video animation based on a scientific approach to conventional learning or usually continuously used for education, of course, without a video animation that is scientifically approached. For more clear differences in the scores/scores of pre-test and post-test students in the treatment class and the scores obtained by students in control, the course can be seen

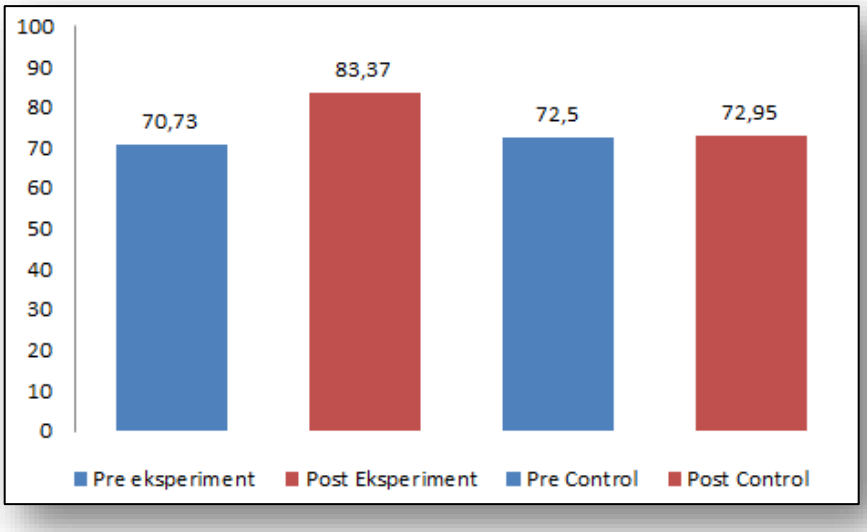

Figure 1 Pre-post Score Chart

We can see the difference in changes in students' mastery of concept skills towards Matei content provided is at the time pre and post-test. For the students' concept mastery score at the time of the pretest, the difference between the experimental class and the control class is not so significant because, in terms of ability, respondents in the implementation class and the control class are homogeneous abilities. However, in the posttest score, significant differences in the students 'mastery of concept concepts were obtained, this can be a note that the use of scientific animated video approaches affected the students' concept mastery abilities. This study aims to find out the improvement of students 'high-level thinking skills, to test differences in students' abilities after the use of scientific-animated video media with classes that do not use scientific-based animated videos. Data on the level of thinking ability of high-level students is presented in Figure 2 below:

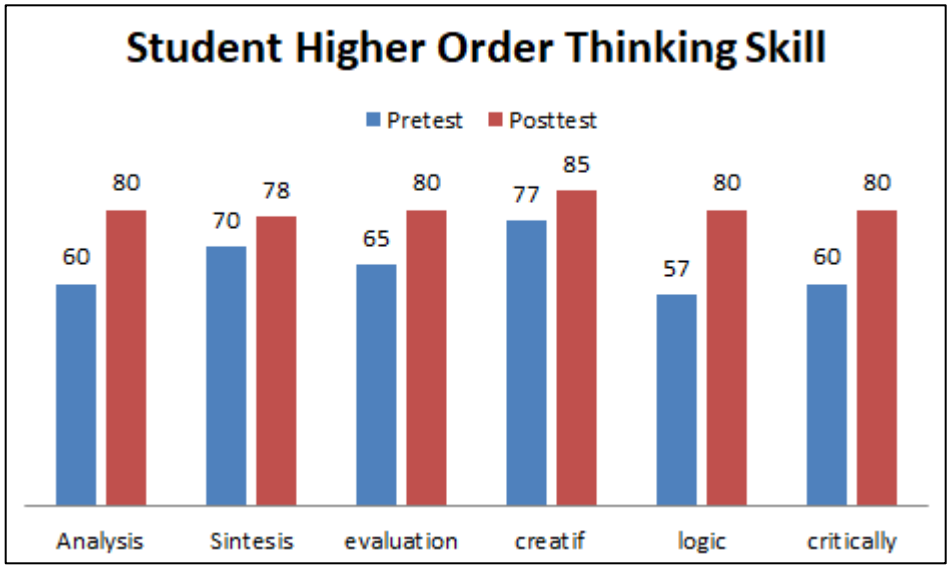

Figure 2 Students HOTS in the experimental class

Figure 2. The ability to think of senior students in the innovative class showed a significant difference between pretest and posttest. For students 'analytical skills, the difference between pre-post is 20%, while the synthesis ability has increased by 8%, which is lower than the increase in analytical skills students'. The highest increase in capacity is the ability to think students logically by 23%. This is because the material presented through scientific video animation includes visualization that helps students think logically by giving a real picture or evidence of things that are considered illogical by students.

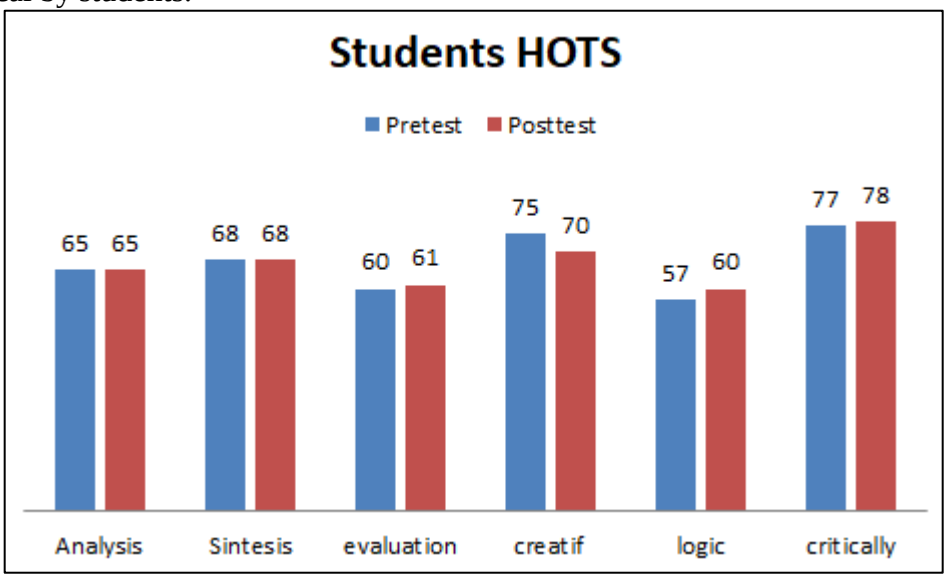

Figure 3. The ability to think high-level control class

In Figure 3, the research findings show data that the control class or students who did not receive treatment using a scientific video animation with a lower increase in high-level thinking skills compared to the experimental category. The ability to analyze and synthesize doesn't even change at all. In the data, it can be seen that the strength of student creativity decreases while the ability to think critically, experiencing yang is very insignificant, namely under 5%. Likewise, the results of the ability to evaluate and think logically students, all of them are in the category of negligible improvement.

Discussion

Students' high-level thinking skills are measured through the use of questions arranged according to the categories of high-level thinking skills, which are questions containing analytical, synthesis, evaluation, creative, logical, and critical abilities. The ability of students to solve problems with high-level thinking skills will train students at complex thinking stages, where students will be increasingly honed in their thinking abilities so that they become more mature and develop optimally. Before completing questions containing high-level thinking skills, students are first given exciting and challenging learning by using animated video based on a scientific approach. Where the animated video presented includes scientific concepts taught to students at school by submitting the scientific side of each conception. The experimental side that is intended is the presentation by showing things that are real and real but also reveals items that contain mystery in the context of science that will be puzzles for students to solve.

The results of the pretest and posttest showed a significant difference between the experimental class and the control class. Where the trial class is superior in terms of the ability to master the concepts of the material presented, this proves that video animation media used affects the understanding of students 'conceptions and students' high-level thinking abilities. This finding is in line with the results of research Hwang et al. (2012) which states that an animated video is an active media because the video presents a more flexible media and can support learning activities undertaken by the teacher, the video can explain concepts related to mechanisms or processes, media can also be repeated and stopped according to student needs. It was also found by Yusuf et al. (2017) that the use of animation media in learning is more interesting for students than the use of other media. This is also evident in the control class data, where the increase experienced by students is very insignificant, and it can even experience a decrease in inability. The decline experienced by students in the control class can be caused by various things that become obstacles or obstacles. However, when this (decrease) does not occur in the experimental category, this is sufficient initial evidence that the media used is very working and has an effect on increasing the ability of students in learning. The decline in students' knowledge in the control class is in the ability to think creatively. While in the experimental category, the ability to think creatively is quite high. The conclusion that can be drawn from this is that if students are taught to use animated video with a scientific approach, the students' creative abilities will increase significantly. The effect of this experimental video animation media is a very positive influence on students' high-level thinking skills.

4. CONCLUSION

This study found evidence of the importance of using new and educational media for students. The use of media in the form of animation videos based on a positive approach makes a very significant difference in the ability to master concepts or the ability to think at a high level of students. This also proves that students today not only need content or material as knowledge, but teachers should also provide high-level thinking skills for students. In the future, for researchers who will examine the same thing related to animation for learning activities and research about higher-level thinking skills, it is expected to be able to use all possible aspects such as collaboration or combining technology aniamsi or technological sophistication with the ability of teachers in mastering content and the teacher's ability to use the technology itself, which in this research has not been able to present data seen from the possible influence of the teacher's skill in mastering the

concepts to be taught as well as the teacher's ability to use technology in the classroom learning.

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