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Students' Critical Attitude through Practicum Videos Based on the RADEC Model on the Topic of Water Cycle in Elementary Schools

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Abstract. A critical attitude is one of the scientific attitudes that students must have when studying science. The pandemic condition that requires students to study online is an obstacle for teachers in applying the nature of science as a whole. Practical videos can make it easier for students to understand learning materials and increase student learning motivation. This study aims to describe students' critical attitudes through practicum videos based on the RADEC model on the water cycle material. This type of research is descriptive qualitative research. This research was conducted at El Fitra Elementary School, Antapani, Bandung, West Java, Indonesia. The subjects of this study were 29 elementary school fifth grade students. This study uses three data collection techniques, namely observation, interviews, and documentation. The results showed that a small number of students' critical attitudes emerged during learning through practicum videos based on the RADEC learning model. Based on the RADEC learning model, this practicum video makes students active in making hypotheses when carrying out science experiments. In addition, it can provide a meaningful experience when learning science, especially on water cycle material.

Keywords: Critical Attitude, RADEC Model, Practicum Video

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INTRODUCTION ~ Science education plays an essential role in preparing students who can think critically, creatively, logically, and have ideas in facing the era of globalization. Science is the knowledge accumulated over time through a scientific process to produce new knowledge Science is not only the mastery of a collection of facts, concepts, principles, or laws but is a process of discovery. Science is formed based on scientific products, processes, and attitudes (Yunita & Wijayanti, 2017), which is called the nature of science. The nature of science can provide essential background on how science and scientists work and how scientific knowledge is created, validated, and influenced (Anggraeni & Widodo, 2019).

Practicum as a part of the nature of science is a process aspect that cannot be separated from other aspects. Subiantoro, (2014) said The science learning process should emphasize providing direct experience to develop competence in exploring and understanding nature scientifically. Science learning is directed at inquiry and action to help students gain a more meaningful understanding of their natural surroundings (Subiantoro, 2014). Learning with a process skills approach is ideal learning for meeting the demands of the application of scientific processes and scientific attitudes. In general, learning with this process skills approach can be done through inquiry-based learning or practicum-based learning.

A scientific attitude is an attitude that must exist in a scientist when dealing with scientific problems. One of the scientific attitudes that students must have when studying science is a critical attitude. Anwar (2009) said that this critical attitude is seen in the habit of seeking as

much information as possible related to the field of study to compare its advantages and disadvantages, whether it is suitable or not, whether it is correct or not, and so on. A critical attitude will strengthen the stance (persistence) and dare to have different opinions. The weak critical attitude of students towards understanding science can make it difficult for students to apply it in everyday life (Middleton, 2019). The low ability of students' scientific critical attitude can be caused by several factors, namely the low ability of students to express their opinions, the low level of student accuracy in connecting the information obtained in the learning process (Anwar, 2009).

One learning model that has been proven to improve students' critical attitude skills is the RADEC (Read, Answer, Discuss, Explain and Create) model. Previous research has shown that the application of the RADEC model assisted by the Zoom application significantly affects critical thinking skills and science learning outcomes for sixth-grade students at SDN Kalukuang 1 Makassar(Ilham S, Muhammad, Syarifuddin, Kune, 2020). In addition, research Satria & Sopandi, (2019) shows that primary science teachers are not oriented towards increasing critical thinking among students because very few students show a critical attitude. Sopandi (2019) said that the RADEC model is an alternative solution for teachers in Indonesia who find it challenging to organize learning by the demands of the times, one of which is the demand to teach and familiarize students with critical attitudes.

The RADEC learning model believes that all students can learn independently and learn more about knowledge and skills (Sopandi, 2017). The RADEC learning model emphasizes students carry out various steps in learning such as reading, discussing, explaining, exploring, solving problems, and creating works. This activity is an acronym for the RADEC model name, namely Read, Answer, Discuss, Explain and Create. (Sopandi, 2017) said that the RADEC model made the syntax easy to memorize to be an answer to teachers' misconceptions about innovative learning models.

After making observations at El Fitra Elementary School in Bandung regarding science learning, the fact is that science learning only teaches product aspects. Based on an interview with one of the teachers, aspects of the scientific process and attitude find it challenging to learn because of the COVID-19 pandemic hitting Indonesia, which requires online learning. Practical activities as science process skills are rarely applied as well as scientific attitudes which are a unity. The incompleteness of the aspect of the nature of science hurts the concepts of science that students will accept and understand (Rahayu & Widodo, 2019).

The RADEC model-based practicum video utilizes technology and networks in learning through practicum activities. Video can be used as an audio-visual learning medium because it makes students more motivated and happy to learn. It has an impact on increasing student learning outcomes. The practicum video that explains an experimental experiment and its simulation can make students learn independently and encourage them to understand the concept of the material.

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Based on this view, the primary purpose of this research is to describe students' critical attitudes through a practicum video based on the RADEC model on water cycle material. Specifically, this study aims to: (1) describe learning activities by applying the RADEC model-based practicum video, (2) describe students' critical attitudes through the application of the RADEC model-based practicum video, (3) describe student responses to the RADEC model-based practicum video. The benefits that are expected to be an alternative problem-solving in implementing science learning include all the nature of science during the online learning period. In addition, it can foster students' critical attitude with the existence of a practicum video based on the RADEC model.

METHOD

This type of research is descriptive qualitative research and includes field research. Descriptive-qualitative research is research on the status of human groups, or objects, a condition, a system of thought, or an event at present, to make a systematic, actual, and accurate description, picture or painting of facts, characteristics, and the nature and relationship between the phenomena under investigation.

This research was conducted at El Fitra Elementary School, Antapani District, Bandung City, West Java, Indonesia. The type of data used as a research study from scientific writing results from observing learning activities by applying a practicum video based on the RADEC model. The subjects of this study were 29 fifth-grade students of SD El Fitra.

This study uses three data collection techniques, namely observation, interviews, and documentation. The interview technique was obtained from the class teacher who was the subject of the research. Observation technique, obtained when observing learning activities. While the documentation technique was obtained from students when filling out a practicum video response form based on the RADEC model. The research instruments that the author uses are observation and interview guidelines. At the time of observation, the authors made direct observations of the object under study. The object is a Class V science learning activity for water cycle material by applying a practicum video based on the RADEC model. Learning is carried out online through the Zoom cloud meeting application and WhatsApp.

The tools used in this study were student response sheets to the video practicum shown in the form of a google form and a critical attitude observation sheet that had to be filled out by four observers. The data collection procedure went through two stages, namely the preparation stage and the implementation stage.

Data processing in this research is written (documentation data) and unwritten (field data). Therefore, based on the mapping, the written and field data obtained will be analyzed, compared, and categorized, and then a descriptive analysis or comparative analysis will be carried out. Once collected, there are two ways to conclude, first by the inductive way, namely drawing conclusions based on specific things. The second method is deductive, namely, concluding general things.

RESULTS

RADEC Model Learning

Learning by implementing a practicum video based on the RADEC model is carried out in one face-to-face meeting through the zoom application and a meeting through the WhatApp Group. Before showing the practicum video, students learn first by applying the RADEC model, namely the Read, Answer, Discuss, Explain step. A detailed description of the RADEC learning can be seen in the following table.

Table 1. Student Activities According to the RADEC Model Syntax

Syntax	Student Activities
Read	Students were given nine pre-learning questions through the WA group. Here are the pre-learning question: 1. What is meant by water? 2. What are the benefits of water for humans, animals and plants? 3. Where does the water on our earth come from? 4. How does rain occur? 5. What is acid rain? 6. What are the factors that cause acid rain? 7. When our dry season rarely rains, where is the rain during the dry season? 8. Can rainwater be drunk directly? 9. In some areas, there are many problems with the difficulty of getting clean water. How to solve the problem of clean water scarcity?
Answer	Students are instructed to find out independently the answers to pre-learning questions from any source that is accessible to students. The answer is understood first.
Discusss	The Discuss stage is carried out face-to-face online through the Zoom cloud meeting application. At this stage, the teacher divides the students into four groups. Each group enters the zoom room, which has been divided into four rooms. Each room is accompanied by a companion teacher who will monitor the discussion. Each group discusses the answers to the pre-learning questions to obtain the conclusion of the answers for each number. In addition, students were instructed to discuss what work they would do related to the water cycle. After the discussion is over, students return to the main room to continue learning.
Explain	Representatives of students from each group presented the results of the answers to each number in front of other friends. The answers presented are answers that are different from other groups. After each group presents their answers, the final answers to each question are concluded.

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After the students explained the results of their discussion at the explain stage, it was continued by showing a practicum video about the water cycle. The video contains pre-experimental questions, hypothesis questions, explanations, and follow-up questions. This pre-experimental question should be answered only by doing a practicum. Hypothesis questions are questions that require students to hypothesize when practicum steps are carried out. The explanation is an explanation of the functional relationship with the water cycle. Follow-up questions are questions that require students to think critically and are related to contextual problems. When a question is shown, pre-experimental questions, hypothesis questions, and follow-up questions, the video will be paused for a moment until several students can answer them. After that, the video will resume again. The detailed contents of this practicum video can be seen in the following table.

Table 2. Description of Practicum Video

Step video	Description
Pre-trial Questions	At the beginning of the video, pre-experimental questions are presented as a stimulus to the concept to be studied. The pre-trial questions include: "Where does the rain come from?" "How is the process of forming rain?"
Hypothesis Question	Hypothesis questions are presented after each step of the experiment to see students' hypotheses about what will happen. The tools, materials, practical steps, and hypothetical questions are as follows: Tools and materials: beaker, spirit burner, tripod, plate, lighter, water, and ice cubes. Experiment steps: 1. Put 200 ml of water into a beaker glass, then heat it for about 10 minutes on a spirit stove. Hypothesis question: "What do you think will happen once the water is heated?" 2. After 10 minutes, turn off the spirit stove 3. Cover the beaker glass with a plate filled with some ice cubes. Hypothesis question: "What do you think will happen to the water vapor after it has been left for a few minutes?" *After letting it sit for a while, the water vapor disappeared.* Hypothesis question:

	"Where did the water vapor go?"
Explanation	After a series of practical steps is completed, a thorough explanation of the experiment is presented. After that, a question is presented about the relationship between the experiment and the process of rain. Then proceed with explaining the relationship between the experiment and the process of rain and the actual concept.
Follow-up questions	Follow-up questions include: 1. When the water vapour evaporates and then condenses again, will the amount of water be the same as the amount of water before? Experiment to prove it! 2. Does it have anything to do with the amount of water on earth? 3. In your opinion, will the water on earth gradually decrease, increase, or remain? Give me your reason!

After showing the video, students were instructed to do work related to the water cycle. Assigned works are not limited, meaning that students are free to make whatever works as creative as they are. Making this work is the last stage of the RADEC learning model.

Critical Attitude

A critical attitude towards learning through practicum videos based on the RADEC model has appeared in most students. The results of observations regarding the critical attitude can be seen in the following table.

Table 3. Critical Attitude Observation Results

Critical Attitude Indicator	Finding Description
Students doubt the findings on the experiment	All students did not doubt the findings in the experiment, so the indicator of this critical attitude did not appear.
Students actively hypothesize at each step of the experiment	Most of the students actively hypothesized when observing the experiment. So that this indicator has appeared to most students well. Although there are some students who only actively hypothesize in one ste.
Students ask for any changes/new things	A small number of students actively ask for new things or new changes. Thus, this indicator still appears slightly during learning.
Students repeat the activities carried out	Most of the students repeated the experimental activities at home and were creative in replacing the tools and materials with those that were easily found.

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Students question the findings of the observations	Students do not question the findings of their experiments. So it can be said that this indicator still appears a little at the time of learning.

Student Responses to Practicum Videos

These student responses are presented in the form of student statements regarding the practicum videos that have been watched and studied. Indicators regarding the response are made in a google form, and students fill in according to what they feel when learning practicum through video. Detailed results can be seen in the following tabl

Table 4. Student Responses to Practicum Videos

No	Indicator	Rating range (%)			
		4	3	2	1
1	The initial appearance of the interesting practicum video media	34	59	7	0
2	The display of practicum video media makes me enthusiastic about learning	41	45	14	0
3	Practical video media can stimulate my curiosity	31	52	14	4
4	The explanation of the practicum video made me understand	31	48	17	5
5	The practical video makes me want to try to put it into practice	24	28	38	10
6	The use of practicum videos in the learning process makes it easier for me to understand the concept of the water cycle	41	48	7	4
7	I found many new things from the learning process using practicum videos	38	48	10	4
8	I did not focus, because the delivery of the material was too fast.	10	37	24	28
9	I paid less attention to the practicum in the video because it was too difficult	10	28	38	24
10	The practical video presented is easy to implement	14	55	28	4
11	The language style in the practical video is interesting	34	59	4	4

12	The sound effects in the practicum video are boring	17	41	28	14
13	Work procedures practicum videos are easy to understand	21	62	14	4
14	The information I got from the practical video shows is beneficial	52	31	10	7
15	The practical video helped me master the concept of the water cycle without the help of others	21	45	28	7
16	The practical video provides an interesting experience regarding science learning, especially the water cycle material	52	41	3	3
	Amount	29	45	18	8

Overall, from the table, it can be said that the student's response to the practicum video was excellent, as seen from the percentages obtained in the range of values 4 and 3 as much as 29% and 45%. The best response from some of these indicators is on indicators number 14 and 16, with the percentage in the range of values 4 being 52%. That way, it can be said that students get helpful information from the practicum videos presented. In addition, it can provide an exciting experience regarding science learning, especially on water cycle material. Meanwhile, the students' lowest responses were on indicators number 8 and 9 with percentages in the 1st range of 28% and 24%. That is, the practicum video is too fast, so that it makes students unfocused. Other than that.

DISCUSSION

Attitudes towards science are considered essential because they can affect student performance and improve student achievement (Kurniawan et al., 2019). One of the scientific attitudes that students must have when studying science is a critical attitude. Anwar (2009) said that this critical attitude is seen in the habit of seeking as much information as possible related to the field of study to compare its advantages and disadvantages, whether it is suitable or not, whether it is correct or not, and so on. Guided inquiry learning models and conventional learning can improve students' critical thinking skills (Jayadinata & Gusrayani, 2016). Students must have a critical attitude in science learning to find concepts independently with direct experience (Widya et al., 2019). In this study, only a small number of students' critical attitudes emerged during learning. Students feel that the material being taught is complex, so they tend not to pay attention to it. In addition, it can also be caused by a lack of student motivation in learning. Students' learning motivation when learning online is decreasing. Low learning motivation is caused by more interesting playing time, such as online games (Masfiah & Putri, 2019).

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Learning that links technology can support the development of students' critical thinking (Hong et al., 2021). The problem-oriented RADEC learning model is proven to improve critical thinking (Anggraeni et al., 2021). The existence of a practicum video based on the RADEC model makes students more active in learning but has not provided the best solution to bring up students' critical attitudes during learning sains. One of the learning videos is a practicum video, effectively implemented during the Covid-19 pandemic. It makes it easier for educators to teach material and make it easier for students to understand learning material. (Rida, 2021). Students will easily understand complex material or material that requires practicum with the display of learning video media (Busyaeri et al., 2016).

Learning using the RADEC Model-Based Practicum video is proven to make students active in hypothesizing. Students can quickly formulate hypotheses that will occur. A hypothesis is a fundamental skill that must be practised and trained in teaching science (Salsiah, 2015). Scientists commonly use this hypothetical thinking ability to answer a natural phenomenon or solve problems. The ability to hypothesize can be influenced by several things, namely the learning process, students experience and practice, understanding of concepts, and students' enthusiasm when doing tests (Dwi Andani & B Prastowo, 2018).

Based on students' responses to the practicum video, several indicators related to learning motivation have a good percentage with scores in the range of 3 and 4 around 31%-52%. With practicum videos, students become faster in understanding the concepts of the material being taught. Teachers can teach concepts from material and help educators explain abstract things into concrete with the help of videos (Nurdin et al., 2019). Practical video media can make it easier for students to understand learning materials and motivate students to study independently at home. According to Ribawati, (2015) that the use of video media has an effect on students' learning motivation.

It's just that the practicum video based on the RADEC model is considered difficult for students, so some students choose not to pay attention to it. In addition, the video is too fast, so that students find it challenging to digest each material concept in the video. If video media is packaged in an engaging, fun, and easy-to-understand way, it can also help parents guide their children to study at home (Rida, 2021). Educators are also helped in instilling good character in students.

CONCLUSION

Critical attitude, as one of the scientific attitudes that students must have when studying science, is still a small part of students. Practising practicum videos based on the RADEC model is still ineffective in raising students' critical attitudes during online learning. This RADEC model-based practicum video has a good influence on students' learning motivation. Students can quickly learn science concepts and provide meaningful experiences in learning science. In addition, students become more active in hypothesizing when carrying out practicum.

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