

# Analysis of Critical Thinking Skills and Environmental Care Attitudes Through a Problem Based Learning Model Assisted by Natural Laboratories in Science Subjects

Nanik Maharani<sup>1</sup>, Bambang Ismanto<sup>2</sup>, Heni Safitri<sup>3</sup>

<sup>1,2,3</sup>Department of Primary Education, Postgraduate Program, Open University, Semarang, Indonesia.

Corresponding Author: Nanik Maharani

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## ABSTRACT

Learning is carried out using scientific methods, and one of the strategies used is a problem-based learning model that can help students become more proficient in critical thinking. The purpose of the study was to analyze the ability to think critically, the attitude of caring for the environment of students through a problem-based learning model assisted by a natural laboratory in science subjects. This study used a quasi-experimental research design with quantitative data analysis. The population in this study was grade VI students of public elementary schools in the Pangeran Diponegoro Cluster. Determination of research subjects by purposive sampling there are 4 students from 22 experimental class students consisting of one low student, two medium students, and one high student. The researcher as an instrument is equipped with observation sheets, test questions, interview guidelines, documentation. The results showed that learning using the Problem Based Learning model assisted by a natural laboratory can increase the improvement of critical thinking skills and environmental care attitudes in science learning for grade VI students at SDN 1 Nglendeyan and SDN 4 Ngraho. The data shows that the Sig. (2-tailed) 0.000 which is smaller than 0.05 then H<sub>0</sub> is rejected and H<sub>1</sub>

is accepted, meaning that there is a difference in the average post-test scores of the Nglendeyan class and the Ngraho class where the average value of the Ngraho class is 84.14 greater than the Nglendeyan class which is 63.91. Based on the results of the above research, there is an increase in the implementation of the Problem Based Learning model in science learning on critical thinking skills and environmental care attitudes assisted by natural laboratories on Class VI Plant Breeding material, there is an influence on environmental care attitudes and critical thinking skills of students during the learning process, and there is an increase in learning designed on critical thinking skills, and the formation of environmental care attitudes.

**Keywords:** Problem Based Learning, Nature Laboratory, Critical Thinking, Environmental Care Attitude.

## INTRODUCTION

The progress of a nation is determined by the quality of human resources, while the quality of human resources depends on the quality of education. The role of education is very important to create intelligent and highly competitive human beings to face XXI century learning (21), by mastering 21st century skills, students will have the adaptive qualities needed to adapt to the environment

(Ferdinandus & Desak, 2018). For this reason, there needs to be meaningful learning, the indicators must vary, ranging from Lower Order Thinking Skills (LOTS) to High Order Thinking Skills (HOTS). If the learning is meaningful, it is hoped that the habit of critical thinking will arise in students, by using this skill, students will be better able to store the knowledge they will need in the future (Sani, 2019).

Various teaching strategies can be used to develop students' critical thinking capacity as well as make science lessons more engaging and applicable. An effective teaching method to increase students' environmental awareness is problem-based learning. Problem based learning (PBL) is an inquiry-based learning approach whose problems are used as the starting point for learning (Shofiyah & Wulandari, 2018).

Students' inability or lack of desire to answer HOTS category questions indicates a lack of critical thinking skills. Teachers need to be able to choose a learning model that supports critical thinking in order to help students develop their critical thinking skills. Instructors can help students develop their critical thinking skills by choosing the appropriate learning style. The learning process is carried out with scientific methods, and one of the strategies used is a problem-based learning model that can help students become more proficient in critical thinking. This is in accordance with research conducted by Herzon et al. (2018:45), which found that PBL has proven to be beneficial in improving students' critical thinking skills. This is so that children can learn to think critically and think at a higher level through PBL. Learning will be effective and successful if PBL is carried out with the right protocol.

This is not in accordance with the science learning of grade VI students at the Prince Diponegoro Cluster, Kedungtuban District, Blora Regency. Based on data collected from the Class VI Teacher Working Group Activities of the Prince Diponegoro Cluster in 2023, most Class VI teachers have not fully included the problem-based learning

model. This problem arises because teachers still use traditional teacher-centered teaching strategies in their lesson plans, making learning look boring and uninteresting. Researchers' observations in class VI semester 1 of the 2023/2024 school year at the Prince Diponegoro Cluster, Kedungtuban District, Blora Regency with a total of 283 students in science subjects and the material "Plant Breeding" are known that students can complete assignments by solving problems. Based on the material on plant propagation generafic, 68 students achieved KKM 70, in other words only 24% were able to achieve KKM completeness. while those who were unable to complete the KKM were 215 students or 76% who were not able to achieve the completeness of the KKM. The maximum score achieved is 90, while the lowest score is 30.

This shows that there are problems in the implementation of teaching and learning activities. By using the PBL learning paradigm and nature laboratories, it is hoped that students can observe various plants directly. Therefore, practicum is needed in Science Education. Because direct observation exercises are an effective way for students to learn. One of the challenges in implementing practicum in schools is the lack of adequate infrastructure. Utilizing the outdoors as an open-air laboratory is one way to get around it. The goal is to provide students with a more satisfying educational experience that will affect their learning goals. An open laboratory called a "nature laboratory" can be in the form of a school park, park, forest, or other surrounding area. It can also be a social, technological, or cultural environment that can be used as a tool or source of teaching. In its natural state, hands-on learning involves teaching children to explore possibilities, information, and ask questions. It also involves their involvement in activities, observing, finding, collecting data, and being able to analyze and draw conclusions on their own.

Based on the description mentioned above, the following problems can be formulated: (1) Is the implementation of science learning

with the Problem Based Learning model to improve critical thinking skills and environmental care attitudes in the natural laboratory of class IV plant breeding materials effective? (2) What is the influence of students' environmental care attitude and critical thinking ability during the learning process using the Problem Based Learning model in the nature laboratory? (3) How does the process of improving the designed learning impact critical thinking skills, and the formation of an attitude of caring for the environment? The objectives of this study are: (1) To determine the effectiveness of science learning with the Problem Based Learning model to improve critical thinking skills and environmental care attitudes in the natural laboratory of class VI plant breeding materials. (2) Knowing the influence of students' environmental care attitudes and critical thinking skills during the learning process using the Problem Based Learning model in the nature laboratory. (3) Knowing the process of improving learning on critical thinking skills, and the formation of an attitude of caring for the environment.

## **MATERIALS & METHODS**

This study uses a quasi-experimental research design (Quasi Experiment). Research method is a way of solving research problems that is carried out in a planned and careful manner with the aim of obtaining facts and conclusions to understand, explain, forecast and control the situation" (Syamsuddin and Damayanti, 2011, p. 14).

In this study, a single type of treatment was used in a quasi-experiment with a pretest-posttest control group design paradigm. In this strategy, an initial test, or pretest, is given to both groups before starting therapy to measure the initial condition. In addition, treatment was given to the experimental group while no treatment was given to the comparison group. Post-test was given to both groups after the treatment was completed (Bambang Prasetyo and Lina Miftahul Jannah, 2005: 162).

In experimental research using a pseudo-experimental pattern, group members were

first randomly selected, followed by stimulus, and finally post-test questions. In contrast, the comparison class (control class) was assigned into groups first, followed by the post-test questions. tests that have no input (conventional learning).

The research design of the two sample groups was divided into an experimental group and a control group for the pretest-posttest control group research design. A pretest that measures students' initial abilities before carrying out learning activities is given to both groups. The experimental group then received treatment using problem-based learning activities assisted by a specially made nature laboratory. Meanwhile, the control group completed the hands-on exercise using the verification design as a comparison material. After participating in the learning, students at the end of the activity were given a posttest in the form of test questions. The increase in pretest and posttest scores of both groups served as a benchmark to examine how problem-based learning with the help of natural laboratories affected science subjects.

The population in this study is all students from grade VI elementary school in the Prince Diponegoro cluster in 2022/2023 consisting of 18 state elementary schools. The number of samples in this study is 283 students. Sampling was carried out by purposive sampling technique. Heterogeneous groups that have different levels of ability, namely, low, medium, and high. The subjects of purposive sampling were 4 students from 22 students in the experimental class consisting of one low student, two medium students, and one high student. The procedure for determining group membership, namely the researcher looks at the value of the previous material and asks the teacher to determine the subject of the research. Based on the score, the researcher divided it into three categories, namely 25% of the low group, 50% of the medium group, and 25% of the high group.

## RESULT

1. Implementation of science learning with the Problem Based Learning model to improve critical thinking skills and environmental care attitudes in the natural laboratory of effective class VI plant breeding materials.

It is known that from a total of 44 respondents, the average score of the post test of the Nglendeyan sample group was 63.91 with a standard deviation of 5.773 while the average score of the post test of the Ngraho sample group was 84.14 with a standard deviation of 4.411. A score of Sig. (2-tailed) 0.000 was obtained where it was less than 0.05, then H0 was rejected and H1 was accepted, meaning that there was a difference in the average score of the post test of the Nglendeyan class and the Ngraho class where the average score of the Ngraho class of 84.14 was greater than that of the Nglendeyan class which was 63.91.

2. The influence of environmental care attitudes and students' critical thinking skills during the learning process using the problem-based learning model in the nature laboratory

It is known that the value of Sig. in the variable of critical thinking ability is 0.052, the value of Sig. in the variable of Environmental Care Attitude is 0.181, and the value of Sig. in the variable of the post test value is 0.061 where all are greater than 0.05, it can be concluded that all data groups of data samples are normally distributed.

In the relationship between the critical thinking ability variable and the post test score, a correlation value (R) of 0.610 and a Sig. value of  $0.003 < 0.05$  were obtained, then H0 was rejected and H1 was accepted. This shows a high correlation or relationship between the variables of critical thinking ability and post test scores.

In the relationship between the variable of environmental concern attitude and the post test score, a correlation value (R) of 0.830 and a Sig. value of  $0.00 < 0.05$  were obtained, H0 was rejected and H1 was accepted. This shows that there is a very high correlation or relationship between the variable of environmental care attitude and the post test score.

3. The process of improving the learning that is designed has an impact on critical thinking skills, and the formation of environmental care

Based on the results of the SPSS calculation, it shows that at the value of SDN 1 Nglendeyan, the value of Sig. one tailed =  $\frac{\text{Asymp.Sig.(2-tailed)}}{2} = \frac{0,000}{2} = 0,000$  where less than 0.05 then H0 is rejected and H1 is accepted, meaning that the average value described in the descriptive statistics can be said to be significantly different. This explains that the average score of students after treatment is 63.91 is greater than the average score of respondents before being given treatment, which is 44.45.

At the SDN 4 Ngraho value, the value of Sig. one tailed =  $\frac{\text{Asymp.Sig.(2-tailed)}}{2} = \frac{0,000}{2} = 0,000$  where less than 0.05 then H0 is rejected and H1 is accepted, meaning that the average value described in the descriptive statistics can be said to be significantly different. This explains that the average score of students after treatment is 84.14 bsar more than the average score of respondents before being given treatment, which is 62.68.

## CONCLUSION

Based on the description of the research results and discussion above, the conclusions in this study are:

1. The implementation of science learning with a problem-based learning model to improve critical thinking skills and environmental care attitudes, there is a

difference in the average score of the post test of the Nglandeyan class and the Ngraho class where the average score of the Ngraho class of 84.14 is greater than that of the Nglandeyan class which is 63.91.

2. The influence of environmental care attitudes and students' critical thinking skills during the learning process using the problem-based learning model, there is a high correlation or relationship between the variables of critical thinking ability and environmental care attitudes with post test scores.
3. The designed learning improvement process has an impact on critical thinking skills, and the formation of an attitude of caring for the environment, the results show that the average score of students after being treated is greater than the average of the previous score.

#### **Declaration by Authors**

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