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***Research Article***

# Differences inquiry learning model and problem based learning model on cognitive learning outcomes and critical thinking of students Class VII SMP in Ambon concepts environmental pollution

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## ABSTRACT

This study aims to look at the differences between *Inquiry* learning model and *Problem Based Learning* model on cognitive learning outcomes and critical thinking of class VII students of SMP in Ambon City concepts environmental pollution. This research was conducted at SMP Negeri 4 Ambon, SMP Negeri 20 Ambon and SMP Negeri 22 Ambon. The analysis technique used in this research is descriptive statistics and inferential statistics. The results showed that the mastery of biological concepts before the learning model was applied was very low. This can be seen in the students pre-test with an average score of < 70. After applying the learning model, the results show that there is an influence of the *Inquiry* learning model and the *Problem Based Learning* (PBL) learning model on cognitive learning outcomes and critical thinking.

**Keywords:** inquiry, problem based learning, cognitive, critical thinking**.**

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## INTRODUCTION

The quality of education needs to be considered to achieve educational goals. The quality of education can be seen from the success achieved by a student while participating in teaching and learning activities. The important thing in the learning process is the activity of instilling the meaning of learning for students so that learning outcomes are useful for their lives in the present and the future. One of the determining factors is how the learning and teaching process can run as expected. Meaningful learning is a teaching and learning process that is expected for students where students can be directly involved in the learning process and find that knowledge directly (Suparno, 1997).

Teachers and prospective teachers should be aware of what should be done to create learning conditions that can lead students to learning goals. Choosing the right learning method can improve students ability to master the competencies specified in the learning carried out so that the teacher does not only function as a source of information which is used as a reference for students at any time, but must also act as a stimulant in developing

students' interest in seeking information online. Independent. Therefore, forms of participatory learning by applying active learning methods and cooperative learning are needed (Kusumaningtias, 2013).
The inquiry learning model is a strategy that requires students to find something and know how to solve problems in a scientific research. The processes in inquiry learning are: 1) acceptance and problem definition, 2) hypothesis development, 3) data collection, 4) hypothesis testing, 5) drawing conclusions. The main goal is to develop student attitudes and skills that enable them to become independent problem solvers (Ngalimun, 2014).

The problem-based learning model makes students required to learn through direct experience based on problems. Problem-Based Learning is an innovation in learning because in PBL students' thinking abilities are really optimized through a systematic group or team work process, so that students can empower, hone, test, and develop their thinking skills on an ongoing basis (Rusman, 2012). The syntax in PBL is: 1) students' orientation to problems, 2) organizing students for learning, 3) guiding individual/group experiences, 4) developing and presenting work, 5) analyzing and evaluating the problem-solving process. Through the application of problem-based learning in the learning process, it is able to increase students' interest in learning both inside and outside the classroom and is able to increase student understanding. Problem Based Learning can also increase student learning motivation, where students can build their own understanding and knowledge (Akcay, 2009).

In the application of these two learning models to create students who are independent in their learning can be realized. Inquiry learning models and problem-based learning are important for improving soft skills among students, namely communication skills, group collaboration, independent learning skills, critical and creative thinking skills (Ibrahim et al, 2013). Knowing someone about the results or progress of their learning is important, because by knowing the results that have been achieved, students will try to improve their learning outcomes more. So that thus increasing learning outcomes can be more optimal because these students feel motivated to improve learning outcomes that have been achieved before. Learning outcomes are also abilities that students acquire after carrying out learning activities (Nashar, 2004).

Critical thinking skills provide the right direction for thinking for students to understand the subject matter. Critical thinking is the ability to think rationally and reflectively based on what is believed and done. This is in line with Permendikbud No. 81 of 2013 concerning curriculum implementation states that the future competency needs of students are needed, namely the ability to communicate, be creative and think critically. So critical thinking in the learning process is the ability to analyze facts, generate and organize ideas, defend opinions, make comparisons, draw conclusions, evaluate arguments and solve problems (Chance, 1986).

Learning biology is learning that emphasizes providing direct learning experiences to students, therefore students need to be assisted to develop a number of skills so that they are able to explore and understand the natural surroundings and themselves (Budimansyah, 2003). Environmental pollution material in biology learning has an important role in instilling cognitive aspects and attitudes related to environmental problems. Learning environmental pollution material has a link between human activities and the problem of damage or environmental pollution. This material should not only serve as concepts and knowledge, but how students can apply the values contained in these concepts in everyday life. Based on the results of observations at the location where the research will be carried out, there are several things that make researchers interested in conducting research at the school. Among other things, the differences in the character of schools between schools located in the city center and the suburbs. The other problem is the learning model that is rarely applied

## METHODS

### Data collection techniques

This test is given at the beginning and end of learning and aims to determine student learning achievement against environmental pollution. The procedure for carrying out the test is as follows; The initial test (pre-test) is given at the beginning of the activity before the teaching and learning process takes place and final test (post-test) is given at the end of the learning activity.

a. Non Test

Cognitive assessment is divided when the teaching and learning process takes place, then students work on the questions on work in groups.

b. Observation sheet

Observation sheets are used to assess learning outcomes, critical thinking and metacognitive abilities of students.

c.Documentation

In this study, the authors used documentation to obtain records or archives related to research, including documentation of student learning and student learning outcomes.

**Population and Sample**

Population in this study were all class VII students of SMP Negeri 20 Ambon, SMP Negeri 4 Ambon and SMP Negeri 22 Ambon. The sample in this study were 126 students of class VII at SMP Negeri 22 Ambon, SMP Negeri 4 Ambon and SMP Negeri 20 Ambon.

**Data Analysis Techniques**

The analysis technique used in this research is descriptive and inferential. Descriptive analysis to describe data about learning outcomes, critical thinking and students' metacognition abilities in the learning process. Variant analysis technique (ANOVA) to determine differences in learning outcomes, critical thinking, and metacognition abilities produced through Inquiry learning models and Problem Based Learning learning models.

## RESULTS AND DISCUSSION

### 1. Pre-Test

**Table 1.** Qualification of Student Achievement Scores in the Preliminary Test

| Interval | Class | Frequency | Presentation | Qualification |
|---|---|---|---|---|
| **SMP N 20 Ambon** | | | | |
| > 70 | VII-1 | - | 0% | Complete |
| < 70 | | 20 | 100% | Fail |
| > 70 | VII-2 | - | 0% | Complete |
| < 70 | | 21 | 100% | Fail |
| **SMP N 4 Ambon** | | | | |
| > 70 | VII-9 | - | 0% | Complete |
| < 70 | | 20 | 100% | Fail |
| > 70 | VII-10 | - | 0% | Complete |
| < 70 | | 21 | 100% | Fail |
| **SMP N 22 Ambon** | | | | |
| > 70 | VII-1 | - | 0% | Complete |
| < 70 | | 22 | 100% | Fail |
| > 70 | VII-2 | - | 0% | Complete |
| < 70 | | 22 | 100% | Fail |

Based on Table 1, it can be seen that at intervals > 70 it shows that there are no students who have grades with complete qualifications, and at intervals <70 it shows that all students are in each class VII-1 and VII-2 at SMP N 20 Ambon, Class VII-9 and VII-10 at SMP N 4 Ambon and class VII-1 and VII-2 at SMP N 22 Ambon have scores with less qualifications in mastering the learning indicators to be studied.

### 2. *Post-Test*

**Table 2. Qualification of Student Achievement Scores in the Final Test**

| Interval | Class | Frequency | Presentation | Qualification |
|---|---|---|---|---|
| **SMP N 20 Ambon** | | | | |
| > 70 | VII-1 | 20 | 100% | Complete |
| < 70 | | - | 0% | Fail |
| > 70 | VII-2 | 21 | 100% | Complete |
| < 70 | | - | 0% | Fail |
| **SMP N 4 Ambon** | | | | |
| > 70 | VII-9 | 20 | 100% | Complete |
| < 70 | | - | 0% | Fail |
| > 70 | VII-10 | 21 | 100% | Complete |
| < 70 | | - | 0% | Fail |
| **SMP N 22 Ambon** | | | | |
| > 70 | VII-1 | 22 | 100% | Complete |
| < 70 | | - | 0% | Fail |
| > 70 | VII-2 | 22 | 100% | Complete |
| < 70 | | - | 0% | Fail |

Based on Table 2, it can be seen that SMP N 20 Ambon has 20 student and shows that in class VII-1 with a total of 20 students, class VII-2 with a total of 21 students is in the complete category and there are no students who are in failed category. At SMP N 4 Ambon it shows that in class VII-9 with a total of 20 students and class VII-10 with a total of 21 students are in the complete category and there are no students who are in the failed category. SMP N 22 Ambon it shows that in class VII-1 with a total of 22 students and class VII-2 with a total of 22 students are in the complete category and there are no students who are in the failed category.

The results of the initial test assessment of students found that the initial knowledge of students related to environmental pollution material that will be taught has not been well mastered, this can be seen from the lack of achievement of the learning indicators that will be taught in terms of the initial test scores achieved by students as a whole <70 so that it is in the incomplete category and requires further learning.

**3. Cognitive learning**

**Table 3. Cognitive Learning of Class VII-1 and VII-2 Students of SMP N 20 Ambon**

| School | Variable | *Sig.* |
|---|---|---|
| SMP N 20 Ambon | learning *Inquiri* learning PBL | *.039* |

**Cognitive Learning of Class VII-9 and VII-10 Students of SMP N 4 Ambon**

| School | Variable | *Sig.* |
|---|---|---|
| SMP N 4 Ambon | learning *Inquiri* learning PBL | *.008* |

**Cognitive Learning of Class VII-1 and VII-2 Students of SMP N 22 Ambon**

| School | Variable | *Sig.* |
|---|---|---|
| SMP N 22 Ambon | learning *Inquiri* learning PBL | *.037* |

On The table shows ANOVA statistic the learning model are significant at (0.039), (0.008) and (0.037) <α = 0.05. Based on these results, there is an influence of learning models on students' cognitive learning outcomes.

**4. Critical thinking**

**Table 4. Critical Thinking Class VII-1 and VII-2 of SMP N 20 Ambon**

| **School** | **Variable** | ***Sig.*** |
|---|---|---|
| SMP N 20 Ambon | learning *Inquiri* learning PBL | ***.026*** |

**Critical Thinking Class VII-9 and VII-10 SMP N 4 Ambon**

| **School** | **Variable** | ***Sig.*** |
|---|---|---|
| SMP N 4 Ambon | learning *Inquiri* learning PBL | ***.025*** |

**Critical Thinking Class VII-1 and VII-2 SMP N 22 Ambon**

| **School** | **Variable** | ***Sig.*** |
|---|---|---|
| SMP N 22 Ambon | learning *Inquiri* learning PBL | ***.003*** |

Table 4 shows that the learning model variables are significant at (0.026), (0.025) and (0.003) <α = 0.05. Based on these results, there is an influence of the learning model on the results of students' critical thinking. Problem based learning model applied in class VII-2 SMP N 20 and 22 Ambon and class VII-10 SMP N 4 as a student-centered learning model that focuses students on real or relevant problems to be solved using the knowledge of participant students themselves and with the help of other learning resources (Lidnillah, 2013).

Problem based learning is a learning model that raises problems as a first step to collect and integrate new knowledge (Fathurrohman, 2015). In an effort to solve these problems students will gain the knowledge and skills

needed for these problems. Data on students' critical thinking obtained from the results of the assessment of the critical thinking skills rubric given to each student in class VII-1 and VII-2 at SMP N 20 Ambon, classes VII-9 and VII-10 at SMP N 4 Ambon and class VII-1 and VII-2 at SMP N 22 Ambon after learning using the Problem Based Learning and Inquiry learning model. Comparison of the Problem Based Learning learning model with the Inquiry learning model applied shows that in practice, the Inquiry learning model does not improve students' critical thinking, because in this model students tend to get information from educators rather than solving problems thoroughly to get information so that in the learning process students are less trained in using the ability to understand concepts and think critically (Yulianti, 2019).

## CONCLUSION

There are differences in the application of the Problem Based Learning and Inquiry learning model in each class VII at SMP N 20 Ambon, SMP N 4 Ambon and SMP N 22 Ambon on students' cognitive learning outcomes. Classes that are taught using the Problem Based learning model have better cognitive learning outcomes than students who are taught using the Inquiry learning model.

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