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# Critical Thinking Skills of Grade VII Students of SMP Negeri 2 Barombong in Science Subjects

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## Abstract

The purpose of this study was to determine the critical thinking skills of class VII students of SMP Negeri 2 Barombong in science subjects. The research method used in this study was a quasi-experiment. The sample used in this study was a class or study group. The research sampling technique was used to determine the sample to be used in the study. The results showed that the critical thinking skills of class VII students of SMP Negeri 2 Barombong in science subjects were in the good category. Learning using the PjBL 1 and PjBL 2 models can improve students' creative thinking skills from categories 2 and 3 to categories 4 and 5, as evidenced by students being able to produce projects in the form of posters and pocket books on the material of classification of living things and video projects on the material of symbiosis.

**Keywords:** PjBL, Biology, Learning Model

## Introduction

Students' creative thinking skills cannot be obtained instantly but require a process and need to be trained or empowered optimally (Listiana & Bahri 2019; Siburian et al., 2019). Creative thinking skills are a way to produce ideas, something new or different from what already exists in solving problems (Ananda et al., 2021; Wulandari et al., 2019). Creative thinking is thinking consistently and continuously to produce something creative as needed (Meitiyani et al., 2022). Through creative thinking skills, students can increase their curiosity, and train students to be able to think critically and logically. In reality, students' critical and creative thinking skills have not been optimally developed. Many students are unable to express their opinions to solve a problem, some students cannot work together with their group members during discussions.

Students are often given the opportunity to ask questions, but very few are enthusiastic about asking questions, this is because students are still afraid or confused about what to ask. In addition, students are less trained in developing their ideas in solving problems (Taupik & Fitria, 2021; Mulyani et al., 2023). Students only see the references given by the teacher. Many students are still passive, unable to think critically and do not dare to express their opinions in the learning process. In reality, what is seen in schools, the learning process in the classroom is ineffective because teachers are often too active and more dominant in the learning process (Ningsih et al., 2017) The learning that is needed today is learning that actively involves students in developing their ideas but still under the guidance of the teacher.

The learning model needed is an active, innovative, creative, effective and fun learning model (Nugraha et al., 2020; Taupik and Fitria, 2021; Mulyani et al., 2023). The selection of learning models must be in accordance with the material to be discussed so that it attracts students' attention to actively learn and try to optimize all their abilities in order to achieve the expected learning objectives and help students develop critical thinking skills in solving problems. Choosing the right method can improve student learning outcomes (Nugraha et al., 2020).

The learning model that is considered quite influential on students' critical and creative thinking skills is the Project Based Learning (PjBL) model. The project-based learning model is an innovative learning that focuses on student activities in designing, planning, and implementing projects, and producing projects that are published or presented to solve real-world problems. The characteristic of project-based learning is that it is project-centered. During the problem-solving process, students go through stages of asking questions and filtering questions, debating ideas, making predictions, collecting and analyzing data, drawing conclusions, and communicating findings with other groups.

Throughout the project, teachers must also continue to assess student progress, provide feedback and appreciate achievements and successes. It is very important to recognize and encourage students' creative and critical thinking skills both individually and in groups (Saenab et al., 2018). If the learning process using the PjBL model can take place well and critical thinking skills and creative thinking continue to be trained gradually and continuously, then it will certainly have a good effect on learning outcomes.

The PjBL learning model is very effective to apply. One method that is less appropriate to use in the learning process is the lecture method, because the lecture method will only make students fixated on the teacher's explanation and books without being able to develop their thinking. So it is very difficult for students to develop their critical and creative thinking skills which will later affect learning outcomes (Taupik & Fitria, 2021). It is also not uncommon to find that in some schools teachers rarely apply the PjBL learning model.

One of them is at SMP Negeri 2 Barombong, Jalan Poros Kanjilo Number 11, Kanjilo Village, Barombong District, Gowa Regency, so researchers need to conduct research at the school, specifically on class VII students who have used the independent curriculum, on the material Classification of Living Things and Symbiosis. One of the problems in the learning process is the lack of encouragement to develop thinking skills, including critical and creative thinking processes. Students in class are only directed to memorize, making students passive in learning. Students are forced to remember information but not to relate it to real life in learning (Mulyani et al., 2023). Considering the importance of the right learning model used in science learning, this research needs to be done. The results of this study are input for teachers regarding the appropriate learning model to be applied to the material on classification of living things and symbiosis, so that the teaching and learning process becomes more varied

## Methods

The type of research used in this study is a quasi-experiment because it cannot fully control external variables that are likely to affect the dependent variable in the study. This study aims to compare an effect with the treatment of a particular group. In quantitative research, the population is an area determined by the researcher to be studied and then conclusions are drawn. In this study, the population was all students of class VII of SMP Negeri 2 Barombong, Gowa Regency, totaling 340 students spread across 10 study groups. The sample used in this study was the class or study group. The research sampling technique was used to determine the sample to be used in the study. This study used a random sampling technique. Random sampling is a random sampling technique. The reason for using this technique is because it assumes that all classes have the same abilities and can represent the population. The classes used as samples were: class VII.B, VII.C and VII.D. The class used as the Experimental PjBL 1 class was class VII.B with a total of 35 students consisting of 19 females and 16 males. The experimental class of PjBL 2 is class VII.C with a total of 35 students consisting of 18 females and 17 males, while the class used as the control class is class VII.D, with a total of 34 students consisting of 19 females and 15 males. Data collection techniques are used to obtain data during the study, so the techniques used are Test Techniques, Documentation Techniques. The data obtained from

the research sample are in the form of quantitative data, the data is analyzed using two types of analysis techniques, namely descriptive analysis and inferential analysis.

## Results and Discussion

### Critical Thinking Skills Taught Using PjBL 1, PjBL 2 and STAD Type Cooperative Learning Models

The results of the descriptive analysis of students' critical thinking skills before and after the learning process using the PjBL 1, PjBL 2 and STAD cooperative models can be seen in Table 1.

Table 1. Descriptive Analysis of Critical Thinking Skills in Each Class

| Description | PjBL 1 | | PjBL 2 | | STAD Type Cooperative | |
|---|---|---|---|---|---|---|
| | ***Pre-test*** | ***Post-test*** | ***Pre-test*** | ***Post-test*** | ***Pre-test*** | ***Post-test*** |
| Number of samples | 35 | 35 | 35 | 35 | 34 | 34 |
| Mean | 50,51 | 74,49 | 50,17 | 74,03 | 40,35 | 67,76 |
| Standard deviation | 5,52 | 2,85 | 5,65 | 3,76 | 6,31 | 3,22 |
| Lowest value | 40,00 | 70,00 | 40,00 | 66,00 | 30,00 | 60,00 |
| Highest value | 60,00 | 80,00 | 60,00 | 80,00 | 50,00 | 75,00 |
| Median | 50,00 | 74,00 | 50,00 | 74,00 | 40,00 | 68,00 |
| Mode | 50,00 | 72,00 | 50,00 | 70,00 | 35,00 | 68,00 |

*Source: Appendix D.1*

Based on Table 1, it is known that the pre-test results of critical thinking skills of PjBL class 1 obtained an average value of 50.51 ± 5.52, a median of 50.00 and a mode of 50.00. The post-test results obtained an average value of 74.43 ± 2.85, a median of 74.00 and a mode of 72.00. PjBL class 2 pre-test results obtained an average value of 50.17 ± 5.65, a median of 50.00 and a mode of 50.00. The post-test results obtained an average value of 74.10 ± 3.76, a median of 74.00 and a mode of 70.00. The pre-test control class obtained an average value of 40.35 ± 6.31, a median of 40.00 and a mode of 35.00. The post-test results obtained an average value of 67.76 ± 3.22, a median of 68.00 and a mode of 68.00. The frequency distribution and category of critical thinking skills values in PjBL 1 class are presented in Table 2.

Table 2. Frequency Distribution and Categories of Critical Thinking Skills Values of PjBL Class 1 Students

| Interval | Category | Frequency | | Percentage (%) | |
|---|---|---|---|---|---|
| | | Pre-test | Post-test | Pre-test | Postptest |
| 81 – 100 | Very good | 0 | 0 | 0,00 | 0,00 |
| 61 – 80 | Good | 0 | 35 | 0,00 | 100 |
| 41 – 60 | Enough | 32 | 0 | 91,40 | 0,00 |
| 21 – 40 | Less | 3 | 0 | 8,60 | 0,00 |
| 0 – 20 | Very less | 0 | 0 | 0,00 | 0,00 |
| **Total** | | **35** | **35** | **100** | **100** |

*Source: Appendix D.1*

Based on Table 2, it can be seen that the results of the descriptive analysis show that the number of students whose critical thinking skills scores in the pre-test were in the less category was 3 people (8.60%) and the sufficient category was 32 people (91.40%). The results of the post-test of critical thinking skills of all students were in the good category as many as 35 people (100%).

Thus, it can be said that the application of the PjBL 1 model improves the critical thinking skills of students in the PjBL 1 experimental class. The frequency distribution and categories of critical thinking skills scores in the PjBL 2 experimental class are presented in Table 3.

Table 3. Frequency Distribution and Categories of Critical Thinking Skills Values of PjBL Class 2 Students

| Interval | Category | Frequency | | Percentage (%) | |
|---|---|---|---|---|---|
| | | ***Pre-test*** | ***Post-tes*** | ***Pre-test*** | ***Post-test*** |
| 81 – 100 | Very good | 0 | 0 | 0,00 | 0,00 |
| 61 – 80 | Good | 0 | 31 | 0,00 | 88,60 |
| 41 – 60 | Enough | 32 | 4 | 91,40 | 11,40 |
| 21 – 40 | Less | 3 | 0 | 8,60 | 0,00 |
| 0 – 20 | Very less | 0 | 0 | 0,00 | 0,00 |
| **Total** | | **35** | **35** | **100** | **100** |

*Source: Appendix D.1*

Based on Table 3, it can be seen that the results of the descriptive analysis show that the number of students whose critical thinking skills scores in the pre-test were in the less category was 3 people (8.60%) and the sufficient category was 32 people (91.40%). The results of the post-test of critical thinking skills for the sufficient category were 4 people (11.40%) and the good category was 31 people (88.60%). Thus, it can be said that the application of the PjBL 2 model improves the critical thinking skills of students in the PjBL 2 experimental class..

**Manova Prerequisite Test of Critical Thinking Skills, Creative Thinking and Learning Outcomes.**

***Normality Test***

The following are the results of the data normality test of the influence of the PjBL model on critical and creative thinking skills and learning outcomes of class VII students of SMP Negeri 2 Barombong.

Table 4. Results of the Kolmogorov Normality Test of Critical and Creative Thinking Skills and Learning Outcomes of Students.

| Class | | Kolmogorov-Smirnov | | | Information |
|---|---|---|---|---|---|
| | | **Statistic** | **Db** | **Sig.** | |
| Critical thinking skills | Experimental class PjBL 1 | 0,096 | 35 | 0,200 | Normal |
| | Experimental class PjBL 2 | 0,140 | 35 | 0,081 | Normal |
| | Control class | 0,089 | 34 | 0,200 | Normal |
| Creative thinking skills | Experimental class PjBL 1 | 0,086 | 35 | 0,200 | Normal |
| | Experimental class PjBL 2 | 0,119 | 35 | 0,200 | Normal |
| | Control class | 0,118 | 34 | 0,200 | Normal |
| Learning outcomes | Experimental class PjBL 1 | 0,095 | 35 | 0,200 | Normal |
| | Experimental class PjBL 2 | 0,145 | 35 | 0,061 | Normal |
| | Control class | 0,118 | 34 | 0,200 | Normal |

*Source: Appendix D.2*

Based on the decision making of the Kolmogorov Smirnov normality test, the data on critical thinking skills, creative thinking skills and student learning outcomes have a sig. value > 0.05. So it can be concluded that the scores of the critical thinking skills, creative thinking skills and learning outcomes variables are normally distributed.

**Homogeneity Test**

The following are the results of the homogeneity test of the data on the influence of the PjBL model on critical and creative thinking skills and learning outcomes of class VII students at SMP Negeri 2 Barombong.

Table 5. Results of the Homogeneity Test of Critical and Creative Thinking Skills and Student Learning Outcomes

| Variables | Levene Statistic | Db | Sig. | Information |
|---|---|---|---|---|
| Critical thinking skills | 0,816 | 2 | 0,445 | Homogeneous |
| Creative thinking skills | 0,800 | 2 | 0,452 | Homogeneous |
| Learning outcomes | 0,689 | 2 | 0,505 | Homogeneous |

*Source: Appendix D.2*

Description: Levene statistic = homogeneity test; Db = Degree of freedom; Sig = significant.

Based on the decision-making of the homogeneity test of the critical thinking skills, creative and learning outcomes variables of students have a sig. value > 0.05. So it can be concluded that the scores of the critical thinking skills, creative thinking skills and learning outcomes variables are homogeneous. The learning process using the PjBL model significantly supports the development of critical thinking of students, the presence of feedback from students and the ability to present projects carried out become a stimulus for students to develop critical thinking skills. However, the role of the facilitator in mediating with students, especially in triggering cognitive thinking is very much needed (Syamsuddin, 2019).

Learning using the PjBL 1 and PjBL 2 models can improve students' creative thinking skills from categories 2 and 3 to categories 4 and 5, as evidenced by students being able to produce projects in the form of posters and pocket books on the material on the classification of living things and video projects on the material on symbiosis. The project shows that students are able to find ideas for answers or think of more than one answer to solve problems. Students are also able to provide varied solutions and produce answers that can be explained in their own language. In line with the opinion of Lisliana et al., (2016) students who are included in the creative and very creative categories, indicate that these students have been able to formulate detailed problem solving, then can combine several ideas they have, and can convey clearly both verbally and in writing.

Based on the results of this study, it was found that the application of the PjBL 1 and PjBL 2 models on the Classification of Living Things and Symbiosis material, using the independent curriculum has an influence on improving critical thinking skills, creativity and learning outcomes. It can only be said that the increase is not optimal, as evidenced by students having difficulty adapting to this learning model. Furthermore, although students are enthusiastic about following the learning process, students are not yet accustomed to applying the phases in the PjBL learning model independently so that continuous habituation and guidance are needed, so that critical thinking skills, creativity and learning outcomes do not experience maximum improvement. In line with research conducted by Wicaksana & Sanjaya (2021), it states that the difficulty of adapting to the phases in the PjBL model causes students' scientific attitudes to appear less good. Students' scientific attitudes will be formed during the learning process. Scientific attitudes consist of curiosity, critical attitudes, cooperative attitudes, respect for the work of others and thoroughness (Rifai et al., 2019).

**Conclusion**

Based on the results of the research that have been described, the following conclusions can be drawn. The critical thinking skills of class VII students of SMP Negeri 2 Barombong in the

subject of science are in the good category. Learning using the PjBL 1 and PjBL 2 models can improve students' creative thinking skills from categories 2 and 3 to categories 4 and 5, as evidenced by students being able to produce projects in the form of posters and pocket books on the material of classification of living things and video projects on the material of symbiosis).

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