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## **Application of Project Based Learning Model to Improve Critical Thinking Skills of Students SMA Muhammadiyah 1 Sragen**

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### **ABSTRACT**

**KEYWORDS:**

*Education*

*Project Based Learning (PjBL)*

*Critical thinking skills*

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The goal of education is to develop each person's potential and competence so they can become good people. This study uses the Project Based Learning (PjBL) instructional model to enhance students' critical thinking abilities. Research types Qualitative description with a one-group pretest-posttest design that is pre-experimental in nature. 29 students make up the sample in this study. Tests and documentation are the tools used to obtain research data. The average posttest scores on each measure of the capacity to think critically have improved, according to the data. It is clear from the t-test findings that there is a significant difference between the pretest and posttest scores because the result was  $0.000 < 0.05$ . The use of the Project Based Learning (PjBL) learning model in class X SMA Muhammadiyah 1 Sragen resulted in a boost in students' critical thinking abilities.

### **1. INTRODUCTION**

The goal of education is to develop each student's potential and skills so they can become good people. Technology-based learning, information, and communication are prevalent in many spheres of life in the 21st century, including education. One of the objectives of education for the twenty-first century is to help students develop the four talents that make up the twenty-first century, known as the four Cs: communication, critical thinking, creativity, and collaboration. Students must possess critical thinking abilities as one of their competencies. Students that possess critical thinking abilities can approach challenges in an organized manner, generate creative questions, and create acceptable answers to the issues they encounter. (Carter et al., 2018). Suitable learning frameworks, such as the Project-Based Learning (PjBL) paradigm, can be used to acquire these abilities.

A learning model known as the project-based learning model (PjBL) acknowledges that authentic questions and problems from real-world practice provide learning contexts and allow students to work together on an end product. Project-based learning models can help students develop their ability to analyze, synthesize, do/create, and reflect (Trilek et al., 2016). The use of project-based learning models (PjBL) has a number of benefits, including: a) increasing student learning motivation; b) building student confidence; c) encouraging student collaboration; d) encouraging student participation in learning activities; and e) preparing students to analyze information sources. (Nurul'Azizah & Wardani, 2019).

Some previous studies include (Pratiwi & Setyaningtyas, 2020; Saputro & Rahayu, 2020). The use of the Project Based Learning and Problem Based Learning learning models has different effects on students' critical thinking abilities, with the experimental group's (Project Based

Learning class) average critical thinking ability being higher than the control group's (Problem Based Learning class) average critical thinking ability. Another area of research focuses on the Project-Based Learning (PJBL) strategy, which combines traditional approaches with student learning. The Project-Based Learning (PJBL) model's results demonstrate its efficacy in boosting students' learning outcomes and critical thinking skills.(Kristiyanto, 2020; Sumardiana et al., 2019).

Based on observations made in SMA Muhammadiyah 1 Sragen, Because teachers are not conducting critical thinking skill assessments, pupils' critical thinking abilities are still not at their best. The learning which is frequently employed by teachers to impart material, makes pupils less engaged in the learning process, which results in less optimal understanding of the subject matter. Enhancing critical thinking abilities requires not just student-centered instruction but also a teacher-centered approach to the implementation of learning methodologies (Kurniawati & Astuti, 2022; Yusmanto et al., 2017).

Researchers are very interested in investigating students' thinking skills by using a project-based learning model in biology subjects on biotechnology material as shown from the description above, and by taking the title "Application of Project-Based Learning Models to Improve Critical Thinking Skills of SMA Muhammadiyah 1 Sragen Students".

## 2. MATERIALS AND METHODS

### 2.1. Types of research

His employs a qualitative descriptive research design for his study. The one group pretest-posttest design type of the pre-experimental design approach (pseudo-experimental) involves only one group; no other groups or comparisons are used.

**Table 2.1** One group pretest-posttest research design

Pretest	Treatment PjBL	Posttest
O1	X	O2

Source: (Dr, 2008)

Information:

O1 : Preliminary test before treatment

X : Giving PjBL Model Treatment

O2 : Final Test after Treatment

### 2.2. Population and Sample

This study was carried out at SMA Muhammadiyah 1 Sragen, which is situated at Sine, Sragen District, Sragen Regency, Central Java, at Jl. Sukowati No. 108. All members of SMA Muhammadiyah 1 class X made up the study's population. Class X-F, the experimental class, which had 29 pupils, served as the sample for this study. Purposive sampling was used in this study's sampling.

### 2.3. Data analysis

After all the data was collected, analysis of the data was done to assess the class X pupils at SMA Muhammadiyah 1 Sragen's critical thinking abilities utilizing the Project Based Learning (PjBL) instructional approach.

Critical Thinking Ability. Critical thinking indicators in this study there are only 5 indicators. A table of critical thinking markers is provided below.

**Table 2.2** Critical-thinking signs

Indicators	Sub indicators
Give a simple explanation	Focus and analyze questions
Build Basic Skills	Observing and considering a report on the results of observations and the credibility of a source
Conclude	Set the strategy and tactics of deduction, induction and decision value
Provide further explanation	identify assumptions
Set strategy and tactics	define an action

As for the method of calculating data using percentage analysis techniques (Susilawati et al., 2020) The following formula is used to determine each critical thinking indicator's average value:

$$\Sigma SA = \frac{\Sigma SP}{\Sigma SM} \times 100\%$$

Information:

$\Sigma SA$  : Percentage of critical thinking ability

$\Sigma SP$  : The total score

$\Sigma SM$  : Total maximum score

The researcher identified the students' critical thinking categories after determining the percentage of pupils who demonstrated critical thinking skills. Giving categories seeks to ascertain the standards of the percentage of critical thinking among students. Table 2.3 illustrates it as follows.

**Table 2.3** Categories of Critical Thinking Values

Percentage	Criteria
0 – 20	Not Critical
21 – 40	Less Critical
41 – 60	Pretty Critical
61 – 80	Critical
81 – 100	Very Critical

Source: (Setyorini et al., 2011)

Furthermore, the Paired-Samples T Test formula will be used to assess the collected data. It is required to create a statistical hypothesis first, as shown below, before testing the hypothesis.

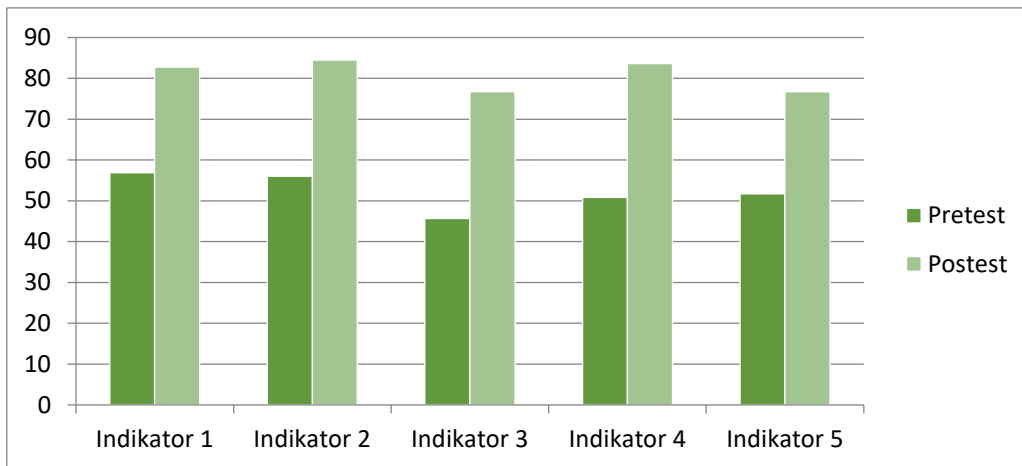
$H_a$  = There is a considerable variation in the usual student's critical thinking skills between the pretest and posttest learning results using the Project Based Learning (PjBL) learning model.

$H_o$  = The typical student's critical thinking skills do not significantly differ between the pretest and posttest learning results when using the Project Based Learning (PjBL) learning model.

With the test requirements is sig. (2 tailed) < 0,05  $H_a$  accepted. And  $H_o$  accepted if sig. (2 tailed) > 0,05.

### 3. RESULT AND DISCUSSION

#### 3.1. Result



**Figure 1.** The typical critical thinking indication diagram

The average values for each indicator's pretest and posttest may be seen in the diagram above. The posttest outcomes improve with the use of the Project Based Learning (PjBL) learning model.

The data from the pretest and posttest were examined using the Paired-Samples T Test to see whether or not there was an improvement in the students' critical thinking abilities. Table 3 displays the findings of the analysis.

**Table 3.** Critical Thinking Ability Analysis Results

Grade	Mean	N	df	Taraf.sig	sig. Normal	sig. Homogen	sig. (2 tailed)
Pretest	52.24	29	28	0.05	0.110	0.212	0.000
Posttest	80.86	29	28	0.05	0.140		

#### 3.2. Discussion

The learning environment is described by the learning model. The learning model can be used for a variety of purposes, including creating lesson plans and curricula as well as creating learning materials. (Warsono, 2013). The Project Based Learning (PjBL) learning approach uses issues as the initial step in learning new information based on the experience of concrete life activities. (Fahrezi & Taufiq, 2020). The following are the learning processes for the Project Based Learning (PjBL) Model: deciding on fundamental issues; creating a project design; setting up schedules; keeping track of project progress; assessing project outcomes; and evaluating experience (Yulianto et al., 2017). The benefit of project-based learning (PjBL) is that it is one of the best learning methods for improving students' ability to think critically, make decisions, engage in action, and solve problems. challenges that might help students develop their self-management and self-confidence at the same time (Guo et al., 2020).

According to Figure 1, which demonstrates how the critical thinking skills of class X SMA Muhammadiyah 1 Sragen have developed, the average posttest score of students who used the Project Based Learning (PjBL) learning model falls into the category of very critical. The results of the pretest showed that each student did not meet the minimal completion requirements (KKM). After teacher instruction, group discussion, and finally the use of the Project Based Learning

(PjBL) learning model, which motivates students to learn and makes the material simple to comprehend and remember, the post-test results all meet the Minimum Completeness Criteria (KKM), indicating that students have a good understanding of the material.

The results of the research analysis show that for each measure of critical thinking skills, there is a difference between the outcomes of the pretest and posttest. Five characteristics of critical thinking: giving straightforward explanations, establishing fundamental competencies, drawing conclusions, offering additional explanations, and creating plans and methods. Indicator 1, provides a simple explanation that the pretest average value is 56.90 which is classified as a moderately critical category, while the posttest average value is 82.76 which is classified as a very critical category. In Indicator 2 Building basic skills, the average pretest was 56.03, which was classified as quite critical, while the posttest average score was 84.48, which was classified as a very critical category. In Indicator 3 Concluding the conclusion, the average pretest score is 45.69 which is classified as the Critical Enough category, while the post-test average value is 76.72 which is classified as a critical category. In indicator 4 Making further explanations, the average pretest value is 50.86 belonging to the moderately critical category while the post-test average value is 76.72 belonging to the critical category. In indicator 5 Developing Strategies and Tactics, the average pretest score is 51.72, which is classified as a moderately critical category, while the average post-test score is 76.72, which is classified as a critical category.

The use of the Project Based Learning (PjBL) learning model enhanced the students' capacity for critical thought, according to an analysis of the post-test and pretest average scores. (Ratu et al., 2021) It claims that the Project Based Learning (PjBL) learning style can be used to enhance students' critical thinking abilities and academic results. The very critical category is represented by the average posttest score of 80.86, while the moderately critical category is represented by the average pretest score of 52.24. If the findings of data analysis using the t-test are  $0.000 < 0.05$ ,  $H_0$  is rejected and  $H_a$  is approved, indicating that the differences are significant. This means that class X students at SMA Muhammadiyah 1 Sragen can use the project-based learning (PjBL) learning mode to hone their critical thinking skills.

#### **4. CONCLUSIONS**

According to an analysis of the average posttest and pretest scores. The class X SMA Muhammadiyah 1 Sragen's capability for critical thought demonstrates a considerable improvement in the learning model known as project-based learning (PjBL). The use of the Project Based Learning (PjBL) learning model in class X SMA Muhammadiyah 1 Sragen resulted in a boost in students' critical thinking abilities.

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