

# The Effectiveness of Project-Based Learning in Improving Students' Critical Thinking Skills

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## ABSTRACT

This study aims to examine the effectiveness of Project-Based Learning (PBL) in improving students' critical thinking skills at the junior high school level. The study was motivated by the increasing need for students to develop higher-order thinking skills in twenty-first-century education, particularly critical thinking, problem-solving, collaboration, and creativity. However, conventional teaching methods are often unable to actively engage students in meaningful learning experiences. Therefore, Project-Based Learning is considered an innovative learning model that can encourage active participation and critical analysis among students.

The study concludes that Project-Based Learning is effective in improving students' critical thinking skills and creating more interactive and student-centered learning environments. Therefore, teachers are encouraged to implement Project-Based Learning as an alternative instructional strategy to support the development of students' higher-order thinking skills in classroom learning.

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## 1. INTRODUCTION

Education in the twenty-first century emphasizes the importance of developing higher-order thinking skills, particularly critical thinking, creativity, communication, and collaboration. Among these competencies, critical thinking is considered one of the most essential skills because it enables students to analyze information, solve problems, evaluate evidence, and make logical decisions. In modern educational contexts, students are expected not only to memorize information but also to apply knowledge critically in real-life situations.

Critical thinking skills are highly important in school learning because students are frequently confronted with complex problems that require analytical and reflective thinking. Students who possess strong critical thinking abilities are more capable of understanding concepts deeply, identifying relationships among ideas, and generating appropriate solutions to academic and social problems. Therefore, educational institutions are encouraged to implement learning approaches that actively engage students in meaningful learning experiences.

However, in many schools, classroom learning is still dominated by conventional teaching methods in which teachers play a central role in delivering information while students act as passive recipients of knowledge. Such learning practices often limit students' opportunities to explore ideas, ask questions, and develop problem-solving abilities. As a result, students' critical thinking skills remain relatively low. Many students experience difficulties in analyzing information independently and expressing logical arguments during classroom discussions.

One learning model that is considered effective in promoting critical thinking skills is Project-Based Learning (PBL). Project-Based Learning is a student-centered learning approach that involves students in investigating problems, conducting projects, collaborating with peers, and producing meaningful products. Through project-based activities, students are encouraged to think critically, communicate effectively, and work collaboratively to solve real-world problems.

According to educational experts, Project-Based Learning creates active and meaningful learning environments because students learn through direct experiences and problem-solving activities. In PBL classrooms, students are given opportunities to identify problems, collect and analyze information, develop project plans, and present the results of their work. These activities stimulate students' curiosity and encourage deeper understanding of learning materials.

Previous studies have shown that Project-Based Learning contributes positively to students' academic achievement and critical thinking development. Students who participate in project-based activities tend to demonstrate better analytical skills, creativity, and learning motivation compared to students taught through conventional instructional methods. Furthermore, Project-Based Learning supports the development of collaborative skills because students work together in groups to complete learning projects.

In Indonesian educational settings, the implementation of Project-Based Learning has become increasingly relevant, particularly in the context of the Merdeka Curriculum, which emphasizes student-centered and competency-based learning. Teachers are encouraged to create interactive learning activities that promote critical thinking and active student participation.

Despite its potential benefits, the implementation of Project-Based Learning in schools still faces several challenges. Some teachers have limited understanding of project-based instructional strategies, while others experience difficulties in classroom management and assessment during project activities. In addition, limited learning facilities and time constraints sometimes hinder the successful implementation of project-based learning.

Based on these conditions, this study aims to examine the effectiveness of Project-Based Learning in improving students' critical thinking skills at the junior high school level. The study is expected to provide empirical evidence regarding the impact of Project-Based Learning on students' learning outcomes and contribute to the development of innovative instructional strategies in education.

## **2. METHODS**

This study employed a quantitative research approach using an experimental method to examine the effectiveness of Project-Based Learning (PBL) in improving students' critical thinking skills. The experimental method was considered appropriate because the study aimed to compare the learning outcomes of students taught through Project-Based Learning and those taught through conventional teaching methods.

The research used a pretest-posttest control group design. In this design, two groups of students were involved: an experimental group and a control group. The experimental group received instruction using the Project-Based Learning model, while the control group was taught using conventional learning methods

commonly applied in classroom instruction. Both groups were given a pretest before the treatment and a posttest after the treatment to measure changes in students' critical thinking skills.

The study was conducted at a junior high school in Sorong, Papua Barat. The participants consisted of seventh-grade students selected using purposive sampling techniques. Two classes were chosen as research samples based on similar academic characteristics and learning abilities. One class consisting of 30 students was assigned as the experimental group, while another class consisting of 30 students served as the control group.

The independent variable in this study was Project-Based Learning, while the dependent variable was students' critical thinking skills. Project-Based Learning refers to a student-centered instructional model that involves students in problem-solving, collaborative learning, investigation, and project development activities. Critical thinking skills refer to students' abilities to analyze information, evaluate arguments, identify problems, and make logical conclusions.

Data collection techniques included tests, classroom observations, and documentation. The critical thinking test was used to measure students' abilities before and after the implementation of Project-Based Learning. The test consisted of essay and analytical questions designed to assess students' abilities in interpretation, analysis, evaluation, inference, and explanation.

Classroom observation was conducted during the learning process to identify students' participation, collaboration, communication, and problem-solving activities. Observation sheets were used to record students' learning behaviors during project implementation. Documentation techniques included collecting lesson plans, students' project reports, photographs, and classroom learning records.

Before the instruments were used in the research, validity and reliability testing were conducted to ensure the quality of the instruments. Instrument validity was tested using expert judgment and product-moment correlation analysis, while reliability testing used Cronbach's Alpha formula. The results showed that all instruments were valid and reliable for data collection.

The implementation of Project-Based Learning in the experimental class was conducted through several stages. First, students were introduced to real-world problems related to the learning topic. Second, students were divided into groups and asked to design project plans collaboratively. Third, students collected information, discussed solutions, and developed project products. Finally, students presented their project results and reflected on the learning process.

Data analysis was conducted using descriptive and inferential statistical techniques. Descriptive statistics were used to describe students' critical thinking scores, while inferential analysis involved t-tests to determine differences between the experimental and control groups. The significance level used in the analysis was 0.05.

To maintain research ethics, all participants were informed about the objectives of the study before the research was conducted. Students' identities and personal information were kept confidential, and participation in the study was voluntary.

### **3. FINDINGS AND DISCUSSION**

The results obtained from the research have to be supported by sufficient data. The research results and The findings of this study indicate that the implementation of Project-Based Learning (PBL) significantly improved students' critical thinking skills compared to conventional teaching methods. The improvement was observed through students' performance on critical thinking tests, classroom participation, collaborative activities, and problem-solving abilities during the learning process.

Before the treatment was conducted, both the experimental and control groups were given a pretest to measure their initial critical thinking abilities. The pretest results showed that the average scores of both

groups were relatively similar, indicating that the students had comparable academic abilities before the implementation of the learning model.

After several weeks of instruction, the posttest results revealed a significant increase in the critical thinking scores of students in the experimental group. Students who participated in Project-Based Learning demonstrated better abilities in analyzing problems, evaluating information, developing arguments, and presenting logical conclusions compared to students in the control group who learned through conventional methods.

The findings suggest that Project-Based Learning creates more active and meaningful learning experiences because students are directly involved in solving real-world problems through collaborative projects. Students were encouraged to investigate issues, collect information, discuss ideas, and produce project outcomes, which stimulated their analytical and reflective thinking abilities.

### **3.1 Improvement of Students' Critical Thinking Skills**

The implementation of Project-Based Learning contributed positively to the development of students' critical thinking skills. Students in the experimental class demonstrated improvement in several critical thinking indicators, including interpretation, analysis, inference, evaluation, and explanation.

During project activities, students were required to identify problems, formulate questions, gather information from different sources, and propose solutions collaboratively. These activities encouraged students to think more critically and systematically. Students became more capable of evaluating information and connecting theoretical concepts with real-life situations.

The posttest results showed that the experimental group achieved higher average scores compared to the control group. Students who participated in project-based activities were more successful in answering analytical and problem-solving questions. They also demonstrated greater confidence in expressing opinions and presenting arguments during classroom discussions.

The improvement of critical thinking skills can be attributed to the student-centered nature of Project-Based Learning. Unlike conventional learning methods where students mainly receive information passively, Project-Based Learning requires students to actively construct knowledge through exploration and collaboration.

### **3.2 Students' Participation and Learning Engagement**

Classroom observation results indicated that students in the experimental group were more active and engaged during learning activities. Students showed enthusiasm in participating in group discussions, conducting investigations, and completing project tasks collaboratively.

Project-Based Learning encouraged students to communicate more effectively with peers and teachers. Students learned how to share ideas, negotiate solutions, and work together to achieve common goals. Collaborative learning activities also improved students' social interaction and teamwork skills.

Furthermore, students demonstrated higher learning motivation during project implementation. Many students expressed that project-based activities were more interesting and enjoyable compared to traditional classroom instruction. The opportunity to create project products and present their work increased students' confidence and sense of responsibility.

Students also became more independent learners because they were encouraged to search for information from books, internet resources, and other learning materials. This process helped students develop research skills and self-directed learning habits.

### **3.3 Teachers' Responses toward Project-Based Learning**

Teachers responded positively to the implementation of Project-Based Learning in classroom instruction. According to teachers, Project-Based Learning created more interactive and student-centered learning environments. Teachers observed that students became more active in asking questions, discussing ideas, and solving problems during classroom activities.

Teachers also stated that Project-Based Learning helped students understand learning materials more deeply because students learned through direct experiences and practical activities. Students were not only memorizing concepts but also applying knowledge in meaningful contexts.

However, teachers also identified several challenges in implementing Project-Based Learning. One of the main challenges was time management because project activities required longer instructional time compared to conventional learning methods. Teachers also needed additional preparation to design project activities and monitor students' progress effectively.

Another challenge involved differences in students' participation levels. Some students were more active during group discussions, while others tended to rely on their peers. Therefore, teachers needed to provide guidance and supervision to ensure balanced participation among group members.

### **3.4 Discussion**

The findings of this study are consistent with previous research indicating that Project-Based Learning positively influences students' critical thinking skills and academic performance. Project-Based Learning provides opportunities for students to learn actively through inquiry, collaboration, and problem-solving activities.

The improvement of critical thinking skills among students in the experimental group demonstrates that meaningful learning experiences contribute significantly to cognitive development. Through project activities, students are encouraged to analyze information critically, evaluate evidence, and develop logical solutions to problems.

The results also support constructivist learning theory, which emphasizes that knowledge is constructed actively through interaction and experience. Project-Based Learning allows students to become active participants in the learning process rather than passive recipients of information.

In addition, the findings highlight the importance of collaborative learning in developing critical thinking abilities. Students learned not only from teachers but also from interactions with peers during project discussions and group activities. Collaborative learning environments encourage students to exchange perspectives, challenge ideas, and refine their understanding of concepts.

Despite its advantages, successful implementation of Project-Based Learning requires adequate preparation, classroom management skills, and sufficient learning resources. Teachers need professional training and institutional support to apply project-based instructional strategies effectively.

Overall, the findings indicate that Project-Based Learning is an effective instructional approach for improving students' critical thinking skills and creating more engaging learning environments in junior high school education.

## **4. CONCLUSION**

This study concludes that Project-Based Learning (PBL) is effective in improving students' critical thinking skills at the junior high school level. The findings revealed that students who participated in project-based learning activities achieved significantly better results in critical thinking assessments compared to students who learned through conventional teaching methods. The implementation of Project-Based Learning encouraged students to analyze problems critically, evaluate information, communicate ideas effectively, and develop logical solutions collaboratively.

The study also demonstrated that Project-Based Learning created more active, interactive, and student-centered learning environments. Students became more engaged during classroom activities because they were directly involved in investigating problems, conducting discussions, and developing project outcomes. In addition, project-based activities increased students' learning motivation, confidence, creativity, and collaboration skills.

Furthermore, Project-Based Learning supported the development of independent learning habits because students were encouraged to search for information, conduct investigations, and manage learning tasks responsibly. The learning process not only improved students' academic performance but also strengthened important twenty-first-century skills such as teamwork, communication, and problem-solving abilities.

However, the implementation of Project-Based Learning also presented several challenges, including time management, differences in students' participation, and the need for additional preparation by teachers. Therefore, successful implementation of Project-Based Learning requires adequate planning, effective classroom management, and institutional support.

Based on the findings, teachers are encouraged to apply Project-Based Learning as an alternative instructional strategy to improve students' critical thinking skills and learning engagement. Schools should also provide training and facilities to support innovative learning practices in classrooms. Future studies are recommended to explore the long-term impact of Project-Based Learning on students' academic achievement, creativity, and collaborative skills in different educational contexts..

## REFERENCES

- Arends, R. (2020). *Learning to Teach*. New York: McGraw-Hill.
- Bell, S. (2010). Project-Based Learning for the 21st Century: Skills for the Future. *The Clearing House*, 83(2), 39–43.
- Boss, S., & Krauss, J. (2018). *Reinventing Project-Based Learning*. Eugene, OR: International Society for Technology in Education.
- Condliffe, B. (2017). *Project-Based Learning: A Literature Review*. New York: MDRC.
- Kemendikbud. (2022). *Kurikulum Merdeka dan Pembelajaran Berbasis Proyek*. Jakarta: Kementerian Pendidikan dan Kebudayaan.
- Krajcik, J. S., & Blumenfeld, P. C. (2006). Project-Based Learning. In R. K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences*. Cambridge: Cambridge University Press.
- Sugiyono. (2022). *Metode Penelitian Pendidikan*. Bandung: Alfabeta.
- Thomas, J. W. (2000). *A Review of Research on Project-Based Learning*. California: Autodesk Foundation.
- Trianto. (2019). *Model Pembelajaran Inovatif*. Jakarta: Kencana.
- Wena, M. (2020). *Strategi Pembelajaran Inovatif Kontemporer*. Jakarta: Bumi Aksara.