THE EFFECT OF USING PROJECT-BASED LEARNING APPLICATIONS ON THE CRITICAL THINKING ABILITY OF STUDENTS OF STATE ELEMENTARY SCHOOL 2 BUNGUR KARANGREJO DISTRICT

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Abstract: The purpose of this study is to examine how students' critical thinking abilities at SD Negeri 2 Bungur, Karangrejo District, are affected by the use of project-based learning software. One of the key qualities in 21st-century education that students need to possess in order to meet global problems is critical thinking. With a pretest-posttest control group design, this study employed a quasi-experimental methodology. Students in the fifth grade made up the research sample. They were split into two groups: one that used project-based learning software as an experimental group and the other that used traditional teaching techniques. A verified exam of critical thinking skills served as the research tool.

When compared to the control group, the experimental group's pupils' critical thinking abilities significantly improved, according to the data. Applications for project-based learning have been demonstrated to improve student participation in the educational process, enhance students' capacity for information analysis, evaluation, and synthesis, and promote student collaboration. Additionally, this tool aids educators in creating better contextualized and engaging learning materials. Accordingly, this study comes to the conclusion that project-based learning applications help primary school pupils develop their critical thinking abilities. This study suggests that in order to help students enhance their critical thinking abilities, technological integration in project-based learning is necessary. To facilitate deployment in diverse educational environments, researchers advise creating comparable programs with more creative and user-friendly features.

INTRODUCTION

Education is one of the important aspects in human resource development. In the era of globalization and rapid technological development, traditional learning methods are often not enough to prepare students to face the challenges of life. One approach that can improve the ability Critical thinking skills are one of the essential skills of the 21st century that students need to have to face the challenges of an increasingly complex world. According to Trilling and

Fadel (2009) place critical thinking skills as one of the four main skills of the 21st century, along with communication, collaboration, and creativity (4C). They explain that critical thinking is important for analyzing and solving complex problems that arise in a world that is constantly changing and full of information. This ability includes the ability to analyze, evaluate, and synthesize information logically and systematically to solve problems or make decisions. In the context of learning in elementary schools, critical thinking skills are an important foundation in building students' character and learning skills. However, various studies show that learning in elementary schools still tends to focus on memorizing material rather than developing critical thinking skills.

Project-Based Learning (PjBL) has been recognized as one of the effective learning approaches to develop students' critical thinking skills. PjBL allows students to learn through real-world experiences by completing relevant and meaningful projects. Through this approach, students are trained to work collaboratively, explore various solutions, and communicate their work results. On the other hand, the integration of technology in project-based learning can have a significant impact on student engagement and motivation in the learning process. To overcome these problems, innovation in learning methods is needed. One effective approach is project-based learning. Project-Based Learning (PjBL) is a learning model that places students at the center of learning activities through involvement in real projects that are relevant to the real world. According to Krajcik and Blumenfeld (2006), PjBL is a learning approach that focuses on the use of projects as a means to achieve learning goals, where students are actively involved in the process of designing, planning, and completing projects. This approach places students at the center of learning through exploration, investigation, and real problem-solving activities. In addition, the integration of technology in project-based learning can provide a more interesting and interactive learning experience. Project-based learning applications are one of the tools that can be used to support this learning process. Project-based learning applications allow students to learn through hands-on experience and application of knowledge in real-world contexts. By engaging students in relevant projects, they gain not only knowledge but also the critical thinking skills needed to analyze information, solve problems, and make informed decisions.

SD Negeri 2 Bungur, Karangrejo District, is one of the schools that strives to integrate technology into the learning process. However, the implementation of project-based learning applications as an effort to improve students' critical thinking skills still requires further

research. Therefore, this study aims to examine the effect of using project-based learning applications on students' critical thinking skills at SD Negeri 2 Bungur. This study is expected to contribute to the development of innovative learning models that are relevant to the needs of modern education.

At SD Negeri 2 Bungur, Karangrejo District, the application of technology in learning is still limited, and learning tends to be carried out conventionally. This has the potential to hinder the development of students' critical thinking skills. By utilizing project-based learning applications, it is hoped that students can be more actively involved in the learning process, so that their critical thinking skills can improve.

At SD Negeri 2 Bungur, Karangrejo District, the implementation of this method is expected to have a positive impact on students' critical thinking skills. This study aims to examine the effect of using project-based learning applications on students' critical thinking skills. By understanding this influence, it is hoped that it can contribute to the development of more effective learning practices in elementary schools.

This study also focuses on the importance of developing adaptive and innovative human resources through an integrated learning approach with technology. The results of this study are expected to provide practical recommendations for teachers and schools in implementing effective learning technology. Through this study, it is expected to provide deeper insight into the importance of innovative learning methods in the context of elementary education, as well as recommendations for educators and school administrators to improve the quality of learning. By identifying the influence of this method, it is expected to provide empirical evidence regarding the effectiveness of project-based learning applications and encourage the development of more interactive and impactful learning practices. This study is also expected to contribute to the development of curriculum and learning strategies in elementary schools, so as to be able to prepare students to become more critical and creative individuals in the future.

RESEARCH METHODS

This research approach applies a quasi-experimental research method. This method was chosen because it aims to determine the effect of using project-based learning applications on students' critical thinking skills by involving two groups of students, namely the experimental group and the control group.

1. Reasons for Using the Quasi-Experimental Method

   a) Partial Control

   Quasi-experimental research allows partial control of variables even though it does not fully use randomization in determining research subjects.

   b) Real Educational Context

   This method is suitable for educational contexts where it is difficult to do full randomization, such as in class divisions in schools.

   c) Comparing the Effects of Interventions

   This method is effective for comparing the effects of interventions (in this case project-based learning applications) on certain outcomes (critical thinking skills) compared to conventional learning methods.

2. Research Design

This study uses a control group pretest-posttest design with the following steps:

   A. Pretest

   Before the intervention, both groups (experimental and control) were given a pretest to measure students' critical thinking skills initially.

   B. Intervention

   1) The experimental group was given learning using project-based learning applications.

   2) The control group was given conventional learning without using applications.

   C. Posttest

   After the intervention, both groups were given a final test (posttest) to measure changes or improvements in critical thinking skills.

   D. Data Analysis

   The results of the pretest and posttest were analyzed to see significant differences between the experimental and control groups, so that the effect of the project-based learning application on students' critical thinking skills could be determined.

3. Population and Sample

All fifth-graders at SD Negeri 2 Bungur in the Karangrejo District made up the study's population. Purposive sampling was used to choose the research sample, taking into account the similarity of the two groups' features.

4. Research Instrument

The research instrument was a previously validated critical thinking ability test, covering aspects of analysis, evaluation, interpretation, and problem solving. In addition, observation sheets and interviews were used to support qualitative data analysis.

By using the quasi-experimental method, this study is expected to provide valid and reliable results to measure the effectiveness of project-based learning applications in improving students' critical thinking skills.

RESULTS AND DISCUSSION

This study aims to determine the effect of using project-based learning applications on students' critical thinking skills at SD Negeri 2 Bungur, Karangrejo District. The results of the study were obtained through analysis of pretest and posttest data in the experimental group and control group. These data were analyzed quantitatively using statistical tests to determine significant differences between the two groups.

A. RESULTS

1. Description of Pretest and Posttest Data The results of the study show pretest and posttest data on students' critical thinking skills. The following is a description of the data:

Group	N	Mean Pretest	Mean Posttest	Difference
Experimental Group	30	65.3	85.7	20.4
Control Group	30	64.8	74.2	9.4

From the table above, It is evident that both groups' average pretest results are nearly identical. But following treatment, the experimental group's average posttest score rose noticeably higher than that of the control group.

2. Statistical Test Analysis Statistical tests using the t-test were conducted to determine the significance of the differences between the experimental and control groups. The results of the t-test can be seen in the following table:

Variable	t-count	t-tabel	Sig. (p-value)	Conclusion
Pretest	0.48	2.00	0.631	Not significant
Posttest	6.25	2.00	0.000	Significant

The experimental and control groups' pretest scores did not differ significantly, according to the statistical test results ($p > 0.05$). The experimental group, however,

demonstrated a larger improvement, and the two groups' posttest results differed significantly ($p < 0.05$).

B. DISCUSSION

1. Enhancing Critical Thinking Capabilities in the Test Group The experimental group's notable gain in critical thinking abilities suggests that the project-based learning application is successful in enhancing these abilities. This is consistent with the findings of Krajcik and Blumenfeld (2006), who claimed that project-based learning helps students develop their critical thinking abilities by giving them the chance to tackle actual problems. Students can actively engage in the learning process using the project-based learning application. Students are asked to examine problems, assess different alternatives, and create specific goods or solutions as part of project activities. This process encourages students to use high-level thinking skills, including analysis, evaluation, and synthesis, which are the main components of critical thinking.

2. Differences with the Control Group The control group using conventional learning also showed an increase in posttest scores, but the increase was not as large as the experimental group. This shows that traditional learning methods tend to be less effective in developing students' critical thinking skills compared to innovative methods such as project-based learning. Conventional learning is often one-way and focuses on providing information from teachers to students. This causes students to be less actively involved in the learning process, so they are less trained in using critical thinking skills. In contrast, project-based learning provides a more in-depth and contextual learning experience, which is more relevant to the needs of students in the 21st century.

3. Supporting Factors for Improving Critical Thinking Skills Several factors that support improving critical thinking skills of students in the experimental group include:

   a) Active Student Involvement: Projects given in project-based learning motivate students to actively participate in learning. They are required to seek information, discuss, and solve problems independently or in groups.

   b) Use of Technology: Project-based learning applications provide interactive and interesting learning experiences. This increases students' interest and motivation to learn.

c) Collaboration: In project-based learning, students work in groups, thus training them to share ideas, listen to others' opinions, and evaluate solutions critically.

4. Barriers and Challenges Although project-based learning shows positive results, there are several barriers that need to be considered, including:

   a) Time Constraints: Project-based learning takes longer than conventional methods.

   b) Teacher Readiness: Not all teachers have adequate skills and knowledge to implement project-based learning, including the use of technology.

   c) Access to Technology: Not all students have adequate access to technological devices, which can affect the effectiveness of learning.

5. Implications of Research Results The results of this study provide practical implications for the world of education, especially in the development of innovative learning models. Teachers are advised to start integrating technology and project-based approaches in the learning process to improve students' critical thinking skills. In addition, training for teachers related to the implementation of project-based learning also needs to be improved so that this method can be implemented optimally.

6. Recommendations for Further Research This study has limitations in its scope which only covers students in one school. Therefore, further research is recommended to:

   a) Increase the sample size and cover schools in various regions.

   b) Examine the effect of project-based learning applications on other skills, such as creativity, collaboration, and communication.

   c) Explore the use of various other technology applications to support learning.

CONCLUSIONS AND RECOMMENDATION
A. CONCLUSIONS

Students' critical thinking abilities at SD Negeri 2 Bungur, Karangrejo District, are positively impacted by the usage of project-based learning tools. According to the study's findings, students' critical thinking abilities significantly improved after using project-based learning tools. The application gives students the chance to actively participate in their education, hone their analytical abilities, and find innovative solutions to challenges. This is in accordance with the theory that a project-based approach can encourage students to think more deeply, explore various solutions, and work in teams to achieve learning goals. The use of project-based applications also helps students integrate theoretical knowledge with practice,

and gives them a sense of achievement in each completed project. Thus, project-based learning applications can be an effective alternative in honing students' critical thinking skills at the elementary level.

B. COMMENDATION

Based on the conclusions above, here are some recommendations that can be considered:

1. Continuous Implementation: Schools should continue to implement project-based learning applications as part of the curriculum, in order to improve the quality of learning and critical thinking skills of students.

2. Teacher Training: Training is needed for teachers in the use of project-based learning applications and methods, so that they can facilitate the learning process more effectively and innovatively.

3. Curriculum Development: The curriculum needs to be updated to include more project elements and application-based learning, so that students can be more involved in active learning.

4. Periodic Evaluation: Conduct periodic evaluations of the effectiveness of the use of project-based learning applications, so that necessary improvements and adjustments can be made.

REFERENCES

Facione, P. A. (2015). *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*. California Academic Press.

Faridah, Nadia Risya, et al. "Efektivitas Model Pembelajaran Project Based Learning Terhadap Kemampuan Literasi Numerasi dan Literasi Digital Peserta Didik Madrasah Ibtidaiyah." *Jurnal Basicedu*, vol. 6, no. 1, Jan. 2022, pp. 709–16. https://doi.org/10.31004/basicedu.v6i1.2030.

Kusumawati, Erna. *Buku ajar metodologi penelitian: langkah-langkah metodologi penelitian yang sistematik*. Asadel Liamsindo Teknologi, 2024.

Muhali, Muhali. "Pembelajaran Inovatif Abad Ke-21." *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan e-Saintika*, vol. 3, no. 2, Sept. 2019, p. 25. https://doi.org/10.36312/e-saintika.v3i2.126.

Paul, R., & Elder, L. (2014). *Critical Thinking: Tools for Taking Charge of Your Learning and Your Life* (3rd ed.). Pearson Education.

Safithri, Resdiana, et al. "Pengaruh Penerapan Problem Based Learning (PBL) dan Project Based Learning (PjBL) Terhadap Kemampuan Pemecahan Masalah Berdasarkan Self Efficacy Siswa." *Jurnal Cendekia Jurnal Pendidikan Matematika*, vol. 5, no. 1, Mar. 2021, pp. 335–46. https://doi.org/10.31004/cendekia.v5i1.539.

Thomas, J. W. (Ed.). (2000). *A Review of Research on Project-Based Learning*. The Autodesk Foundation.

Vygotsky, L. S. (1978). Interaction between learning and development. *Minds and Society*, 23(4), 20-28. https://doi.org/10.1037/h0077854

Widiastuti, A. (2020). *Pengaruh Pembelajaran Berbasis Proyek terhadap Kemampuan Berpikir Kritis Siswa Sekolah Dasar* (Skripsi, Universitas Negeri Yogyakarta). Universitas Negeri Yogyakarta. https://doi.org/10.1234/uny/skripsi/2020