Current Issues on Elementary Education Journal

Journal homepage: https://ejournal.upi.edu/index.php/CIEE

Improving the critical thinking ability of fifth grade students in science learning using the project based learning model

Okeu Wila Silvia[1*], Asep Kurnia Jayadinata[2], Galih Dani Septian Rahayu[3]

[1]SDN Walahir, Indonesia, [2]Universitas Pendidikan Indonesia, Indonesia, [3]IKIP Siliwangi, Indonesia

*okeuwsilvia@gmail.com

ABSTRACT

This research is motivated by the problem of low critical thinking skills of class V students at SDN Wahir in science learning. Science learning encourages students to think at a higher level, analyze, design and create a product/work. Therefore it takes high-level thinking skills to achieve good science learning. This study aims to describe the Project Based Learning (PJBL) model that is implemented to overcome the problem of students' low critical thinking skills. This research is a qualitative research using classroom action research methods. Data were collected by observation, interviews, documentation and data acquisition were analyzed descriptively qualitatively. Researchers analyzed the data by means of data reduction, data presentation, and drawing conclusions and verification. This research was conducted in two cycles while the percentage of the first cycle was based on the implementation of learning with the results of students' critical thinking skills of 62.50% achieving the target of success indicators for critical thinking skills, and 68.75% of students' learning outcomes reaching the target exceeding the KKM. In cycle II there was an increase in students' critical thinking skills of 81.25% reaching the target with learning outcomes of 87.50% reaching the target above the KKM. The data shows that students' critical thinking skills in science learning have increased through the application of the Project Based Learning (PJBL) model.

ARTICLE INFO

Article History:
Submitted/Received 03/05/2024
First Revised 12/06/2024
Accepted 30/06/2024
First Available online 30/06/2024
Publication Date 30/06/2024

Keyword:
Project Based Learning (PJBL)
critical thinking skills
Science Learning

How to cite: Silvia, O. W., Jayadinata, A. K., & Rahayu, G. D. S. (2024). Improving the critical thinking ability of fifth grade students in science learning using the project based learning model. *Current Issues on Elementary Education Journal, Vol 3 (1), 1-8.*

1. INTRODUCTION

Science subjects are one of the mandatory subjects at every level of education. Samatowa (in Gowasa, et al. 2019) states that the elementary school education level is the basis for studying science subjects from branches such as biology, chemistry and physics at higher education levels. It is important that in learning science students improve their critical thinking skills because learning science requires students to have the ability to think at a high level, analyze, design and create a product/work. This subject is not just rote learning but has the potential to shape students' personalities. Because of this, science subjects are very important to be taught at elementary school level.

Based on the results of observations in class V of SDN Walahir during science learning, it can be seen that in the learning process, when the teacher gives the opportunity to ask questions about the material being presented, students tend to be passive, and when asked for their opinion, students do not give a positive response so that learning tends to be monotonous and only the teacher plays a role. active. When given HOTS questions, students had difficulty answering these questions.

The above facts are supported by the results of interviews with previous teachers that teachers have not optimized HOTS-based learning, and teachers have not implemented learning models that can develop students' critical thinking skills, so students are not used to thinking critically (Jaya, 2022). Learning that is dominated by lectures and assignments makes students accustomed to being told rather than finding out. This affects critical thinking skills which definitely affect students' learning outcomes.

In practice, teachers are expected to be able to apply good models and strategies for science learning. Therefore, efforts are needed to improve the quality of learning that supports HOTS-based learning and is in accordance with 21st century learning (Mariam, 2020). One of the efforts made is to apply the Project Based Learning learning model. Project Based Learning is an innovative learning model or approach that emphasizes learning contextually through complex activities. This model encourages students to be able to analyze and solve problems through a product design.

Research that focuses on the PJBL model has been carried out by many previous researchers, including First, research conducted by Mabruroh (2019) with the results that there was an influence on the critical thinking abilities of class VI students with the implementation of the PJBL model. Second, research conducted by Winarti, et, al. (2022) stated that there was a significant increase in the use of the PJBL model regarding the critical thinking abilities of grade III elementary school students. Referring to the two previous studies, the researcher used the PJBL learning model to improve students' critical thinking skills with different subjects and characteristics, namely in science learning in class V at SDN Walahir.

Critical Thinking Ability

According to Greenstein (Fitri et al., 2018) that in the 21st century the high-level thinking skills needed are critical thinking, creativity and problem solving. According to Unaenah (2019) Critical thinking is a skill in thinking by using the process of analyzing and evaluating a problem so as to produce the right decision in solving the problem. According to Ennis (in Mabruroh, 2019), critical thinking is the ability to think with the aim of making reasonable decisions about what to believe or do. Critical thinking is the ability to use logic. Logic is a way of thinking to gain knowledge accompanied by an assessment of truth based on certain reasoning patterns. The six basic elements of critical thinking according to Ennis are Focus, Reason, Inference (conclusion), (situation), Clarity (clarity) and Overview (comprehensive

view). Therefore, the ability to think critically in 21st century learning This is an ability that students must have.

Project Based Learning

The main learning model in the 2013 Curriculum used in science learning to develop thinking skills, learning abilities, curiosity, caring and responsible attitudes towards the natural environment is Project Based Learning (PjBL) or also referred to as a project-based model (Permendikbud No. 35 No 2018), Pratiwi et al. (2018) stated that PJBL is a learning process that focuses on a relatively long learning system, focuses on problems and combines concepts from several components, both in terms of knowledge and scientific disciplines. Meanwhile, according to Fahrezi, et al. (2020) stated that PJBL is a model that applies problems as the first step in acquiring new knowledge based on concrete life activities. The PJBL model certainly has advantages and disadvantages. Niswara, et al. (2019). Explain the advantages and disadvantages of the PJBL model. The advantages of the PJBL Model are (1) increasing motivation, (2) increasing problem solving abilities, (3) increasing collaboration abilities, (4) increasing resource management abilities. Meanwhile, the shortcomings of the PJBL model are, (1) it requires teachers who are skilled and willing to learn, (2) it requires a lot of time and money, (3) it requires adequate equipment and materials, (4) it is not suitable for students who give up easily, (5) difficulty involving all students in group work.

Science Learning

According to Rusnadi, (Widiana, 2016) Science lessons are one of the important subjects to instill in students because through science lessons, students are able to act scientifically in solving the problems they face. Meanwhile, Wedyawati and Lisa (2019) explained that science as an inquiry method includes ways of thinking, attitudes and steps for scientific activities to obtain science products or scientific knowledge. For example, observation, measurement, formulating, testing, collecting data, experimenting and predicting. It is hoped that science learning can become a vehicle for students to learn about themselves and the natural world around them, as well as further prospects for applying it in everyday life. Science lessons have an important role in human development, both in terms of technology and in the application of concepts.

2. METHODS

This research applies the classroom action research method using the Kurt Lewin model, this model is the main reference for various classroom action research. In this model there are four stages of research, namely planning, action, observation and reflection. Asrori, (2020). This research was conducted on class V students at SDN Walahir, Cililin District, West Bandung Regency with a sample size of 16 students. According to Sugiarni (2021), the stages of classroom action research consist of several cycles. Each cycle consists of four steps, namely: (1) planning, (2) action or action, (3) observation, and (4) reflection.

At the planning stage, the researcher prepares an action plan that will be implemented to find problems that occur in the classroom. After that, create learning tools along with assessment instruments such as teacher observation sheets, student questionnaires and interviews. In the action stage, researchers carry out learning activities using the PJBL model according to the tools that have been created. At the observation stage, observations are made during the learning process. This activity is assisted by colleagues to observe the activities of the teacher and students during learning. In the reflection stage, the researcher examines the strengths and weaknesses of the learning and makes improvement plans for the next lesson.

Data collection techniques in this research were carried out using test and non-test instruments. The test instrument is in the form of HOTS-based description questions to determine the extent of students' ability to solve questions that require critical thinking skills. Meanwhile, non-test instruments include observation sheets, questionnaires and interviews. This research, which was carried out in 2 cycles, can be said to be successful if ≥80% of students obtain complete learning outcomes of KKM ≥70 and have critical thinking skills in the good and very good categories.

3. RESULTS AND DISCUSSION

3.1 Results

This research was carried out from September to November 2022. Problems that occurred in class were identified through observations and interviews, with the results of students' low critical thinking abilities, especially in science material, due to teaching methods that still prioritize lectures and assignments, teacher-centered learning, learning media that has not been developed and learning that is still LOTS based. This causes students' low critical thinking abilities as seen from activities in class through indicators of critical thinking abilities, namely the ability to ask questions, the ability to answer questions, the ability to analyze and argue, the ability to solve problems, the ability to evaluate and the ability to conclude which is still very low. Students tend to be passive which causes the learning atmosphere to become monotonous. This low critical thinking ability certainly affects students' attitudes and learning outcomes, as evidenced by evaluation results with a greater percentage below the KKM compared to those who reach the KKM.

From the analysis of the problems that occurred, the steps taken to improve students' critical thinking skills were classroom action research. In cycle I of the planning stage, the researcher prepared an action plan, namely a learning design consisting of lesson plans, learning media, teaching materials, assessment instruments, observation guidelines, student questionnaires and interviews. In the implementation stage, researchers carry out learning activities in accordance with the teaching tools that have been designed at the planning stage. Research in cycle I produced the following data.

Table 1. Results of analysis of teacher performance, student activities and student learning outcomes in Cycle I

Aspect	Facts	Target	Information
Teacher performance	83,33%	80%	Achieve the target
Students' critical thinking abilities	62,50%	80%	Haven't reached the target yet
Student Learning Outcomes	68,75%	80%	Haven't reached the target yet

Based on table 1, it can be seen that the results of teacher performance assessed based on observations have reached the target, but cannot be said to be optimal. Meanwhile, students' critical thinking abilities assessed based on critical thinking ability indicators, namely the ability to ask questions, the ability to answer questions, the ability to express opinions, the ability to evaluate and the ability to conclude, reached 62.50%, which means they have not reached the target. Data was obtained that out of 16 students, 10 students were able to achieve targets above the KKM. Followed by learning outcome data which is still below the target, namely 68.75% with data as many as 11 students were able to reach the KKM.

From the results of the data analysis, it was found that several weaknesses were faced by teachers and students in cycle I learning, such as students who were still embarrassed to ask questions, answer questions and express opinions, teachers who were still not optimal in managing time so that learning seemed rushed, teachers who were not able to motivate students, students are less active during group work. These shortcomings mean that reflection can be improved in cycle II, it is hoped that there will be significant developments in the learning process.

Not much different from the previous cycle, in cycle II the planning stage the researcher considered the deficiencies in the learning activities that occurred in cycle I so that this cycle has been adjusted to perfect the deficiencies in cycle I. The results of observations in cycle II on teacher performance learning activities in designing and implementing learning reached 93.33%. Meanwhile, students' critical thinking abilities reached 81.25%. Student learning outcomes reached 87.50%. Data was obtained that 13 out of 16 students were able to achieve the target and develop their critical thinking skills, and 14 out of 16 students were able to achieve the target of solving HOTS-based questions. The results of cycle II are as follows.

Table 2. Results of analysis of teacher performance, student activities and student learning outcomes in Cycle II

Aspect	Facts	Target	Information
Teacher performance	93,33%	80%	Achieve the target
Students' critical thinking abilities	81,25%	80%	Achieve the target
Student Learning Outcomes	87,50%	80%	Achieve the target

The results of the analysis can be seen that during cycle II there was quite a significant increase from the previous cycle. From the results of observations during the learning process, the teacher has been able to motivate students and carry out learning using the innovative PJBL model, the teacher has implemented it in accordance with the steps of the PJBL model, developing 21st century learning based on 4C communication, collaboration, critical thinking and creative thingking so that learning runs actively for both teachers and students and achieves targets in the very good category with a score of 93.33%. Students' critical thinking abilities also increased with a percentage of 81.25% achieving the target. As well as student learning outcomes which have increased with a percentage of 87.50% above the KKM. To see a comparison of the improvements that occurred in cycles I and II, you can see the following diagram.

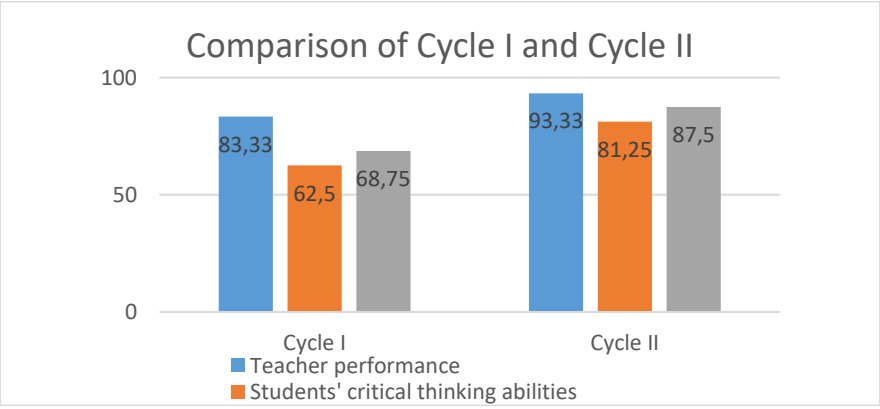

Figure 1. Comparison diagram of Cycle I and Cycle II

Based on the comparison picture above, it can be seen that the increase from cycle I to cycle II is quite significant. In terms of teacher performance, it can be seen that the comparison between cycle I and cycle 2 is 10%. Meanwhile, students' critical thinking abilities from cycle I to cycle II increased quite significantly, namely by 18.75%. This of course influenced students' learning outcomes, the percentage of which increased by 18.75%.

3.2 Discussion

The research results of the problem of the low critical thinking skills of class V students at SDN Walahir which has an impact on student learning outcomes, require a change to make learning more enjoyable based on High Order Thinking Skills (HOTS), namely by using the PjBL model. The findings in this research, during the learning process, students appear active and can come up with the results of their own thoughts, students are able to express their opinions and have the courage to present the results of the projects they have created with confidence. Students can collaborate both between students and with teachers. Students become more active in asking, answering questions and expressing opinions. The following findings are in accordance with the presentation by Azizah, et al., (2018) that the PjBL model can increase learning motivation. train students' self-confidence, train collaboration between students, students become more active in learning activities, and train students to process information sources. In line with this explanation, Makio et al., (2019) stated that PjBL is a learning approach where students play an active role in learning, discussing and solving problems and working in teams. It was further stated by Susanti et al., (2021) that the PjBL model can train students' skills in planning, organizing, negotiating, and making agreements about the tasks to be carried out, who is responsible for the tasks, and how information will be collected and served.

The research results showed that there was a significant increase in students' critical thinking skills after implementing the PjBL model. By implementing the PjBL model, it helps students solve a problem they face. In the PjBL model there are stages where students discuss each problem through basic questions given by the teacher. This is in line with research by Mujiyono (2018) which explains that the application of the PjBL model is effective in bringing students in groups or individually to solve problems presented by teachers. It can be seen that group learning trains students' ability to ask and answer questions with their group members. Learning with group discussions also sharpens students' abilities to determine which solution is most appropriate in solving problems, evaluating and presenting products as solutions to problems. This is closely related to indicators of critical thinking abilities. Kibtiyah, (2019) also explained that the Project Based Learning learning model is able to increase students' self-confidence, motivation, tolerance, understanding of the material, and cooperation. Furthermore, Guo et al. (2020) product creation in PjBL is important because it helps students to integrate and reconstruct knowledge, discover and improve professional skills, and increase students' interest in the discipline and ability to work with other people. In other words, the final product is a concentrated expression of various competencies that students can develop while studying using the PjBL model.

5. CONCLUSION

Overall, this research can be concluded that students' critical thinking skills can be improved by applying the PjBL model seen from the critical thinking ability indicators, with the PjBL model students are more active in asking, answering questions, and solving problems and creating a work product to solve these problems. The success of the PjBL model in

improving students' critical thinking skills can be seen from the percentage of critical thinking skills in cycle I of 62.50% achieving the success target of critical thinking ability indicators, as well as 68.75% of students' learning outcomes achieving targets exceeding the KKM. In cycle II, students' critical thinking skills increased by 81.25%, achieving the target with learning outcomes of 87.50% achieving the target above the KKM. This strengthens the fact that applying the PjBL model can improve the critical thinking skills of class V students in science learning.

6. REFERENCES

Fahrezi, I., Taufiq, M., & Akhwani, A. (2020). Meta-Analisis Pengaruh Model Pembelajaran Project Based Learning Terhadap Hasil Belajar Peserta didik Pada Mata Pelajaran IPA Sekolah Dasar. *Jurnal Ilmiah Pendidikan Profesi Guru*, *3*(3), 408-415.

Fitri, H. & Suharjo, S. (2018). Pengaruh Model Project Based Learning (PjBL) Terhadap Kemampuan Berpikir Tingkat Tinggi Ditinjau dari Motivasi Berprestasi Siswa Kelas IV Sekolah Dasar. Briliant: Jurnal Riset Dan Konseptual, 3(2), 201.

Gowasa, S., Harahap, F., & Suyanti, R. D. (2019). Perbedaan penggunaan media powerpoint dan video pembelajaran terhadap kemampuan berpikir tingkat tinggi dan retensi memori peserta didik pada mata pelajaran IPA di kelas V SD. *Jurnal Tematik*, *9*(1), 19-27.

Guo, P. & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research, 102(April), 101586.*

Jaya, G. A., & Kelana, J. B. (2022). Peningkatan Pemecahan Masalah Matematika Menggunakan Model Pembelajaran Problem Based Learning Berbantuan Bar Modelling Untuk Siswa Sekolah Dasar. *Jurnal Profesi Pendidikan (JPP)*, *1*(1), 18-24.

Kibtiyah, A. M. (2022). Penggunaan Model Project Based Learning (PJBL) dalam Meningkatkan Kemampuan Bernalar Kritis pada Materi Mengklasifikasikan Informasi Wacana Media Cetak Siswa Kelas 5 Sekolah Dasar. *INOPENDAS: Jurnal Ilmiah Kependidikan*, *5*(2), 82-87.

Mabruroh, M. (2019). Pengaruh Model Pembelajaran Project Based Learning Pada Mata Pelajaran IPA Terhadap Kemampuan Berpikir Kritis Peserta didik Kelas VI SD Negeri Margorejo VI Surabaya. *Child Education Journal*, *1*(1), 28-35.

Makio-Marusik, E. … Pechmann, A. (2019). Concept and case study for teaching and learning industrial digitalization. *Procedia Manufacturing, 31, 97–102*

Mariam, L., & Kelana, J. B. (2020). Upaya pemahaman konsep matematika materi perkalian pada siswa sd dengan menggunakan metode hands on activity. *COLLASE (Creative of Learning Students Elementary Education)*, *3*(6), 335-341.

Pratiwi, C. D. & Anugraheni, I. (2018). Penerapan Model Pembelajaran Project Based Learning (PjBL) Berbantuan Media Mind Map Untuk Meningkatkan Keaktifan dan Hasil Belajar Siswa Kelas IV SD. *Jurnal Guru Kita (JGK), 2(3), 116–125*.

Susanti, E., Maulidah, R., & Makiyah, Y. S. (2021, November). Analysis of problem-solving ability of physics education students in STEM-based project based learning. In *Journal of Physics: Conference Series* (Vol. 2104, No. 1, p. 012005). IOP Publishing.

Unaenah, E., & Rahmah, N. (2019). Pengaruh Model Learning Cycle Terhadap Kemampuan Berpikir Kritis Matematika Peserta didik Kelas V Sekolah Dasar. *Jurnal Cakrawala Pendas*, *5*(2), 1-12.

Wedyawati, N., & Lisa, Y. (2019). *Pembelajaran IPA di Sekolah Dasar*. Deepublish.

Widiana, I. W. (2016). Pengembangan asesmen proyek dalam pembelajaran ipa di sekolah dasar. *JPI (Jurnal Pendidikan Indonesia)*, *5*(2), 147-157.