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Improving the Critical Thinking Skills of Grade III Students through Project-Based Learning in Natural and Social Sciences Subjects at State Elementary School 030/VIII Rimbo Bujang, Tebo

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ABSTRACT

This research was motivated by the low critical thinking ability of grade III students in Natural and Social Sciences (IPAS) learning at SD Negeri 030/VIII Rimbo Bujang, Tebo, which was shown by the initial completeness of 31.58% or six out of nineteen students. The research aims to describe the application of project-based learning, analyze the improvement of critical thinking skills, and assess the achievement of indicators of action success. The research uses the Kemmis and McTaggart model, Class Action Research, which is carried out in two cycles through the stages of planning, implementation, observation, and reflection. Data were collected through observation of learning implementation, critical thinking ability tests, project assessments, documentation, and field notes; Furthermore, it was analyzed descriptively, quantitatively, and qualitatively. The results showed that the average learning implementation increased from 77.5% in the first cycle in the good category to 92.5% in the second cycle in the very good category. The average score of critical thinking increased from 65.47 to 78.05, while classical completeness increased from 36.84% to 57.89%. Project-based learning increases student participation in observing, discussing, drafting products, presenting findings, and drawing conclusions. It was concluded that project-based learning is effective in improving the quality of the learning process and critical thinking skills, but classical completeness of at least 85% has not been achieved, so a follow-up cycle is needed. The next improvement needs to prioritize individual mentoring, strengthening evidence-based reasons, and formative assessments for students who have not been completed optimally.

Informasi Artikel

Kata Kunci:

Berpikir kritis; IPAS; Pembelajaran berbasis proyek; Penelitian tindakan kelas.

ABSTRAK

Penelitian ini dilatarbelakangi oleh rendahnya kemampuan berpikir kritis siswa kelas III pada pembelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS) di SD Negeri 030/VIII Rimbo Bujang, Tebo, yang ditunjukkan oleh ketuntasan awal sebesar 31,58% atau enam dari sembilan belas siswa. Penelitian bertujuan mendeskripsikan penerapan pembelajaran berbasis proyek, menganalisis peningkatan kemampuan berpikir kritis, dan menilai ketercapaian indikator keberhasilan tindakan. Penelitian menggunakan Penelitian Tindakan Kelas model Kemmis dan McTaggart yang dilaksanakan dalam dua siklus melalui tahap perencanaan, pelaksanaan, observasi, dan refleksi. Data dikumpulkan melalui observasi keterlaksanaan pembelajaran, tes kemampuan berpikir kritis, penilaian proyek, dokumentasi, dan catatan lapangan; selanjutnya dianalisis secara deskriptif kuantitatif dan kualitatif. Hasil menunjukkan bahwa rata-rata keterlaksanaan pembelajaran meningkat dari 77,5% pada siklus I berkategori baik menjadi 92,5% pada siklus II berkategori sangat baik. Nilai rata-rata berpikir kritis meningkat dari 65,47 menjadi 78,05, sedangkan ketuntasan klasikal meningkat dari 36,84% menjadi 57,89%. Pembelajaran berbasis proyek meningkatkan partisipasi siswa dalam mengamati, berdiskusi, menyusun produk, mempresentasikan temuan, dan menarik simpulan. Disimpulkan bahwa pembelajaran berbasis proyek efektif meningkatkan kualitas proses pembelajaran dan kemampuan berpikir kritis, tetapi ketuntasan klasikal minimal 85% belum tercapai sehingga diperlukan siklus lanjutan. Perbaikan berikutnya perlu memprioritaskan pendampingan individual, penguatan alasan berbasis bukti, dan asesmen formatif bagi siswa belum tuntas secara optimal.

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INTRODUCTION

Critical thinking skills are one of the essential competencies that need to be developed through 21st-century learning. This competency is not only related to students' ability to answer questions, but also includes the ability to understand information, identify problems, compare evidence, give reasons, and draw logical conclusions. In elementary education, the development of critical thinking needs to be carried out in stages according to the characteristics of students' cognitive development [1]. Grade III elementary school students still need a learning experience that is concrete, visual, contextual, and close to everyday life. Therefore, learning should not only be oriented to the delivery of material by teachers, but also needs to provide opportunities for students to observe, ask, try, discuss, and communicate their learning results. The Independent Curriculum also places critical reasoning as one of the important competencies that need to be formed through active and meaningful learning. Thus, teachers need to choose a learning model that is able to facilitate the direct involvement of students in the process of building knowledge and solving simple problems.

Natural and Social Sciences subjects have a strategic role in developing the critical thinking skills of elementary school students. IPAS integrates an understanding of natural phenomena, social life, the environment, and human relationships with the environment [2]. Through learning social studies, students are not only expected to master concepts, but also be able to use these concepts to understand events encountered in daily life [3]. In Phase B, IPAS learning directs students to make observations, ask questions, make predictions, carry out simple investigations, process information, reflect, and convey results. These activities show that IPAS has a strong relationship with the development of critical reasoning. Life cycle material for living things, for example, can help students understand the stages of growth of humans, animals, and plants through observing, sequencing, comparing, and explaining their similarities and differences. Social studies learning will be more meaningful if students are actively involved in finding information and building conclusions based on observations, discussions, and relevant learning experiences.

Project-based learning is one of the relevant learning models to improve students' active engagement and critical thinking skills [4]. This model places students as learning subjects who play a role in designing, implementing, completing, and evaluating projects based on meaningful questions or problems. In project-based learning, students are encouraged to seek information from various sources, come up with ideas, divide tasks, work together, create products, and present the results of their work [5]. The process allows students to develop analytical, creative, communicative, collaborative, and reflective abilities. Teachers no longer act as the only source of information, but rather as facilitators who provide direction, guidance, reinforcement, and feedback during the project. In science learning, projects can be designed in the form of creating charts, posters, models, or visual media that illustrate certain concepts [6]. A project on the life cycle of living things, for example, can help students understand the sequence of life changes in concrete terms while also training their ability to process information and convey the reasons for the results made.

Several previous studies have shown that project-based learning has the potential to improve students' learning outcomes, learning activities, creativity, teamwork, and critical thinking skills [7]. Project-based learning provides a more immersive learning experience as students not only receive explanations but are involved in the process of investigation and assignment completion directly [5]. Through project preparation, students learn to determine work steps, use learning resources, discuss findings, and assess the suitability of products for learning objectives. Previous research has also shown that the application of a project-based learning model can have a positive impact on student engagement in social studies

learning [8]. However, the success of the model is influenced by the teacher's readiness in designing the project, the clarity of the instruction, the suitability of the project with the student's ability, the availability of media, and the implementation of process and product assessments. Therefore, the implementation of project-based learning needs to be carried out systematically and in a targeted manner. Projects are not enough to be positioned as a work-producing activity, but rather should be a means for students to observe, reason, compare, conclude, and communicate their understanding responsibly.

The learning conditions of science in grade III of SD Negeri 030/VIII Rimbo Bujang, Tebo, show the need for learning improvement actions. Based on initial observations, learning still tends to be teacher-centered, while students have not had optimal opportunities to ask questions, express opinions, process information, and explain the reasons for their answers. Students tend to accept material passively, so that their critical thinking skills have not been developed optimally. Research shows that out of 19 students, as many as 13 students have not achieved the set learning goals. This condition requires the use of a learning model that can actively involve students, provide concrete experiences, and encourage them to complete tasks collaboratively [9]. Project-based learning is seen as appropriate to answer these needs because it can be applied through the project of creating visual media for the life cycle of living things [10]. Students can gather information, sort life stages, compare different types of living things, create products, and present results. Therefore, this class action research was carried out to improve the critical thinking skills of grade III students through project-based learning in science subjects.

Previous research has shown that project-based learning can improve the learning outcomes, creativity, activities, collaboration, and critical thinking of elementary school students. However, there are still research gaps in context, subject, material, and focus of action. Some previous research was conducted more on high-grade students in elementary school or focused on general learning outcomes, learning activities, and student creativity. Research on improving the critical thinking skills of grade III students through project-based learning in science subjects still requires strengthening empirical evidence, especially in the context of classrooms where learning is still teacher-centered. The novelty of this research lies in the application of project-based learning in the design of Classroom Action Research in grade III students of SD Negeri 030/VIII Rimbo Bujang, Tebo, with life cycle material on living things. The project is not only understood as the creation of a visual product, but is designed as an investigative process that facilitates students to observe, identify information, compare stages of the life cycle, formulate reasons, draw conclusions, and present results. The next novelty is that the evaluation of improving critical thinking skills is carried out gradually between cycles through actions, observations, reflections, and learning improvements.

This research aims to improve the critical thinking skills of grade III students through project-based learning in Natural and Social Sciences subjects at SD Negeri 030/VIII Rimbo Bujang, Tebo. In particular, this study aims to describe the application of project-based learning in science learning, analyze the improvement of students' critical thinking skills during the implementation of actions, and determine the achievement of indicators of action success in each cycle. The research is directed not only to assess the project products produced by students, but also to observe their thought processes in identifying problems, collecting information, comparing data, drawing conclusions, and communicating the results of the work. Based on these objectives, the formulation of this research problem is: How to apply project-based learning to science subjects in grade III of SD Negeri 030/VIII Rimbo Bujang, Tebo; How to improve the critical thinking skills of grade III students through

project-based learning in science subjects; The extent to which project-based learning can achieve indicators of success in improving the critical thinking skills of grade III students in science subjects.

RESEARCH METHODS

This study uses Classroom Action Research (PTK) with the Kemmis and McTaggart models to improve the critical thinking skills of grade III students through the application of a project-based learning model in Natural and Social Sciences (IPAS) subjects at SD Negeri 030/VIII Rimbo Bujang, Tebo. PTK was chosen because the research is oriented towards the systematic improvement of learning practices through actions that are planned, implemented, observed, and reflected on repeatedly. The subjects of the study were all grade III students, totaling 19 people, and class teachers as the implementers of the action. The research was carried out in the even semester of the 2025/2026 academic year. The focus of action is the use of visual projects of life cycles of living things that involve observation activities, information search, sequencing of stages, comparisons between life cycles, discussions, product preparation, presentations, and reflection [11]. This action is designed so that students have a concrete, collaborative, and meaningful learning experience, while being able to identify problems, assess information, formulate reasons, and draw conclusions based on evidence. The research was carried out in two cycles based on the need for real learning improvement.

The implementation of research in each cycle follows four stages, namely planning, implementation of actions, observation, and reflection. In the planning stage, researchers and teachers prepare teaching modules, student worksheets, project materials and media, observation instruments, product assessment rubrics, and critical thinking skills tests [12]. Learning is designed with essential questions about the life cycle of living things, and then students are formed into small groups to design and produce a chart or poster of the life cycle. In the implementation stage, the teacher facilitates students to find information, observe visual sources, determine the order of the stages, compare similarities and differences, and present the results of the project. Observations were carried out collaboratively to record the implementation of project-based learning syntax, teacher activities, student activities, group cooperation, and the development of critical thinking skills. The reflection stage is carried out by analyzing the findings of the process and the results of the action, identifying obstacles, and determining improvements for the next cycle. Improvements can be in the form of affirmation of triggering questions, simplification of work instructions, group role arrangements, more intensive mentoring, and strengthening reflective activities.

Research data was collected through observation, critical thinking ability tests, project assessments, documentation, and field notes. Observation sheets were used to assess the implementation of project-based learning as well as student activities during the Action process [13]. The critical thinking test is prepared based on indicators of providing simple explanations, building basic skills, concluding, providing further explanations, and setting strategies and techniques. Project rubrics are used to assess the accuracy of concepts, completeness of information, the ability to compare stages, the quality of reasoning, creativity, and communication of results. Quantitative data was analyzed descriptively by calculating the average score, percentage of learning completeness, and increase in results in each cycle. Qualitative data from observations, documentation, and field records were analyzed through data reduction, data presentation, and conclusion. The validity of the data is strengthened through triangulation of techniques and collaboration between researchers and classroom teachers. The action is declared successful if the implementation of learning reaches the good category, student activities increase, and at least 85 percent of students

achieve minimum grades according to the completeness criteria set by the school, and show continuous improvement in critical thinking.

RESULTS AND DISCUSSION

The application of project-based learning in science subjects is carried out in two cycles, which include planning, implementation of actions, observation, and reflection. In cycle I, teachers begin learning with essential questions about the life cycle of living beings, form groups, explain project procedures, distribute worksheets, and facilitate the creation of life cycle charts or posters. The results of observations showed that the average implementation of learning in the first cycle reached 77.5% with the good category. Students have begun to engage in observation, discussion, and product development, but some students still need guidance in task sharing, information processing, reasoning, and concluding. Reflection in cycle I is used as the basis for improving actions in cycle II through affirmation of instructions, giving product examples, setting group roles, and strengthening spark questions. In cycle II, the average implementation increased to 92.5% with the very good category. The findings show that the implementation of project-based learning is increasingly systematic, active, collaborative, and student-centered.

Table 1. Results of Project-Based Learning Implementation

Observed Aspects	Cycle I	Category	Cycle II	Category
Implementation of preliminary activities	75%	Good	90%	Excellent
Submission of essential questions	75%	Good	90%	Excellent
Project planning and execution	80%	Good	95%	Excellent
Discussion and collaboration activities	80%	Good	95%	Excellent
Project presentations and reflections	77,5 %	Good	92,5 %	Excellent
Average Implementation	**77,5 %**	**Good**	**92,5 %**	**Excellent**

Students' critical thinking skills show improvement after the application of project-based learning to the life cycle material of living beings. In the initial condition, 13 out of 19 students had not achieved the learning objectives, while 6 students had completed with a classical completion percentage of 31.58%. In the first cycle, the average score of critical thinking skills reached 65.47, with the number of students completing as many as 7 people or 36.84%. These results showed an increase in completeness by 5.26 percentage points compared to the initial condition, although students still had difficulty in giving reasons and drawing conclusions based on the observations. After making improvements in the second cycle, the average score increased to 78.05, and the number of completed students increased to 11 people or 57.89%. Thus, classical completeness increased by 21.05 percentage points from cycle I to cycle II. The improvement shows that visual projects, discussions, presentations, and reflections provide a concrete learning experience that supports students' critical reasoning development.

Table 2. Improving Students' Critical Thinking Skills

Rese	Num	Aver	Comp	Compl	Cate

arch Stage	ber of Students	age Score	leted Students	etion Percentage	gory
Pre-cycle	19	Not yet available	6	31,58 %	Less
Cycle I	19	65,47	7	36,84 %	Less
Cycle II	19	78,05	11	57,89 %	Enough

The success of the action is determined based on the implementation of at least good categorical learning, an increase in student learning activities, an increase in critical thinking skills, and classical completeness of at least 85%. The results of the study showed that the implementation of learning and learning activities had reached the good category in the first cycle, then increased to the very good category in the second cycle. The average value of critical thinking skills also increased from 65.47 in the first cycle to 78.05 in the second cycle. However, the classical completeness in the first cycle of 36.84% and in the second cycle of 57.89% has not met the minimum target of 85%. Reflection on actions shows that some students are still not confident in expressing their opinions, are not able to divide group tasks proportionally, and still need guidance when giving reasons and concluding observations. Therefore, the action cannot be declared successful as a whole and needs to be continued to the next cycle with more intensive assistance.

Table 3. Achievement of Research Success Indicators

Success Indicators	Target	Cycle I	Cycle II	Remarks
Implementation of learning	Minimal category baik	77,5 %	92,5 %	Achieved
Student learning activities	Minimal category baik	77,5 %	92,5 %	Achieved
Critical thinking average score	According to the school's MOH	65,47	78,05	Increase; needs to be adjusted to MOH
Classical completeness	Minimum 85%	36,84 %	57,89 %	**Not yet achieved**
Ability to explain and reason	Increase	Start to improve	Increase	Achieved by process
Ability to infer observations	Increase	Start to improve	Increase	Achieved by process

The theory of constructivism is the most relevant foundation for this research because it views learning as an active process when learners build knowledge through interaction with objects, experiences, environments, and others [14]. In this view, grade III students are not positioned as passive recipients of IPAS information, but as learners who interpret phenomena, ask questions, test understanding, and revise their ideas based on evidence. Project-based learning translates the principles of constructivism through life cycle investigation activities, information gathering, group discussions, chart or poster preparation,

presentations, and reflection [15]. The series allows students to connect initial knowledge with new findings, compare stages of human, animal, and plant life, and formulate conclusions that can be accounted for. In Classroom Action Research, this theory underlies the teacher's actions as facilitators who provide essential questions, step-by-step guidance, learning resources, and feedback. Thus, the improvement of critical thinking skills is understood as a result of students' active involvement in building, evaluating, and communicating knowledge.

The application of project-based learning in Natural and Social Sciences subjects in grade III of SD Negeri 030/VIII Rimbo Bujang, Tebo, is carried out through two cycles of Classroom Action Research, which include the stages of planning, implementation of actions, observation, and reflection. In the first cycle, learning begins with the submission of essential questions about the life cycle of living things to arouse students' curiosity. Teachers then form groups, explain project procedures, distribute worksheets, and facilitate students in creating lifecycle charts or posters. This learning places students as active actors who observe, seek information, discuss, develop products, and present results. The average implementation of learning in the first cycle reached 77.5% with the good category. This achievement shows that the project-based learning syntax has been implemented, although the implementation is not yet fully optimal. Some students still need direction when determining the division of tasks, selecting important information, and presenting reasons for the group's work.

The implementation of preliminary activities in the first cycle reached 75% with the good category, while the submission of essential questions received the same percentage. The results show that teachers have been able to condition students and direct their attention to the material of the life cycle of living beings. Essential questions serve as the starting point of the investigation process because they encourage students to think about the reasons why living things undergo growth, development, and proliferation. However, the response of some students is still limited to short answers and has not been accompanied by adequate reasons. This condition shows that grade III students need simple, concrete, and visual examples to understand learning problems better. The use of images, everyday experiences, and life-cycle media helps students connect new material with their initial knowledge [16]. Thus, the preliminary stage not only serves as an introductory activity but also serves as a foundation for building cognitive readiness, learning motivation, and student involvement in the implementation of the project.

In the core stage of cycle I, the planning and implementation aspects of the project reached 80%, while discussion and collaboration activities also reached 80%; both were categorized as good. This achievement shows that students are beginning to be able to work in groups to observe images, sequence the stages of the life cycle, and compile charts or posters according to the given project. Project activities make the concept of life cycle not only learned through verbal explanations of teachers, but also through direct experience in identifying, comparing, and organizing information [17]. However, there are still several obstacles, especially the inequality of participation between students in groups. Students who have higher confidence tend to dominate the discussion process, while other students are still waiting for a friend's or teacher's direction. In addition, some groups have not been able to distinguish between the main and complementary information in the products made. The findings show the need for a firm division of roles, gradual mentoring, and simpler work guidelines so that all students participate proportionally.

Cycle I reflection results in several action improvements to be applied to Cycle II. The teacher clarifies the project work instructions, provides examples of charts or posters that match the criteria,

arranges the division of roles in groups, and reinforces the spark questions at each learning stage [18]. These improvements have an impact on improving all aspects of learning implementation. Preliminary activities and the submission of essential questions increased to 90%, respectively, while project planning and implementation, and discussion and collaboration activities increased to 95%. Project presentations and reflections also increased from 77.5% to 92.5%. Overall, the average learning implementation in cycle II reached 92.5% with the very good category. This increase indicates that teachers are more effective in carrying out their role as facilitators, while students increasingly understand the stages of project activities. Clarity of instructions and product examples helps students complete tasks more independently. Group role arrangements also encourage more equitable engagement during observations, discussions, product development, and presentations.

The results of the implementation in cycle II show that project-based learning is able to create a more active, collaborative, contextual, and student-centered IPAS learning process [19]. Students no longer only receive information about the life cycle of living things, but also engage in building understanding through the process of observation, discussion, product creation, presentation, and reflection. The increase in implementation from 77.5% to 92.5% shows that the corrective actions taken after the reflection of the first cycle are effective. The findings are also in accordance with the learning characteristics of IPAS Phase B, which emphasize the activities of observing, questioning, investigating, analyzing information, evaluating, and communicating results. In the context of this study, the project product in the form of a life cycle chart or poster serves as a medium to visualize the results of students' thinking. Therefore, the application of project-based learning is not solely judged from the final product, but from the involvement of students in the process of building knowledge together and meaningfully.

Theoretically, the success of the implementation of project-based learning can be explained through the perspective of constructivism, which places students as active individuals in building knowledge based on social experiences and interactions. The improvement of learning implementation in cycle II shows that a learning environment that provides essential questions, visual resources, group work, gradual guidance, and reflection can support the construction of student understanding. In cycle I, students still need help because they are not used to managing project assignments and stating reasons independently. After the teacher makes action improvements, students gain a clearer learning structure through product examples, role sharing, and targeted triggering questions. This shows that project-based learning for grade III students must be accompanied by adequate *scaffolding* so that the learning process does not turn into just a work-making activity. Thus, the application of this model is effective when the project is designed according to the student's cognitive development, related to the real-life context, and followed by continuous observation and reflection in each PTK cycle.

The critical thinking skills of grade III students showed an improvement after project-based learning was applied to social studies subjects with life cycle material [20]. In the initial condition, only 6 out of 19 students achieved completeness, or 31.58%. After the action in the first cycle, the number of completed students increased to 7 students with a completion percentage of 36.84% and an average class score of 65.47. In cycle II, the average score increased to 78.05, while the number of students who completed reached 11 people or 57.89%. The data shows an increase in the average score of 12.58 points from cycle I to cycle II. In addition, classical completeness increased by 21.05 percentage points. This improvement shows that project-based learning makes a positive contribution to the development of students' abilities to observe, identify information, compare life cycle stages, convey reasons, and draw conclusions. However, the completeness of the

classical cycle II has not reached the research target of 85%, so improvement actions still need to be continued.

The improvement in critical thinking skills in the first cycle occurred because students began to gain a learning experience that was different from learning that was previously centered on the teacher's explanation. Through a lifecycle chart or poster project, students not only receive concepts verbally, but also observe images, sequence life stages, select important information, and discuss findings with groups [21]. The activity helps students understand that every living thing has stages of growth and development that can be compared based on its characteristics. An average score of 65.47 in cycle I indicates that the initial actions have encouraged positive changes in students' thinking processes. However, the completion percentage of 36.84% shows that most students still need assistance to develop logical reasons and draw conclusions appropriately. These obstacles are related to the limited experience of students in working independently, processing information, and expressing opinions in group activities.

Improvement in actions in cycle II resulted in a more pronounced improvement in students' critical thinking skills. Teachers provide simpler and more targeted instruction, provide examples of project products, establish group role breakdowns, and ask lighter questions in stages [22]. The strategy helps students understand the project task, determine relevant information, and relate the results of observations to the concept of the life cycle of living things. The average grade point average, which increased to 78.05, showed that students were increasingly able to understand the material and use information to answer learning questions. The number of completed students also increased from 7 students in the first cycle to 11 students in the second cycle. The change shows that teacher guidance has an important role in helping third-grade students develop reasoning. Students at this level still need concrete direction to be able to distinguish the similarities and differences in the human, animal, and plant life cycles and to convey conclusions based on the evidence they have identified.

The improvement of critical thinking skills is also related to the characteristics of the project used in learning. The project, in the form of a life cycle chart or poster, provides an opportunity for students to represent knowledge in visual form that is appropriate to the cognitive development of grade III students. When students determine the order of life phases, complete information, compare life cycles, and explain products in front of friends, they engage in a thought process that goes beyond memorization. Students learn to choose information, organize ideas, consider the accuracy of content, and provide explanations of the products made. Group discussions also allow students to hear their peers' opinions, respond to differing views, and improve their understanding [23]. Therefore, the project functions as a learning medium as well as a means of assessing students' thinking processes. The results of the second cycle that reached the sufficient category showed that project-based learning has provided a positive direction of development, although the mastery of critical thinking indicators has not been evenly distributed among all students.

The findings of the study show that the improvement of critical thinking does not take place instantaneously, but through repetitive actions, reflection, and learning improvement. In the first cycle, some students were still not confident in expressing their opinions, had not actively divided group assignments, and had not been able to conclude the results of observations independently. After reflection, teachers assist students who are experiencing difficulties and provide a wider space for presentations, questions, and answers [24]. These improvements support the improvement of the ability to explain and give reasons from the stage of starting to increase in cycle I to increasing in cycle II. The ability to infer observations also develops through the use of questions that lead students to relate evidence to answers. Even so, the classical

completeness of 57.89% proves that there are still 8 students who have not completed it. Thus, project-based learning has improved critical thinking skills, but the implementation of PTK needs to be continued in cycle III to achieve the classical completeness target.

The improvement of students' critical thinking skills can be analyzed through the theory of constructivism, which views learning as an active process in building knowledge based on experience and social interaction. Project-based learning provides this experience through observing, questioning, seeking information, discussing, creating products, presenting results, and reflecting. Students are no longer positioned as recipients of information about the life cycles of living beings, but as learners who build understanding through visual evidence and communication with peers. The difference in results between cycle I and cycle II shows the importance of *scaffolding* or gradual help from teachers. In cycle I, students are not fully able to manage projects and convey reasons independently. In cycle II, product examples, clearer instructions, role divisions, and triggering questions help students carry out the thinking process in a more structured manner. However, the achievement of 57.89% shows that this support needs to be increased through cycle III, especially for students who have not completed giving reasons and drawing conclusions.

The achievement of research success indicators was analyzed based on four components, namely learning implementation, student learning activities, average scores of critical thinking skills, and classical completeness [25]. The results show that the implementation of project-based learning has met the process indicators, but has not fully met the outcome indicators. In the first cycle, the average learning implementation reached 77.5% with the good category, then increased to 92.5% with the very good category in the second cycle. The increase shows that learning actions are increasingly organized and teachers are increasingly able to facilitate project activities according to the planned stages. Students' activities in observing, discussing, compiling products, presenting results, and reflecting also increased in line with the implementation of actions. Thus, success indicators related to the quality of the learning process have been achieved. However, the success of the process has not automatically resulted in complete learning for all students. Therefore, the analysis of action achievement needs to consider the balance between the improvement of the learning process and the achievement of critical thinking skills in a classical manner.

The indicators of learning implementation can be stated to be achieved because all components of project-based learning show an increase in cycle II. Preliminary activities increased from 75% to 90%, while the submission of essential questions also increased from 75% to 90%. Project planning and execution increased from 80% to 95%, and discussion and collaboration activities increased from 80% to 95%. Project presentations and reflections increased from 77.5% to 92.5%. The data proves that corrective actions after the reflection cycle I are effective. Clarity of instructions, product examples, group role sharing, and reinforcement of lighter questions help students better understand the learning task. The improvement in implementation also shows that teachers can carry out the role of facilitators, not just deliverers of material [26]. In project-based learning, this role is important because students need guidance to connect the activities of making products with the aim of understanding the concept of the life cycle of living things in a logical, directed, and meaningful way.

Student learning activities also meet the indicators of process success because they developed from the good category in cycle I to very good in cycle II. In cycle I, students begin to participate in image observation, group discussions, chart or poster preparation, and presentation of project results. However, student involvement is not even because some students are still passive, not

confident in expressing their opinions, and rely on the direction of teachers or more active friends. After the action improvements, students in cycle II showed better participation in carrying out group roles and completing project tasks. Role arrangements more clearly provide opportunities for each student to engage in information retrieval, composing products, or delivering the results of discussions [27]. This condition proves that project-based learning can build a collaborative learning atmosphere. Increased student activity is an important prerequisite for the development of critical thinking because students have the opportunity to test comprehension, respond to friends' ideas, correct mistakes, and make excuses based on observations.

In terms of learning outcomes, the average value of critical thinking skills increased from 65.47 in the first cycle to 78.05 in the second cycle. An increase of 12.58 points showed that project-based learning actions had a positive influence on students' ability to understand, process, and communicate information. Students are increasingly able to identify the stages of the life cycle of living things, compare the similarities and differences of human, animal, and plant life cycles, and explain the results of the project in a more targeted way. These achievements are in line with the learning objectives of IPAS Phase B, which emphasize the skills of observing, questioning, investigating, analyzing information, evaluating, and communicating results. Although the average score of cycle II has shown positive development, the achievement of this indicator must still be interpreted based on the Minimum Completeness Criteria applicable in schools. If the score of 78.05 has met the KKM, then the average score indicator can be declared achieved. However, the increase in the average score needs to be followed by an equal distribution of competency mastery for all students.

Classical completeness is the main indicator that has not been achieved in this study. In the initial condition, classical completeness was 31.58%, then increased to 36.84% in cycle I and 57.89% in cycle II. Although there was an increase of 21.05 percentage points between cycle I and cycle II, this achievement was still below the research success target of 85%. In cycle II, there are 11 students who have completed, while 8 students still have not reached the completeness criteria. This data shows that project-based learning has had a positive impact, but the benefits have not been felt equally by all students. The incompleteness of some students can be related to diverse initial abilities, limitations in understanding instructions, undeveloped confidence, and difficulty in formulating reasons and conclusions [27]. Therefore, the statement that the action has succeeded as a whole cannot be methodologically justified. Research needs to be continued to cycle III with corrective actions that are more focused on the needs of students whose needs have not been met.

The achievement of indicators of the ability to explain and give reasons, as well as the ability to conclude observation results, shows the development of students' thinking processes. In the first cycle, both abilities are at a stage of improvement, which is characterized by the willingness of students to answer questions and convey the results of their work, even though the reasons given are still simple. In cycle II, these abilities are increased as students gain repeated experiences in observing images, comparing life cycles, discussing, and presenting products. The use of lighter questions helps students relate the information found to the answers delivered. However, the category of "improving" in the process indicator does not mean that all students have achieved optimal critical thinking mastery. Some students still need guidance when selecting relevant evidence, explaining differences between life cycles, and drawing conclusions sequentially [28]. Thus, indicators of critical thinking ability in the process have evolved, but need to be strengthened through individual exercises, structured discussions, and the provision of specific feedback. Follow-up action is

needed for the development of the process to contribute to the targeted classical completeness.

In depth, the results of the study show that the success of project-based learning is gradual and determined by the quality of *scaffolding* provided by teachers. From the perspective of constructivism, students build understanding through direct engagement with objects, information, experiences, and social interactions. The increase in learning implementation from 77.5% to 92.5% proves that a clearer learning structure allows students to participate more actively. However, classical completeness of 57.89% confirms that high activity is not always directly proportional to the mastery of critical thinking evenly. Grade III students need gradual support in the form of simple questions, example reasons, heterogeneous grouping, division of individual tasks, and reinforcement to conclude the results of observations. Cycle III needs to prioritize mentoring eight students who have not completed through small group learning, peer tutoring, image-based exercises, and formative assessments. With this strategy, the project not only produces posters or charts, but also becomes a means to build students' ability to give reasons, evaluate information, and draw conclusions independently.

Conclusion

This study concludes that the application of project-based learning in Natural and Social Sciences subjects in grade III of SD Negeri 030/VIII Rimbo Bujang, Tebo, has improved the quality of the learning process and students' critical thinking skills. The application is carried out through two cycles that include planning, implementation, observation, and reflection, with a chart project or poster of the life cycle of living things as a contextual learning vehicle. The answer to the formulation of the first problem showed that the implementation of learning increased from 77.5% categorized as good in cycle I to 92.5% categorized as very good in cycle II. The answer to the formulation of the second problem shows that the average value of critical thinking ability increased from 65.47 in cycle I to 78.05 in cycle II, while classical completeness increased from 36.84% to 57.89%. This improvement shows that observing, seeking information, discussing, compiling products, presenting results, and reflecting help students build understanding and present reasons in a more targeted manner. The answer to the formulation of the third problem emphasizes that the process indicators have been achieved because the implementation of learning and student activities is in the good to very good category. However, the result indicator in the form of classical completeness of at least 85% has not been achieved in cycle II. These findings indicate that project-based learning is effective as an action to improve critical thinking, but requires more intensive follow-up action.

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