Implementation of the Project Based Learning (PJBL) Learning Model in an Effort to Improve Science Motivation and Learning Outcomes in Fifth Grade Elementary School Students

Anike Putri , PGSD, FKIP, UNTAN, Pontianak, Indonesia
Email: anike.putri1993@gmail.com
WhatsApp : 085753120185

Abstract*:* This study was conducted to examine the implementation of the Project Based Learning (PJBL) model in enhancing motivation and science learning outcomes among fifth-grade students. The research followed a Classroom Action Research (CAR) design, consisting of two cycles with three meetings each, covering the stages of planning, implementation, observation, and continuous reflection based on the Kemmis and McTaggart spiral model. The respondents were 37 students, comprising 18 females and 19 males. Data were collected using a descriptive-comparative approach through motivation questionnaires, participatory observation sheets, and learning outcome tests, then analyzed quantitatively to identify changes from the pre-cycle to cycle II. The findings revealed a consistent and significant improvement in both learning outcomes and motivation. In the pre-cycle, student motivation was predominantly in the medium (44%) and low (56%) categories. In cycle I, the proportion of high motivation was 30%, which dramatically increased to 83% in cycle II, while the low motivation category decreased to only 5%. This boost in motivation was reflected in the learning outcomes, with mastery rates rising from 40% (pre-cycle) to 62% (cycle I) and reaching 81% in cycle II, along with an increase in the average class score from 57.7 to 72.35. These results demonstrate that PJBL effectively stimulates intrinsic motivation, deepens conceptual understanding, and fosters collaboration and creativity through authentic project-based experiences.

Keywords: Classroom Action Research; Science Learning Outcomes; Learning Motivation; Project Based Learning (PJBL)

Introduction

Education is a planned, continuous, and comprehensive effort to actualize all the potential of students in the cognitive, affective, and psychomotor domains through a series of integrated guidance, teaching, and training. The goal is for the mastery of theory, forming a whole human being with a strong spirit, noble character, intelligence, self-reliance, and skills to face future life challenges. Therefore, education can be achieved through formal, informal, and non-formal channels (Syaadah et al., 2023). Education is not just a transfer of knowledge, but a long-term investment for the nation's civilization, requiring a broader assessment to determine students' intellectual level that is not centered only on the mastery of subject matter (Suratman et al., 2019). However, in practice, educational success cannot be measured solely by mastery of subject matter. There are other important non-intellectual factors, such as motivation, attitude, discipline, and critical thinking skills that also determine student learning success (Rialdy & Rusdamayanti Br Panjaitan, 2023).

Critical thinking skills are essential for students to solve problems in daily life (Jannah & Atmojo, 2022). Field findings indicate that fifth-grade students still show low critical thinking skills, tend to be passive, and lack enthusiasm for active involvement in learning activities (N. N. S. K. Dewi et al., 2023). Critical thinking is not an innate talent, but a skill that can be developed through meaningful learning experiences, such as constructing knowledge, solving problems, and finding solutions independently.

One of the main factors driving learning success is motivation. Motivation acts as a driving force that encourages students to study diligently, ask questions, discuss, and complete tasks earnestly. Conversely, a lack of motivation will cause students to give up easily, become bored, and not be challenged to achieve (Suharni & Purwanti, 2019). The same opinion is expressed by Wahab (Leobisa & Namah, 2022) and (Rista, 2022). Learning motivation often arises when students feel that the material being studied is relevant to their lives, or when they have a clear learning goal (Ilmiyah & Sumbawati, 2021).

Based on preliminary observations in fifth grade, it was found that 22 out of 37 students (59.5%) had not reached the Minimum Mastery Criteria (KKM) in Science. In addition, many students were less enthusiastic, passive in discussions, and not actively involved in learning activities. Students also consider Science material irrelevant to daily life, resulting in low motivation and learning outcomes (Pertiwi et al., 2018). Students who have low motivation levels, low critical thinking, and are less active in learning activities can affect their learning outcomes because motivation plays a role in influencing, directing, and completing their learning tasks (Nurhidayah, 2016). The solution to this

problem lies in the implementation of an innovative, applicative learning model that focuses on the active role of students. One model considered appropriate is Project Based Learning (PJBL). This model encourages students to learn through real projects, where students must identify problems, design solutions, collaborate in teams, and produce a product that can be presented (Fahlevi, 2022). The diversity of learning approaches is a supporting factor for the successful achievement of Science learning objectives. Through PJBL, students show a significant increase in the aspects of activeness, motivation, and their learning outcomes, especially in the expected Science subject. PJBL can increase student activeness, motivation, and learning outcomes, especially in Science subjects which are applicative and experimental (P. Dewi et al., 2023). It can be concluded that the PJBL learning model is very suitable for Science learning in schools because it is project-based and helps students train critical thinking skills, as well as creativity in making quality products. Thus, the Project Based Learning (PJBL) model is believed to be the right solution for improving Science learning outcomes and motivation in fifth grade elementary school.

Methods

The method used in this research is Classroom Action Research (CAR), which is carried out directly in the classroom to solve practical problems faced by teachers in the learning process. The goal is to improve the quality and learning outcomes of students through the application of more effective and efficient learning techniques, methods, or strategies. The research procedure refers to the Kemmis and McTaggart model (Arikunto, 2010; Wahyudi, 2024; and Hidayat in Ulfa et al., 2022), which includes four stages of the action plan: planning, acting, observation, and reflecting.

This research was implemented using two cycles, where each cycle took place in three meetings. This design was arranged to ensure gradual improvement over time. In the first meeting, students were given the opportunity to explore information related to the material to be studied through various sources such as books, the internet, and simple interviews. The second meeting focused on group project creation, where students applied the Science concepts learned to produce a tangible work or solution. Finally, in the third meeting, an evaluation was conducted in the form of project result presentations, reflection, and tests to measure understanding and achievement of learning objectives.

This research was conducted on 37 fifth-grade students, consisting of 18 female students and 19 male students. This research involved two variables: the independent variable was the application of the Project Based Learning (PJBL) model, and the dependent variables included students' learning motivation and Science learning outcomes. The selection of PJBL as an intervention was based on its characteristics

which encourage students to learn actively, critically, and collaboratively through real projects.

Data collection techniques were carried out through three main instruments. First, written tests were conducted, including multiple-choice, short-answer, and structured essay questions. All three were used to measure students' individual competency achievement. Second, group assignments, which were designed to train cooperation, communication, and joint problem-solving. Through this assignment, students learned to respect each other's opinions, discuss, and exchange ideas to produce the best project. Third, observation, carried out by the researcher to directly record students' behavior, participation, and activities throughout the learning process. This observation was used to directly evaluate the influence of the PJBL model on student involvement and motivation.

Results and Discussion

Before entering the action cycle, the researcher conducted participatory observation and in-depth interviews with the class teacher and 37 students to map the actual Science learning problems. The results showed that learning was still centered on the teacher, students were passive, and real involvement was minimal. Therefore, an intervention based on Project Based Learning (PJBL) was designed, which theoretically places authentic projects as the core of learning activities. The research results are elaborated based on the analysis of the instruments used and describe and report the mechanism of the research carried out. Through observation activities, the researcher was able to understand the class conditions during the learning process before the application of the PJBL model. PJBL provides space for students to collaborate, determine their own learning strategies, and develop concrete products (Saban et al., 2023). PJBL is a learning approach that emphasizes project work as the core of learning activities. Through exploration, evaluation, interpretation, synthesis, and information processing, students construct meaningful knowledge (Erlin Ristianti Kusuma, Dewi; Ida, Sulistyawati; Rarasaning, 2023). This is in line with the research of Zang (Nasril & Desyandri, 2023) and (Faslia et al., 2023). This model also fulfills the principle of student-centered learning because children design individual or group projects that result in tangible works (Nisfa et al., 2022). According to Komalasary, the stages of the PJBL model are (1) giving an initial question to trigger curiosity, (2) designing a project plan, (3) scheduling activities, (4) monitoring the process by the teacher, (5) testing the product, and (6) reflective evaluation (Riyanti, 2020). Through this series of activities, students are trained to become active, creative learners who are responsive to the dynamics of the modern world (Sumilat et al., 2023). Basically, the final goal of this learning model is a project, so this model is more favored by elementary school-age children because they can learn while

"doing something" meaningful (Sari et al., 2020) (Mayuni et al., 2019). Ismail et al. (2021) emphasize that PJBL improves the quality of student work results because they feel a sense of ownership over the product created (Ismail et al., 2021). Furthermore, this approach positions students as the central subject of learning and at the same time prepares them to face real life (Nurhadiyati et al., 2020). Budiarti & Putri (2022) state that PJBL provides ample opportunity to learn through project work (Budiarti & Putri, 2022). Meanwhile, Turiyah (2023) proves that this model is capable of honing creative thinking (Turiyah, 2023) by showing that the application of this method positively influences the improvement of students' creative thinking skills. Aini et al. (2022) add that project development is positively correlated with increased motivation and learning outcomes (Aini et al., 2022). Motivation itself is the main driving factor; the more appropriate the motivational style evoked, the more optimal the achievement of learning outcomes (Fatmawati et al., 2021). The desire to achieve goals gives rise to various efforts that show determination to achieve achievements (Nurfauzan et al., 2023). The success or failure of learning activities is also determined by how strong the motivation students have (Sakinah, 2023). Learning motivation plays a major role in student success (Andriani & Rasto, 2019). Learning outcomes are a complete reflection of the complex interaction between the cognitive, affective, and psychomotor domains formulated in symbolic language, numbers, or narratives (Setiawan et al., 2022). The Bloom's framework cited by Watini (2019) emphasizes that the cognitive domain concerns intellectual capacity such as remembering, understanding, applying, and analyzing. Learning outcomes include three domains: (1) cognitive, which develops intellectual capabilities and skills;
(2) affective, which fosters attitudes, values, and emotional reactions; and (3) psychomotor, which trains movement skills or physical activities (Watini, 2019). These three domains are benchmarks for the effectiveness of learning and a roadmap for achieving educational goals (Isnanto, 2022). However, the achievement of these three domains is influenced by internal factors such as students' intelligence, talent, interest, habits, and motivation, as well as external factors such as family support, community dynamics, and school climate (Ridho'i, 2022). Internal factors come from within the students, including intelligence, attitude, habits, talent, interest, and motivation. Meanwhile, external factors come from the external environment, such as family, community, and school (Astiti et al., 2021). The level of learning outcomes reflects the extent of the teacher's success in delivering the material during the learning process (Puspitasari & Nurhayati, 2019). Therefore, the level of test scores is an indicator of cognitive ability, as well as a reflection of the teacher's success in designing motivating and contextual learning experiences (Irawati et al., 2021). Based on field findings, the application of Project Based Learning (PJBL) in fifth-grade Science subjects proved capable of encouraging a gradual and consistent increase in learning outcomes. Tests in each cycle were in the form of mixed tests including multiple-choice, short-answer, and structured essay questions, showing a positive movement: in the pre-cycle, 40% of students reached the KKM, in cycle I it increased to 62% with an average of 67.08, and

in cycle II it increased to 81% with an average of 72.35. This achievement exceeded the performance indicator target (≥80%) and confirmed that PJBL successfully stimulated all Bloom's domains. Students were able to explain the concept of photosynthesis verbally (cognitive), show environmental concern (affective), and were skilled in operating light intensity measuring instruments (psychomotor). Thus, through authentic, collaborative, and problem-based projects, PJBL provides an interactive field that integrates knowledge, attitudes, and skills into a cohesive and measurable learning outcome.

Table 1. Comparative Results of Student Motivation Pre-Cycle, Cycle I, and Cycle II

No.	Score Range	Category	Pre-Cycle		Cycle I		Cycle II	
			F	**(%)**	**F**	**(%)**	**F**	**(%)**
1	96-75,6	High	0	0%	11	30%	30	83%
2	74,6-55,2	Medium	14	44%	20	54%	4	11%
3	54,2-32	Low	21	56%	6	16%	2	5%
Total Students			**37**	**100%**	**37**	**100%**	**37**	**100%**

Based on the data in Table 1, it is clear that the proportion of students who obtained motivation scores in the "high" category experienced a sharp jump over time. Observation was carried out through questionnaires targeting six main aspects: interest, attention, activeness, persistence, cooperation, and self-confidence, which were broken down into 32 concrete behavioral indicators. In the pre-cycle, 14 people (44%) were only at the "medium" level, meaning students still showed passive involvement, often waiting for instructions, and were reluctant to ask questions. After the PJBL intervention during cycle I, the pattern began to change, where 11 people (30%) successfully moved up to the "high" category, marked by the courage to convey ideas, initiative to seek additional learning resources, and active participation in group discussions. Although this figure of 30% had not reached the ideal target of 80%, the direction of change was already positive. It was only in cycle II that the 80% threshold was exceeded, where 30 out of 37 students (83%) were recorded in the "high" level, while the rest (11%) were at the "medium" level and only 5% were still at the "low" level. This increase was reflected in the numbers and directly observed during the process, such as the class atmosphere becoming more active, students actively displaying products, asking and responding to friends' presentations with scientific language, and showing expressions of satisfaction after successfully completing the project. The results of the closed questionnaire filled out individually reinforced the observation findings in the form of average scores for the "persistence" aspect increasing by 21 points, the "cooperation" aspect by 19 points, and the "self-confidence" aspect by 24 points. Thus, the application of PJBL successfully

boosted fifth-grade students' Science learning motivation to a much higher level compared to the initial condition.

Table 2. Comparative Results of Science Learning Outcomes Mastery Pre-Cycle, Cycle I, and Cycle II

No.	Category	Pre-Cycle		Cycle		Cycle II	
		F	(%)	F	(%)	F	(%)
1	Mastery ≥ 75	15	40%	23	62%	30	81%
2	Not Mastery < 75	22	60%	18	38%	7	19%
Average		57,72973		67,08108		72,35135	
Highest Score		80		84		85	
Lowest Score		24		36		41	

Table 2 above shows a stable and meaningful increase in Science learning outcomes along with the Project Based Learning-based Classroom Action Research. In the pre-cycle, only 15 children (40%) reached the KKM with a class average of 57.7, so most were still struggling below the concept mastery threshold. After cycle I, the mastery rate rose to 23 students (62%) and the mean score increased to 67.08, indicating that project work began to hone students' scientific understanding. The biggest improvement occurred in cycle II when 30 students (81%) successfully surpassed the KKM with an average of 72.35, a level which exceeded the established performance target of 80%. This achievement proves that PJBL, which requires students to design experiments, analyze data, and present findings collaboratively, significantly strengthens their cognitive domain. Thus, this model can be maintained as the main strategy to reduce the percentage of non-mastery and improve the quality of Science learning in fifth grade. The application of the Project Based Learning (PJBL) model in fifth-grade students proved capable of increasing motivation and Science learning outcomes. The evidence is that questionnaire data and evaluation scores from cycle I to cycle II showed a consistent upward trend after the action was carried out. The increase in learning outcomes is inseparable from the change in student learning motivation which also showed a positive trend. During cycle I, students began to show greater enthusiasm in following the learning. Students were actively involved in discussions when designing the project, dared to submit ideas, and were responsible for their group tasks. Motivation questionnaire results showed an increase in aspects such as persistence, cooperation, and self-confidence. However, cycle I also revealed some obstacles, such as commotion during group work, uneven distribution of roles, and suboptimal time management. These obstacles caused most of the learning time to be consumed for classroom control, thus reducing the

efficiency of the learning process. Thus, the implementation of learning still left some shortcomings; to overcome them, the researcher made improvements to the design and implementation of the action in cycle II. The changes implemented included: (1) providing a clear class contract regarding group work rules, (2) dividing team roles (leader, secretary, presenter, etc.) before the project started, (3) using a timer so that each project stage was on time, and (4) utilizing the outdoor area to minimize noise during practicum or presentations. As a result, cycle II ran more conducive. Students focused on tasks, respected friends' opinions, and were able to complete the project according to the timeline. Group presentations became more systematic, questions from friends increased, and mastery of Science material appeared deeper. Thus, through continuous improvement, the PJBL model successfully increased both motivation and Science learning outcomes for fifth-grade students. The three meetings in cycle II went very well; both student motivation and learning outcomes increased sharply and had met the 80% success indicator. Enthusiasm for learning was evident from their concentration when listening to the explanation, the courage to ask and answer questions, and their activeness during the project. In making the product, students discussed intensely to design materials, divide tasks proportionally, and then presented them with a clear voice and polite, easily understood language. To maintain a conducive condition, some groups were given the flexibility to work outside the classroom; the researcher still closely monitored them so that the activity remained focused and effective. The application of the Project Based Learning (PJBL) model in fifth-grade Science learning successfully created a pleasant and enthusiastic atmosphere. Students showed high enthusiasm through active information seeking and greater participation during learning activities. This model deepens students' understanding because they do not just receive theoretical material, but directly design and create products in a team. The existence of groups encourages collaboration: students learn to discuss, convey ideas, and listen to the opinions of others, thus honing their social skills. Each team also practiced presenting in front of the class, enriching their communication experience. Learning resources were not limited to textbooks; they could interview teachers, school staff, or local residents, then present their findings through videos, PowerPoint, or product works. The weakness was that group activities sometimes caused noise that made it difficult for some students to concentrate when working on the project. The results of this study support and reinforce various previous studies, including: (Wakhid et al., 2023) (Pradana et al., 2023) (Azizi et al., 2023) (Tarigan & Nadhira, 2023) (Samsiyati, 2023) (Haryudo et al., 2021) (Anis Wahdati Sholekah, 2020) (Yusro & Ardania, 2023). Thus, the PJBL model is effective in increasing motivation and learning outcomes. The difference is that this study focuses on fifth-grade elementary school Science subjects and measures improvement not only in the cognitive domain but also in the affective and psychomotor domains.

Discussion

The results of the Classroom Action Research in the first semester of 2025/2026 in fifth

grade show that Project Based Learning (PJBL) successfully changed the Science learning atmosphere to be more active and meaningful. With a gradually given activity design, ranging from designing authentic questions, compiling an investigation plan, collecting data, to presenting the product, students transitioned from passive spectators to enthusiastic small researchers. Students were systematically and step-by-step invited to explore, process, and analyze problems through the scenario given by the teacher. The final reflection of each cycle made students aware of methodological shortcomings and encouraged them to refine the next plan. As a result, intrinsic motivation increased sharply, the indicator of Science learning mastery exceeded 80%, and more importantly, students could build self-confidence and skills in solving real problems, which is tangible proof that PJBL can increase learning outcomes and foster enthusiasm and self-confidence. Presenting problems as case studies in learning is expected to trigger and accelerate analytical and active thinking skills and encourage students to ask questions, experiment, and make decisions based on evidence. In addition, this project-based learning also created a *creative learning* atmosphere, where students were free to express their creative ideas in designing solutions, as well as *collaborative learning*, where students learned to communicate, share tasks, and support each other to achieve group goals. As a result, student learning motivation increased significantly, which was reflected in their activeness in discussions, courage to present, and persistence in completing tasks. This increase in motivation directly impacted learning outcomes, where the percentage of mastery reached 81% in cycle II. Thus, the PJBL model proved capable of creating Science learning that is fun, meaningful, and effective in developing both the academic and social competencies of fifth-grade elementary school students.

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