

Management of Project-Based Learning (PjBL) to Enhance Students' Critical Thinking Skills in Elementary Schools

Author:

Ira Setiani¹
Sobari²

Affiliation:

Universitas Islam
Nusantara Bandung^{1,2}

Corresponding email

irasetiani648@gmail.com

Histori Naskah:

Submit: 2026-04-01
Accepted: 2026-04-29
Published: 2026-05-03



*This is an Creative Commons
License This work is licensed
under a Creative Commons
Attribution-NonCommercial 4.0
International License*

Abstract:

This study aims to analyze the management of the Project Based Learning (PjBL) model in enhancing students' critical thinking skills in elementary education. The research employed a qualitative approach with a multisite case study design conducted at SDN Bunikasih 1 and SDN Vada in Cianjur Regency. Data were collected through in-depth interviews, observations, and document analysis involving school principals, teachers, and students. Data analysis was carried out using an interactive model consisting of data reduction, data display, and conclusion drawing. The findings reveal that the management of the PjBL model is implemented through four main stages: planning, organizing, actuating, and controlling. In the planning stage, teachers design project-based learning activities that integrate critical thinking indicators, although with varying levels of consistency. In the organizing stage, collaboration among teachers and the formation of heterogeneous student groups support the learning process, despite some coordination constraints. In the implementation stage, PjBL creates an active and engaging learning environment that promotes students' participation and problem-solving skills. In the controlling stage, evaluation is conducted through supervision, reflection, and the use of critical thinking assessment rubrics, although supervision intensity is sometimes limited. The study concludes that PjBL management contributes positively to improving students' critical thinking skills, as reflected in increased engagement, deeper understanding of learning materials, and the ability to apply knowledge in real-life contexts. However, challenges related to time management, teacher competence, collaboration, and learning facilities need to be addressed to optimize implementation.

Keywords: Critical Thinking Skills; Elementary Education; learning management; PjBL; Project Based Learning.

Introduction

Critical thinking is a fundamental competence that students must develop to face the challenges of the 21st century (Saleh, 2019). In an ideal learning environment, students are expected to analyze information, evaluate arguments, and generate solutions to complex problems. This competence is widely recognized as part of the essential 21st-century skills framework, often referred to as the 4Cs: critical thinking, communication, collaboration, and creativity (Purwanto, Hartono, & Wahyuni, 2023). These competencies emphasize that students should not merely receive information passively but actively construct knowledge and apply it to real-life situations. As a result, the development of critical thinking skills has become a central goal in contemporary education systems (Wardani & Fiorintina, 2023).

However, empirical evidence indicates that students' critical thinking skills in Indonesia remain relatively low. Data from the Programme for International Student Assessment (PISA) 2018 show that Indonesia ranked 74th out of 79 participating countries in terms of critical thinking and problem-solving abilities (Esti, Hersulastuti, Indiyah, & Kun, 2023). This condition reflects a significant gap between expected competencies and actual learning outcomes. Several factors contribute to this issue, including the persistence of conventional teacher-centered instructional methods, limited teacher competence in implementing innovative learning models, insufficient learning resources, and assessment systems that do not fully support higher-order thinking skills (Muhammad Aditya Firdaus, Jamal, & Arifin, 2023)

In response to these challenges, national education policies have emphasized the importance of developing higher-order thinking skills. The implementation of the Merdeka Curriculum explicitly promotes the development of the Pancasila Student Profile, particularly the dimension of critical reasoning. This policy provides flexibility for teachers to design student-centered learning and encourages authentic problem-solving activities. One of the recommended instructional approaches aligned with these principles is the Project Based Learning (PjBL) model. PjBL emphasizes learning through real-world projects, where students actively engage in planning, implementing, and evaluating solutions to meaningful problems (M Aditya Firdaus, 2022; Komala, 2025; Susanto, 2020).

From a theoretical perspective, Project Based Learning is grounded in constructivist learning theory, which posits that knowledge is actively constructed through experience and interaction (Laur, 2021). PjBL facilitates experiential learning by engaging students in inquiry-based activities that promote exploration, collaboration, and reflection (Mitry, 2021). Through project-based tasks, students are encouraged to develop critical thinking by analyzing problems, synthesizing information, and evaluating outcomes. This approach aligns with the notion that meaningful learning occurs when students are actively involved in authentic and contextual learning experiences (Amiri, 2025).

Previous studies have demonstrated that the PjBL model has strong potential to enhance students' critical thinking skills (Tafakur, Retnawati, & Shukri, 2023). By involving students in real-world projects, PjBL promotes deeper understanding, active engagement, and problem-solving abilities (Karan & Brown, 2022). However, most existing research tends to focus on the effectiveness of PjBL as a teaching strategy rather than examining how it is managed within the educational process. There is still a lack of comprehensive studies that analyze the managerial aspects of PjBL implementation, particularly how planning, organizing, actuating, and controlling functions contribute to optimizing learning outcomes in diverse school contexts.

Previous studies have confirmed that Project Based Learning (PjBL) can improve students' critical thinking skills, collaboration, motivation, and learning outcomes. However, these studies tend to position PjBL mainly as an instructional model and often measure its effectiveness based on student achievement, while paying less attention to the managerial processes that determine whether PjBL can be implemented consistently and effectively in schools. This creates a critical gap because the success of PjBL is not only determined by the project activities themselves, but also by how teachers plan project objectives, organize student groups and learning resources, facilitate project implementation, and evaluate students' critical thinking development. Without strong management, PjBL may become merely a practical activity that is engaging but not necessarily directed toward measurable critical thinking outcomes. Therefore, this study addresses this gap by examining PjBL through a management perspective, particularly the functions of planning, organizing, actuating, and controlling, to explain how PjBL can be systematically managed to enhance students' critical thinking skills in elementary schools.

Based on this background, this study aims to analyze the management of the Project Based Learning (PjBL) model in enhancing students' critical thinking skills at SDN Bunikasih 1 and SDN Vada. The focus of this study is on the implementation of managerial functions, namely planning, organizing, actuating, and controlling, in the context of PjBL. The novelty of this research lies in its integrative approach, which combines instructional innovation with management perspectives to provide a more comprehensive understanding of how PjBL can be effectively implemented to improve students' critical thinking skills in elementary education

Literature Study

Learning management is a critical component in ensuring the effectiveness of instructional processes, particularly in fostering higher-order thinking skills. In contemporary educational research, learning management is understood as a systematic process involving planning, organizing, implementing, and evaluating learning activities to achieve desired outcomes. Recent studies emphasize that effective learning management significantly influences students' cognitive development, especially when it integrates innovative instructional models and student-centered approaches. In this context, teachers are not only facilitators of knowledge but also managers of learning environments who design meaningful experiences that promote active engagement and critical thinking (Husna & Mundiri, 2023; Sáiz-Manzanares, Marticorena-Sánchez, Díez-Pastor, & García-Osorio, 2019).

Critical thinking itself is widely recognized as a core competency in 21st-century education. It involves the ability to analyze, evaluate, and synthesize information to solve complex problems. According to recent empirical studies, students' critical thinking skills are closely linked to instructional strategies that encourage inquiry, reflection, and problem-solving. Furthermore, research in international contexts shows that critical thinking develops more effectively in learning environments that emphasize student autonomy and active participation rather than passive knowledge transmission. This indicates that the development of critical thinking requires not only appropriate content but also effective pedagogical and managerial practices (Anwar, Saeful & Umam, 2023; Bandur, Hamsal, & Furinto, 2022; Rehman, Huang, Mahmood, AlGerafi, & Javed, 2024).

Project Based Learning (PjBL) has emerged as one of the most effective instructional models for developing critical thinking skills. PjBL is grounded in constructivist learning theory, which posits that learners actively construct knowledge through experience and interaction. Recent studies demonstrate that PjBL enhances students' ability to think critically by engaging them in real-world problem-solving, collaborative work, and reflective learning processes. In addition, PjBL has been found to improve students' motivation and learning outcomes by making learning more relevant and meaningful. These findings confirm that PjBL is not only an instructional model but also a pedagogical approach that supports deeper learning (Guo, Saab, Post, & Admiraal, 2020; Kokotsaki, Menzies, & Wiggins, 2016; Yustina, Syafii, & Vebrianto, 2020).

Despite its potential, the effectiveness of PjBL largely depends on how it is managed within the classroom and school context. Learning management plays a crucial role in ensuring that PjBL is implemented systematically and consistently. Research shows that the success of PjBL is influenced by factors such as teacher competence, availability of resources, time management, and institutional support (Pratiwi & Suyanto, 2022). Without proper management, PjBL may not achieve its intended outcomes, particularly in developing critical thinking skills. Therefore, the integration of management functions planning, organizing, actuating, and controlling is essential to optimize the implementation of PjBL.

In addition, recent studies highlight the importance of collaborative learning environments and teacher professional development in supporting the successful implementation of PjBL. Teachers need adequate

training and support to design meaningful projects, facilitate student learning, and assess higher-order thinking skills effectively (Fitriyani, Hapsari, & Putra, 2021). Moreover, school leadership plays a significant role in creating a supportive environment by providing resources, fostering collaboration among teachers, and ensuring continuous evaluation of learning processes. These findings indicate that PjBL implementation is not solely a classroom issue but also an institutional and managerial concern.

Although previous studies have consistently reported the positive impact of Project Based Learning (PjBL) on students' critical thinking skills, they differ in emphasis and analytical scope. For example, Tafakur, Retnawati, and Shukri (2023) focused on the effectiveness of PjBL through a meta-analysis and confirmed its contribution to critical thinking improvement, but their study did not explain how schools manage PjBL implementation in daily classroom practices. Karan and Brown (2022) emphasized the role of PjBL in strengthening problem-solving skills, yet their discussion focused more on student learning processes than on managerial factors such as planning, organizing, supervision, and follow-up. Similarly, Guo, Saab, Post, and Admiraal (2020) reviewed PjBL outcomes and measurement practices, but the study was conducted in higher education contexts and did not specifically address elementary school management. Meanwhile, studies by Pratiwi and Suyanto (2022) and Fitriyani, Hapsari, and Putra (2021) highlighted teacher competence and institutional support as important factors, but they did not integrate these factors into a complete management framework. Thus, previous research has provided strong evidence that PjBL is effective, but has not sufficiently explained how PjBL should be managed through systematic planning, organizing, actuating, and controlling to enhance students' critical thinking skills in elementary schools.

Based on this comparison, this study develops a conceptual framework that integrates PjBL, critical thinking skills, and learning management functions. The framework positions PjBL not merely as an instructional model, but as a managed learning process. In this model, the implementation of PjBL is analyzed through four management functions: planning, organizing, actuating, and controlling. Planning refers to the preparation of project themes, learning objectives, critical thinking indicators, learning media, and assessment tools. Organizing refers to the coordination of teachers, formation of student groups, distribution of roles, and allocation of learning resources. Actuating refers to the implementation of project activities, teacher facilitation, student collaboration, inquiry, problem-solving, and presentation. Controlling refers to supervision, assessment using critical thinking rubrics, reflection, and follow-up actions. These four functions are expected to support the development of students' critical thinking skills, including analyzing problems, evaluating information, generating ideas, making decisions, and presenting solutions.

Methods

This study employed a qualitative approach with a multisite case study design to examine the management of the Project Based Learning (PjBL) model in enhancing students' critical thinking skills. A qualitative approach was chosen because it enables an in-depth understanding of learning processes, managerial practices, and contextual dynamics within natural school settings. The multisite case study design allows for comparative analysis across two different elementary schools, providing a more comprehensive understanding of how PjBL management is implemented in diverse contexts (Adrias & Ruswandi, 2025; Creswell & Creswell, 2018; Yin, 2018).

Participants were selected using purposive sampling based on their direct involvement in the implementation of Project Based Learning (PjBL). The participants consisted of 16 informants, including 2 school principals, 4 classroom teachers, and 10 students from SDN Bunikasih 1 and SDN Vada. Each school was represented by 1 principal, 2 teachers, and 5 students. The principals were selected because they

were responsible for supervising and supporting the implementation of PjBL at the school level. Teachers were selected because they directly planned, organized, implemented, and evaluated project-based learning activities in the classroom. Students were involved as supporting informants because they experienced the PjBL process directly and could provide information about participation, collaboration, problem-solving activities, and the development of critical thinking skills during project-based learning.

Data were collected through triangulation of methods, including in-depth interviews, participant observation, and document analysis (Patton, 2014; Shenton, 2004; Tisdell, Merriam, & Stuckey-Peyrot, 2025). In-depth interviews were conducted with school principals, teachers, and students to explore their understanding and experiences in implementing the PjBL model. Observations were carried out to examine the actual implementation of PjBL in classroom settings, including student engagement, teacher facilitation, and learning dynamics. Document analysis was conducted by reviewing lesson plans, project designs, assessment rubrics, and other relevant school documents to understand how PjBL management is structured and implemented.

In qualitative research, the researcher acts as the primary instrument (*human instrument*) who directly collects and interprets data (Lincoln & Guba, 1985). To ensure systematic data collection, the researcher used interview guides, observation checklists, and document analysis formats as supporting instruments. These tools helped maintain consistency while allowing flexibility in capturing rich and contextual data.

Data analysis was conducted using the interactive model proposed by Miles, Huberman, and Saldaña (2014), which consists of data reduction, data display, and conclusion drawing/verification. The analysis was carried out simultaneously with data collection, enabling continuous reflection and refinement of emerging findings. This process allowed the researcher to identify patterns, themes, and relationships related to the management of the PjBL model and its impact on students' critical thinking skills (Miles, Huberman, & Saldaña, 2014).

To ensure the trustworthiness of the findings, this study applied the criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). Credibility was achieved through triangulation of data sources and methods, as well as member checking with participants. Transferability was ensured by providing detailed descriptions of the research context. Dependability and confirmability were maintained through systematic documentation of the research process, allowing for auditability and transparency.

The study was conducted over a period of three months, including preparation, data collection, analysis, and report writing. Through this methodological approach, the study aims to provide a comprehensive understanding of how the management of the PjBL model contributes to the development of students' critical thinking skills in elementary education.

Results

Planning of Project Based Learning (PjBL) Management

Planning is the initial and fundamental stage in the management of the Project Based Learning (PjBL) model, as it determines the direction and effectiveness of the learning process in developing students' critical thinking skills. Based on observations and document analysis conducted at SDN Bunikasih 1 and SDN Vada, the planning stage involves the preparation of learning tools, project design, and the readiness of teachers and school leaders in implementing PjBL. This stage reflects a proactive managerial effort to ensure that learning activities are aligned with curriculum objectives and 21st-century competencies.

At SDN Bunikasih 1, planning is carried out through the preparation of project-based lesson plans that integrate critical thinking indicators into learning objectives. Teachers design projects that are contextual and relevant to students' daily lives, allowing them to explore real-world problems. The school principal plays an active role in ensuring the availability of learning tools, media, and facilities to support the implementation of PjBL.

This finding is supported by an interview with the school principal, who stated:

“We ensure that teachers prepare lesson plans and project designs properly so that learning can run effectively and support students’ critical thinking.”(Interview with Principal)

Teachers also emphasized that planning is essential to guide the learning process and ensure that projects are meaningful and achievable:

“We design projects that are simple but relevant, so students can understand and solve problems step by step.”(Interview with Teacher)

Observations show that teachers at SDN Bunikasih 1 prepare structured learning scenarios, including project stages, learning objectives, and assessment criteria. Documentation further indicates that lesson plans include components such as project themes, expected outcomes, and critical thinking indicators.

In contrast, SDN Vada demonstrates a similar planning process but with variations in consistency and teacher readiness. While some teachers are able to design innovative and contextual projects, others still face difficulties in developing project-based learning scenarios, particularly in integrating real-world problems and selecting appropriate learning media.

This is supported by an interview with a teacher who explained:

“Designing project-based learning is still a challenge for some teachers, especially in determining suitable project topics and activities.”(Interview with Teacher)

The school principal also highlighted the need for further training to improve teachers' competence in planning PjBL:

“We need more training so that all teachers can design project-based learning effectively.”(Interview with Principal)

Documentation at SDN Vada shows that while lesson plans have been prepared, the quality and depth of project design vary among teachers. Some lesson plans lack detailed indicators of critical thinking and clear project stages.

Table 1 Comparison of Planning in PjBL Management

Aspect	SDN Bunikasih 1	SDN Vada
Planning Orientation	Systematic and contextual project design	Varies depending on teacher competence
Role of Principal	Active in ensuring readiness of learning tools	Supportive but needs to strengthen teacher training
Teacher Readiness	Generally able to design PjBL projects	Some teachers still face difficulties

Learning Documents	Structured lesson plans with clear project stages	Lesson plans available but less consistent
--------------------	---	--

Based on the table above, both schools have implemented the planning stage of PjBL management; however, differences exist in terms of consistency and teacher readiness. SDN Bunikasih 1 demonstrates more systematic and structured planning, while SDN Vada still faces challenges in developing comprehensive project-based learning designs.

These findings indicate that effective planning is a critical factor in the successful implementation of the PjBL model. The readiness of teachers, support from school leadership, and the quality of learning design significantly influence the ability of PjBL to foster students' critical thinking skills. Therefore, strengthening teacher competence in designing project-based learning and ensuring consistent planning practices are essential to optimize learning outcomes.

Organizing of Project Based Learning (PjBL) Management

Organizing is a crucial stage in PjBL management that involves structuring roles, coordinating stakeholders, and allocating resources to support the implementation of project-based learning. This stage ensures that the planned learning activities can be carried out effectively through clear division of responsibilities, collaboration among teachers, and appropriate grouping of students. Based on findings at SDN Bunikasih 1 and SDN Vada, organizing is reflected in the coordination between school principals and teachers, the formation of student groups, and the management of time and learning resources.

At SDN Bunikasih 1, organizing is carried out systematically through collaboration between the school principal and teachers. The principal plays a coordinating role in ensuring that learning activities are well-structured and aligned with school programs. Teachers work together to design project schedules, determine learning resources, and manage classroom activities. One of the key strategies implemented is the formation of heterogeneous student groups to promote collaboration and peer learning.

This finding is supported by an interview with a teacher, who stated:

“Students are grouped based on different abilities so they can help each other during project activities.”(Interview with Teacher)

The principal also emphasized the importance of coordination in organizing learning:

“We coordinate with teachers to ensure that each stage of the project is implemented according to the plan.”(Interview with Principal)

Observations show that group formation at SDN Bunikasih 1 is conducted strategically to ensure balanced participation among students. Teachers assign roles within groups, such as leader, recorder, and presenter, to encourage responsibility and collaboration. Documentation also indicates that project schedules and learning resources are clearly organized to support the implementation of PjBL.

In contrast, organizing at SDN Vada shows similar efforts but with some limitations in coordination and time management. Although student grouping and role distribution have been implemented, coordination among teachers is sometimes constrained by limited time and conflicting schedules. This affects the consistency of project implementation across different classes.

This is supported by an interview with a teacher, who explained:

“We try to coordinate with other teachers, but sometimes it is difficult because of different teaching schedules.” (Interview with Teacher)

The principal also acknowledged this challenge:

“Time management is still a challenge, especially in coordinating teachers for project-based learning.”(Interview with Principal)

Observations indicate that while group work is implemented, the distribution of roles and coordination among teachers are not always optimal. Documentation shows that project schedules are available but sometimes lack flexibility to accommodate coordination needs.

Table 2 Comparison of Organizing in PjBL Management

Aspect	SDN Bunikasih 1	SDN Vada
Coordination	Strong coordination between principal and teachers	Coordination exists but limited by time constraints
Student Grouping	Heterogeneous grouping with clear roles	Grouping implemented but roles less structured
Teacher Collaboration	Collaborative planning and implementation	Limited collaboration due to schedule conflicts
Resource Management	Well-organized learning resources and schedules	Resources available but less optimally managed

Based on the table above, both schools have implemented organizing functions in PjBL management; however, the level of effectiveness differs. SDN Bunikasih 1 demonstrates stronger coordination and structured organization, while SDN Vada faces challenges related to time management and teacher collaboration.

These findings indicate that effective organizing is essential to ensure the successful implementation of PjBL. Clear role distribution, strong coordination, and efficient resource management contribute significantly to creating a collaborative learning environment that supports the development of students’ critical thinking skills. Conversely, limitations in coordination and time management can hinder the optimal implementation of project-based learning.

Actuating (Implementation) of Project Based Learning (PjBL) Management

Actuating represents the implementation stage of PjBL management, where planned learning activities are carried out in real classroom settings. This stage focuses on how teachers facilitate learning, how students engage in project activities, and how the learning environment supports the development of critical thinking skills. Based on observations at SDN Bunikasih 1 and SDN Vada, the implementation of PjBL has contributed to more active, engaging, and meaningful learning experiences for students.

At SDN Bunikasih 1, the implementation of PjBL is characterized by active student involvement in project-based activities that require problem-solving and collaboration. Teachers act as facilitators who guide students through each stage of the project, from identifying problems to presenting solutions. Learning activities are designed to encourage exploration, discussion, and critical thinking.

This is supported by an interview with a teacher who explained:

“Students are more active when working on projects because they have to think, discuss, and solve problems together.” (Interview with Teacher)

Observations show that students at SDN Bunikasih 1 actively participate in group discussions, share ideas, and collaborate in completing project tasks. Teachers provide guidance and feedback throughout the process, ensuring that students stay on track and achieve learning objectives. Documentation indicates that project activities include stages such as problem identification, planning, implementation, and presentation, which align with the principles of PjBL.

In contrast, SDN Vada also implements PjBL, but with some challenges related to classroom management and time allocation. While students are actively involved in project activities, teachers sometimes face difficulties in managing group dynamics and ensuring that all students participate equally.

This is supported by an interview with a teacher who stated:

“Students are enthusiastic, but sometimes it is challenging to manage time and ensure that all groups complete their projects properly.” (Interview with Teacher)

The principal also highlighted that the implementation of PjBL requires continuous improvement, particularly in terms of teacher readiness:

“Teachers need more experience and training to manage project-based learning effectively.” (Interview with Principal)

Observations at SDN Vada show that although students demonstrate enthusiasm and engagement, the effectiveness of learning is sometimes affected by limited time and insufficient classroom management strategies. Additionally, limited facilities and learning media also pose challenges in implementing projects optimally.

Table 3 Comparison of Implementation in PjBL Management

Aspect	SDN Bunikasih 1	SDN Vada
Learning Approach	Active, student-centered, project-based	Student-centered but less consistent
Student Engagement	High participation and collaboration	High enthusiasm but uneven participation
Teacher Role	Facilitator guiding learning process	Facilitator with challenges in classroom management
Implementation Challenges	Minimal challenges, relatively well-managed	Time management, classroom control, limited facilities

Based on the table above, both schools have implemented PjBL in a way that promotes student engagement and active learning. However, SDN Bunikasih 1 demonstrates a more effective and consistent implementation, while SDN Vada still faces challenges in managing classroom dynamics, time, and resources.

These findings indicate that the success of PjBL implementation depends not only on student participation but also on the teacher’s ability to manage the learning process effectively. Strong facilitation skills, adequate time management, and sufficient learning resources are essential to ensure that PjBL can optimally enhance students’ critical thinking skills.

Controlling (Evaluation and Follow-Up) of Project Based Learning (PjBL) Management

Controlling is the final stage in PjBL management that focuses on monitoring, evaluating, and improving the learning process to ensure that educational objectives—particularly the development of students’ critical thinking skills—are achieved. This stage involves supervision by school leaders, assessment by teachers, and reflective practices by students. Based on findings at SDN Bunikasih 1 and SDN Vada, controlling is implemented through classroom supervision, evaluation using critical thinking rubrics, and follow-up actions aimed at improving learning quality.

At SDN Bunikasih 1, controlling is carried out systematically through active supervision by the school principal and continuous evaluation by teachers. The principal conducts classroom observations and engages in reflective discussions with teachers to assess the effectiveness of PjBL implementation. Teachers evaluate students’ performance using critical thinking rubrics and reflective activities that allow students to assess their own learning process.

This is supported by an interview with the principal, who stated:

“We monitor the learning process directly in the classroom and discuss the results with teachers to improve the next learning activities.” (Interview with Principal)

Teachers also emphasized the importance of evaluation in identifying students’ progress:

“We use rubrics to assess students’ critical thinking and ask them to reflect on what they have learned.” (Interview with Teacher)

Observations show that evaluation at SDN Bunikasih 1 is conducted continuously, allowing teachers to identify strengths and weaknesses in both teaching strategies and student performance. Documentation indicates that assessment tools include rubrics for critical thinking, project reports, and student reflection sheets.

In contrast, SDN Vada also implements controlling through supervision and evaluation; however, the process is less consistent due to time constraints and administrative workload. While the principal conducts monitoring activities, the intensity of supervision is sometimes limited by official duties. Teachers carry out evaluation using similar methods, but follow-up actions are not always implemented systematically.

This is supported by an interview with the principal, who explained:

“We have planned supervision activities, but sometimes they are not implemented optimally due to other responsibilities.” (Interview with Principal)

Teachers also noted challenges in conducting consistent evaluation:

“We assess students’ work, but sometimes it is difficult to follow up regularly due to limited time.” (Interview with Teacher)

Observations indicate that although evaluation practices are present, the lack of consistent monitoring and follow-up affects the overall effectiveness of controlling. Documentation shows that assessment tools are available, but their use varies across teachers.

Table 4 Comparison of Controlling in PjBL Management

Aspect	SDN Bunikasih 1	SDN Vada
--------	-----------------	----------

Supervision	Regular classroom observation and reflection	Planned but less consistent supervision
Evaluation Method	Use of critical thinking rubrics and student reflection	Similar methods but less consistent application
Follow-Up Actions	Continuous improvement based on evaluation	Follow-up exists but not systematic
Challenges	Minimal, well-managed evaluation process	Time constraints and limited monitoring intensity

Based on the table above, both schools have implemented controlling functions in PjBL management; however, the level of effectiveness differs. SDN Bunikasih 1 demonstrates more systematic and continuous evaluation practices, while SDN Vada faces challenges related to time management and consistency in supervision and follow-up.

These findings indicate that controlling is essential for ensuring the sustainability and effectiveness of PjBL implementation. Continuous monitoring, structured evaluation, and consistent follow-up actions are crucial in improving learning quality and enhancing students' critical thinking skills. Without effective controlling, the potential benefits of PjBL may not be fully realized.

Discussion

The findings of this study indicate that the management of the Project Based Learning (PjBL) model in enhancing students' critical thinking skills has been implemented through four main managerial functions: planning, organizing, actuating, and controlling. These findings confirm that the effectiveness of PjBL is not solely determined by the instructional model itself, but also by how it is systematically managed within the learning process. This aligns with contemporary perspectives in educational management, which emphasize that well-structured learning management significantly contributes to the achievement of higher-order thinking skills (Mohamad Fadzil, Mohd Noor, & Bakar, 2025)

In the **planning stage**, the results show that both schools have designed project-based learning activities that integrate critical thinking indicators, although with varying levels of consistency. This finding is consistent with constructivist learning theory, which emphasizes that meaningful learning occurs when students actively engage with real-world problems. Effective planning allows teachers to design contextual learning experiences that support students' cognitive development. Empirical studies support this finding, indicating that well-designed PjBL planning enhances students' ability to analyze and solve problems (Kurniawati, Setiawan, & Anwar, 2020). However, inconsistencies in planning quality, particularly in SDN Vada, reflect challenges in teacher competence, which is also highlighted in previous research as a critical factor influencing the success of innovative learning models (Supriani, Meliani, Supriyadi, Supiana, & Zaqiah, 2022).

In the **organizing stage**, the study reveals that collaboration among teachers and the formation of heterogeneous student groups play a significant role in supporting PjBL implementation. This finding aligns with social constructivist theory, which posits that knowledge is constructed through social interaction and collaboration. The use of heterogeneous grouping strategies allows students to learn from one another and develop critical thinking through discussion and problem-solving. Recent studies confirm that collaborative learning environments significantly enhance students' cognitive and social development (Lestari & Wulandari, 2023). However, the limited coordination time among teachers at SDN Vada indicates that organizational challenges can hinder the effectiveness of PjBL, supporting previous findings that time management and institutional support are essential factors in successful learning management (Hidayati, Nurhasanah, & Rahman, 2021).

In the **implementation stage**, the findings demonstrate that PjBL creates an active and engaging learning environment where students are involved in problem-solving, discussion, and project activities. This is consistent with experiential learning theory, which emphasizes learning through experience, reflection, and active participation. The active involvement of students observed in both schools indicates that PjBL effectively promotes deeper understanding and critical thinking skills. Empirical research supports this result, showing that PjBL significantly improves students' motivation, engagement, and higher-order thinking abilities (Rahmawati & Kurniadi, 2022; Çalışkan & Ulaş, 2022). However, challenges related to classroom management and time allocation, particularly in SDN Vada, highlight the importance of teacher readiness and pedagogical competence in implementing PjBL effectively.

In the **controlling stage**, the study shows that evaluation and supervision play a crucial role in ensuring the effectiveness of PjBL implementation. The use of critical thinking rubrics, student reflections, and classroom supervision reflects the application of formative assessment principles, which focus on continuous improvement. This aligns with the Total Quality Management approach in education, where evaluation is used as a basis for improving learning processes. Recent studies emphasize that continuous monitoring and reflective practices are essential in enhancing learning quality and ensuring the sustainability of innovative instructional models (Santoso & Mulyadi, 2024). However, limitations in supervision intensity due to administrative workload indicate that organizational support and flexible supervision strategies are necessary to optimize the controlling function.

Overall, this study reinforces the idea that the success of PjBL in improving students' critical thinking skills depends on the integration of instructional innovation and effective management practices. While PjBL provides a strong pedagogical framework for developing higher-order thinking skills, its effectiveness is significantly influenced by how well it is planned, organized, implemented, and evaluated. These findings extend previous research by demonstrating that learning management functions play a critical role in maximizing the impact of PjBL. Therefore, strengthening teacher competence, improving coordination among educators, and ensuring consistent evaluation practices are essential strategies to enhance the effectiveness of PjBL in elementary education.

Conclusions

This study concludes that the management of the Project Based Learning (PjBL) model contributes positively to enhancing students' critical thinking skills in elementary schools. The implementation of PjBL management at SDN Bunikasih 1 and SDN Vada is carried out through four managerial functions: planning, organizing, actuating, and controlling. In the planning stage, teachers prepare project-based lesson plans, determine project themes, formulate learning objectives, and integrate critical thinking indicators. In the organizing stage, teachers coordinate learning resources, form heterogeneous student groups, and distribute student roles. In the actuating stage, students are involved in project activities that encourage inquiry, discussion, collaboration, problem-solving, and presentation. In the controlling stage, teachers and school principals conduct supervision, assessment, reflection, and follow-up to ensure that project activities support the development of students' critical thinking skills.

The findings show that SDN Bunikasih 1 demonstrates more systematic PjBL management, particularly in lesson planning, student grouping, teacher coordination, and evaluation using assessment rubrics. Meanwhile, SDN Vada has also implemented PjBL, but still faces challenges related to teacher readiness, time management, classroom control, learning facilities, and consistency of supervision. These differences indicate that the effectiveness of PjBL is not only determined by the instructional model, but also by the quality of learning management and school support.

This study has several limitations. First, the research was conducted only in two elementary schools in Cianjur Regency, so the findings cannot be generalized to all elementary schools. Second, this study used a qualitative multisite case study design, so the results focus on describing processes, experiences, and contextual patterns rather than measuring the statistical effect of PjBL on students' critical thinking skills. Third, the study was conducted within a limited period of three months, so it could not fully examine the long-term development of students' critical thinking. Fourth, the data were obtained through interviews, observations, and document analysis, so the interpretation of findings may be influenced by participants' responses and the availability of school documents.

Based on these findings, several operational recommendations are proposed. First, teachers should prepare PjBL lesson plans that explicitly include project themes, project stages, critical thinking indicators, learning media, time allocation, assessment rubrics, and follow-up activities. Second, schools should provide regular teacher training focused on designing project-based learning, developing critical thinking rubrics, managing student groups, and integrating projects with curriculum objectives. Third, teachers should form heterogeneous student groups and assign clear roles, such as group leader, recorder, material organizer, presenter, and evaluator, to ensure equal participation. Fourth, school principals should conduct scheduled classroom supervision at least once in each project cycle and provide feedback to teachers after observation. Fifth, schools should improve learning facilities by preparing simple project materials, worksheets, reading sources, display boards, and other locally available resources. Sixth, evaluation should not only focus on final project products, but also on students' problem analysis, idea development, collaboration, decision-making, presentation, and reflection.

Therefore, effective PjBL implementation requires systematic management, teacher competence, adequate resources, and continuous evaluation. When planning, organizing, actuating, and controlling are implemented consistently, PjBL can become an effective learning model for improving students' critical thinking skills in elementary education.

Referensi

- Adrias, & Ruswandi, A. (2025). *Desain Penelitian Kuantitatif, Kualitatif, dan Mix Method*. Depok: Rajawali Pers.
- Amiri, S. M. H. (2025). Project-based learning pedagogy: Bridging theory and practice for real-world impact. *Available at SSRN 5333995*.
- Anwar, Saeful & Umam, H. (2023). Transformative Education: Emphasizing 21st Century Skills And Competencies In The Independent Learning Curriculum. *AIM: Journal of Islamic Education Management, 1*(1), 1–16.
- Bandur, A., Hamsal, M., & Furinto, A. (2022). 21st Century experiences in the development of school-based management policy and practices in Indonesia. *Educational Research for Policy and Practice, 21*(1), 85–107.
- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Fifth Edit). Thousand Oaks: SAGE Publications Inc.
- Esti, I., Hersulastuti, H., Indiyah, P. A., & Kun, A. A. (2023). Portrait of education in Indonesia: Learning from PISA results 2015 to present. *International Journal of Learning, Teaching and Educational Research, 22*(1), 321–340.

- Firdaus, M Aditya. (2022). *Model Model Pembelajaran PAI* (1st ed.). Bandung: Rajawali Press.
- Firdaus, Muhammad Aditya, Jamal, M. Y. S., & Arifin, B. S. (2023). Improving Student Learning Outcomes Through Project-Based Learning in Islamic Religion Lessons. *Tafkir: Interdisciplinary Journal of Islamic Education*, 4(2), 241–254. <https://doi.org/10.31538/tijie.v4i2.400>
- Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, 102, 101586.
- Husna, K., & Mundiri, A. (2023). Improving Student Competence Through Learning Management Outcome Based Education. *PEDAGOGIK: Jurnal Pendidikan*, 10(1), 1–14.
- Karan, E., & Brown, L. (2022). Enhancing Student’s Problem-Solving Skills through Project-Based Learning. *Journal of Problem Based Learning in Higher Education*, 10(1), 74–87.
- Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, 19(3), 267–277.
- Komala, E. (2025). *Implementasi model Project Based Learning (PJBL) berbasis literasi pada pembelajaran pai dan budi pekerti dalam membentuk sikap moderat siswa: Penelitian di SMP Negeri 18, SMP Swasta Vijaya Kusuma dan SMP Swasta Al-Falah kota Bandung*. UIN Sunan Gunung Djati Bandung.
- Laur, D. L. (2021). *A systematic review of the literature: The impact of constructivist learning through authentic project-based learning experiences*. Sam Houston State University.
- Lincoln, Y., & Guba, B. (1985). *Naturalistic inquiry*. Beverly Hills: Sage Publications. Inc.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (Third edit). Thousand Oaks: SAGE Publications Inc.
- Mitry, M. M. (2021). Translating constructivism into pedagogy from philosophy to practice: Active project-based learning. *The International Journal of Humanities Education*, 19(1), 39.
- Mohamad Fadzil, N. F., Mohd Noor, N. H., & Bakar, A. N. (2025). Exploring approaches to strengthen higher-order thinking skills in malaysian higher education. *Journal of Administrative Science*, 22, 47–64.
- Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications.
- Purwanto, M. B., Hartono, R., & Wahyuni, S. (2023). Essential skills challenges for the 21st century graduates: Creating a generation of high-level competence in the industrial revolution 4.0 era. *Asian Journal of Applied Education (AJAE)*, 2(3), 279–292.
- Rehman, N., Huang, X., Mahmood, A., AlGerafi, M. A. M., & Javed, S. (2024). Project-based learning as a catalyst for 21st-Century skills and student engagement in the math classroom. *Heliyon*, 10(23), e39988. <https://doi.org/https://doi.org/10.1016/j.heliyon.2024.e39988>
- Sáiz-Manzanares, M. C., Marticorena-Sánchez, R., Díez-Pastor, J. F., & García-Osorio, C. I. (2019). Does the use of learning management systems with hypermedia mean improved student learning outcomes?

Frontiers in Psychology, 10, 88.

- Saleh, S. E. (2019). Critical thinking as a 21st century skill: conceptions, implementation and challenges in the EFL classroom. *European Journal of Foreign Language Teaching*.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63–75.
- Supriani, Y., Meliani, F., Supriyadi, A., Supiana, S., & Zaqiah, Q. Y. (2022). The process of curriculum innovation: Dimensions, models, stages, and affecting factors. *Nazhruna: Jurnal Pendidikan Islam, 5*(2), 485–500.
- Susanto, S. (2020). *Pengaruh Model Project Based Learning (Pjbl) Terhadap Hasil Belajar Siswa Pada Mata Pelajaran PAI Kelas X di SMK PGRI 4 Bandar Lampung*. UIN Raden Intan Lampung.
- Tafakur, T., Retnawati, H., & Shukri, A. A. M. (2023). Effectiveness of project-based learning for enhancing students critical thinking skills: A meta-analysis. *JINoP (Jurnal Inovasi Pembelajaran), 9*(2), 191–209.
- Tisdell, E. J., Merriam, S. B., & Stuckey-Peyrot, H. L. (2025). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.
- Wardani, I. S., & Fiorintina, E. (2023). Building critical thinking skills of 21st century students through problem based learning model. *JPI (Jurnal Pendidikan Indonesia), 12*(3), 461–470.
- Yin, R. K. (2018). Case study research and applications: Design and methods. In *Journal of Hospitality & Tourism Research* (Vol. 53). <https://doi.org/10.1177/109634809702100108>
- Yustina, Y., Syafii, W., & Vebrianto, R. (2020). The effects of blended learning and project-based learning on pre-service biology teachers's creative thinking through online learning in the covid-19 pandemic. *Jurnal Pendidikan IPA Indonesia, 9*(3), 408–420.