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Project-based learning management in strengthening students' collaboration and communication skills in elementary school

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ABSTRACT

This study aimed to describe how project-based learning management supports the development of students' collaboration and communication skills at SD Negeri 5 Muara Rupit. A descriptive qualitative approach was employed to examine classroom interaction, teacher facilitation, and students' learning experiences during project-based learning activities. The participants were selected through purposive sampling and consisted of one school principal, three upper-grade classroom teachers, and six students who represented active, moderate, and less active participation in group work. Data were collected through classroom observations, semi-structured interviews, and documentation analysis, including teaching modules, lesson plans, project worksheets, students' project products, classroom photographs, and school records. The data were analyzed using the interactive model of Miles, Huberman, and Saldaña, consisting of data condensation, data display, conclusion drawing, and verification. Trustworthiness was strengthened through source triangulation, technique triangulation, repeated observations, member checking, and detailed field notes. The findings showed that project-based learning was managed through instructional planning, structured group organization, task distribution, teacher guidance, classroom interaction control, and reflective evaluation. Collaboration skills were supported through task sharing, teamwork, peer assistance, and collective problem-solving, while communication skills were supported through group discussions, idea expression, active listening, peer responses, and project presentations. The findings also revealed that teacher facilitation was essential in encouraging passive students and maintaining balanced group interaction. However, unequal participation, low confidence, limited time, limited facilities, and group management challenges remained obstacles. This study suggests that project-based learning can support collaboration and communication skills when it is managed systematically and contextually.

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Introduction

Education at the elementary level plays a fundamental role in shaping early competencies in cognitive, affective, and psychomotor domains (Montano-silva & Cabrera, 2025). In the context of 21st-century education, elementary schools are expected not only to develop students' literacy and numeracy skills but also to strengthen critical thinking, creativity, collaboration, and communication competencies as essential skills for future learning

and social participation. Among these competencies, collaboration and communication skills occupy a particularly strategic position because they enable students to work effectively with others, exchange ideas, solve problems collectively, and participate actively in academic and social interactions (Ningsih et al., 2025). Collaboration skills refer to students' ability to cooperate effectively in groups, share responsibilities, respect differences, and achieve common goals. Meanwhile, communication skills involve the ability to convey ideas and information clearly, both orally and in writing, while also demonstrating active listening and constructive responses during interactions (Adamson et al., 2023). These two competencies are closely interconnected because effective collaboration can only be achieved through open, dialogic, and reflective communication processes.

Collaboration and communication skills were selected as the focus of this study because both competencies are directly observable in project-based classroom activities. In project-based learning, students are required to work in groups, divide responsibilities, discuss ideas, listen to peers, solve problems together, and present project outcomes. These activities provide observable indicators of how students interact socially and communicate during learning. Therefore, collaboration and communication are relevant competencies for examining how project-based learning is managed in elementary classrooms.

The development of collaboration and communication skills requires systematic and sustainable learning management rather than incidental instructional activities. Effective classroom management involves planning collaborative learning activities, organizing group interactions, facilitating student participation, and evaluating communication processes during learning activities. Because collaboration and communication skills depend on how classroom interaction is planned, organized, facilitated, and evaluated, teachers play a crucial role not only as curriculum implementers but also as learning managers who are responsible for designing, organizing, implementing, and controlling instructional processes. The current educational curriculum in Indonesia also emphasizes student-centered learning and the strengthening of the Profil Pelajar Pancasila, particularly in the dimensions of cooperation and critical reasoning (Harjanti et al., 2026; Rachman et al., 2024). Consequently, teachers are encouraged to create meaningful learning experiences that provide opportunities for students to interact, discuss, collaborate, and solve contextual problems collectively (Mebert et al., 2020). Therefore, innovative instructional approaches that support the systematic development of collaboration and communication skills are increasingly needed in elementary education.

One instructional approach that is highly relevant to these demands is project-based learning (PBL). PBL is an instructional approach that actively engages students in investigating problems or topics through project planning, implementation, and presentation of products or outcomes (Jafarli et al., 2026). In elementary education, PBL provides authentic and contextual learning experiences that allow students to connect academic knowledge with real-life situations. PBL encourages active participation, collaborative work, communication, and problem solving during the learning process. However, the implementation of PBL at the elementary school level does not automatically result in effective collaboration and communication among students. In classroom practice, project activities may still be dominated by students who are more confident, while passive students tend to depend on their peers and contribute minimally to group discussions. Therefore, teachers need to manage PBL systematically by preparing clear project objectives, forming balanced groups, distributing tasks fairly, monitoring group interaction, guiding students during discussions, and providing opportunities for all students to present ideas. Without these managerial processes, PBL may become merely a group assignment activity and may not optimally support students' collaboration and communication skills.

Previous studies have generally examined project-based learning in relation to students' learning outcomes, engagement, teamwork, and communication improvement (Crespí et al., 2022). However, these studies have mostly positioned PBL as an instructional model, while limited attention has been given to PBL as a learning management process. In other words, previous research has not sufficiently explained how teachers plan project activities, organize group structures, distribute student responsibilities, facilitate classroom discussions, monitor collaboration, and evaluate students' communication during project implementation. In addition, many studies on PBL have been conducted at secondary school or higher education levels, whereas qualitative studies focusing on PBL management in Indonesian elementary schools remain limited. This creates a research gap regarding how elementary school teachers manage PBL to strengthen collaboration and communication skills in real classroom contexts, especially in regional schools such as SD Negeri 5 Muara Rupit.

Based on the research gap and preliminary observations conducted on January 15, 2026, this study aims to describe and analyze how project-based learning is managed to support students' collaboration and communication skills at SD Negeri 5 Muara Rupit. Preliminary observations indicated that although teachers had implemented project-based learning as part of the Merdeka Curriculum, students' collaboration and communication skills had not yet developed optimally. Several students remained passive during group work, lacked confidence in expressing ideas, showed limited interaction with peers, and tended to depend on more

dominant group members (Ngoc Tuong Nguyen & Thi Kim Oanh, 2025). Therefore, this study focuses on four aspects. First, it examines how teachers plan project-based learning activities through teaching modules, project objectives, group work design, and learning assessment. Second, it explores how project-based learning is implemented to develop students' collaboration skills through task sharing, teamwork, peer assistance, and collective problem-solving. Third, it analyzes how project-based learning supports students' communication skills through group discussions, idea expression, active listening, peer responses, and project presentations (Benlaghrissi & Ouahidi, 2024). Fourth, it identifies the supporting and inhibiting factors that influence the implementation of project-based learning in strengthening students' collaboration and communication skills. The novelty of this study lies in its focus on project-based learning as a learning management process in an elementary school context, rather than merely examining it as an instructional model or measuring its learning outcomes. The findings are expected to enrich the discussion of learning management in elementary education and provide practical guidance for teachers in implementing more structured, contextual, and meaningful project-based learning (Aisyah & Novita, 2025).

Method

This study employed a qualitative descriptive design to describe how project-based learning management supports students' collaboration and communication skills at SD Negeri 5 Muara Rupit. This design was selected because the study focused on understanding classroom interaction, learning dynamics, teacher facilitation, and students' experiences during project-based learning activities in an authentic elementary school setting. The study did not aim to measure statistical relationships among variables, but to describe how project-based learning was planned, implemented, facilitated, and evaluated in relation to students' collaboration and communication practices. Therefore, the qualitative descriptive design was considered appropriate for examining collaboration and communication as social processes that occur through group interaction, discussion, task sharing, and classroom presentation (Taggart & Wheeler, 2025).

The study was conducted at SD Negeri 5 Muara Rupit, Musi Rawas Utara Regency, during the semester in which project-based learning was implemented as part of the Merdeka Curriculum. The participants were selected using purposive sampling based on their direct involvement in project-based learning activities. The participants consisted of ten informants: one school principal, three upper-grade classroom teachers, and six students. The school principal was selected because she was responsible for supervising learning programs and supporting student-centered learning at the school level. The three teachers were selected because they had directly designed, implemented, and evaluated project-based learning activities in their classes (Zhao et al., 2023). The six students were selected because they were directly involved in project-based learning and represented different levels of classroom participation, namely active, moderate, and less active students. These participation levels were identified based on teacher recommendations and classroom observation indicators, including frequency of speaking during discussions, involvement in task completion, willingness to present ideas, and interaction with peers during group work. The number of participants was considered adequate for this qualitative descriptive study because the data obtained from observations, interviews, and documentation repeatedly showed similar patterns related to project planning, group organization, teacher facilitation, student participation, collaboration, and communication practices.

The research instruments consisted of observation guidelines, semi-structured interview protocols, and documentation checklists. The observation guideline was used to record classroom activities during project-based learning, particularly group formation, task distribution, student participation, peer assistance, discussion patterns, idea expression, active listening, and project presentations. The teacher interview protocol explored project planning, teaching module preparation, project objectives, group organization, task distribution, facilitation strategies, assessment, and classroom challenges. The principal interview protocol focused on school support, curriculum implementation, supervision, facilities, and institutional challenges in implementing project-based learning (Zhong & Lyu, 2022). The student interview protocol explored students' experiences in group work, task sharing, discussion, idea expression, peer interaction, and presentation activities. The documentation checklist was used to examine teaching modules, lesson plans, project worksheets, students' project products, classroom photographs, and school records related to project-based learning (Saimon et al., 2023). The instruments were developed based on three main indicators: project-based learning management, collaboration skills, and communication skills.

Data collection was carried out through three stages. First, classroom observations were conducted during project-based learning activities to identify how teachers organized group work, guided student interaction, monitored task distribution, facilitated discussion, and supported presentation activities. Observations also focused on students' collaboration and communication practices, including task sharing, teamwork, peer assistance, idea expression, active listening, and peer responses. Second, semi-structured interviews were

conducted with the principal, teachers, and students to obtain deeper information about the planning, implementation, teacher facilitation, supporting factors, and inhibiting factors of project-based learning. Interviews with students were conducted using simple and age-appropriate language to make them feel comfortable in expressing their learning experiences. Third, documentation analysis was conducted by examining teaching modules, lesson plans, project worksheets, students' project products, classroom photographs, and school records. These three data collection techniques were used to obtain a comprehensive understanding of how project-based learning was managed and how students' collaboration and communication appeared during classroom activities (Almulla, 2020).

Table 1 <Research Instrument Framework>

Research Focus	**Indicators**	**Data collection techniques**	**Participants**
Planning project-based learning	Teaching module preparation, project objectives, group activity design, task distribution planning, and assessment planning	Interview, Documentation	Teachers
Collaboration skills	Group interaction, task sharing, teamwork participation, peer assistance, responsibility sharing, and collective problem-solving	Observation, Interview	Students
Communication skills	Group discussion, idea expression, active listening, peer response, question-answer interaction, and project presentation	Observation, Interview	Students
Teacher facilitation	Guidance, monitoring, motivation, feedback, classroom support, and management of student participation	Observation, Interview	Teachers, Principal
Supporting and inhibiting factors	Student enthusiasm, student confidence, time allocation, learning facilities, school support, classroom conditions, and group management challenges	Interview, Documentation	Teachers, students, and the principal

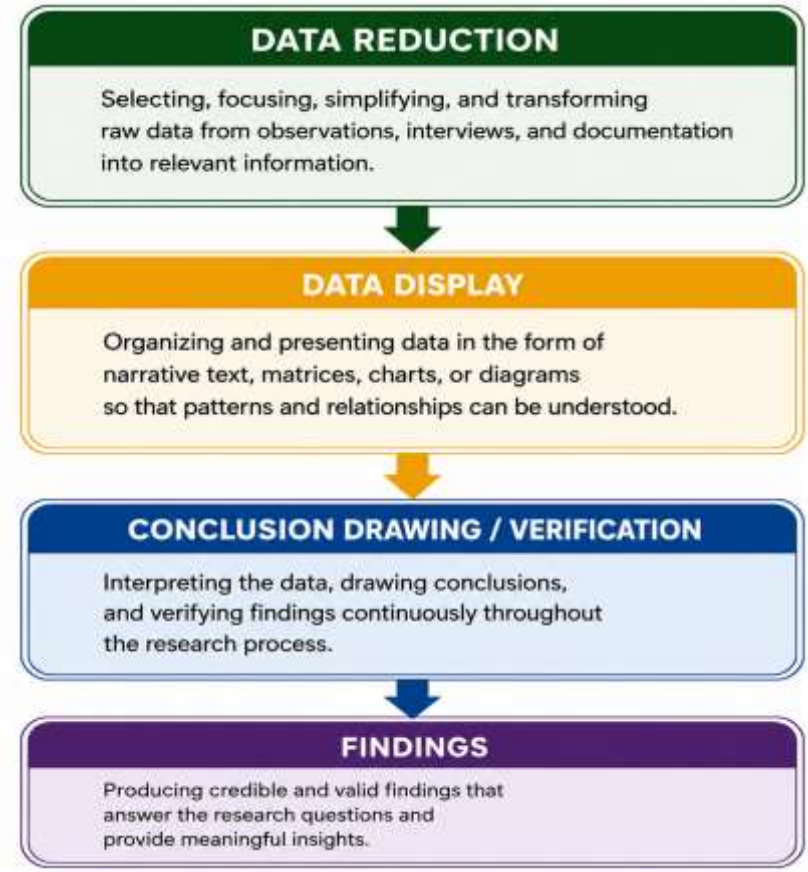


Figure 1 <Interactive Data Analysis Process>

Data analysis followed the interactive model of Miles, Huberman, and Saldaña, consisting of data condensation, data display, conclusion drawing, and verification. In the data condensation stage, observation notes, interview results, and documentation data were selected, simplified, and grouped based on relevant themes. The coding process focused on several categories, including instructional planning, group organization, task sharing, teamwork, peer assistance, idea expression, classroom discussion, project presentation, teacher facilitation, supporting factors, and inhibiting factors (Radović et al., 2021). In the data display stage, the findings were arranged in narrative descriptions and tables to show the relationship among data sources. Conclusions were drawn by identifying repeated patterns across observations, interviews, and documents. The findings were then verified repeatedly to ensure consistency between classroom observations, participant responses, and documentation evidence (Rubenstein et al., 2023). The stages of data analysis used in this study are illustrated in Figure 1.

To ensure trustworthiness, this study applied source triangulation and technique triangulation. Source triangulation was conducted by comparing information obtained from the principal, teachers, and students. Technique triangulation was conducted by comparing data from observations, interviews, and documentation. Member checking was also conducted by confirming the main findings with participants to ensure that the researcher's interpretation was consistent with their experiences. To minimize researcher bias, the researcher maintained detailed field notes, compared interpretations across different data sources, and avoided relying on a single observation or interview result. Repeated observations were also used to strengthen the credibility and dependability of the findings (Grgic et al., 2020).

Results and Discussions

The findings of this study indicate that project-based learning management at SD Negeri 5 Muara Rupit supported students' collaboration and communication skills through five main themes: instructional planning, structured group activities, teacher facilitation, classroom interaction management, and reflective evaluation. The findings were obtained from classroom observations, semi-structured interviews with the principal, teachers, and students, and documentation analysis of teaching modules, lesson plans, project worksheets, students' project products, classroom photographs, and school records. The results are presented based on repeated patterns found across the three data sources (Guthrie et al., 2021).

The data analysis produced several main themes related to project-based learning management and the development of students' collaboration and communication skills. These themes were derived from repeated patterns found across observations, interviews, and documentation. Table 2 presents the coding framework and convergence of data sources used in this study.

Table 2 <Coding Framework and Convergence of Data Sources>

Main Theme	Codes identified	Observation	Interview	Documentation
Project-based learning planning	Teaching module preparation, project objectives, group activity design, task distribution planning, and assessment planning	Found	Found	Found
Collaboration skills	Task sharing, teamwork, peer assistance, responsibility sharing, and collective problem-solving	Found	Found	Found
Communication skills	Group discussion, idea expression, active listening, peer response, question-answer interaction, and project presentation	Found	Found	Found
Teacher facilitation	Guidance, monitoring, motivation, feedback, classroom support, and management of student participation	Found	Found	Found
Supporting factors	Student enthusiasm, teacher guidance, peer collaboration, school support, and supportive classroom environment	Found	Found	Found
Inhibiting factors	Unequal participation, low confidence, limited time, limited facilities, and group management challenges	Found	Found	Found

The convergence of the three data sources shows that the main findings were not based on a single source of information. Observation data showed how students interacted during project activities, interview data explained the experiences and perceptions of the principal, teachers, and students, while documentation data confirmed the existence of instructional planning, project worksheets, and student project outputs. Based on the coding process, the findings are presented in several themes related to project-based learning management and the development of students' collaboration and communication skills (Marnewick, 2023).

The first finding concerns the planning of project-based learning. The data showed that teachers prepared project-based instructional activities by developing teaching modules, determining project objectives, designing group tasks, and preparing assessment activities. Project planning was not only directed toward students' understanding of learning materials, but also toward the development of collaboration and communication skills. In this stage, teachers designed activities that required students to work in groups, divide responsibilities, discuss ideas, complete project tasks, and present project results. Interview data with teachers indicated that project activities were intentionally integrated into learning modules to encourage students to participate actively in group learning (Sormunen et al., 2020). The school principal also emphasized that project-based learning was encouraged as part of the implementation of the Merdeka Curriculum. Documentation data supported these findings through the availability of teaching modules, lesson plans, project worksheets, and students' project products. These findings indicate that collaboration and communication skills had been considered from the planning stage of project-based learning.

Table 3 <Findings on Project-based Learning Planning>

Aspect	Findings	Data Sources
Teaching module preparation	Teachers prepared learning modules containing project-based activities	Interview, documentation
Project objectives	Project objectives included academic understanding and social skill development	Interview, documentation
Group activity design	Students were directed to work in groups and complete project tasks collaboratively	Observation, interview
Task arrangement	Teachers provided opportunities for students to share responsibilities during project completion	Observation, interview
Assessment planning	Teachers assessed students' participation, teamwork, discussion, and presentation activities	Interview, documentation

The second finding concerns the development of students' collaboration skills during project-based learning implementation. Classroom observations showed that students worked in small groups, shared tasks, discussed project solutions, and helped peers who experienced difficulties. Students were encouraged to complete project tasks collectively rather than individually. Interview data with students also showed that group work helped them understand their responsibilities and learn from their peers. These findings indicate that project-based learning provided opportunities for students to practice teamwork, responsibility, mutual assistance, and collective problem-solving (Al-Thani & Ahmad, 2025).

Table 4 <Findings on the Development of Collaboration Skills>

Aspect	Findings	Data Sources
Group formation	Students worked in small collaborative groups	Observation
Task distribution	Group members received different responsibilities during project completion	Observation, interview
Teamwork	Students worked together to complete project tasks	Observation, interview
Peer assistance	Students helped peers who had difficulties	Observation, interview
Collective problem-solving	Students discussed solutions before completing project products	Observation, interview

The third finding concerns the development of students' communication skills. The implementation of project-based learning encouraged students to express ideas, listen to peers, respond to opinions, and present project results. During group discussions, students exchanged ideas and negotiated decisions related to project completion. The presentation stage also provided opportunities for students to explain their work in front of the class. Although some students were still hesitant to speak, repeated discussion and presentation activities helped them become more involved in classroom communication (Nyborg et al., 2022).

Another finding concerns the teacher's role in facilitating collaboration and communication during project-based learning. The data showed that teachers not only assigned project tasks but also guided students throughout the learning process (Martinez, 2022). During classroom observations, teachers monitored group

activities, helped students understand task instructions, encouraged passive students to participate, and provided feedback during discussions and presentations. Interview data also indicated that teachers played several important roles as facilitators, motivators, mentors, discussion coordinators, and feedback providers. These roles were important because elementary students still required continuous guidance to work collaboratively, express ideas confidently, and complete project tasks responsibly.

Table 5 <Findings on the Development of Communication Skills>

Aspect	Findings	Data Sources
Group discussion	Students discussed ideas and project solutions with peers	Observation, interview
Idea expression	Students expressed opinions during group work	Observation, interview
Active listening	Students listened to explanations and suggestions from group members	Observation
Peer response	Students responded to questions, suggestions, and feedback	Observation, interview
Project presentation	Students presented group project results before classmates	Observation, documentation

The study also identified several supporting factors in strengthening students' collaboration and communication skills through project-based learning. These supporting factors included systematic instructional planning, students' enthusiasm, teacher guidance, peer collaboration, and school support. Teaching modules and project worksheets helped teachers organize learning activities more clearly. Students' enthusiasm supported group interaction because students were more motivated when learning activities involved projects, discussions, and presentations. In addition, teacher guidance created a supportive classroom environment where students felt more comfortable asking questions, sharing ideas, and helping their peers (Hardie et al., 2022).

However, the implementation of project-based learning also faced several inhibiting factors. The main challenges included unequal student participation, limited confidence in speaking, time constraints, limited facilities, and group management difficulties. Some students were more dominant during group work, while others tended to be passive and depended on their peers. Several students were also hesitant to express opinions or present project results in front of the class. In addition, project-based learning required longer instructional time because students needed to plan, discuss, complete, and present their projects. Limited learning facilities also required teachers to adjust project activities to available classroom resources (Niemi, 2021).

The triangulation of observation, interview, and documentation data showed consistent findings. Observation data confirmed that students practiced collaboration and communication through group work, discussion, task sharing, peer assistance, and presentation activities. Interview data explained the experiences of the principal, teachers, and students regarding the planning, implementation, benefits, and challenges of project-based learning. Documentation data, including teaching modules, lesson plans, project worksheets, students' project products, and classroom photographs, supported the evidence that project-based learning had been systematically planned and implemented. Therefore, the findings indicate that project-based learning management supported the development of students' collaboration and communication skills when it was accompanied by clear planning, active teacher facilitation, structured group activities, and reflective classroom evaluation (Hossain & Younus, 2025).

Discussion

The findings of this study indicate that project-based learning management contributed to the strengthening of students' collaboration and communication skills through systematic planning, structured group activities, active teacher facilitation, classroom interaction management, and reflective evaluation. These findings show that the success of project-based learning at the elementary school level is not only determined by the use of project tasks, but also by how teachers manage the entire learning process. In this study, project-based learning functioned not merely as a learning model, but as a classroom management process that involved planning, organizing, implementing, monitoring, and evaluating student activities (Jääskä & Aaltonen, 2022).

The first important finding concerns the planning of project-based learning. The results showed that teachers prepared teaching modules, project objectives, group activity designs, task arrangements, and assessment plans before implementing project activities. This finding indicates that collaboration and communication skills need to be intentionally included in instructional planning rather than expected to develop automatically during group work (Pervaz Iqbal et al., 2020). In the context of this study, teachers did not only plan academic content, but also designed learning situations that encouraged students to share responsibilities, exchange ideas, solve problems together, and present project results.

This finding also shows that the planning stage plays an important role in determining the quality of students' collaboration and communication during project-based learning. For elementary school students, project tasks

need to be clearly structured because students are still developing independence, confidence, responsibility, and social awareness. Therefore, teacher planning becomes a key factor in ensuring that each student receives meaningful opportunities to participate in group work and classroom communication (Golden, 2023). Without clear planning, project-based learning may only become a group assignment and may not optimally support the development of students' collaboration and communication skills.

The second finding shows that project-based learning strengthened students' collaboration skills through group formation, task distribution, teamwork, peer assistance, and collective problem-solving. Collaboration in this study was not limited to placing students in groups. It involved the process of sharing tasks, helping peers, discussing solutions, and taking collective responsibility for project completion (Newman & Ford, 2021). These activities enabled students to learn how to work with others, respect group roles, and support classmates who experienced difficulties during project activities.

The findings also indicate that collaboration among elementary students requires teacher guidance. Some students were able to participate actively, while others still needed encouragement to contribute to group work. This condition shows that collaboration does not automatically occur when students are placed in groups. Teachers need to manage group composition, clarify student responsibilities, monitor participation, and ensure that each student has a role in completing the project (Aranzabal et al., 2022). Through this process, project-based learning can become a meaningful space for students to practice responsibility, cooperation, and collective problem-solving.

The third finding concerns the development of students' communication skills. The results showed that project-based learning encouraged students to express ideas, listen to peers, respond to opinions, and present project outcomes. These communication skills were developed through repeated classroom practices, especially during group discussions and project presentations. Students were not only asked to complete learning products, but also to explain their ideas, respond to questions, and communicate project results to their classmates. This finding shows that communication skills develop more effectively when students are given opportunities to participate actively in learning. In conventional classroom activities, students may have limited opportunities to speak, ask questions, or respond to peers. In project-based learning, however, students are encouraged to communicate during planning, discussion, task completion, and presentation. Although some students were still hesitant to speak in front of the class, repeated discussion and presentation activities helped them become more involved in classroom communication. This indicates that communication confidence needs to be built gradually through supportive and continuous learning experiences.

The teacher's role emerged as a central factor in the implementation of project-based learning. The findings showed that teachers acted as facilitators, motivators, mentors, discussion coordinators, classroom managers, and feedback providers. Teachers guided students by monitoring group work, encouraging passive students, clarifying task instructions, helping students solve problems, and giving feedback during discussions and presentations. These roles helped maintain classroom interaction and ensured that project activities remained aligned with learning objectives (Penuel et al., 2022).

This finding confirms that project-based learning cannot be implemented effectively by simply assigning students to complete projects (Kumar, 2021). Teachers must actively manage the learning process so that all students have opportunities to participate. This is especially important in elementary classrooms because students' collaboration and communication skills are still developing. Teacher facilitation helps students understand their roles, become more confident, communicate ideas, and complete project tasks responsibly. Therefore, the teacher's managerial competence is an important element in strengthening students' collaboration and communication skills through project-based learning. The study also identified several supporting factors, including systematic instructional planning, student enthusiasm, teacher guidance, peer collaboration, school support, and a supportive classroom environment. Teaching modules and project worksheets helped teachers organize learning activities more clearly. Student enthusiasm also contributed to the success of group activities because students were more motivated when learning involved projects, discussions, and presentations. In addition, teacher guidance created a classroom atmosphere where students felt more comfortable asking questions, sharing ideas, and helping their peers.

School support also contributed to the implementation of project-based learning. Support from the school encouraged teachers to apply student-centered learning and provided space for teachers to develop more interactive classroom activities. A supportive classroom environment also helped students participate more actively because they felt accepted and guided during the learning process. These findings indicate that the success of project-based learning depends not only on teacher performance, but also on student readiness, peer interaction, and institutional support from the school. At the same time, the study found several inhibiting

factors, including unequal student participation, low confidence, time constraints, limited facilities, and group management challenges (Omari et al., 2025). Some students tended to dominate group discussions, while others were less active and depended on their peers. This condition shows that collaborative learning requires clear task distribution and continuous teacher monitoring. If group work is not managed properly, only certain students may benefit from the activity, while passive students may remain uninvolved.

The issue of low student confidence also shows that communication skill development requires continuous practice and a psychologically supportive classroom climate. Some students were hesitant to express ideas or present project results because they were afraid of making mistakes. Therefore, teachers need to create classroom environments where students feel safe to speak, ask questions, give opinions, and respond to others. In elementary education, this support is particularly important because students are still building confidence, social maturity, and communication habits. Time constraints and limited facilities also influenced the implementation of project-based learning. Project activities required longer instructional time because students needed to plan, discuss, complete, and present their projects. Limited learning facilities also required teachers to adjust project activities to available classroom resources. These challenges indicate that project-based learning requires careful time management, flexible learning strategies, and school support to ensure that project activities can be implemented effectively.

The findings of this study have theoretical and practical implications. Theoretically, this study contributes to the discussion of project-based learning by positioning it as a learning management process, not merely as an instructional model. The study shows that collaboration and communication skills are strengthened through the integration of planning, organizing, facilitation, classroom interaction control, and evaluation. Practically, the findings suggest that teachers should design project activities with clear objectives, balanced group structures, fair task distribution, guided discussion, presentation opportunities, and reflective assessment. Schools should also support project-based learning by providing facilities, time flexibility, teacher development opportunities, and policies that encourage student- centered learning (Miller et al., 2021).

Overall, the discussion shows that project-based learning management can support the development of collaboration and communication skills when it is implemented systematically and contextually. The findings indicate that students' collaborative and communicative experiences are shaped by the quality of teacher planning, facilitation, classroom management, and school support. However, the implementation of project-based learning still requires continuous guidance, adequate resources, and careful group management to address unequal participation, limited confidence, and instructional time constraints. Therefore, strengthening students' collaboration and communication skills through project-based learning depends not only on the use of project activities, but also on the quality of learning management carried out by teachers and supported by the school.

Conclusions

This study concludes that project-based learning management contributes to strengthening students' collaboration and communication skills at SD Negeri 5 Muara Rupit through systematic instructional planning, structured group activities, active teacher facilitation, classroom interaction management, and reflective evaluation. The findings show that collaboration and communication skills do not develop automatically through project assignments, but require clear learning objectives, balanced group organization, fair task distribution, continuous teacher guidance, and opportunities for students to discuss and present their ideas. Project-based learning encouraged students to practice collaboration through task sharing, teamwork, peer assistance, and collective problem-solving. Students learned to work with group members, complete responsibilities, support peers, and participate in shared decision-making. In addition, project-based learning supported students' communication skills through group discussions, idea expression, active listening, peer responses, and project presentations. These activities provided meaningful opportunities for students to become more involved in classroom interaction and gradually build confidence in expressing opinions.Teachers played an important role as facilitators, motivators, mentors, discussion coordinators, classroom managers, and feedback providers. Their guidance helped students understand project tasks, participate in group work, communicate ideas, and complete learning activities more responsibly. The implementation of project-based learning was supported by systematic planning, student enthusiasm, teacher involvement, peer collaboration, school support, and a supportive classroom environment. However, several inhibiting factors were also found, including unequal participation, low student confidence, limited instructional time, limited facilities, and group management challenges. The study implies that project-based learning can become a meaningful strategy for developing 21st-century skills when it is managed systematically and contextually. Teachers are encouraged to design clear project activities, provide balanced roles, guide discussions, and create safe spaces for students to communicate. Schools should support implementation through adequate facilities, flexible time allocation, and

teacher development programs. Future researchers may examine project-based learning in broader school contexts or use mixed methods to provide more comprehensive findings.

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