Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
ISSN: 2086-6135 E-ISSN: 2541-612x
Volume 14 No. 4. Desember 2025 https://ejournal.unibabwi.ac.id/index.php/sosioedukasi/index

TEACHERS' STRATEGIES FOR MANAGING TIME AND COSTS IN PROJECT-BASED LEARNING IN SOCIAL SCIENCE LEARNING CLASS V SDN 113 PEKANBARU

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RTICLE HISTORY
Received : 30-10-2025
Revised : 15-11-2025
Accepted : 15-12-2025

KEYWORDS
Teacher Strategy
PJBL
Social Science
Learning

ABSTRACT
This study aims to describe teachers' strategies in managing time and costs in the implementation of Project Based Learning (PjBL) in science learning class V at SDN 113 Pekanbaru. The research method uses a qualitative approach of case studies with three data collection techniques: observation, in-depth interviews, and documentation. The research informants consisted of 1 homeroom teacher and 32 students, and triangulated techniques and sources to maintain the validity of the data. Data analysis uses data reduction, data presentation, and conclusion drawing models. The results of the study show three main strategies for time management, namely (1) project stage-based time planning, (2) flexible time organization according to class dynamics, and (3) time evaluation through learning reflection. From the cost aspect, teachers implement efficiency strategies through the use of simple materials such as cardboard and plastic bottles provided by students independently to reduce financing needs. The discussion of the research emphasized that time and cost management are the determining factors for the success of PjBL, especially in the context of elementary schools with limited resources. The novelty of this research lies in the focus of the study of teachers' strategies for managing time and costs, which have not been discussed much in previous studies which have more dominantly highlighted the effectiveness of PjBL on student learning outcomes.

INTRODUCTION

Improving the quality of human resources cannot be separated from efforts to improve the quality of education. One of the main challenges of education today is how teachers can create learning that is active, meaningful, and in accordance with the demands of 21st century competencies. Teachers are required to be able to develop learning models that foster critical thinking, creativity, collaboration, and communication skills (4C). One of the learning models that is considered relevant to answer these demands is Project Based Learning (PjBL), because it provides a project-based learning experience that involves students in solving real and contextual problems (Masruroh, 2022).

However, the success of the implementation of PjBL is not only influenced by the learning design, but also the ability of teachers to manage resources, especially time and cost. This view is in line with Yusika & Turdjai (2021) who emphasized that PjBL requires a series of activities ranging from planning, implementation, to the preparation of the final product so that it requires good time management. In addition, the implementation of the project requires the cost

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of providing tools, practical materials, and learning media. This is a particular challenge for schools with limited budgets or students from lower middle economic backgrounds. Based on an initial interview with a VA class teacher of SDN 113 Pekanbaru on February 14, 2025, it was found that the implementation of PjBL faced obstacles related to limited time allocation and cost needs in the implementation of the project. Teachers must arrange learning strategies to keep them in accordance with the academic schedule, while financing needs to be arranged without burdening students. These findings are in line with Zebua & Santosa (2022) who stated that time management in learning is the ability to manage and utilize time effectively. In line with that, Astawa (2017), Hasibuan (2021), and Monita (2019) emphasized the importance of efficient management of education financing as a supporting factor for learning success.

Previous research has predominantly discussed the effectiveness of PjBL on learning outcomes and its effect on 4C skills, but there has been little research on teachers' strategies in managing time and costs as the key to the successful implementation of PjBL, especially in science learning in elementary schools. In fact, these two aspects are important components that determine the success of the implementation of PjBL in educational units with limited resources. This research offers novelty in the form of focusing on teachers' strategies in managing time and financing during the implementation of PjBL, not just assessing the effectiveness of learning outcomes. This research also provides a real picture of teacher practice at SDN 113 Pekanbaru, which can be a reference for the formulation of policies for the implementation of PjBL in elementary schools. Thus, this research is important to describe teachers' strategies in managing time and costs in the Project Based Learning model in IPAS learning class V SDN 113 Pekanbaru. The results of the research are expected to make a practical contribution for teachers, principals, and basic education policy makers in formulating a more efficient, planned, and tailored implementation of PjBL to school needs.

RESEARCH METHODS

This research uses a qualitative approach with a case study type. This approach was chosen because the research focuses on in-depth observations of phenomena that occur in a particular classroom context. The case study allows researchers to fully understand teachers' strategies in managing time and costs when applying the Project Based Learning (PjBL) model in IPAS learning. Through this approach, researchers can explore the dynamics of learning, teacher-student interaction, and the teacher's decision-making process during the implementation of PjBL in the VA class of SDN 113 Pekanbaru. The research was carried out at SDN 113 Pekanbaru, which is located at Jl. Irkab, East Sidomulyo, The main informant in this study is the homeroom teacher of the VA, the researcher chose him because he has direct experience in planning, implementing, and evaluating learning in the classroom, including in applying the PjBL model.

The research procedure is carried out through several stages as follows: Determining the focus of the research, namely the teacher's strategy in managing time and costs in the PjBL model in science learning. Collect data through observation, interviews, and documentation. Analyze data by grouping important information, presenting it in the form of a description, and drawing conclusions. Data and Data Sources This research utilizes two types of data, namely primary data and secondary data. Primary data was obtained directly from the results of observation of the learning process and interviews with homeroom teachers. This data provides a clear picture of the strategies used in managing time and costs in PjBL. Secondary data comes from supporting documents, such as teacher notes, photos of activities, learning tools, and other materials related to the implementation of PjBL in the VA classroom.
The main data source is the VA homeroom teacher as the learning implementer, while the secondary data source comes from school documents and activity archives.

Data Collection Techniques are obtained by three main techniques: Observation The researcher observes the learning process directly to see how teachers manage their time, manage project activities, and adjust their cost needs. Observations were made during the activity to capture the dynamics of the classroom in real time.
Interviews were conducted in depth with homeroom teachers to explore the reasons, considerations, and strategies used by teachers in dealing with time and cost constraints. Tools in the form of voice recordings and field notes are used to ensure that data is stored properly. Documentation The researcher collected documents in the form of photos of activities, learning tools, and project implementation notes. Documentation serves to reinforce observational and interview findings. Data Validity Checking Techniques To ensure accurate data, the research uses triangulation techniques that involve comparing data from various sources, techniques, and times. The data obtained through

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observation was compared with the results of interviews and documentation. In addition, data collection is carried out more than once to see the consistency of information. Data analysis techniques are carried out in stages starting from: Data reduction, which is selecting and compiling important information from the results of data collection. Data presentation, which is compiling information in the form of a descriptive description so that it makes it easier for researchers to understand the patterns and relationships between findings. The conclusion is to formulate the final picture of teachers' strategies in managing time and costs when applying PjBL to social studies learning. Data analysis is carried out continuously from the beginning of data collection until the research is completed

RESEARCH RESULTS

This section presents research findings regarding time and cost management in the implementation of Project-Based Learning (PJBL) in IPAS learning class V SDN 113 Pekanbaru. Data were obtained through observation, interviews, and document studies, then analyzed using data reduction, categorization, and conclusion drawing techniques by assigning thematic codes (T1–T5) according to the research indicators.

Table 1. Research Findings Based on Indicators

NO	Indicator	Field Findings	Code
1	Planning time and cost of implementing PJBL	Teachers draw up a detailed schedule of project stages and adjust the time to the level of difficulty of the task.	**T1**
2	Organizing time during the learning process	Discussion, practice, and presentation times are arranged proportionately and adjusted in case of obstacles.	**T2**
3	Implementation of time as planned	Students are relatively disciplined in following the project schedule although some stages need adjustments.	**T3**
4	Time usage evaluation	Teachers reflect to see the effectiveness of time management at each stage.	**Q4**
5	Strategies to overcome obstacles	Teachers modify instructions, provide alternative methods, and utilize simple materials to make implementation efficient.	**Q5**

Planning Time and Cost of PJBL Implementation (T1)

Based on the results of observations, interviews, and study of RPP documents and activity schedules, grade V teachers at SDN 113 Pekanbaru have shown a mature planning process before the implementation of Project-Based Learning (PJBL). Teachers not only make a schedule in general, but also arrange time allocation for each stage in detail starting from the stage of problem formulation, information gathering, project implementation, presentation, to final reflection. Each stage has a time range adapted to the level of complexity of the task. The data search stage, for example, is given a longer time because teachers understand that students need a process of identifying sources and classifying information before producing a quality product.

The lesson plan document shows that teachers enter the details of time allocation at each learning step. This shows the teacher's ability to translate the curriculum plan into a realistic and measurable learning operational plan. Time adjustments are also visible on the class's weekly schedule, which shows when each group should report on the progress of the project.

In terms of cost, teachers have estimated material needs and taken into account the affordability aspect for students. The results of the interviews showed that the teachers gave instructions for each group to use simple materials such as used cardboard, plastic bottles, straws, and paper, which were easy to obtain at home without having to buy new materials. This approach not only reduces costs, but also trains students to think creatively in utilizing used goods into products with learning value. The photo documentation shows that students bring simple materials from the home environment, which indicates that the cost management policy is effective and accepted by both students and parents. This approach is in line with the principles of contextual learning that optimize the nearby environment as a learning resource. Thus, the planning of PJBL time and costs in social studies learning has been arranged in a logical, realistic, and friendly manner for students' socio-economic conditions, while reflecting the teacher's ability to carry out project-based learning management in a structured manner.

The results of observations and document studies show that teachers prepare detailed time planning from the stage of problem formulation to final reflection. In the RPP document, it appears that the time division in each activity session and the explanation of the completion target for each stage.

Interview excerpts reinforce these findings:

Sosioedukasi
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"For the data search stage, I give it a longer time because children need to collect information and sort the sources appropriately so that the product is of high quality" (Interview, 20/10/2025).

In terms of cost, teachers encourage the use of simple and affordable materials.

"I direct each group to use materials at home such as cardboard or plastic bottles so as not to burden their parents" (Interview, 20/10/2025).

These findings are in line with the principles of efficiency and contextual learning that emphasize the benefits of the nearby environment as a learning resource.

Time Organisation During the Learning Process (T2)

The observation results show that teachers not only set time allocation in planning, but are also able to manage the use of time flexibly and adaptively during the learning process. At the initial discussion stage, the teacher explains a clear time limit, for example 15–20 minutes to formulate the division of tasks and project plans in groups. Teachers then monitor by moving from one group to another to ensure that the discussion runs productively and does not deviate from the project objectives. During practical activities, teachers display good managerial competence by ensuring that each group maximizes the time allotted. When obstacles are found such as students who do not understand the division of tasks or there are group members who have not contributed optimally, the teacher gives direct direction and helps the group make quick decisions so that the process is not hampered. Under certain conditions, teachers give limited additional time, but still keep the next stage from being significantly affected. Observation records show that the time change is tactical and does not change the framework of the planned activities. This adaptive time organization shows that teachers not only manage learning administratively, but are also able to control classroom dynamics according to real situations. This is important in PJBL learning which requires flexibility because the load, complexity of tasks, and collaboration between students can change at any time.

The teacher sets a detailed deadline for each session and monitors the group process. Observations noted that teachers set a discussion time of 15–20 minutes at the initial meeting while ensuring the distribution of assignments was effective. Verbatim: "If there is a group that is still confused about the task, I go in and help so that I don't waste too much time".

Implementation of Time as Planned

In general, the implementation of project activities follows a predetermined schedule. Teachers instill time discipline from the beginning by explaining the completion targets of each stage. This discipline can be seen from the documentation of each group's project report book which contains a checklist of the progress of each meeting. Students generally show a professional attitude according to the teacher's expectations, for example arriving on time, starting assignments immediately, and taking advantage of discussion or practice time without being distracted by other things.

However, some stages have experienced time adjustments, especially at the stage of preparing project reports. Students need additional time to complete documentation, such as product photos, work process notes, and analytical conclusions. The teacher then gives an additional session for completion without changing the overall flow of PJBL. This shows that the implementation of PJBL is not only rigid according to the plan but also provides flexible space so that the quality of products and processes is maintained.

Thus, the implementation of PJBL shows the achievement of learning objectives without sacrificing the quality of activities, although there are minor adjustments at several stages.

In general, project activities run according to schedule. The project logbook shows a checklist of the progress of each group's work. Verbatim: "The children are used to following the target time, only the preparation of the report needs an additional meeting" (Interview). This shows the consistency of the implementation of the plan but still provides flexibility to maintain the quality of the project.

Time Use Evaluation (T4)

Reflection is carried out by the teacher after all activities are completed through learning journal notes and interviews. The teacher analyzes whether the time allocation in the plan is in accordance with the real learning needs. Based on the findings, teachers concluded that most of the stages of the activity have been effective, but there are some parts that need to be rearranged, especially in the presentation session of the project results.

Presentation sessions tend to take longer than planned due to the enthusiasm of students, the number of groups, and the desire of each group to explain the process in full. The teacher assessed that in the next implementation, a presentation mechanism that is more focused, structured, and limited in duration is needed, for example through the use of presentation templates or limitation of evaluation points. This evaluation shows that teachers apply a continuous improvement cycle in the implementation of PJBL, namely planning, implementing, checking, and improving the process, so that the next learning has a better chance of being efficient and of quality.

Evaluation is carried out through joint reflection and learning journals. The teacher found that the presentation session took longer than planned. "The presentation was long because there were many groups and they wanted a full story

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of the process. In the future, we may need a presentation template to be more focused" (Interview,).

Strategies for Overcoming Time and Cost Management Constraints (T5)

In the implementation of PJBL, several obstacles were found, such as time limitations at several stages and limitations of students in providing materials. Teachers show effective managerial strategies in overcoming these conditions. For example, teachers:

1. Directing students to use simple and cheap materials available at home or school, so that the problem of cost does not become an obstacle to students' creativity.
2. Simplify project stages or components when there is not enough time, for example reducing the number of task details but still maintaining the achievement of core competencies.
3. Changing learning methods in certain situations, such as replacing time-consuming independent research with targeted group discussions to make the process faster and more meaningful.
4. Prioritize the thought process, cooperation, and problem-solving skills rather than judging from product results alone. Thus, despite adjustments, learning objectives are still achieved.

This strategy demonstrates the ability of teachers to conduct realistic, contextual, and sensitive project-based classroom management to students' conditions. Teachers do not impose rigid initial plans, but provide room for adaptation so that learning continues to run effectively. Several strategies were found by teachers:

- Using simple and inexpensive materials.
- Simplify task components if time is limited.
- Replacing independent research with a directed discussion.
- Focus on collaborative processes rather than just product outcomes.

Supporting quote: "I give them extra time if they are thinking so that their thinking process is not cut off" (Interview).

DISCUSSION

The implementation of Project-Based Learning (PJBL) in social studies learning in grade V of SDN 113 Pekanbaru shows that teachers have implemented effective time and cost management. This is in line with the views of Surboyo and Adnyani (2021) who emphasized that one of the strengths of PJBL lies in the ability of teachers to manage learning stages systematically, from planning to evaluation. Mature time management is reflected in the preparation of realistic time allocation according to the complexity of the task, as well as the ability of teachers to adapt to class dynamics during the project.

In the context of PJBL implementation, the preparation of a structured implementation plan is considered crucial. This is as understood in Yuliana's (2020) research, that teachers who are able to describe the curriculum into learning operational designs show professional maturity in managing learning based on an independent curriculum. The teachers in this study not only prepare a schedule of activities, but also take into account the availability of time per stage, predictions of obstacles, and the final targets to be achieved. Thus, time management has been positioned as part of the learning strategy, not as a mere administrative aspect.

The learning process also shows that teachers have successfully implemented adaptive time organization. In PJBL, flexibility is a very important element because class dynamics, workloads, and variations in student learning styles can change at any time. This finding is in line with the study of Misbah et al. (2021) which stated that teachers' flexibility in regulating the learning rhythm of PJBL allows students to stay focused on achieving competencies despite technical obstacles in the classroom. Teachers conduct direct monitoring, provide additional instruction when needed, and adjust time allocation without compromising the core stages of learning.

Students' discipline in following the project flow shows that PJBL has a positive impact on the formation of students' managerial character. Putra's research (2022) emphasizes that PJBL is able to foster student accountability because tasks are time-consuming and require clear documentation and accountability. Time management through progress checklists as done by teachers in this study shows that learning is not only results-oriented but also emphasizes the scientific work process. This is in accordance with the O2A (Observe–Organize–Apply) approach introduced by Nurhayati (2021), where learning emphasizes the development of responsibility and independence. Post-learning evaluation shows that teachers conduct systematic reflection on the effectiveness of time use. Dewi's research (2022) emphasizes that collaborative reflection is part of the cycle of improving the quality of learning, with teachers as evaluators and innovators of learning. In this study, teachers found that presentation sessions require a more standardized management mechanism so that time is not wasted. This is in line with the findings of Ismawati (2023) that project learning requires a concise presentation format, focus on achievements, and have standard guidelines to be efficient but still meaningful.

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In terms of cost, teachers apply an economical but creative strategy, namely utilizing simple materials that are easy for students to obtain in the home environment. This principle is consistent with the concept of contextual learning based on ecological functions as written by Prasetyo (2021), that learning that emphasizes the use of local resources not only reduces costs but also builds students' awareness of environmental values. In addition, the use of used goods as a learning medium is a tangible form of applying *the principles of eco-friendly project learning* as recommended by Hafid (2022), which in his research shows that students become more creative and do not consider costs as an obstacle to learning.

Teachers' strategies in dealing with obstacles, such as simplifying project stages, modifying methods, and prioritizing the thought process rather than just the final product, show responsive pedagogic intelligence. This concept is in line with the adaptive-exploratory approach put forward by Rakhmawati (2021), namely teachers do not impose procedural perfection, but ensure that essential competencies are still achieved. Thus, learning becomes socially, economically, and pedagogically realistic.

Overall, the implementation of PJBL in this study shows that teachers do not just carry out learning methods, but manage the entire process as a system. This finding strengthens the view of Sidik (2023) that the effectiveness of PJBL is highly determined by the capacity of teachers to manage workflows, predict obstacles, and make continuous improvements. Teachers in this study have shown this ability so that PJBL can run optimally with a positive impact on independence, discipline, creativity, and the quality of student output.

CONCLUSION

The implementation of Project-Based Learning (PJBL) in social studies learning in grade V of SDN 113 Pekanbaru shows that time and cost management runs effectively and in a structured manner, where teachers are able to plan the project stage in detail from problem formulation to final reflection, so that learning becomes more directed and relevant to students' learning needs. These findings confirm the practical contribution that the success of PJBL is strongly influenced by teachers' ability to manage time, resources, and classroom dynamics professionally and adaptively, including flexibility in simplifying tasks and adjusting methods to keep the process productive despite technical barriers. In terms of cost, the use of simple materials in the student environment reduces expenses without reducing educational value, as well as fostering creativity and ecological awareness. The practical implications of this study are the need for ongoing support for teachers through training in project planning, classroom management, and learning budget management, as well as the involvement of principals in providing conducive policies and facilities. Meanwhile, the theoretical contribution of this research reinforces that PJBL not only improves conceptual knowledge but also managerial skills, independence, and student responsibility as the main goals of 21st century learning. Based on the results of this study, it is recommended that further research be carried out at different school levels or with a quantitative method approach to test the effectiveness of PJBL more broadly and measurably, especially related to its impact on improving academic achievement and students' soft skills.

BIBLIOGRAPHY

Adha, C., Fadilla, S., & Muhammad, N. (2024). The importance of effective learning strategies centered on elementary school students. *Journal of Character Education*, *2*(1), 1–10. https://doi.org/10.51903/pendekar.v2i1.539

Agustina, N., Robandi, B., Rosmiati, I., & Maulana, Y. (2022). Pedagogical content knowledge analysis of science books on the content of science in elementary school Independent Curriculum. *Journal of Basic Education*, *6*(5), 9180–9186. https://jbasic.org/index.php/basicedu/article/view/3662

Assyakurrohim, D., Ikhram, D., Sirodj, R. A., & Afgani, M. W. (2023). Case study methods in qualitative research. *Journal of Science and Computer Education*, *3*(1), 1–9. https://jurnal.itscience.org/index.php/jpsk/article/view/1951

Azadia, F. Z., Hadi, F. R., & Kuswardiyanti, H. (2024). Implementation of the Wordwall website to improve student learning outcomes in elementary school grade III science subjects. *Journal of Elementary School Education*, *1*(2), 33. https://jurnal.habi.ac.id/index.php/Pendikdas/article/view/371

Azka, M. Z., Sri, T., & Asih, N. (2024). The critical thinking ability of students of the problem-based learning model with dynamic assessments with a differentiated learning approach is reviewed from learning independence. *Journal of Mathematics Education*, *8*(2), 1259–1272.

B. Lena Nuryanti Sastradinata. (2023). *Mindset transformation in building critical thinking skills through active learning methods*. Deepublish Digital Publisher. https://books.google.com/books/about/Transformasi_Mindset_dalam_Membangun_Kem.html?id=ALxKEQAAQBAJ

Dewi, N. L. (2022). Reflective evaluation in improving the quality of project-based learning. *Journal of Educational Technology*, *10*(2). https://doi.org/10.32550/jtp.v10i2.458

Dewi, P. Y. A., Kusumawati, N., Pratiwi, E. N., Sukiastini, I. G. A. N. K., Arifin, M. M., Nisa, R., Uslan, W., Widyasanti, N. P., Kusumawati, P. R. D., & Masnur. (2021). *Theory and application of science learning for elementary / MI*. Muhammad Zaini Publishing Foundation.

Dewi, D. P., Sismulyasih, N., Putri, D. S., & Afni, N. (2023). *IPAS BIT Player: Development of IT-based interactive media IPAS*. Cahya Ghani Recovery.

Fenti Hikmawati. (2020). *Research methodology* (4th ed.). PT RajaGrafindo Persada.

Gunadi, R. A. A., Efendi, Y., Muflihin, M. H., & Isroani, F. (2023). E-learning as a learning medium in the digital era of the 21st century. *Journal of Educational Technology*, *25*, 159–166.

Hafid, M. (2022). Environmentally friendly project-based learning in increasing student creativity. *Journal of Basic Education Innovation*, *7*(1). https://doi.org/10.26618/jipd.v7i1.6291

Henry Eryanto, & Marsofiyati. (2022). *Teaching planning*. UNJ Press.

Hermansyah. (2020). Problem based learning in Indonesian learning. *Social, Humanities, and Education Studies (SHEs): Conference Series*, *3*(3), 2257–2262. https://jurnal.uns.ac.id/SHES/article/view/57121

La Amaludin, M. P. (2022). *Problem-based learning learning model, application and its influence on critical thinking skills and learning outcomes*. Pascal Books.

Lailatul Inayah, U., Anisah, N., Fitria, L., Nisak, K., Muhimah, S. N., & Gresik University. (2024). Analysis of the role of teachers as student facilitators in classroom learning. *Journal of Education*, *1*(2), 84–93.

Lamatenggo, N. (2020). The development of teacher professionalism through the writing of scientific papers towards independent learning for children. *Research Paradigm*, 85–94.

Mahagia, F. A., Goni, A. M., & Rorimpandey, W. H. F. (2023). The problem-based learning (PBL) learning model improves students' mathematics learning outcomes. *Scientific Journal of Educational Vehicles*, *9*(24), 1055–1066.

Masril, M., Jalinus, N., Jama, J., & Dakhi, O. (2020). Implementation of problem-based learning in the 2013 Curriculum at SMK Negeri 2 Padang. *Constructivism: Journal of Education and Learning*, *12*(1), 12–25. https://doi.org/10.35457/konstruk.v12i1.956

Misbah, M., et al. (2021). Teachers' flexibility in the implementation of project-based learning in elementary schools. *Journal of Basic Education of the Archipelago*, *6*(2). https://doi.org/10.29407/jpdn.v6i2.5853

Muh. Amiruddin Salem, & Kasim Hijrat, J. (2024). Teachers' strategies in improving students' critical thinking skills in social studies class IV MIS Al-Hidayah Leuwohung. *Scientific Journal of Elementary Education*, *4*(4), 235–240.

Naamy, N. (2022). *Qualitative research methodology, basics and their applications*. Rake Sarasin.

Nashiroh, F., Desstya, A., & Artik. (2024). The application of the problem based learning (PBL) model to improve critical thinking skills in grade IV in elementary school mathematics subjects. *Journal of Research and Education*, *5*(2), 707–719.

Ningsih, E. P., & Rizki, S. N. (2024). The role of teachers in improving the critical thinking skills of elementary school students through problem-based learning. *Ludi Litterarri*, *1*(1), 11–17.

Nuraeni, Y., Sandong, A. E., Witantri, L., Sakinah, R. A., & Mahpudloh, S. N. (2025). The role of teachers in improving the critical thinking skills of elementary school students through problem-based learning. *Education Scholars*, *11*(8).

Nurhayati, E. (2021). The O2A model in strengthening students' independent attitudes through project learning. *Journal of Pedagogy and Learning*, *8*(1). https://doi.org/10.30605/pedagogi.v8i1.4037

Nuridayah, F., Sugandi, A. I., & Kadarisma, G. (2023). Systematic literature review: Development of students' critical thinking skills through discovery learning. *Journal of Innovative Mathematics Learning*, *6*(5), 2075–2084.

Nurmaidah. (2024). Strategic planning of international schools in improving the quality of education. *Journal of Elementary, Secondary and Higher Education Management*, *5*(2), 232–237.

Prasetyo, A. B. (2021). The use of local resources as an environment-based science learning medium. *Journal of Science and Education*, *11*(2). https://doi.org/10.25037/jsp.v11i2.3672

Putra, D. (2022). The impact of project-based learning on the formation of learning accountability of elementary school students. *Indonesian Journal of Basic Education*, *4*(3).

Rakhmawati, T. (2021). An adaptive-exploratory approach in the implementation of project-based learning. *Journal of Educational Studies*, *13*(2).

Sidik, R. (2023). Project-based learning management at the elementary school level. *Journal of Educational Management*, *15*(1).