Jurnal Dimensi Pendidikan dan Pembelajaran, Vol. 14 No. 1 : January 2026 , pp. 51-63.
ISSN 2303-3800 (Online), ISSN 2527-7049 (Print)

Vol. 14 No. 1: January 2026

JDPP

Jurnal Dimensi Pendidikan dan Pembelajaran

ISSN 2303-3800 (Online), ISSN 2527-7049 (Print)

https://journal.umpo.ac.id/index.php/dimensi/index

The Effect of PjBL Learning Model with CTL Approach on the Fifth-Grade Students' Problem-Solving Ability

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Article Information

Article History:

Received October 2025

Accepted November 2025

Published January 2026

Keywords:

CTL; Learning; PjBL; Problem-solving: Fifth-Grade.

How to Cite:

Kurnia, I., Bintartik, L. (2026). The Effect of the PjBL Model with CTL Approach on the Problem-Solving Ability of Fifth-Grade Students. *Jurnal Dimensi Pendidikan dan Pembelajaran Universitas Muhammadiyah Ponorogo*, 14 (1), pp 51-63.

Abstract

Problem-solving abilities are essential for adapting to new situations, and students, as future leaders of civilization, need the competence to solve a range of problems. This aims to examine the effect of the PjBL learning model, combined with the CTL approach, on fifth-grade problem-solving abilities. This study employs a quantitative, quasi-experimental, nonequivalent control-group design. The subjects in this research were fifth-grade students at SD Negeri Kalipang 1, with a sample size of 21 students in the control class and 23 students in the experimental class. The experimental class received treatment with the PjBL learning model using the CTL Approach, while the control class received cooperative learning. The data in this study were collected using observation and tests. This research found that the execution of the CTL-based PjBL Model in the experimental class was 80.6% in the first cycle and 90.42% in the second cycle. From these results, it can be rationalized that the implementation of the PjBL learning model with the CTL approach was exemplary. Then, the results from pre- and post-tests were analyzed using an independent-samples t-test to determine the effect of the treatment. The results showed a 2-tailed sig. value of 0.001, so H1 was accepted. Thus, it can be concluded that implementing the CTL-based PjBL model significantly improves students' problem-solving abilities in fifth grade.

INTRODUCTION

The competencies needed nowadays go beyond mere memorization. According to the OECD (2019), by 2030, higher-order thinking skills, including problem solving, critical thinking, goal setting, and decision making, will be essential to have. One of these competencies is problem-solving ability. Problem-solving ability refers to how individuals can engage in identifying the causes of a problem and presenting solutions (Choudhar et al., 2022). According to Polya (2004), indicators of problem-solving abilities include understanding the situation, making a plan to solve the problem, executing the plan, and reviewing the result and the procedure. Teachers, as facilitators in learning, are responsible for developing these skills in students (Yuniawatika et al., 2025).

Quality education should provide students with opportunities to develop the skills needed for the future. This aligns with IPAS education in Indonesia's objectives to prepare the younger generation to respond to future challenges. IPAS education must be able to facilitate students in fostering curiosity about the phenomena around them. In IPAS learning, students are not only recipients of knowledge but also promoters of social change in solving real problems through reflection and collaboration. Such learning must ensure that the material taught is relevant to students' real lives. By connecting learning to cultural, social, and everyday challenges, in-depth learning motivates students to make critical, analytical, and synthetic decisions in solving complex problems (Permendikdasmen No. 13, 2025).

Problem-solving abilities are very crucial for students to master, but in Indonesia, these skills are still relatively low. In conformity with the 2022 PISA, Indonesia placed 69th out of 80 countries. There was a decline in Indonesia's science assessment score from 396 in 2018 to 383 in 2022 (OECD, 2023). The low level of problem-solving abilities among students was also found at SD Negeri Kalipang 1 in Blitar, according to Mrs. Nur Alfi Yulianti, S.Psi., S.Pd, a fifth-grade homeroom teacher at SD Negeri Kalipang 1. The problems faced by students at SD Negeri Kalipang 1 were identified through an analysis of the average scores on pre-research questions distributed to fifth-grade students. The questions focused on problem-solving related to the students' ecosystem. Students worked on 10 essay questions to assess their ability to analyze problems and design appropriate solutions. From the scores obtained, it was found that the general score for V-Agus Salim class was 58.04, while the average score for V-Muh Yamin class was 61.52.

IPAS learning plays a vital role in overcoming these problems through relevant learning designs. According to John Dewey's learning-by-doing theory, learning is a process in which knowledge is gained through the transformation of experience (Devi & Thendral, 2023). Students acquire knowledge because, in the learning process, they combine understanding and transform experiences. In the context of IPAS learning, the PjBL model also prioritizes a learning process that structures students' experiences, with students learning through the creation of real products. In these projects, students also combine the various knowledge they already have to prepare for the project. Thus, the entire activity becomes a process for them to develop their understanding. PjBL is the model that focuses on students' problem-solving ability; it has the potential to develop students' ability (Novitasari & Estuningsih, 2024).

In addition to learning models, approaches also play an essential role in developing problem-solving skills. The learning approach is the teacher's perspective on how to implement learning to achieve learning objectives. In developing problem-solving skills and student engagement during the learning stage, an approach that helps students recognize existing problems can be used. One such approach is Contextual Teaching and Learning (CTL). This

approach focuses on connecting learning materials with real-world situations, applying them in the learning process to make it easier for students to generate new ideas (Trimastuti & Chritinawati, 2021). In daily life, students are constantly faced with problems that require problem-solving skills (Pernanda et al., 2023). Through the CTL approach, students can more easily identify the problems given and turn what they have learned into meaningful understanding.

The IPAS learning design, implemented through the PjBL model with a CTL approach, can help students learn and improve their cognitive abilities. This is especially true if the material presented is in line with the model, for example, in the case of ecosystem material that discusses issues related to ecosystems. The suitability of the IPAS material taught within the learning environment or social system can maximize all the components that students need to achieve the expected competencies (Widodo et al., 2024). From those statements, it can be inferred that both the PjBL learning model and the CTL approach can improve students' problem-solving abilities. However, no specific research has measured the effect of integrating the PjBL learning model with the CTL approach on students' problem-solving skills in IPAS learning at the elementary school level. This study will examine whether there is a causal relationship between project-based learning models combined with a contextual teaching and learning approach and elementary school students' problem-solving abilities in science subjects. The results of this research can contribute to improving the quality of education and preparing students to compete in a sustainable society.

LITERATURE REVIEW

Project-Based Learning Model

The PjBL model is a learning model recommended for 21st-century learning. Various studies have examined and developed their own understanding of the PjBL model. According to Azzahra et al. (2023), PjBL is a learning model that uses real-world problems as a context for students to practice critical thinking and problem-solving skills, as well as to internalize essential aspects of the material being studied. In line with this statement, Aliriad et al. (2023) also found that the PjBL model offers students opportunities to learn through projects addressing real-world problems. From the above definitions, it can be concluded that the PjBL model is a learning model that collects and integrates new knowledge from real-world experiences and involves students in an activity (project) that produces a product.

According to The George Lucas Educational Foundation (2005) and Octaviani & Mujimin (2025), the PjBL model comprises six steps: fundamental questions, designing project plans, compiling activity schedules, monitoring project progress, product assessment, and evaluation. The benefits of implementing the PjBL model, according to Evenddy & Gailea (2023) include (1) maximum student engagement, through project-based activities, students can develop the ability to direct their learning process independently, (2) student collaboration, PjBL opens up opportunities for students to appreciate the value of different perspectives and learn from their peers, (3) authentic problem solving, PjBL can fill the gap between theory and practice through authentic problem solving.

Contextual Teaching and Learning Approach

One approach to 21st-century learning is the CTL approach. According to Banu et al. (2022), CTL learning is a concept that focuses on the relationship between the topics being studied and real-world situations, enabling students to apply their knowledge and skills in everyday life.

Furthermore, Jubhari et al. (2022) reveal that the CTL approach is a learning concept that requires educators to connect the material being taught to students' real experiences, through several components that work together to build understanding. From the above definitions, it can be concluded that the CTL approach emphasizes the process of student involvement as a whole to understand the material being studied and relate it to real-life situations for application in their lives.

In applying the CTL approach in the classroom, CTL components should be used. According to Johnson (2002), these components include: (1) constructivism, where students construct their own new knowledge based on their learning experiences, (2) inquiry, where students seek and discover knowledge through systematic thinking activities, (3) questioning, where students confirm and explore further what they do not yet know, (4) learning communities, learning outcomes through cooperation, (5) modeling, demonstrating something that students can emulate, (6) reflection, rethinking what has been learned. According to Hasudungan (2022), the advantages of the CTL approach include encouraging students to connect the material to real-world situations and then apply what they have learned to real-world behaviors and problem-solving.

Implementation of the PjBL Model with the CTL Approach

Effective learning cannot rely solely on learning steps. According to Abuhassna et al. (2024), learning models explain the structure of instruction, but the output greatly depends on the approach, strategy, and learning context. Therefore, this study combines the PjBL model with a relevant context-based perspective to maximize the output. The implementation of the CTL-based PjBL model will be realized through the emergence of the model's syntax and components, as well as its approach to learning, and by linking the material being studied with the real context in students' immediate environment. By adapting the syntax of the PjBL model and the components of the CTL approach, appropriate learning steps were designed.

The first step in this learning process is to ask fundamental questions. Fundamental questions will serve as the starting point for learning and as the main problems to be solved through the project (Herowati, 2023). Next, students can discuss the topic with teachers and peers to explore aspects they are unfamiliar with. Then, they continue by designing product planning through modeling. Before students plan their projects, the teacher will give a demonstration of project design (Kurniasih, 2020). The third step is to arrange a schedule of activities with group members, during which students discuss the project's timeline and requirements under the teacher's guidance. The fourth step is to monitor the project's progress. At this stage, students and their groups begin looking for the right solutions to the given questions. In this stage, students can build knowledge through teacher-guided discussion and project creation (constructivist learning). At the end of the project, each student will discover (inquire) new knowledge that they did not have before. During project preparation, the teacher will collect information about what the students have been able to do. This assessment focuses on students' skills and attitudes during the project (Narindro et al., 2021).

The next step in learning is product assessment. At this stage, the product results are evaluated to reflect students' progress in understanding. Students will also receive teacher feedback to improve their products. Learning ends with evaluation and reflection. Students will determine the activities that have been carried out, review the basic questions, and reflect on what they have done and whether the questions have been answered in this learning process. With the

teacher's guidance, students will provide answers to these questions. Not only that, but students will also express their feelings after completing the project.

Problem-Solving Ability

Problem-solving skills are essential for adapting to new situations and supporting the achievement of goals in modern society. Problem-solving skills are an individual's ability to engage cognitive abilities to understand and solve problems where the solution is not always clear (Rahman, 2019). This definition aligns with Wahyuti et al. (2023), who argue that problem-solving skills are efforts made by a person to solve a problem by utilizing their knowledge and skills, and that these efforts follow problem-solving steps that include gathering facts, analyzing information, developing alternative solutions, and selecting the most effective solution. Meanwhile, according to Purnama et al. (2021), problem-solving skills in the context of learning refer to how students use their knowledge and skills to solve problems or issues presented by teachers. Based on the above definitions, problem-solving skills refer to an individual's ability to use their thinking process to solve problems by gathering facts, analyzing information, developing alternative solutions, and choosing the most effective solution.

According to Polya (2004), there are four indicators of problem-solving skills: (1) Understanding the problem, students can identify known elements, or those that are being questioned. (2) Planning problem solving, namely, how students express their opinions about various possible strategies. At this stage, it will be determined whether the problem-solving strategies created are appropriate. (3) Solving problems according to plan, a good problem solution is one where there is a solution, a correct discovery process, and an appropriate result. (4) Reviewing the procedures and results of the solution. This skill is essential because experiments are often conducted without critical reflection, so students do not understand specifically what they still do not understand. The success of this indicator will be seen from whether the conclusions given are correct

METHODS

This study aims to describe the implementation of the PjBL model with the CTL approach. This objective will be achieved through observation techniques, focusing on teachers' and students' activities during the learning process and using an observation sheet to measure learning implementation as an instrument. Furthermore, this study also aims to examine the effect of implementing the PjBL model with the CTL approach on problem-solving skills. In this study, an experimental method is used to control and manipulate an x variable and test the y variable to examine the differences associated with manipulating the independent variable (Kesyha et al., 2025). The research design used is a quasi-experimental design with a control group to determine the effect of the treatment. The control and experimental groups are not randomly assigned. Furthermore, pre-tests and post-tests are used to assess the impact. More details on this research design are provided in the following table.

Table 1. Research Design

Group	*Pretest*	Treatment	*Postest*
Experiment	O_1	X_1	O_2
Control	O_1	X_2	O_2

This study used two groups: the experimental and the control. The experimental group learn the ecosystem material through PjBL with CTL, while the control group uses the Cooperative model. The data sources included fifth-grade students from Agus Salim and Muh Yamin SDN Kalipang 1, Blitar Regency, with 21 students in the control group and 23 students in the experimental group. The data in this study were collected using an observation sheet and a problem-solving skills test. The data collection instrument consisted of six essay questions. Before implementation, the instrument was tested for validity and reliability by experts and through pilot trials. The validity test used the Pearson product-moment correlation, and the reliability test used Cronbach's alpha. The data analysis technique used SPSS version 27 software and several tests, including prerequisite tests for normality and homogeneity, which were applied as requirements for conducting parametric tests. The hypothesis test used an independent-samples t-test, assuming normality and homogeneity of variances.

RESULTS AND DISCUSSION

Implementation of the PjBL Learning Model with a CTL Approach on the Problem-Solving Abilities of Fifth Grade

Data on the implementation of the PjBL model with the CTL approach were collected through observation. In this study, observations were conducted to ensure that the learning model and approach were correctly implemented. The following are the results of observation in two meetings. The implementation of the CTL-based PjBL learning model in the first meeting was 80.6%, and in the second meeting was 90.42%. Thus, it can be said that the PjBL model with the CTL approach was implemented quite well. For more details, here are the implementation details for each syntax.

Table 2. Learning Implementation Result

Syntax	Percentage (%)		
	Maximum Score	Meet 1	Meet 2
Driving Questions	16,66	10,41	16,66
Designing Product Planning Through Modelling	16,66	16,06	15,47
Developing Schedules With a Group	16,66	12,49	14,57
Monitoring the Project	16,66	16,66	16,66
Product Assessment	16,66	12,49	14,57
Evaluation and Reflection	16,66	12,49	12,49
Total	100	80,6	90,42

An ecosystem is the reciprocal relationship between living organisms, including plants and animals, and their environment. In this research, students learn about the flow of energy between living organisms in rice fields and marine ecosystems, changes in food webs, and the role of humans in maintaining ecosystem balance. For example, if a flood occurs in a rice field, killing all the rice plants, the populations of herbivorous animals such as grasshoppers and birds will decline due to the loss of their energy source (Ali, 2024). Therefore, humans must play their part in protecting the earth to restore the ecosystem, for example, by replanting rice so that the population of primary consumers returns to its original state.

Ecosystem learning using the CTL-based PjBL Model was carried out in two meetings. Based on the observation results, the implementation rate was 80.6%. The smallest percentage

was in the fundamental question syntax (10.41%), and the largest was in the project monitoring syntax (16.66%). This was because, in the fundamental question syntax, students remained passive in discussions, and teachers needed to guide them in answering questions. Some questions also used terms that students found difficult to understand. In the syntax for arranging activity schedules with groups, students also had difficulty dividing tasks among group members. However, overall, students were able to create food webs, analyze ecosystem problems and their impact on food webs, and formulate the role of humans in restoring ecosystem balance.

The implementation of learning in the second meeting was 90.42%. The smallest percentage was in the evaluation and reflection syntax (12.49%), and the most significant was in the project monitoring syntax and fundamental questions (16.66%). In the basic questions section, students actively participated in discussions and expressed their opinions and experiences related to the ecosystem issues presented. In the context of product planning through modeling, students were also enthusiastic about stepping forward to analyze changes in marine ecosystem food webs. According to Sailirrohmah & Azani (2025), through modeling, teachers can demonstrate the appropriate steps for solving problems and implementing concepts in authentic contexts, allowing students to observe and understand them.

Based on Table 2, it can be observed that there was a 9.82% increase in learning implementation in the first and second meetings. This was because in the second meeting, students already had an overview of the learning and understood what needed to be done in the learning process. Students were also more enthusiastic about discussing and analyzing changes in the food web in the ecosystem. In the second meeting, each group presented their food web boards effectively, explaining how they analyzed the food webs. Through more active discussions and increased understanding, students were able to provide relevant solutions to the problems they created (Nasrulloh et al., 2024).

The Effect of Implementing the PjBL Learning Model with a CTL Approach on the Problem-Solving Abilities of Fifth-Grade

Data on students' problem-solving abilities in this study were obtained through pre-tests and post-tests. Students were first given a pre-test to assess their initial skills. Then, students received treatment through a PjBL model with a CTL approach in the experimental class and a cooperative model in the control class. After obtaining the pre-test and post-test scores, they were first analyzed using normality and homogeneity tests as prerequisites for parametric testing. The following table contains the results of the normality test.

Table 3. Normality Test Result

Statistic Test	Group	*Sig.*	Desicion
Saphiro Wilk	Control Group Pre-test	0,439	Normal
	Experiment Group Pre-test	0,229	Normal
	Control Group Post-test	0,498	Normal
	Experiment Group Post-test	0,208	Normal

Based on the pre-test and post-test scores for each class, the overall significance value was greater than 0.05, indicating that the data on students' problem-solving ability were usually distributed.

Table 4. Homogeneity Test Result

Statistic Test	Sig.	Desicion
Levene (Based On Mean)	0,979	Homogen

Table 4 shows that the sig. The value is 0.979, which is greater than 0.05, indicating that the students' post-test data is homogeneously distributed. Based on this decision, where the data are declared regular and homogeneous, we can proceed with hypothesis testing using an independent-samples t-test.

Table 5. Hypothesis Test Result

Statistic Test	Sig. (2-tailed)
Independent Sample T-Test	0,001

Deprived of the Hypothesis Test table, it can be inferred that the significance. (2-tailed) value is 0.001, which is less than 0.05, so H1 is accepted. Based on this decision, it can be concluded that implementing the PjBL model with the CTL approach in learning affects the fifth-grade students' problem-solving abilities. Then, a comparison of problem-solving skills will be conducted to determine the improvement in each indicator.

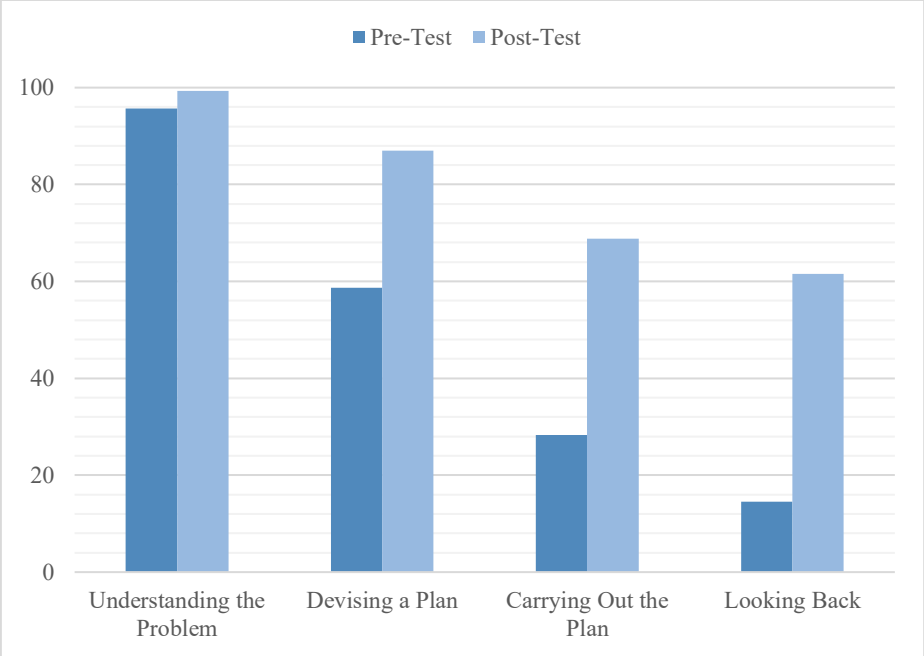

Figure 1. Comparison of Problem-Solving Abilities on the Pretest and Posttest

As shown in Figure 1, each indicator has increased. The highest increase was observed in indicators of carrying out the plan and in looking back at the results and procedures of problem-solving. The effect of implementing the PjBL model with the CTL approach on fifth-grade students' problem-solving abilities was measured through hypothesis testing. Based on hypothesis testing using the Independent Sample T-Test, the sig. value (2-tailed) was 0.001, which is less than 0.05, so H1 was accepted. Therefore, it can be concluded that implementing the PjBL model with a CTL approach in learning improves fifth-grade students' problem-solving abilities. This

finding emerged because learning using the PjBL model, which is related to everyday life, can improve students' problem-solving skills. In the opinion of Aliyah & Muthi (2025), project-based learning provides students with opportunities to explore the material they are learning through projects. The CTL-based PjBL learning model in this study was implemented in the experimental class, while the control class used the cooperative model. During the activity, an observer in the experimental class monitored teachers' and students' activities during learning. It was assumed that learning with the CTL-based PjBL model would have a greater effect on problem-solving skills than other models.

Problem-solving abilities in the education context refer to students' knowledge and ability to solve problems or issues presented by teachers. According to Polya, there are four indicators of problem-solving skills: understanding the situation, making a plan to solve the problem, executing the plan, and reviewing the result (Polya, 2004). This study reveals students' problem-solving abilities before and after treatment. In the first indicator, namely understanding the problem, there was no significant improvement. In the pre-test, students already understood the issues presented in the questions, with an average of 95.65%. After the treatment, their ability to understand the problem increased to 99.28%. These results show that students understood the issues but did not master the next steps in problem-solving.

On the ‘devising a plan’ indicator, the average student ability on the pre-test was 58.69%. Meanwhile, on the post-test, the average was 86.95%. Then, on the carrying out the plan indicator, the average student ability was 28.26%. After the treatment, the average increased to 68.89%. From this data, it can be observed that CTL-based PjBL learning improves students' ability to devise a plan by 28.26% and to carry out the plan by 40.63%. This finding aligns with John Dewey's theory of learning by doing. In the learning process, there is a gap between the theory being studied and real-world practice. Therefore, students must practice what they have learned to gain meaningful knowledge (Mouni, 2022). Learning by doing in this context means learning to analyze changes in the ecosystem by observing problems so that students can provide solutions to real problems around them. The PjBL learning model encourages students to apply problem-solving skills, especially during the stages of searching for solutions, planning problem-solving steps, and implementing those plans.

In John Dewey's learning-by-doing process, this is evident in the syntax of monitoring the project's progress. At this stage, teachers focus on monitoring students' activities as they complete the project (Widyaningrum, 2023). Students plan the steps to complete the project on time. They divide the tasks so that some students work on the worksheets and others make food web charts. This activity shows that students can plan steps to work on projects efficiently. After creating and using the food web board, students analyze its impact on changes in the food web and provide appropriate solutions. These steps show that students can engage in problem-solving in learning.

The final indicator of problem-solving ability is the review of results and procedures. Before the treatment, students' average ability to review results and procedures was only 14.49%; after the treatment, it increased to 61.59%. This ability increased mainly because of an evaluation and reflection syntax, which helped students develop their reflective thinking. This was evident when students were trained to evaluate basic questions or hypotheses from their previous projects and to draw conclusions from them (Latifah & Juniarso, 2025). At this stage, students in the experimental class were able to show how environmental problems affected food webs and to demonstrate appropriate solutions to these problems, in line with their inquiry in the projects.

The steps in PjBL learning with the CTL approach are also dominated by students discussing with each other while working on projects such as creating food webs, analyzing problems, and drawing conclusions. Student interaction with peers and with teachers, or what is called the learning community, becomes a means of exchanging and acquiring new information (Ali et al., 2024). This process aligns with Vygotsky's constructivist theory, which holds that learning and development are collaborative activities and that students develop cognitively in the context of socialization and education (Siregar et al., 2024).

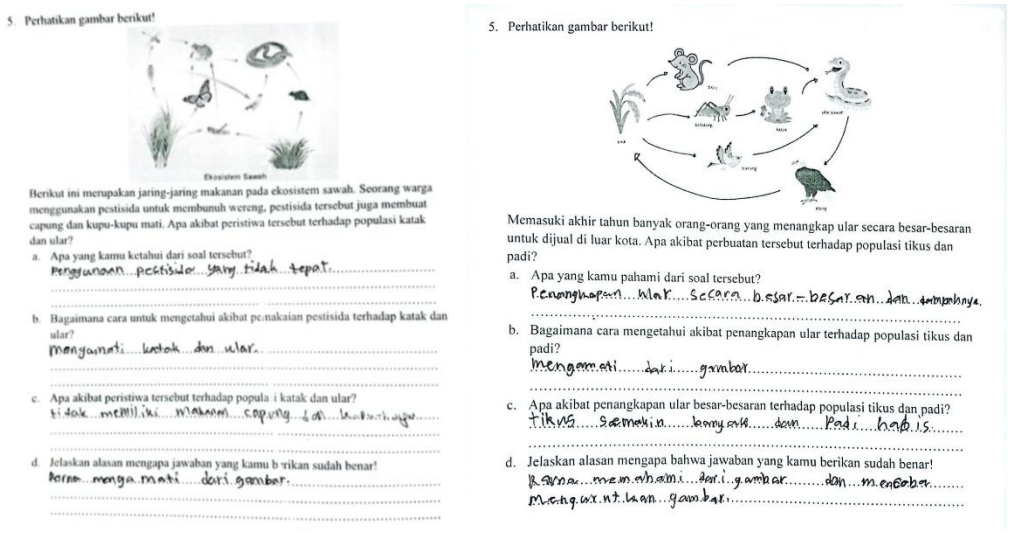

Figure 2. Comparison of Student Pre-test and Post-test Answers

Figures 5.1 and 5.2 show the answers of the same students before and after the treatment. Assumed from Figure 5.1, it can be observed that before the treatment, the students already understood the problem and planned its solution. However, the students still did not master the concept of population in an ecosystem, indicating that their problem-solving stage was suboptimal. Then, in Figure 5.2, after receiving two PjBL learning sessions with CTL, students used their problem-solving skills to analyze changes in food webs. According to Rohmawati & Fadly (2023), the entire process of creating problem-solving solutions involves information, and to obtain the solution, valid data in the form of concepts or principles in science is needed. In the post-test, students demonstrated understanding of the principle of energy flow in food webs.

This study is supported by the findings of Roosyanti & Suryarini (2024), which indicate that the problem-solving abilities of primary school students improved following the implementation of the PjBL model. The findings of this study are consistent with research by Aini & Rosyidi (2023), which shows that the indicator most mastered by the subjects was understanding the problem, while the indicator least mastered was rechecking. Even so, the treatment given can improve students' ability to plan, solve, and recheck a problem. This study shows that project-based learning grounded in real-world contexts influences problem-solving skills because, through this learning, individuals not only acquire knowledge but also develop mental tools, such as critical and reflective thinking. Those abilities are needed to take practical problem-solving steps in real life.

CONCLUSION

The application of the PjBL learning model with the CTL approach in the first meeting was 80.6%, and in the second meeting it was 90.42%. Thus, it can be said that the CTL-based PjBL model was implemented well in the classroom. The implementation of the CTL-based PjBL model was found to affect problem-solving, as evidenced by an independent-samples t-test with a 2-tailed p-value of 0.001 (< 0.05), supporting H1. Therefore, it was decided that implementing the PjBL learning model with the CTL approach improved fifth-grade students' problem-solving abilities. This improvement in ability was mainly evident in indicators of implementing problem-solving and rechecking the procedures and results of the problem-solving process. Through this learning process, students learned firsthand how to use their knowledge and skills to answer basic questions using the projects they created.

REFERENCES

Abuhassna, H., Adnan, M. A. B. M., & Awae, F. (2024). Exploring the synergy between instructional design models and learning theories: A systematic literature review. In Contemporary Educational Technology (Vol. 16, Issue 2). Bastas. https://doi.org/10.30935/cedtech/14289

Ali, A., Bektiarso, S., Walukow, A. F., & Narulita, E. (2024). Building Inclusive Learning Communities in Multicultural Classrooms: The Role of the CTL Model in Learning Interpersonal Skills. Tafkir: Interdisciplinary Journal of Islamic Education, 5(4), 568–583. https://doi.org/10.31538/tijie.v5i4.1172

Aliriad, H., Soegiyanto, S., Setijono, H., & Sulaiman, S. (2023). Effect of the Project-based Learning Model, Age, and Motor Educability on Fundamental Motor Skills in Early Children. https://doi.org/10.58209/hehp.11.1.125

Azzahra, U., Arsih, F., & Alberida, H. (2023). Pengaruh model pembelajaran project-based learning (pjbl) terhadap keterampilan berpikir kreatif peserta didik pada pembelajaran biologi: literature review. In BIOCHEPHY: Journal of Science Education (Vol. 03, Issue 1). http://journal.moripublishing.com/index.php/biochephy

Berlian Widodo, R., Lesmana Alim, M., Ananda, R., & Fitra Surya, Y. (2024). Penerapan Metode Inquiry untuk Meningkatkan Keterampilan Proses Sains dalam Pembelajaran IPA di UPT SDN 010 Siabu. Jurnal Dimensi Pendidikan Dan Pembelajaran, 12. http://journal.umpo.ac.id/index.php/dimensi/index

Choudhar, S., Bi, N., Singh, P. N., & Talwar, P. (2022). Study on Problem Solving Skills and Its Importance. World Journal of English Language, 12(3), 47–54. https://doi.org/10.5430/wjel.v12n3p47

Elisma Banu, M., Tinenti, Y. R., & Tukan, M. B. (2022). Pengaruh Respon Siswa Tentang Penerapan Pendekatan Contextual Teaching And Learning Yang Mengintegrasikan Media Video Pembelajaran Sub Materi Sifat Koloid Terhadap Hasil Belajar Siswa. Educativo: Jurnal Pendidikan, 1(2), 423–429. https://doi.org/10.56248/educativo.v1i1.43

Hasudungan, A. N. (2022). Pembelajaran Contextual Teaching Learning (CTL) Pada Masa Pandemi COVID-19: Sebuah Tinjauan. 3(2).

Herowati. (2023). Analisis penerapan model pembelajaran project based learning (pjbl) materi perubahan fisika dan kimiaterhadap keaktifan belajar peserta didik. Journal of Innovation Research and Knowledge, 2(12).

Johnson, E. B. (2002). Contextual teaching and learning: What it is and why it's here to stay. Corwin Press.

Jubhari, Y., Sasabone, L., & Nurliah, N. (2022). The Effectiveness of Contextual Teaching and Learning Approach in Enhancing Indonesian EFL Secondary Learners' Narrative Writing Skill Article History Keywords CTL EFL Narrative text Contextual teaching Quasi-experimental. Journal of Research and Innovation in Language, ISSN 4(1), 54–66. https://doi.org/10.31849/reila.8633

Kavitha Devi, M. K., & Thendral, M. S. (2023). Using Kolb's Experiential Learning Theory to Improve Student Learning in Theory Course. Journal of Engineering Education Transformations, 37(1), 70–81. https://doi.org/10.16920/jeet/2023/v37i1/23133

Kesyha, F., Saputri, C., & Astuti, T. (2025). The Effect of Value Clarification Technique (VCT) Model Assisted by Canva Media on Motivation and Learning Outcomes of Pancasila Education. Jurnal Dimensi Pendidikan Dan Pembelajaran. https://journal.umpo.ac.id/index.php/dimensi/index

Kurniasih Negeri, D. S. (2020). Implementasi Model Pembelajaran Contextual Teaching And Learning (CTL) Dalam Pelajaran IPA Di Sekolah Dasar. Workshop Inovasi Pembelajaran Di Sekolah Dasar SHEs: Conference Series, 3(4). https://jurnal.uns.ac.id/shes

Latifah, N., & Juniarso, T. (2025). Pengaruh Model Project Based Learning Berbasis Alamterbuka (Membuat Ecoprint Pounding) Terhadap Kemampuan Berpikir Reflektif Siswa. Pendas : Jurnal Ilmiah Pendidikan Dasar.

Mouni, R. B. (2022). Implementing Project-Based Language Learning and Teaching in Classrooms: EFL Teachers' Perspectives. KMC Journal, 4(2), 89–102. https://doi.org/10.3126/kmcj.v4i2.47741

Narindro, L., Sediyono, A., & Qamar, A. S. (2021). Evaluasi Kelayakan Model Sistem Informasi Penilaian Autentik Berbasis Aplikasi Web. Explore:Jurnal Sistem Informasi Dan Telematika, 12(2), 101. https://doi.org/10.36448/jsit.v12i2.2065

Nasrulloh, M. E., Muhammad, N., & Amal, I. (2024). Meningkatkan keterlibatan siswa dalam pembelajaran melalui pembelajaran proyek. Jurnal Tinta, 6(2), 91–99.

Novitasari, L., & Estuningsih, K. (2024). Penerapan Model Project Based Learning Untuk Peningkatan Keterampilan Berpikir Kritis Pada Pembelajaran Pendidikan Pancasila di Kelas XI 9 SMA Negeri 21 Surabaya. Jurnal Dimensi Pendidikan Dan Pembelajaran. https://journal.umpo.ac.id/index.php/dimensi/index

Nur Aliyah, & Ibnu Muthi. (2025). Peran Pembelajaran Berbasis Proyek pada Materi Sistem Pernapasan dalam Memantik Kreativitas Siswa Sekolah Dasar. Edukasi Elita : Jurnal Inovasi Pendidikan, 2(4), 35–45. https://doi.org/10.62383/edukasi.v2i4.2181

Nurul Aini, N., & Haris Rosyidi, A. (2023). Kemampuan Pemecahan Masalah Siswa Berdasarkan Teori Polya Pada Pembelajaran Problem Based Learning Materi Statistika. Jurnal MATH-UMB.EDU, 11(1).

Octaviani, L., & Mujimin, M. (2025). Syntactic Analysis of the Project-Based Learning Model in the Waskitha Basa lan Sastra Jawa Textbook for Grade X Senior and Islamic High Schools. Jurnal Pendidikan Asatiza: Jurnal Pendidikan, 6(1). https://doi.org/10.46963/asatiz

OECD. (2019). SKILLS FOR 2030 Conceptual learning framework. www.oecd.org/education/2030-project

OECD. (2023). PISA 2022 Assessment and Analytical Framework. OECD Publishing. https://doi.org/10.1787/dfe0bf9c-en

Permendikdasmen No 13 Tahun 2025 Tentang Perubahan Atas Permendikbudristek No 12 Tahun 2024 Ttg Kurikulum Pada Pendidikan Anak Usia Dini Jenjang Dikdasmen, Kementerian Pendidikan Dasar dan Menengah (2025).

Pernanda, R., Darma, Y., & Irvandi, W. (2023). Pengembangan LKPD Berbasis Problem Solving Bermuatan Ethnomatematika Terhadap Kemampuan Pemecahan Masalah Siswa. Jurnal Dimensi Pendidikan Dan Pembelajaran, 11. http://journal.umpo.ac.id/index.php/dimensi/index

Polya, G. (2004). How to Solve It: A New Aspect of Mathematical Method. Princeton University Press.

Purnama, J., Berthalita Pujaningsih, F., & Riantoni, C. (2021). Studi Literatur Model Problem-Based Learning Terhadap Kemampuan Pemecahan Masalah Siswa Literature Study of Problem-Based Learning Models on Students' Problem-Solving Ability (Vol. 5, Issue 2).

Rahman, M. M. (2019). 21st Century Skill "Problem Solving": Defining the Concept. Asian Journal of Interdisciplinary Research, 64–74. https://doi.org/10.34256/ajir1917

Rohmawati, A. A., & Fadly, W. (2023). Analisis Kemampuan Membuat Solusi Melalui Kegiatan Eksperimen. Jurnal Tadris IPA Indonesia. http://ejournal.iainponorogo.ac.id/index.php/jtii

Roosyanti, A., & Suryarini, D. Y. (2024). Science problem-solving in elementary schools through the application of project-based learning. Journal of Research in Instructional, 4(1), 27–38. https://doi.org/10.30862/jri.v4i1.278

Sadji Evenddy, S., & Gailea, N. (2023). Exploring the Benefits and Challenges of Project-Based Learning in Higher Education. PPSDP International Journal of Education, 2(2), 458–469.

Sailirrohmah, H., & Azani, M. Z. (2025). Implementation of Contextual Learning Model of Islamic Religious Education at SMP Negeri 2 Wuryantoro. Jayapangus Press Cetta: Jurnal Ilmu Pendidikan, 8(1). https://jayapanguspress.penerbit.org/index.php/cetta371

Siregar, T. E., Luali, N., Vinalistyosari, R. C., Hanurawan, F., & Anggraini, A. E. (2024). Implementation of Vygotsky's Constructivist Learning Theory through Project-Based Learning (PjBL) in Elementary Science Education. Al Qalam: Jurnal Ilmiah Keagamaan Dan Kemasyarakatan, 18(4), 2586. https://doi.org/10.35931/aq.v18i4.3620

Trimastuti, W., & Chritinawati, S. (2021). Students' Perception Of The Use Of Contextual Teaching And Learning To Improve Speaking Skills. Jurnal Dimensi Pendidikan Dan Pembelajaran. http://journal.umpo.ac.id/index.php/dimensi/index

Wahyuti, E., Purwadi, & Kusumaningtyas, N. (2023). Analisis Kemampuan Pemecahan Masalah Melalui Pembelajaran Literasi Baca Tulis Dan Numerasi Pada Anak Usia Dini. Jurnal Pendidikan, Bahasa, Sastra, Seni, Dan Budaya.

Widyaningrum, S. (2023). Pengaruh Model Project Based Learning Terhadap Keaktifan Siswa Kelas VI SD Pada Materi Magnet. In Jurnal Riset Ilmiah (Vol. 2, Issue 2).

Yuniawatika, Bintartik, L., Surayanah, Manggala, I., & Wati, I. (2025). Peningkatan Kompetensi Guru Abad 21 Melalui Pelatihan dan Pendampingan Penyusunan Perangkat Pembelajaran Berdiferensiasi. Jurnal Abdimas Bina Bangsa, 6(2).