

THE EFFECT OF THE *PROBLEM BASED LEARNING* MODEL WITH THE *INQUIRY METHOD* ON THE MATHEMATICAL PROBLEM SOLVING ABILITY OF GRADE V STUDENTS

Amelia Hardiwa¹, Supriadi², Erwin Nurdiansyah³.

(PGSD, Fakultas Keguruan, Ilmu Pendidikan dan Sastra, Universitas Islam Makassar, Indonesia)¹

Email address: ameliahardiwa09@icloud.com

(PGSD, Fakultas Keguruan, Ilmu Pendidikan dan Sastra, Universitas Islam Makassar, Indonesia)²

Email address: supriadi.dty@uim-makassar.ac.id

(PGSD, Fakultas Keguruan, Ilmu Pendidikan dan Sastra, Universitas Islam Makassar, Indonesia)³

Email address: erwinnurdiansyah.dty@uim-makassar.ac.id

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ABSTRACT

This study conducted on May 19, 2025, aims to determine the effect of using the Problem-Based Learning model with the Inquiry method on students mathematical problem-solving abilities. Lack of interest, difficulty understanding the material and students unwillingness to ask questions caused 29.16% of students to have daily mathematics test scores below the minimum passing grade. This study used a quantitative approach with a pre-experimental method (one group pre-test and post-test design), purposive sampling technique, and instruments in the form of observation sheets, tests, and documentation. The results showed that the application of the Problem-Based Learning Model with the Inquiry Method succeeded in creating an active, collaborative, and student-centered learning atmosphere, thereby motivating students to engage in real-world problem solving. The test results showed a significant increase in the average post-test score of students to 88.83 compared to the pre-test score of 69.33. These results prove that the collaboration of these two approaches is very effective in optimizing students conceptual understanding and critical thinking skills at the elementary education level.

1. INTRODUCTION

Education plays a crucial role in the development of the Indonesian nation. It is also a crucial tool for improving the quality of human resources (HR) and ensuring the progress of a nation and state (Selvi, 2016). Through education, individuals can develop their potential, master skills needed in the workplace, and contribute to national development. A nation will progress and develop if education, as a key development priority, is prioritized (Mulyadi dkk., 2021).

As a country with a large population, Indonesia realizes that quality education is the foundation for achieving social, economic and cultural progress. In accordance with Law number 20 of 2003 concerning the National Education System, that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual religious strength, self-control, personality, intelligence, noble morals, and skills needed by themselves, society, nation and state.

According to (Azis, 2021) regarding "The Effect of Problem-Based Learning Models on Elementary School Students' Mathematical Problem-Solving Abilities," the results of his research found that the Problem-Based Learning (PBL) model had a positive effect on students' mathematical problem-solving abilities. This shows that a problem-based learning approach can improve students' skills in solving mathematical problems. In addition, research conducted by (Nasriadi & Mulyadi, 2022) regarding "The Application of the Inquiry Learning Model in Improving Students' Mathematical Problem-Solving Abilities in Grade V of Buajangka Public Elementary School" also found that the application of the Inquiry Learning model can improve students' mathematical problem-solving abilities. This shows that learning methods that actively involve students in the learning process can produce good results.

The results of initial observations conducted on February 12, 2025 at SD Inpres Tamalanrea 6 Makassar City showed that there were several students who still had difficulty understanding the material taught in the learning process, which was indicated by the low results of the fifth grade students' daily Mathematics tests. This was evident from the average value of the daily tests which were still below the KKTP (Learning Objective Completion Criteria) determined by the school, namely with a classical completion of 75. From the results of the daily Mathematics tests conducted by the teacher, it was seen that out of 24 students, only 17 students or 70.84% had their daily test scores reach the KKTP, while 7 students or 29.16% had not reached the KKTP. One of the causes of this low Mathematics learning outcome is the low interest of students in Mathematics lessons, which hinders students' willingness to learn, understand the material taught, and solve problems in the subject (Anrayani & Badruddin Kaddas, 2021).

The results of observations and more in-depth interviews at SD Inpres Tamalanrea 6 revealed various challenges faced by students in learning Mathematics. Students such as Student A expressed difficulty in understanding the material and felt that this lesson was often boring. Student B preferred more practical learning methods, such as using teaching aids or playing, while Student C felt uncomfortable asking questions when he did not understand the teacher's explanation, which indicated barriers in communication and interaction in the classroom. Interviews with Mathematics teachers and class teachers showed that they were aware of many students experiencing difficulties in understanding Mathematics material, despite having tried various teaching methods, but student interest remained low, and they agreed that the way the material was delivered needed to increase student engagement (Agista dkk., 2023).

To address this issue, alternative solutions include implementing active learning methods, such as project-based learning or educational games, that can increase student engagement. When students are actively engaged in learning, they feel more motivated and interested in the material being studied. Student participation and engagement enable them to have hands-on experiences, feel more engaged, and see the relevance of the material in their own lives (Agista dkk., 2023). Furthermore, the increased use of teaching aids and technology in learning to make the material more engaging is supported by research (Anrayani & Badruddin Kaddas, 2021), which shows that audiovisual media is an intermediary or teaching aid used by teachers in teaching and learning activities, where the material is used through sight (images/videos) and hearing (sound). Therefore, this research is crucial to improve the quality of learning.

One approach that can be used to develop mathematical problem-solving skills is the Problem-Based Learning (PBL) model with the Inquiry method. The Inquiry method is a student-centered learning method, where students engage in issues and seek answers through clear and structured procedures. This method is also known as the discovery method, which provides opportunities for students to find information both with and without teacher assistance (Agista dkk., 2023).

Meanwhile, the Problem-Based Learning model is a learning model that requires students to learn independently, individually or in groups, to solve problems presented by the teacher. The teacher's role is to present problems and ask questions that guide students to solve a problem in learning activities (Hj. Andi Ebedkk., 2021).

This study aims to determine the extent to which the Problem Based Learning model with the Inquiry method influences the Mathematics problem-solving abilities of fifth-grade students at SD Inpres Tamalanrea 6, Makassar City. It is hoped that the results of this study can provide a positive contribution for teachers to use more effective learning methods for students' Mathematics problem-solving abilities in elementary schools (SD).

Based on the problems found, the researcher wants to conduct a study with the title "The Effect of Problem Based Learning Model with Inquiry Method on the Mathematical Problem Solving Ability of Fifth Grade Students of Tamalanrea 6 Elementary School, Makassar City".

2. METHOD

This research was conducted from May, 19 2025 to June, 13 2025. Method uses a quantitative approach with a pre-experimental design (one-group pretest-posttest design) which aims to test the effect of the Inquiry method and the Problem Based Learning model on the mathematical problem-solving abilities of fifth-grade students of SD Inpres Tamalanrea 6 Makassar. The study was conducted for one month, using a purposive sampling technique to determine the relevant sample. Data were collected through observation, tests (pretest and posttest), and documentation. The instruments used included observation sheets of teacher and student activities, as well as essay questions for the pretest and posttest. Data analysis was carried out using descriptive and inferential statistics, including normality tests, homogeneity tests, and t-tests (paired sample t-tests) using SPSS 26 to determine the significance of differences in results before and after treatment was given.

Pretest was conducted before treatment using the Problem-Based Learning and Inquiry learning models. Posttest was conducted after treatment. After that, the questions were evaluated based on a mathematics problem-solving ability assessment rubric with scores of 1 (wrong answer), 2 (almost correct answer) and 3 (completely correct answer). The results of both the pretest and posttest were analyzed using descriptive and inferential statistics, including a t-test to compare the average pretest and posttest scores. The implementation of these two models and methods is carried out through the following stages:

In stage one, the teacher orients students to the problem. The teacher presents a contextual problem relevant to the material, such as a word problem about adding and subtracting fractions. The teacher explains the purpose, benefits, and steps of the activity to motivate students. In stage two, the teacher organizes students for learning. Students are divided into small groups. Each group is given a problem-based task to complete together. In stage three, the teacher guides individual and group investigations. The teacher guides students in understanding the problem, designing strategies, and solving it. The teacher also provides assistance to students who are having difficulty. In stage four, the teacher develops and presents the results of their work. Each group is given the opportunity to present their work to the class. In stage five, the teacher and students jointly analyze the results of their group work. Students are asked to reflect on their thinking processes, strategies used, and challenges faced. The results of observations of teacher and student activities are only presented for three meetings, namely:

In the first session, the teacher began the lesson with a prayer and connected the previous material with the new material. The teacher also explained the importance of the topic and motivated the students but did not check student attendance or readiness. During the core activity, the teacher presented a word problem, explained the objectives, and guided students in groups to solve the problem. Students focused on the problem and participated in group discussions, but some were still less enthusiastic and passive. The teacher also facilitated group presentations and reflections. At the end, the teacher gave praise and invited students to summarize the material but did not ask a student to lead the closing prayer.

In the second session, the teacher started by greeting students, leading a prayer, and checking student attendance. The teacher also linked the material but did not provide learning motivation. The core activity began with presenting a word problem and learning objectives. The teacher divided students into groups and provided guidance, although the support was not distributed evenly. Students were more active in group discussions and

were brave enough to ask questions. However, during the closing activity, the teacher did not invite students to summarize the material or provide encouragement, even though a student led the closing prayer.

In the third session, the teacher opened the class with a prayer and greeted the students. The teacher also connected the material and motivated the students. The teacher did not check student attendance or readiness at the beginning. The core activity went well, with the teacher presenting the problem and learning objectives. The teacher divided students into groups, assigned tasks, and provided comprehensive guidance. Students were very active, focused on the problem, and fully engaged in discussions, presentations, and reflections. All aspects of the core activity were carried out well. In the closing activity, the teacher gave praise, invited students to summarize, and provided encouragement but did not give a student the opportunity to lead the closing prayer.

3. RESULTS AND DISCUSSION

RESULT

- 1) **The Application of Problem-Based Learning Model with Inquiry Method on Mathematics Problem-Solving Ability of Fifth Grade Students at SD Inpres Tamalanrea 6 Makassar City**
 - a) **Overview of Pre-test Results on Mathematical Problem-Solving Skills of Fifth Grade Students at Tamalarea 6 Inpres Elementary School in Makassar**



Figure 3.1

Based on the results of the pretest conducted on fifth grade students of SD Inpres Tamalanrea 6 Makassar, a description of the ability to solve mathematical problems was obtained in the indicators showing understanding of problems, being able to create or compile mathematical models, selecting and developing problem-solving strategies, and being able to explain and check the correctness of answers as presented in the table below.

Yes	Indicator	Score	Frequency	Presentase (%)	Category
1.	Demonstrate Understanding of the Problem	1	3	12,5%	Very low
		2	16	66,6%	Tall
		3	5	20,8%	Very low
		0	0	0%	Very low
		0	0	0%	Very low

Average Score	2			Low
Sum		24	100%	

Table 3.1 Indicators Showing Understanding of the Problem

Based on Table 3.1, it can be seen that most of the students, namely 16 people (66.6%), are in the high category with a score of 2. In addition, there were 3 students (12.5%) who were in the very low category with a score of 1, and only 5 students (20.8%) who obtained a score of 3 which was also included in the very low category.

The calculation of the average score is done by multiplying each score by its own frequency, then the results are added up and divided by the total number of students. From the results of the calculation, an average score of 2 was obtained, which shows that in general, students' ability to show understanding of problems is in the low category so it still needs to be improved.

No	Indicator	Score	Frequency	Presentase (%)	Category
1.	Able to Create or Compile Mathematical Models	1	4	16,6%	Very low
		2	16	66,6%	Tall
		3	4	16,6%	Very low
		0	0	0%	Very low
		0	0	0%	Very low
Average Score		2			Low
Sum			24	100%	

Table 3.2 Indicators Being Able to Make or Compile Mathematics Models

Based on Table 3.2, it can be seen that most of the students, namely 16 people (66.6%), are in the high category with a score of 2. In addition, there were 4 students (16.6%) who were included in the very low category with a score of 1, and 4 students (16.6%) who also obtained a score of 3 in the very low category. From the results of the calculation, an average score of 2 was obtained, which shows that in general, students' ability to make or compile mathematical models is still relatively low so it needs to be improved.

No	Indicator	Score	Frequency	Presentase (%)	Category
1.	Choosing and Developing a Problem-Solving Strategy	0	0	0%	Very Low
		2	19	79,1%	Tall
		3	5	20,8%	Very Low
		0	0	0%	Very Low
		0	0	0%	Very low
Average Score		2			Low
Sum			24	100%	

Table 3.3 Indicators of Choosing and Developing Problem-Solving Strategies

Based on Table 3.3, students' ability to choose and develop problem-solving strategies is still relatively low. A total of 19 students (79.1%) were in the high category with a score of 2, while 5 students (20.8%) were in the very low category with a score of 3. From the results of the calculation, an average score of 2.00 was obtained, which shows that students' abilities in this indicator need to be improved.

No	Indicator	Score	Frequency	Presentase (%)	Category
1.	Able to Explain and Check the Truth of Answers	1	1	4,1%	Very low
		2	14	58,3%	Keep
		3	9	37,5%	Low
		0	0	0%	Very low
		0	0	0%	Very low
Average Score		2			Low
Sum			24	100%	

Table 3.4 Indicators Capable of Explaining and Checking the Correctness of Answers

Based on Table 3.4, students' ability to explain and check the correctness of answers is still relatively low. A total of 14 students (58.3%) were in the medium category with a score of 2, followed by 9 students (37.5%) in the low category with a score of 3, and 1 student (4.1%) in the very low category with a score of 1. From the results of the calculation, an average score of 2.00 was obtained, which shows that students' abilities in this indicator still need to be improved.



Figure 3.2

The results of the pretest show that students' mathematical problem-solving skills are still relatively low in various aspects. The following is a recapitulation of the results of the pretest of problem-solving ability:

No	Indicator	Average
1.	Demonstrate Understanding of the Problem	2

2.	Able to Create or Compile Mathematical Models	2
3.	Choosing and Developing a Problem-Solving Strategy	2
4.	Able to Explain and Check the Truth of Answers	2

Table 3.5 Recapitulation of Pretest Result of Problem Solving Ability

Based on table 3.5, the recapitulation of the pretest score of the mathematical problem-solving ability of grade V students, from the table above it can be seen that the recapitulation of the pretest score is at an average score of 2.

b) Results of Observation of Teacher and Student Activities

Result of Observation of Teachers' Activities

The results of observation of teachers' activities in using the Problem Based Learning learning model with the Inquiry Method can be seen in the following table:

	Meeting I	Meeting II	Meeting III
Earnings/scores maximum	7 / 18	14 / 18	16 / 18
Percentage (%)	38%	77%	88%
Kualifikasi	Not Good	Good	Excellent

Table 3.6 Results of Observation of Teacher Activities

Based on table 3.6 above, the results of observations made on teachers' activities in implementing the Problem Based Learning learning model with the Inquiry Method, at the first meeting of teachers, data was obtained that out of the 18 aspects observed, there were 7 aspects that were implemented and 11 aspects that had not been implemented with a percentage of implementation of 38%. The description of learning activities is as follows.

Preliminary activity at the beginning of the lesson, the teacher opens the activity by leading prayers calmly so as to create a conducive classroom atmosphere. The teacher then relates the previous material to the new topic through questions and brief explanations. In addition, the teacher conveyed the importance of the material to be studied and motivated students to be enthusiastic in participating in learning activities. However, teachers have not checked the attendance or readiness of students' tools and books before learning begins.

The core activity in the core activity, the teacher presents story questions that are relevant to the learning material. The teacher explains the learning objectives and provides directions related to the steps of activities that must be carried out by students. The teacher guides the students in forming groups, then gives problem-based tasks that must be solved together. In this process, teachers actively help students in understanding and solving the problems they face. In addition, teachers pay special attention to students who need help, facilitate students in writing and compiling learning outcomes, and give each group the opportunity to present their work. After the presentation, the teacher discussed the results of the group work reflectively with the students and encouraged the students to reflect on the strategies and problem-solving processes that have been taken.

The closing activity at the end of the lesson, the teacher gave praise and appreciation for the efforts and

participation of students during the activity. The teacher also invites students to conclude the learning results and reassess the material that has been studied that day. In addition, teachers encourage students to stay enthusiastic in learning and believe in their own abilities. However, the teacher has not given the students the opportunity to lead the closing prayer.

In both thirds, data was obtained that out of 18 aspects observed, there were 14 aspects that were implemented and 4 aspects that had not been implemented with a percentage of implementation of 77%. The description of learning activities is as follows and textbooks. Next, the teacher relates the previous material to the new topic through questions and brief explanations. However, teachers do not convey the importance of the material to be studied and provide motivation to students to increase their enthusiasm for learning.

Core activities in core activities, teachers convey stories that are relevant to the material, explain the learning objectives, and convey the stages of the activities to be carried out. The teacher divides the groups appropriately and gives clear assignment instructions. Furthermore, teachers give problem-based tasks to each group and assist students in understanding and solving problems. Teachers also pay special attention to students who experience difficulties, although they are not completely evenly distributed because there are still some students who do not receive intensive guidance. In addition, teachers facilitate students in writing and compiling learning outcomes, as well as providing opportunities for all groups to present their work. After that, the teacher and the students discussed the results of the group work reflectively.

The closing activity was a closing activity, the teacher gave praise and appreciation for the efforts and participation of students. However, in the two activities, the teacher did not invite students to conclude the material and reassess the learning that had taken place. In addition, teachers also do not give encouragement to students to remain confident and enthusiastic in learning. In closing, the teacher gives students the opportunity to lead prayer. Almost all aspects of the closing activities were carried out well without any problems implemented with a percentage of implementation of 88%. The description of learning activities is as follows.

In the preliminary activity, the teacher opened the learning by greeting students and leading prayers so as to create a conducive classroom atmosphere. Next, the teacher relates the previous material to the new topic through questions and brief explanations. The teacher also conveyed the importance of the material to be studied to motivate students to be more enthusiastic in participating in learning. However, in the preliminary activity, the teacher has not checked the attendance or readiness of the student's tools or books.

The core activity in the core activity, the teacher presents story questions that are relevant to the material, explaining the learning objectives and the stages of the activities to be carried out. The teacher divides the groups appropriately and gives clear assignment instructions. In addition, teachers give problem-based assignments to groups and assist students in understanding and solving problems. Teachers also provide special attention and assistance to students in need, facilitate students in writing and compiling learning results, and provide opportunities for each group to present their work. Furthermore, the teacher discusses the results of the group work reflectively with the students, and encourages the students to reflect on the strategies and problem-solving processes. Thus, all aspects of core activities at the third meeting can be carried out well.

In the closing activity, the teacher gave praise and appreciation for the efforts and participation of students. The teacher invites students to conclude and reassess the learning that has taken place. Teachers also encourage students to stay enthusiastic about learning and believe in their own abilities. However, the teacher has not given the students the opportunity to lead the closing prayer.

The application of the Problem Based Learning (PBL) learning model in Mathematics class V at SD Inpres Tamalanrea 6 Makassar City has proven to be effective in improving student understanding. The results showed an increase in scores from pretest to posttest, as well as a significant change in student engagement during the learning process. Teacher activities that are structured in each stage successfully create an active, interactive, interactive learning atmosphere and encourage students to think critically.

Result of Observation of Student Activities

The results of observation of student activities using the Problem Based Learning learning model with the Inquiry method can be seen in the following table:

	Meeting I	Meeting II	Meeting III
Earnings/scores maximum	10 / 18	15 / 18	17 / 18
Percentage (%)	55%	83%	94%
Kualifikasi	Enough	Good	Excellent

Table 3.7 Result of Student Activity Observations

Based on table 3.7 of the observations made on student activities in the application of the Problem Based Learning learning model with the Inquiry method at the first meeting, data was obtained that out of the 18 aspects observed, there were 10 aspects that were implemented and 8 aspects that had not been implemented with a percentage of implementation of 55%. The description of learning activities is as follows.

Preliminary Activities, most of the aspects observed have been carried out well. Students answered the greetings politely and followed the prayer seriously. In addition, students were present complete and prepared books and stationery quickly. Students also listen to the teacher's explanation well and are able to understand the relationship between the previous material and the material to be studied. However, in the aspect of student enthusiasm since the beginning of learning, it has not been fully implemented. This can be seen from the existence of some students who are still lacking focus and have not shown optimal learning readiness.

Core Activities In core activities, there are several aspects that have been implemented. Students focus on the story questions given by the teacher and are able to show an initial understanding of the problem. Students also actively participate in group discussions, brainstorming, and working together in developing problem-solving strategies. In addition, some students wrote down the results of the discussion in a neat form so that they could be presented. However, there are still several aspects of core activities that have not been carried out optimally. Some students do not fully understand the learning objectives conveyed by the teacher. In addition, not all students are actively involved in group discussions because there are still those who tend to be passive and dependent on more dominant friends. Students also do not dare to ask questions to teachers or friends when they experience difficulties. Another aspect that has not been implemented is the courage of students in conveying the results of group work orally, providing comments or questions on other group presentations, and re-explaining the material that has been learned. Students' reflection on strategies and problem-solving processes has also not run optimally.

Closing Activities In the closing activities, all aspects observed were carried out well. Students receive praise from teachers with a confident attitude and not exaggeration. They also participate in concluding

learning outcomes both orally and in writing. However, at the end of the activity, the students did not show active participation and read the closing prayer.

In the second meeting, data was obtained that out of 18 aspects observed, there were 15 aspects that had been implemented and 3 aspects that had not been implemented with a implementation percentage of 83%. The description of learning activities is as follows.

Preliminary Activities In the preliminary activities, most of the aspects observed have been carried out well. Students answered the greetings politely and followed the prayer seriously. In addition, students were present complete and prepared books and stationery quickly. Students also listen to the teacher's explanation well and are able to understand the relationship between the previous material and the material to be studied. However, in the aspect of student enthusiasm since the beginning of learning, it has not been fully implemented. This can be seen from the existence of some students who are still lacking focus and have not shown optimal learning readiness.

Core Activities In core activities, most of the aspects observed have been carried out well. Students focus on the story questions given by the teacher and are able to show an initial understanding of the problem. Students also actively participate in group discussions, brainstorming, and working together in developing problem-solving strategies. In addition, the student activity wrote down the results of the discussion in a neat form that had not been carried out properly. Students also understand the learning objectives conveyed by the teacher, actively participate in group discussions, dare to ask questions to teachers or friends when experiencing difficulties, dare to convey the results of group work orally, give comments or questions to other group presentations, and re-explain the material that has been learned. Students' reflection on strategies and problem-solving processes also runs optimally.

Closing Activities In the closing activities, most of the aspects observed have been carried out well. Students receive praise from teachers with a confident attitude and not exaggeration. They also participate in concluding learning outcomes both orally and in writing. However, at the end of the activity, the students were less likely to show active participation in the closing prayer with respect, even though one of the students led the closing prayer well.

Third meeting, data was obtained that out of 18 aspects observed, there were 17 aspects that had been implemented and 1 aspect that had not been implemented with a percentage of implementation of 94%. The description of learning activities is as follows.

Preliminary Activities in the preliminary activities, all aspects observed were carried out well. Students show a good attitude in answering greetings and taking prayers seriously. In addition, students attended fully and prepared books and stationery quickly. Students also listen to the teacher's explanation and understand the relationship between the material that has been studied before and the material that will be studied that day. The enthusiasm of students in participating in learning from the beginning is also well seen.

Core Activities in core activities, all aspects observed are carried out well. Students show focus on the story questions given by the teacher and are able to show an initial understanding of the problem. Students also understand the learning objectives conveyed by the teacher and follow the directions given. In addition, students are active in group discussions, provide ideas, and work together in developing problem-solving strategies. Students also record or write the results of the discussion in a neat form so that they can be presented. Students participate in verbal presentation of the group's work, provide comments, questions, or support for other group presentations, re-explain what they have learned and how to solve problems, and reflect on problem-solving strategies and processes.

Closing Activities In the closing activities, all aspects observed were carried out well. Students receive praise from teachers with a confident attitude and not exaggeration. They also participate in concluding learning outcomes both orally and in writing. At the end of the activity, students demonstrate active participation. However, in the activity there were no students who led the closing prayer.

Based on the results of observation of student activities during the implementation of the learning model, there was a consistent increase from each meeting. The student's activity score increased from 55% at the second meeting and to 94% at the fourth meeting, with excellent qualifications. This shows that students are increasingly active, engaged, and motivated in participating in problem-solving-based learning.

Overview of Posttest Result of Mathematics Problem-Solving Skills for Grade V Students of SD Inpres Tamalanrea 6 Makassar



Figure 3.3

Based on the results of the posttest conducted on grade V students of SD Inpres Tamalanrea 6 Makassar, an overview of mathematical problem-solving skills was obtained on indicators showing problem understanding, being able to make or compiling mathematical models, choosing and developing problem-solving strategies, and being able to explain and check the correctness of answers as presented in the table below.

Yes	Indicator	Score	Frequency	Presentase (%)	Category
1.	Demonstrate Understanding of the Problem	0	0	0%	Very low
		2	4	16,6%	Very low
		3	20	83,3%	Tall
		0	0	0%	Very low
		0	0	0%	Very low
Average Score		3			Keep
Sum			24	100%	

Table 3.8 Indicators Showing Understanding of the Problem

Based on Table 3.8, students' ability to understand math problems is mostly good. Of the 24 students, 20 students (83.3%) showed a high understanding of the problem, while the rest (16.6%) showed a very low understanding. From the results of the calculation, an average score of 3 was obtained, which shows that in general, students' ability to show understanding of problems is in the medium category.

No	Indicator	Shoes	Frequency	Presentase (%)	Category
1.	Able to Create or Compile Mathematical Models	0	0	0%	Very low
		2	4	16,6%	Very low
		3	20	83,3%	Tall
		0	0	0%	Very low
		0	0	0%	Very low
Average Score		3			Keep
Sum			24	100%	

Table 3.9 Indicators of Being Able to Create or Construct Mathematical Models

Based on Table 3.9, students' ability to make or compile mathematical models is mostly good. Of the 24 students, 20 students (83.3%) were able to make or compose mathematical models well (high category), while 4 students (16.6%) were still in the very low category. From the results of the calculation, an average score of 3 was obtained, which shows that in general the ability of students to make or compile mathematical models is in the medium category.

No	Indicator	Shoes	Frequency	Presentase (%)	Category
1.	Choosing and Developing a Problem-Solving Strategy	0	0	0%	Very low
		2	7	29,1%	Very low
		3	17	70,8%	Tall
		0	0	0%	Very low
		0	0	0%	Very low
Average Score		3			Keep
Sum			24	100%	

Table 3.10 Indicators for Choosing and Developing Problem-Solving Strategies

Based on Table 3.10, students' ability to choose and develop problem-solving strategies is mostly good. Of the 24 students, 17 students (70.8%) were able to choose and develop problem-solving strategies well (high category), while 7 students (29.1%) were still in the very low category. From the results of the calculation, an average score of 3 was obtained, which shows that in general, students' ability to choose and develop problem-solving strategies is in the medium category.

No	Indicator	Shoes	Frequency	Presentase (%)	Category
1.	Able to Explain and Check the Truth of Answers	1	1	4,1%	Very low
		2	8	33,3%	Very low
		3	15	62,5%	Keep
		0	0	0%	Very low
		0	0	0%	Very low
Average Score		3			Keep
Sum			24	100%	

Table 3.11 Indicators Capable of Explaining and Checking the Correctness of Answers

Based on Table 3.11, students' ability to explain and check the correctness of answers still needs to be improved. Although most (62.5%) students were able to explain and check the answers in the medium category, there were also some students who were still in the very low (4.1%) and low (33.3%) categories. From the results of the calculation, an average score of 3 was obtained, which shows that in general the ability of students to explain and check the correctness of answers is in the medium category.



Figure 3.4

The posttest results show that students' mathematical problem-solving skills are included in the high category in various aspects. The following is a recapitulation of the results of the posttest of problem-solving skills:

No	Indicator	Average
1.	Demonstrate Understanding of the Problem	3
2.	Able to Create or Compile Mathematical Models	3
3.	Choosing and Developing a Problem-Solving Strategy	3
4.	Able to Explain and Check the Truth of Answers	3

Table 3.12 Recapitulation of Posttest Result of Problem Solving Ability

Based on table 3.12, the recapitulation of the pretest scores of mathematics problem-solving ability of grade V students, from the table above, it can be seen that the recapitulation of pretest scores is at an average score of 3.

2) The Effect of the Use of the Problem Based Learning Model with the Inquiry Method on the Mathematical Problem-Solving Ability of Grade V Students of SD Inpres Tamalanrea 6 Makassar City

Test of Normality			
Tests of Normality			
	Shapiro-Wilk		
	Statistic	Df	Itself.
Pretest	0.937	24	0.141
Posttest	0.966	24	0.570

Table 3.13 Normality Test

Based on the results of the normality test using the Shapiro-Wilk method, information was obtained regarding the distribution of data on the variables of pretest and posttest students' mathematical problem-solving ability. The results of the analysis showed that for the pretest data, the Shapiro-Wilk statistical value was 0.937 with the number of samples (df) = 24 and the significance value (Sig.) of 0.141. Because the significance value is greater than 0.05 (Sig. > 0.05), the pretest data is declared to be normally distributed. Furthermore, in the posttest data, the Shapiro-Wilk statistical value of 0.966 was obtained with the number of samples (df) = 24 and the significance value (Sig.) of 0.570. Similar to the pretest, the significance value of the posttest is also greater than 0.05 so it can be concluded that the posttest data is normally distributed.

Thus, the results of this normality test show that both the pretest and posttest data on the mathematical problem-solving ability of grade V students are distributed normally. This means that both data meet.

Inferential Test				
Paired Samples Test				
significance				
	t	df	One-Sided p	Two-Sided p
Pair 1 Pretest- Posttest	-36.220	23	<. 001	<. 001

Table 3.14 Inferential Test

Based on the results of the inferential test using the Paired Sample T-Test, a calculated t-value of -36.220 with a degree of freedom (df) of 23 and a significance value (Sig. 2-tailed) of < 0.001 . The significance value is much smaller than the significance level set at 0.05. Thus, the null hypothesis (H_0) stating that there is no significant difference between the pretest and posttest values is rejected, while the alternative hypothesis (H_1) is accepted. These results indicate that there is a very significant difference between students' mathematical problem-solving abilities before and after the learning treatment is given. This difference shows an increase in student learning outcomes after participating in learning, where posttest scores are proven to be higher than pretest scores.

The very large t-value of the calculation shows that the difference that occurs is not caused by chance, but really due to the influence of the learning treatment applied. In other words, the results of this analysis provide empirical evidence that the learning model used is able to have a positive impact on the mathematical problem-solving ability of grade V students.

DISCUSSION

This study examines the influence and application of the Problem Based Learning learning model with the Inquiry method on the Problem-Solving Ability of Class V Students of Elementary School Inpres Tamalanrea 6 Makassar City. This research was carried out from May 19 to June 13, 2025, with a One Group Pretest-Posttest Design research design that only involved one experimental group. This group was given an initial test (pretest) and a final test (posttest) to measure the improvement of mathematical problem-solving skills after being given treatment in the form of the application of the Problem Based Learning model with the Inquiry method. The application of the Problem Based Learning model with the Inquiry method has a significant impact on improving the mathematical problem-solving ability of grade V students. This approach emphasizes real-world problem-based learning, where students are required to be active in finding solutions through a critical and systematic thinking process.

The analysis of posttest results is based on four indicators of problem-solving ability according to (Mawaddah, 2015) which has been adapted to the learning context in Indonesia. The four indicators include: (1) Demonstrating Understanding of the Problem, (2) Developing a Mathematical Model, (3) Choosing and Developing Solution Strategies, and (4) Explaining and Checking the Truth of the Answer. These findings strengthen the theoretical study that learning that puts students at the center of learning activities can improve the quality of students' thinking processes and learning outcomes. Type Problem Based Learning, as explained by . (Ardianti dkk., 2022) effective in facilitating students to learn through contextual experiences, where students are confronted directly with real problems that encourage them to think critically, work in teams, and dare to express opinions.

Furthermore, the Inquiry also strengthen the process of developing high-level thinking skills. As affirmed by (Agista dkk., 2023). Inquiry Encourage students to be involved in the scientific process starting from formulating problems, formulating hypotheses, collecting data, to drawing conclusions independently. Synergy between Problem Based Learning and Inquiry This creates an active, challenging, yet structured learning atmosphere, where students are not only recipients of information but also discoverers of knowledge. The results of the study show that the combination of these two models successfully changed students' learning behavior from passive to active, from just remembering to being able to strategize problem solving logically. Phases of Model Learning Problem Based Learning with the Method Inquiry The researcher applies five main phases in learning, adapting the syntax Problem Based Learning and Inquiry as listed in tables 2.1 and 2.2 in the research document.

The application of the Problem Based Learning model with the Inquiry method has a positive impact on students' mathematical problem-solving skills. Students become more active, engage in group discussions, and be able to develop problem-solving strategies independently. The results of observation of teacher and student activities also showed an increase in involvement and motivation to learn during the learning process. The results of the observations show that the application of Problem Based Learning by the Inquiry Increase student activeness, discussion engagement, and independence in developing problem-solving strategies. This is relevant to research (Azis, 2021) entitled "Model Influence Problem Based Learning On the Mathematical Problem-Solving Ability of Elementary School Students" In his research, it was found that the PBL model had

a positive effect and improved students' mathematical problem-solving skills. This is because PBL provides opportunities for students to play an active role in learning, so that they can develop critical thinking skills and problem-solving strategies better. Other research conducted by (Hamzah dkk., 2025) said that the game-based Problem Based Learning (PBL) model showed a significant increase from pre-test to post-test in improving students' literacy and numeracy skills. The acquisition of average scores that exceeded the standard of the learning objective completeness criteria (KKTP) shows that this game-based problem-based learning model is effective in helping to improve student learning outcomes, especially in the literacy and numeracy skills of elementary school students. In addition, this model is also able to make the learning process more enjoyable, foster motivation, and encourage active student involvement in the learning process.

In addition, the effectiveness of the Inquiry It is also strengthened by the research conducted (Kusumaningtyas, 2016) entitled "Effectiveness of Methods Inquiry On Students' Mathematics Learning Outcomes". It can strengthen the theory that cooperative learning models type Inquiry effectively used on the subject matter of the circle. This is shown by the achievement of four aspects of learning effectiveness indicators that are good, effective, positive and complete, namely: (1) The ability of teachers to manage learning that goes well with an average of 77% has exceeded the set criteria, namely 75%; (2) The active involvement of students in the learning process reached an average of 79.16%, which exceeded the set criteria, namely 75%; (3) Student response to the implementation of learning has a positive value, an average of 77.5% has exceeded the set criteria, namely 75%; (4) The achievement of classical learning outcomes is 81.25%, more than 75% of the number of students gets a KKM score, which is more than or equal to 70.

This can weaken research theories (Tyas, 2017) entitled "Implementation Difficulties Problem Based Learning In Mathematics Learning". The results of the study show that the obstacles experienced by teachers at the planning stage are the difficulty of determining the right problem so that it can stimulate a good discussion atmosphere and be able to stimulate students' intellectual development. Long time constraints in learning planning and implementation are caused because teachers are not used to learning Problem Based Learning.

Based on the results of the research and reinforcement from previous studies, it can be concluded that the Problem Based Learning model with the Inquiry method. Able to significantly improve students' mathematics learning outcomes, but also contribute to forming the character of students who are adaptive to the challenges of 21st century learning, namely students who are able to think at a high level, work together in a team, and have confidence in facing complex problems. Therefore, this model is worthy of being used as a strategic alternative in the development of mathematics learning in elementary schools in a sustainable and contextual manner. The application of these models and methods can be an innovative solution to the challenge of low problem-solving skills at the elementary level, as well as an initial foundation in shaping a generation of learners who are independent, reflective, and ready to face the complexities of life in the future.

4. CONCLUSSIONS AND SUGGESTIONS

CONCLUSSIONS

Based on the results of a comprehensive study at SD Inpres Tamalanrea 6 Makassar, it can be concluded that the use of the Problem Based Learning (PBL) learning model integrated with the Inquiry method has a very positive and significant impact on improving the mathematical problem-solving ability of grade V students.

- 1) Specifically, in terms of application, the combination of the PBL model and the Inquiry method has proven to be successful in transforming the learning atmosphere in grade V of SD Inpres Tamalanrea 6 Makassar. The learning process is no longer passive, but rather becomes very active, collaborative, and entirely student-centered. Through this approach, students are proactively encouraged to engage in solving real problems relevant to their lives, as well as guided in conducting systematic scientific investigations. This effectively nurtures and develops a variety of important aspects in students, including deep curiosity, courage to ask questions and explore, teamwork skills, and independence in their learning process.
- 2) Furthermore, regarding its influence on mathematical problem-solving skills, quantitative data showed very convincing results. There was a striking increase in the average posttest score of students, which jumped to 88.83, far exceeding the average pretest score of only 69.33. This drastic improvement indicates that both learning approaches are effectively able to optimize students' conceptual understanding and hone their critical thinking skills in dealing with and solving complex math problems. The majority of students

even managed to achieve the "very high" category in problem-solving skills after this intervention, proving the remarkable effectiveness of the synergy of PBL and Inquiry in the context of basic education.

SUGGESTIONS

- 1) For students, they are expected to be more active and courageous in the learning process, especially in group discussions, investigations, and contextual problem-solving. The PBL model with Inquiry provides opportunities for students to build their own knowledge through hands-on experience, so it requires the willingness to learn independently, the courage to ask questions, and the seriousness to complete challenging tasks.
- 2) For teachers, it is recommended to develop and apply innovative learning models such as Problem Based Learning and Inquiry in learning activities, especially in materials that require understanding of concepts and critical thinking skills. Teachers also need to improve their role as facilitators by creating a conducive learning environment, providing appropriate guidance, and utilizing interesting learning media to support the success of the student learning process.
- 3) For schools and educational institutions, it is better to support the development of teacher professionalism through training or workshops related to problem-based learning and inquiry. The provision of adequate learning facilities and interactive learning media is also important to support the implementation of active and exploratory learning models.
- 4) For the next researcher, this research can be used as a reference for further studies, either by using quantitative, qualitative, or mixed method. Researchers are then advised to examine the effectiveness of the PBL model with Inquiry in different subjects or levels of education, as well as explore the integration of learning technologies.

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