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IMPLEMENTATION OF PROBLEM BASED LEARNING MODEL USING LKPD ON STUDENTS' MATHEMATICAL PROBLEM SOLVING ABILITIES

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ABSTRACT
This research aims: 1) to determine the differences in the problem solving abilities of students who use the PBL model assisted by LKPD and the cooperative learning model. 2) to find out which students have better problem solving abilities who use the PBL model assisted by LKPD with the cooperative learning model. This research is a Quasi Experimental research. The sampling technique uses cluster random sampling. The research instrument uses problem solving ability test questions. Data collection techniques use tests. The data analysis techniques used are normality testing using the Liliefors test, homogeneity testing using the Bartlet test, and hypothesis testing using the one-way ANOVA test. The results of the research show: (1) Based on the results of research and hypothesis testing using the one-way ANOVA test, the results showed that $F_{hitung} = 8{,}18 > F_{tabel} = 4{,}00$, meaning that there are differences in the problem solving abilities of students who use the PBL model assisted by LKPD and the cooperative learning model. This difference is due to the stages of guiding individual and group investigations. Students play an active role during learning, asking each other questions and exchanging ideas with their group members. (2) Learning using the PBL model assisted by LKPD is better than using the cooperative learning model. Problem solving abilities in the experimental class with an average score of 74.5, because students can discuss and collaborate well, so they can solve the problems given.
Keywords: LKPD; mathematical problem solving ability; PBL

ABSTRAK
Penelitian ini bertujuan: (1) untuk mengetahui perbedaan kemampuan pemecahan masalah peserta didik yang menggunakan model PBL berbantu LKPD dengan model pembelajaran kooperatif. (2) untuk mengetahui manakah yang lebih baik kemampuan pemecahan masalah peserta didik yang menggunakan model PBL berbantu LKPD dengan model pembelajaran kooperatif. Penelitian ini merupakan penelitian Quasi Experiment. Teknik pengambilan sampel menggunakan cluster random sampling. Instrumen penelitian menggunakan soal tes kemampuan pemecahan masalah. Teknik pengumpulan data menggunakan tes. Teknik analisis data yang digunakan yaitu uji normalitas menggunakan uji Liliefors, uji homogenitas menggunakan uji Bartlet, dan uji hipotesis menggunakan uji anava satu jalan. Hasil penelitian menunjukkan: (1) Berdasarkan hasil penelitian dan pengujian hipotesis menggunakan uji anava satu jalur diperoleh hasil bahwa $F_{hitung} = 8{,}18 > F_{tabel} = 4{,}00$*, artinya terdapat perbedaan kemampuan pemecahan masalah peserta didik yang menggunakan model PBL berbantu LKPD dengan model pembelajaran kooperatif. Perbedaan tersebut disebabkan pada tahapan membimbing penyelidikan individu dan kelompok peserta didik berperan aktif selama pembelajaran, saling bertanya dan bertukar pikiran dengan anggota kelompoknya. (2) Pembelajaran menggunakan model PBL berbantu LKPD lebih baik daripada menggunakan model pembelajaran kooperatif. Kemampuan pemecahan masalah di kelas eksperimen dengan nilai rata-rata sebesar 74,5 , karena peserta didik dapat berdiskusi dan*

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bekerjasama dengan baik, sehingga dapat memecahkan permasalahan yang diberikan.
Kata Kunci : *Kemampuan pemecahan masalah matematis; LKPD; dan PBL.*

Introduction

One of the abilities that must be possessed and mastered by students after taking mathematics lessons is the ability to solve problems. The problem-solving process can take place if students are faced with a problem in which there is a possible answer (Rambe & Arfi, 2020). Problem solving ability is a student's effort in solving a problem especially in mathematics (Rahmatiya & Miatun, 2020). According to (Supriono et al., 2023) explains that the more students' mathematical problem-solving abilities improve, the more their thought patterns will improve. The importance of students' problem-solving abilities in mathematics lessons, namely: 1) Problem-solving abilities are a general goal in learning mathematics. 2) Problem-solving consisting of methods, procedures, and strategies is a core and main process in the mathematics curriculum. 3) Problem solving is a basic ability in learning mathematics (Reski et al., 2019).

In solving a mathematical problem, there are 4 stages of problem solving according to (Polya, 1957) namely 1) Understanding the problem. 2) Devising a plan. 3) Carrying out the plan. 4) Looking back. There are several reasons why students need to be trained in solving problems in the form of problem solving, namely: 1) can arouse curiosity and motivation in fostering students' creative nature. 2) skilled in reading and making statements correctly. 3) can produce original, new, diverse answers and can add new knowledge. 4) invite students to have problem-solving ability procedures, be able to make analysis and are required to make evaluations of the results of problem solving that they obtain. 4) is an important activity for students to face their lives now and in the future and can stimulate students to use all their abilities (Indriana & Maryati, 2021).

Based on the results of observations and interviews with educators of class VII SMP Muhammadiyah 1 Metro, it was stated that students' mathematical problem-solving abilities were still not as expected. Most students found it difficult to solve math problems, especially those in the form of problem solving. Lack of understanding of students towards the problems faced made students have difficulty in solving math problems. Based on the pre-survey test results of problem-solving abilities of class VII A students from 26 students, there were 73.07% of students who had not achieved the learning objective achievement criteria (KKTP). From the results of the answers, many students were still not able to understand the problem, where students were still not careful enough and did not write down what was known and what was asked from the problem. Students were also not able to plan the solution, namely they were still not right in writing the formula, so that the right results were not obtained in solving the problem.

Most students after completing the problem, students immediately believe the correctness of the answer without rechecking the results of the answers that

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have been obtained. As a result, calculation and answer errors are often made by students. In addition, there are still students who only write down the final results without being accompanied by the steps in working on them. Educators have an important role in the learning process in the classroom, where in the learning process educators use cooperative learning models. Learning using cooperative learning models is still not optimal, where in learning educators explain the material, then provide practice questions related to the material being studied, educators also conduct group discussions but there are still passive students, do not dare to ask if they do not understand the material, are silent when educators do questions and answers, when educators explain the material there are students who do not listen or just chat with their friends, there are still students who are less confident in their abilities and lack of enthusiasm for learning mathematics. This results in learning being less effective, resulting in low student ability in solving mathematical problems.

Based on the description of the problems above, it shows that mathematics learning needs to be improved to improve students' mathematical problem-solving abilities. Therefore, educators must be able to determine an innovation in learning. One of these innovations is the need to apply a learning model that can improve students' problem-solving abilities. One of the learning models that can be used to improve problem-solving abilities is the PBL learning model (Siregar et al., 2023). The PBL learning model has the advantage of increasing students' motivation and learning activities and can make it easier for students to master the concepts they learn to solve problems (Hotimah, 2020). The application of the PBL learning model will enable students to work together in solving mathematical problems and will be more courageous in asking questions and conveying their ideas (Silvi et al., 2020).

This PBL learning model can develop problem-solving skills and make students more active in learning because the material discussed is related to everyday life. In addition, the PBL model challenges students to find solutions to real-world problems both individually and in groups. In implementing the PBL learning model, it has the potential to actively involve students in developing problem-solving skills (Monica et al., 2019). Thus, the PBL model provides an opportunity for students to explore collecting and analyzing data completely in solving the problems faced.

Study (Mazaly et al., 2020) the results obtained show that the average problem-solving ability of students using the PBL learning model is better than the problem-solving ability of students with ordinary learning and the problem-solving process of students with learning using the PBL model is better than the problem-solving process of students using ordinary learning. In addition, the research (Yusri, 2018) the results obtained that there is an influence after the implementation of the PBL learning model on students' mathematical problem solving abilities. This occurs because in the implementation of the PBL learning model, students better understand the problem, plan the problem, solve the problem according to plan, and recheck or interpret the solution.

In addition, the use of the PBL learning model requires the assistance of good and interesting teaching materials so that the learning process can be understood by students. Good teaching materials will lead to good learning outcomes, and vice

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versa. Therefore, this study uses the assistance of LKPD which is developed with the stages of the PBL learning model. LKPD is a teaching material that can accommodate students to actively develop their own knowledge and make students the center of learning activities (Andeswari et al., 2022). Using the PBL learning model assisted by LKPD makes it easier for students to interact with the problems that have been given, and helps students to be more active in learning activities because it contains activities that directly involve students.

Study (Sari et al., 2024) the results obtained that learning using the PBL model assisted by LKPD can have an effect on improving students' problem-solving abilities. This can be seen from the data on the results of knowledge assessment using the PBL learning process assisted by LKPD in the biology subject of waste and pollution material which has experienced an increase in pre-test and post-test scores.

Based on the description above, the purpose of this study is to determine the differences between the mathematical problem solving abilities of students who use the PBL model assisted by LKPD and students who use the cooperative learning model and to determine which is better, the mathematical problem solving abilities of students who use the PBL learning model assisted by LKPD and students who use the cooperative learning model.

Research Methods

The research conducted is a type of research *Quasi Experiment* (Quasi-Experiment) using quantitative research methods. The design used in this study is Posttest Only Control Group Design. This research was conducted at SMP Muhammadiyah 1 Metro. The implementation of this research was in the odd semester of the 2024/2025 academic year in August 2024. The population in this study were students of class VII of SMP Muhammadiyah 1 Metro which consisted of 5 classes. The sampling technique in this study used the cluster random sampling technique involving 5 classes, namely class VII A to class VII E, then a lottery was carried out and 2 classes were obtained which would be used as samples in this study, namely class VII C as the experimental class totaling 30 students who received the PBL learning model assisted by LKPD and class VII A as the control class totaling 30 students who received the cooperative learning model. The instrument used in this study used mathematical problem-solving ability test questions.

Before being given to the research sample, the instrument needs to be tested first to see its validity, test the level of difficulty of the questions and its reliability.

Validity Test

Validity is the accuracy of the measuring instrument used to measure the variables contained in the study. The characteristics of a valid instrument are that it has high validity, while an instrument that is less valid has low validity. This validity uses a validity sheet that is used to measure the validity of the instrument for students' mathematical problem-solving ability questions that are in accordance with the predetermined indicators.

The steps are:

a. Creating Teaching Modules
b. Creating Student Worksheets

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c. Creating a Test Question Grid
d. Creating Test Questions and Answer Keys
e. Creating a Validation Questionnaire
f. Validating Teaching Modules, LKPD, and Test Questions with 3 validators (2 Mathematics Lecturers, and 1 Mathematics Teacher)
g. Analyzing the Level of Validity
h. Revising Teaching Modules, LKPD and Test Questions

Based on the validity test that has been conducted, the results obtained that the learning devices in the form of teaching modules, LKPD, and test questions are valid and can be used in research. The learning devices have been said to be valid, then the next step is to test the level of difficulty of the question items.

Test Question Difficulty Level

According to(Salmina & Adyansyah, 2017)states that to calculate the level of difficulty of each essay question item as follows:

$$TK = \frac{\bar{x}}{x_{maks}} \quad \ldots(1)$$

Information:
TK = Level of difficulty of the questions
$\bar{x}$ = Average score for one question item
x_{maks} = The maximum score that has been set

Table 1. Criteria for the Level of Difficulty of Question Items

Difficulty Level Value	Difficulty Level Criteria
$0{,}00 < TK \leq 0{,}30$	Difficult
$0{,}31 \leq TK \leq 0{,}70$	Currently
$0{,}71 \leq TK \leq 1{,}00$	Easy

Source :(Salmina & Adyansyah, 2017)

Based on Table 1, the difficulty level categories for the questions were used using the easy to difficult difficulty categories listed in table 1. Based on the results of the test on the difficulty level of the questions, 1 question was in the easy category, 4 questions were in the medium category and 1 question was in the difficult category. So in this study only 5 questions were used, consisting of 1 question in the easy category, 2 questions in the medium category and 1 question in the difficult category.

Reliability Test

The reliability test uses the Cronbach Alpha formula as follows:

$$r_{11} = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum \sigma_b^2}{\sigma_t^2}\right) \quad \ldots(2)$$

Information:
r_{11} : Reliability sought
k : Number of questions
$\sum \sigma_b^2$: Number of item variances
σ_t^2 : Total variance

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Table 2. Interpretation of Values$r$

Number of r values	Interpretation
$0{,}80 \geq r_{11} < 1{,}00$	Tall
$0{,}60 \geq r_{11} < 0{,}80$	Enough
$0{,}40 \geq r_{11} < 0{,}60$	Currently
$0{,}20 \geq r_{11} < 0{,}40$	Low
$0{,}00 \geq r_{11} < 0{,}20$	Very Low

Source :(Arikunto, 2020)

Based on Table 2, the criteria used in this study use sufficient to high criteria as shown in table 2. Based on the results of the reliability test, the value obtained is sufficient. Therefore, it can be concluded that the test questions can be given to the research sample.$r_{11} = 0{,}63$

Data Analysis Techniques

The data analysis techniques used were normality testing using the Liliefors test, homogeneity testing using the Bartlet test, and hypothesis testing using the one-way ANOVA test as follows:

Normality Test

After the data on students' mathematical problem solving abilities are obtained, their normality will be tested using the Liliefors test. The steps for normality testing according to (Budiyono, 2016) states that:
H_0 : The sample comes from a normally distributed population.
H_1 : The sample comes from a population that is not normally distributed.

Homogeneity Test

If the data obtained is normally distributed, then the next step is to test its homogeneity. The homogeneity test aims to ensure that the sample comes from a homogeneous population or not. The homogeneity test used in this study is the Bartlet test. The steps for the homogeneity test according to (Budiyono, 2016) as follows:
H_0: $\sigma_1^2 = \sigma_2^2$ (both populations have the same variance)
H_1: $\sigma_1^2 \neq \sigma_2^2$ (both populations do not have the same variance)

Hypothesis Testing

Hypothesis testing is intended to answer the formulation of the problem in the research. Hypothesis testing aims to obtain decisions based on data analysis obtained through normality tests and homogeneity tests. So the techniques used to test the hypothesis are:

a. Hypothesis 1

Based on hypothesis 1, to find out whether there is a difference in problem-solving ability between the two learning models, the hypothesis test used in this study is the one-way ANOVA test as follows (Budiyono, 2016).
$H_0 : \mu_1 = \mu_2$ (There is no difference in average ability students' mathematical

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problem solving between learning models PBL assisted by LKPD and cooperative learning models)

$H_1 : \mu_1 \neq \mu_2$ (There is a difference in average ability students' mathematical problem solving between learning models PBL assisted by LKPD and cooperative learning models)

b. Hypothesis 2

Based on hypothesis 2, to find out which problem-solving ability is better between the two learning models, the procedure taken is to carry out further testing as follows (Budiyono, 2016).

$H_0 : \mu_1 \leq \mu_2$ (Students' problem solving abilities that using a learning model PBL assisted by LKPD is not better than the problemsolving abilities of students who use cooperative learning models)

$H_1 : \mu_1 > \mu_2$ (Students' problem solving abilities that using a learning model PBL assisted by LKPD is better than the problem solving abilities of students who use cooperative learning models)

Results and Discussion

In this study, data analysis was carried outto find out the differences in problem-solving abilities of students who use the PBL model assisted by LKPD with the cooperative learning model and to find out which is better, the problem-solving abilities of students who use the PBL model assisted by LKPD with the cooperative learning model. Before the hypothesis test is carried out, a prerequisite test is first carried out, namely the normality test and the homogeneity test.

Normality Test

In this study, the normality test is used to determine whether the two samples in this study are normally distributed or not. After the data on students' mathematical problem solving abilities are obtained, their normality will be tested using the Liliefors test. Based on this, the following data are obtained from the normality test are presented in Table 3:

Table 3. Recapitulation of Normality Test Results

No	Class	Average	L_{hitung}	L_{tabel}	Test Decision
1	Experiment	74.5	0.14	0.161	Ho accepted
2	Control	62.63	0.12	0.161	Ho accepted

Based on Table 3, the data obtained from the normality test of mathematical problem solving ability data using the PBL learning model assisted by LKPD in the experimental class with a significant level of α = 0.05 obtained the value of $L_{hitung} < L_{tabel}$, namely 0.14 < 0.161. The test decision states that Ho is accepted, so the sample in the experimental class has mathematical problem solving ability data that is normally distributed. Furthermore, the results of the normality test of mathematical problem solving ability data using the cooperative

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learning model in the control class with a significant level of α = 0.05 obtained the value of $L_{hitung} < L_{tabel}$, namely 0.12 < 0.161. The test decision states that Ho is accepted, so the sample in the control class has mathematical problem solving ability data that is normally distributed.

Homogeneity Test

In this study, the homogeneity test uses the Bartlet test, the homogeneity test is used to determine whether the PBL learning model has the same variance or not with the cooperative learning model. Based on this, the homogeneity test results data are obtained:

Table 4. Summary of Homogeneity Test Results

No	Class	Average	S_j^2	χ^2_{hitung}	χ^2_{tabel}	Test Decision
1	Experiment	74.5	234.81	0.232	3,841	Ho accepted
2	Control	62.63	281.34			

Based on Table 4, the homogeneity test data using the Bartlet test obtained an average of the experimental class of 74.5 and an average of the control class of 62.63. Then the experimental class variance was obtained at 234.81 and the control class variance was 281.34. Based on this, χ^2_{hitung} was obtained at 0.232 and χ^2_{tabel} was obtained at 3.841. Therefore, $\chi^2_{hitung} < \chi^2_{tabel}$, namely 0.232 < 3.841, meaning that the test decision states that Ho is accepted, then both populations have the same or homogeneous mathematical problem-solving ability data variances. In this case, there is no difference in variance between the data on students' mathematical problem-solving abilities in the experimental class and the data on students' mathematical problem-solving abilities in the control class, because the samples come from the same grade level.

Hypothesis Testing

After the prerequisite tests are met, namely the normality test and the homogeneity test, the next step is to conduct a hypothesis test. The hypothesis test used in this study is using the one-way ANOVA test. Based on this, the data obtained from the calculation of the hypothesis test using the one-way ANOVA test are as follows:

Table 5. Summary of One-Way ANOVA Test Results

No	Class	Total	Average	F_{hitung}	F_{tabel}	Test Decision
1	Experiment	2235	74.5	8.18	4.00	Ho was rejected
2	Control	1879	62.63			

Based on Table 5, the results of the hypothesis test calculations using the one-way ANOVA test obtained the following results:

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Hypothesis 1

Based on the calculation results that have been carried out using the one-way ANOVA test, the total value in the experimental class using the PBL learning model assisted by LKPD was 2235 and the average value was 74.5. Furthermore, the total values in the control class using the cooperative learning model were 1879 and the average value was 62.63. In addition, from the calculation of the hypothesis test using the one-way ANOVA test, the F_{hitung} value was 8.18 and the F_{tabel} value was 4.00. Therefore $F_{hitung} > F_{tabel}$, namely 8.18> 4.00, which means that the test decision states that Ho is rejected, so there is a difference in the problem-solving ability of students who use the PBL learning model assisted by LKPD with the mathematical problem-solving ability of students who use the cooperative learning model.

This happened because of the implementation of the PBL model assisted by LKPD in learning in the experimental class.In line with previous research conducted by (Bay et al., 2024) conclude that the learning model PBL assisted by LKPD better in improving students' problem solving abilities. In this study, by using the learning model PBL assisted by LKPD, then at the stage of guiding individual and group investigations, the results obtained were that students could participate in discussion activities and could work well together between group members. In accordance with research conducted by (Supraptinah, 2019) conclude that in learning with the PBL model, students who are usually passive in groups, due to the influence of friends in the group, are seen starting to actively participate in group activities. Students discuss in groups to exchange ideas, work together and are actively involved in solving problems given independently, students can use the problem-solving stages well, namely students can write down the stages of understanding the problem by writing down what is known and asked from the problems given, planning solutions, solving problems according to plan, and checking again even though at the stage of checking again students in groups only write down their conclusions without being accompanied by proof of the answers obtained. This is in accordance with previous research conducted by (Astuti, 2021) conclude that the model PBL assisted by LKPD can involve students actively in the learning process and in obtaining problem solving results, this can be seen from one of the stages PBL namely the stage of guiding individual and group investigations where students are required to be able to understand, identify, and build their own knowledge in solving problems found in the LKPD.

The success of the PBL learning model assisted by LKPD on mathematical problem solving skills can occur because the PBL learning model assisted by LKPD has several advantages, namely based on the results of the first meeting observation sheet that has been filled in by the observer, it was found that by using the PBL learning model assisted by LKPD, learning in the classroom can be more active because students can work together in groups well. This happens because students who understand the material in the group can provide explanations to students who do not understand the material and by using the help of LKPD, students can be helped in solving problems because there are instructions for working on and assistance that can make it easier for students to solve the problems given independently. This according to previous research conducted by (Rahmayani & Hendriana, 2021) which concludes that the PBL

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learning model assisted by LKPD can support student activity and make students the center of learning activities and by using LKPD which contains instructions and a flow of understanding concepts, students can solve problems in LKPD independently. Apart from the advantages of the learning model PBL assisted by LKPD also has shortcomings, namely based on the observation sheet for the implementation of learning activities that have been filled in by observers, it was found that there were several students who did not pay attention when the teacher explained the material and only chatted with their friends. As stated (Bay et al., 2024) which concluded that when working on LKPD there were still group members who were less active because they had other activities such as playing with their deskmates. Then when solving problems at the re-checking stage, students still had not written conclusions and did not re-check the answers. In line with previous research conducted (Adawiyah et al., 2024) concluded that the stage of checking the correctness of the results was the stage that obtained the lowest average percentage because most students stopped working at the problem-solving stage because students had difficulty in carrying out the re-checking stage because they were not used to doing it.

There are differences in the learning process in the control class that uses cooperative learning, although both classes have the same characteristics in terms of class level and ability, but in the learning process in the control class that uses cooperative learning, during the group discussion process there are still many students who chat. In addition, during the discussion process, students tend to be less active, there are students who just keep quiet, do not help their group members and only rely on one person when solving problems in group discussion activities, resulting in learning being less effective. This can be seen on the observation sheet that has been filled in by the observer, the results obtained are that at the stage of guiding the group to work and learn, each group has not been able to follow the discussion activities properly, because there are students who still need the teacher's help in solving the problems given. This happens because of the lack of understanding of students regarding the material presented by the teacher because students who understand the material find it difficult to provide explanations to group members who do not understand the material, so students cannot work together well and only rely on one student to solve problems in discussion tasks and the others are just busy chatting. In line with previous research conducted by (Solihah, 2016) concluded that in learning, teachers find it difficult to group students who have heterogeneous abilities, and there are students with high abilities who are less accustomed to and find it difficult to provide explanations to their friends.

In learning in the control class, students have not been able to use the problem-solving stages properly, namely students can write the stages of understanding the problem by writing what is known and asked from the problem given, but there are still groups that do not write the stages of planning the solution, then at the stage of solving the problem according to plan there are still groups that are wrong in calculating so that the right answer is not obtained in the problem-solving process, and at the re-checking stage, students in the group only write their conclusions without being accompanied by proof of the results of the answers obtained. This is what causes the difference between the PBL learning

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model assisted by LKPD and the cooperative learning model in improving mathematical problem-solving skills.

Hypothesis 2

Based on hypothesis 2, to find out which problem-solving ability is better between the two learning models, the procedure taken is to conduct a further test. If in the further test there is a significant difference between the averages of the populations being compared, then the largest average indicates a better treatment (Budiyono, 2016). Based on this, the average data obtained for the post-test scores of mathematical problem solving abilities of students in the experimental and control classes are as follows:

Table 6. Recapitulation of the average post-test scores for mathematical problem solving ability

No	Class	Total	Average
1	Experiment	2235	74.5
2	Control	1879	62.63

Based on Table 6, the final average post-test score of students' mathematical problem solving ability in the experimental class using the PBL learning model assisted by LKPD was higher, namely the average post-test score was 74.5, while in the control class using the cooperative learning model, the average post-test score was 62.63. This shows that there is a difference in the average score of students' mathematical problem solving ability using the PBL learning model assisted by LKPD with students using the cooperative learning model. In accordance with what was stated by (Situmorang et al., 2024) which states that the PBL model assisted by LKPD is better in improving students' problem-solving abilities. Therefore, the PBL learning model assisted by LKPD is better used to improve students' problem-solving abilities at SMP Muhammadiyah 1 Metro.

Learning using the PBL model assisted by LKPD which directly involves students in group discussions can improve students' critical thinking skills in solving mathematical problems. This is evidenced by the students in the experimental class being very enthusiastic and playing an active role during learning and each student asked questions and exchanged ideas with their group members so that discussions were created between group members. This is in line with the results of previous research conducted by (Ayunda & Alberida, 2023) which concludes that the PBL learning model assisted by LKPD can activate and build students' critical thinking skills by providing questions contained in the LKPD to train and improve students' problem-solving abilities. LKPD contains steps that are adjusted to the PBL model and work instructions that can help students write down the stages of problem solving in sequence starting from the stages of understanding the problem, planning the solution, solving the problem according to plan and checking it again. Based on this, it can be concluded that the problem-solving abilities of students who use learning models PBL assisted by LKPD is better than the problem-solving abilities of students who use the cooperative learning model at SMP Muhammadiyah 1 Metro.

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Conclusion and Suggestion

Based on the results of the research that has been conducted, it can be concluded that: (1) There is a difference in the problem-solving abilities of students who use the PBL learning model assisted by LKPD with the mathematical problem-solving abilities of students who use the cooperative learning model. (2) The problem-solving abilities of students who use the PBL learning model assisted by LKPD are better than those of students who use the cooperative learning model.

Based on the research conducted, there are suggestions in this research, namely that it is hoped that other researchers can use new learning models that are more effective and creative through the research conducted, so that it can be useful for all groups in the world of education.

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