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# The Influence of Differentiated Learning and Models *Problem Based Learning* on Mathematical Problem-Solving Ability at SDN 5 Gondang

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**Abstrak**
*This research is inspired by the importance of mathematical problem-solving skills for elementary school students and the need for innovation in learning approaches that can accommodate the diversity of students' learning needs. This study aims to determine the effect of implementing differentiated instruction and the Problem Based Learning (PBL) model on the mathematical problem-solving abilities of fifth-grade students at SDN 5 Gondang. The research method used is quantitative with a quasi-experimental design. The population of this study consisted of all fifth-grade students at SDN 5 Gondang. The data collection instruments included a test instrument to measure mathematical problem-solving abilities and non-test instruments in the form of observation sheets and analysis of student worksheets based on differentiated instruction and the PBL model. Data analysis was conducted using SPSS version 31 software through simple linear regression tests. The results showed that: 1) There is a significant difference in problem-solving abilities between students in experimental class 1 (differentiated instruction) and experimental class 2 (PBL model). The significance value obtained through a two-sided test was 0.024 < 0.05, thus it can be stated that there is a statistically significant difference between the problem-solving abilities of students taught using differentiated instruction and those taught using the PBL model. 2) The use of differentiated instruction in experimental class 1 proved to have an effect on students' problem-solving abilities, as indicated by an F-value of 9.480 with a significance level of 0.006 (<0.05). This confirms that there is an effect of the differentiated instruction variable (X) on the problem-solving ability variable (Y). 3) The application of the PBL model in experimental class 2 significantly influenced students' critical thinking skills. An F-value of 11.918 was obtained with a significance value (Sig.) of 0.003. Since the significance value is less than 0.05.*



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## 1. BACKGROUND

Tomlinson (2014) stated that differentiated learning is a teaching approach that adapts learning strategies, content, and methods based on individual students' needs, interests, and abilities. This model aims to ensure that all students receive meaningful learning, albeit at different levels and in different ways. The application of differentiated learning, with its three dimensions of content differentiation, process differentiation, and product differentiation, provides teachers with the flexibility to adapt learning to each student's unique characteristics. Similarly, Pratomo's (2023) research shows that teachers who comprehensively implement the three dimensions of differentiated learning successfully create a more dynamic and participatory learning environment, which in turn improves students' academic achievement in mathematics.

Numerous studies have revealed significant benefits from implementing differentiated learning in educational contexts. One such study, by Sarie (2022), clearly states that differentiated learning offers distinct benefits in learning because it can increase flexibility and enhance students' potential, tailored to their learning readiness, interests, and learning profiles. These findings are reinforced by research by Maharani (2021), who revealed that differentiated learning effectively accommodates the diverse learning styles of elementary school students, resulting in significant improvements in learning motivation and mathematical problem-solving abilities. According to her, this approach successfully creates a more inclusive learning environment that is responsive to students' individual needs.

Previously, it was mentioned that one of the learning models that can be used to improve student learning achievement is the *Problem-Based Learning Model* (PBL). According to Novita (2015), one of the determining factors for student achievement is their ability to deal with problems. In other words, when students are able to solve a problem, they also have good cognitive abilities. Nugraha (2023) stated that the PBL model can bridge the gap between educational responsibility and the development of problem-solving skills in students. This learning model encourages students to think critically and solve various problems. This is supported by research by Hidayati (2021), which shows that the implementation of PBL in elementary school mathematics learning significantly improves students' mathematical problem-solving abilities.

The Problem-Based Learning model is a learning model where students are actively motivated to solve complex problems in real-life situations with four main indicator pillars according to Polya (1973). Siswanti AB. & Indrajit RE (2023) emphasized that *Problem Based Learnings* a learning method that accustoms students to solving problems and reflecting on their experiences based on their previous knowledge, thus enabling the development of thinking skills (reasoning, communication, and connections) in solving meaningful, relevant, and contextual problems. This is reinforced by research by Nurhayati (2022) and Firdaus et al. (2017), which shows that the application of PBL in mathematics learning in elementary schools significantly improves students' analytical abilities and the quality of learning through increased collaborative interactions and the development of systematic problem-solving skills. When faced with a question, students should be able to apply the problem-solving skills they have acquired in order to select and develop their responses, which has the benefit of expanding the thinking process.

The mathematics learning process often implemented by teachers is conventional, where the teacher begins by presenting the subject matter, explaining example problems or how to solve them, practicing with problems, and concluding with homework. With this learning method, students' activities are dominated by sitting quietly and listening, with the teacher dominating the learning process. Active students can be counted on one hand, whether they are actively asking or answering questions, while the rest simply sit quietly listening and are engrossed in playing or joking with their peers. Teachers are faced with diverse interests, talents, cognitive abilities, and psychological factors, often presenting obstacles to creating meaningful learning experiences for each student. Students with different interests and skills often feel disconnected from the material being taught, which affects their motivation and engagement during learning. Furthermore, students' differing cognitive levels also make it difficult for teachers to accommodate the individual needs of each student, especially in classes with diverse backgrounds.

In the context of mathematics education, problem-solving focuses not only on solving problems but also on the critical and analytical thinking processes necessary to find solutions. However, at SDN 5 Gondang, there are indications that many students experience difficulty in solving math problems. This is indicated by students being unable to write or state what is known and what is asked in the problem. Students often misunderstand the meaning of the problem statement, especially for story problems or non-routine problems. As a result, they sometimes immediately try to calculate without having a clear idea of the appropriate strategy or formula to use. Meanwhile, from the teacher's perspective, there is a tendency to take over the problem-solving process rather than allowing students to construct their own knowledge, which is contrary to the principles of constructivism.

## 2. RESEARCH METHODS

This study used a quasi-experimental design with a non-equivalent control group design. This design was chosen because, in practice, the researcher could not randomize the research subjects. In this study, there were two experimental classes, each of which had different treatments applied: differentiated learning and the PBL model. The research sample was students of grades 5A and 5G at SD Negeri 5 Gondang.

Data collection instruments included a math problem-solving test and a worksheet (LKPD). Instrument validity and reliability tests were conducted before the study. Data were analyzed using prerequisite tests (normality and homogeneity) and hypothesis testing using a t-test. *Sapphire Wilk*, *paired sample t-test*, and *I am F.*

## 3. RESEARCH RESULTS AND DISCUSSION

### 1. Trial Class 1 Differentiated Learning

Data regarding students' problem-solving skills are obtained through grades of *pretest, and posttest. The* instrument used was 5 story questions designed based on problem-solving ability indicators in mathematics for fifth-grade elementary school students. The purpose of this test was to measure the level of students' problem-solving abilities. Details of the scores *pretest* and *posttest* from experimental class 1 are presented in the table below.

**Table 4.1 Results of the Pretest and Posttest of Differentiated Learning**

| Implementation of Differentiated Learning | | | | | | |
|---|---|---|---|---|---|---|
| **Range of Values** | **Pretest** | | **Problem-Solving Ability Level** | **Posttest** | | **Problem-Solving Ability Level** |
| | **Frequency** | **Percentage** | | **Frequency** | **Percentage** | |
| 81 < Score ≤ 100 | 0 | 0 | Very high | 2 | 9,52 | Very high |
| 61 < Score ≤ 80 | 4 | 19,04 | High | 10 | 47,61 | High |
| 41 < Score ≤ 60 | 13 | 61,90 | Currently | 9 | 42,85 | Currently |
| 21 < Score ≤ 40 | 4 | 19,04 | Low | 0 | 0 | Low |
| 0 < Score ≤ 20 | 0 | 0 | Very Low | 0 | 0 | Very Low |
| Amount | 21 | 100 | | 21 | 100 | |
| Minimum Value | 26,67 | | Low | 53,33 | | Currently |
| Maximum Value | 80 | | High | 93,33 | | Very high |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rate-rate | 56,55 | | Currently | 67,30 | | High |

At the *pretest level*, students' problem-solving abilities in the class implementing differentiated learning showed the lowest score of 26.67 (low) and the highest score of 80 (high), with an average achievement of 56.55 (moderate). Meanwhile, after the treatment, the results of the *post-test* showed a significant increase with a minimum value of 53.33 (moderate) and a maximum of 93.33, which is included in the very high category, so that the class average became 67.30. This increase indicates that the value of the *posttest* generally exceeds the results of the *pretest*.

Based on the research data, it is clear that the achievements of *posttest* students are superior compared to *pretest*. Thus, it can be concluded that the implementation of differentiated learning contributes positively to improving students' problem-solving abilities.

**2. Trial Class 2 with the Implementation of the PBL (Problem-Based Learning) Model**

Measurement of problem-solving ability in experimental class 2 also uses the value *pretest* and *posttest.* The instrument consisted of five story problems. These problems were adapted from problem-solving ability indicators for mathematics lessons, specifically on the topic of geometric shapes. The goal remains the same: to identify students' problem-solving ability levels. The results of the class test using the PBL model can be seen in the accompanying table.

**Table 4.2 Pretest and Posttest Results of the PBL Model**

| **Implementation of the PBL Model** | | | | | | |
|---|---|---|---|---|---|---|
| **Range of Values** | **Pretest** | | **Problem-Solving Ability Level** | **Posttest** | | **Problem-Solving Ability Level** |
| | **Frequency** | **Percentage** | | **Frequency** | **Percentage** | |
| 81 < Score ≤ 100 | 0 | 0 | Very high | 7 | 33,33 | Very high |
| 61 < Score ≤ 80 | 5 | 23,80 | High | 10 | 47,61 | High |
| 41 < Score ≤ 60 | 10 | 47,61 | Currently | 4 | 19,04 | Currently |
| 21 < Score ≤ 40 | 6 | 28,57 | Low | 0 | 0 | Low |
| 0 < Score ≤ 20 | 0 | 0 | Very Low | 0 | 0 | Very Low |
| Amount | 21 | 100 | | 21 | 100 | |
| Minimum Value | 26,67 | | Low | 53,33 | | Currently |
| Maximum Value | 80,00 | | High | 100,00 | | Very high |
| Rate-rate | 53,65 | | Currently | 76,19 | | High |

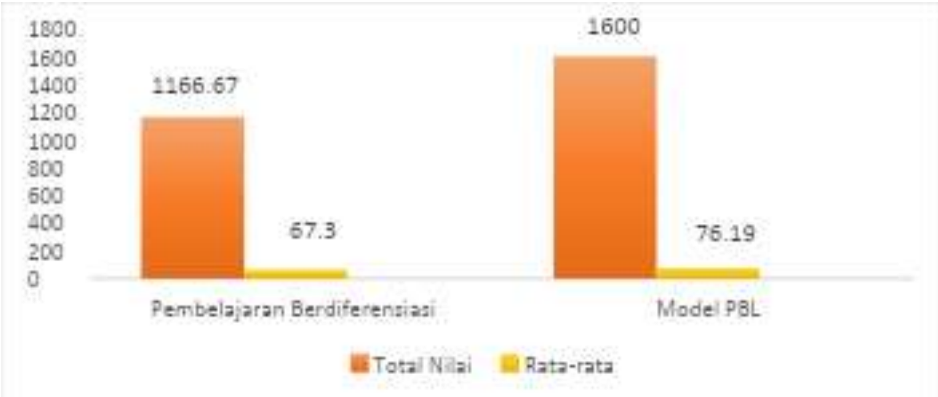
The results of the analysis show that at the time of the *pretest*, the problem-solving ability of students in this class is in the range of minimum values of 26.67 (low) and maximum 80 (high), with an average of 53.65, which is classified as moderate. After the learning process with the PBL Model, there was an increase in the results *post-test,* with the lowest score of 53.33 (moderate) and the highest score of 100, which is included in the very high category, so that the class average rose to 76.19. This increase can be seen from the score *posttest,* which is consistently higher than the value of the *pretest*.

The data confirms that the results *post-test* students significantly exceed the results *pre-test.* This indicates that before the intervention, students had moderate problem-solving skills. After implementing the PBL model, these skills were successfully increased to the very high category. In other words, the PBL model has proven effective in honing students' problem-solving skills.

**3. Comparison of Test Results Between Experimental Classes with Differentiated Learning and PBL Models**

After conducting a comparative analysis of the *pretest* and *posttest f*rom both classes, it was found that the average posttest score of the class that implemented the PBL model was superior to the class that implemented differentiated learning. This indicates that the PBL model is more effective in developing students' problem-solving abilities than differentiated learning. Illustration of the comparison of results *post-test.* Both classes are presented in the following diagram.

**Figure 4.1 Comparison of posttest results for Differentiated Learning classes with the PBL Model**




Based on the figure, the data presents a comparison of post-test results between classes using differentiated learning and classes applying the PBL model, as measured by the total score of all students and the average of each class. In the differentiated learning group, the total score was recorded at 1167.67 with an average score of 67.3. Meanwhile, the PBL model class showed significantly higher achievement with a total score reaching 1600 and an average score of 76.19. These data confirm that the application of the PBL model has a more positive influence on students' problem-solving abilities compared to differentiated learning in fifth-grade elementary school mathematics.

**4. Prerequisite Test Results**

**a. Normality Test of Pretest and Posttest Data**

Normality test is carried out using the data *pretest* and *posttest* from both classes as a prerequisite for conducting a Paired T-Test. A summary of the results of the normality test calculations is presented in the table.

**Table 4.3 Results of the Normality Test of Pretest-Posttest Data on Students' Problem-Solving Abilities in Differentiated Learning Classes and the PBL Model**

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Kelas | Statistic | df | Sig. | Statistic | df | Sig. |
| Hasil Belajar Siswa | Pretest Diferensiasi | .185 | 21 | .058 | .935 | 21 | .171 |
| | Postest Diferensiasi | .166 | 21 | .133 | .928 | 21 | .123 |
| | Pretest PBL | .151 | 21 | .200* | .967 | 21 | .665 |
| | Postest PBL | .129 | 21 | .200* | .961 | 21 | .535 |

In determining the results of the normality test, the table above shows the Shapiro-Wilk test column section because the sample used is small (n<50). Based on this table, the significance value for *pretest* for the differentiation class was 0.171, and the posttest was 0.123. Meanwhile, for the PBL model class, the significance value of the *pretest* and *posttest* were 0.665 and 0.535, respectively. All of these values were above the 0.05 significance level, indicating that the data were normally distributed. Thus, both research classes met the assumption of normality.

**b. Normality Test of Variables X1 and X2 against Y**

Normality tests were also conducted on variables X1 (differentiated learning), X2 (PBL Model) against variable Y (problem-solving ability/posttest) as a requirement for regression analysis. Several tables below further illustrate the results of the normality tests conducted on each of the variables X1 and Y and variables X2 and Y.

**Table 4.4 Results of Normality Test for Variables X1 and Y**

**One-Sample Kolmogorov-Smirnov Test**

| | | | Unstandardized Residual |
|---|---|---|---|
| N | | | 21 |
| Normal Parameters[a,b] | Mean | | .0000000 |
| | Std. Deviation | | 11.33733661 |
| Most Extreme Differences | Absolute | | .152 |
| | Positive | | .152 |
| | Negative | | -.088 |
| Test Statistic | | | .152 |
| Asymp. Sig. (2-tailed)[c] | | | .200[d] |
| Monte Carlo Sig. (2-tailed)[e] | Sig. | | .228 |
| | 99% Confidence Interval | Lower Bound | .217 |
| | | Upper Bound | .239 |

Table 4.4 shows that the significance value of the normality test for variables X1 and Y is 0.228, as seen from the Monte Carlo sig. (2-tailed) value. It can be concluded from the calculation results that the number obtained has a higher calculated value than the r-table value at the Sig. level > 0.05. Thus, variables X1 and Y in this study come from a normally distributed population.

**Table 4.5 Results of Normality Test for Variables X2 and Y**

**One-Sample Kolmogorov-Smirnov Test**

| | | | Unstandardized Residual |
|---|---|---|---|
| N | | | 21 |
| Normal Parameters[a,b] | Mean | | .0000000 |
| | Std. Deviation | | 11.03709999 |
| Most Extreme Differences | Absolute | | .104 |
| | Positive | | .104 |
| | Negative | | -.087 |
| Test Statistic | | | .104 |
| Asymp. Sig. (2-tailed)[c] | | | .200[d] |
| Monte Carlo Sig. (2-tailed)[e] | Sig. | | .792 |
| | 99% Confidence Interval | Lower Bound | .782 |
| | | Upper Bound | .803 |

Table 4.5 indicates that the significance value of the normality test for variables X2 and Y is 0.792, as seen from the Monte Carlo sig. (2-tailed) value. It can be concluded from the calculation results that the number obtained has a higher calculated value than the r-table value at the Sig. level > 0.05. Thus, variables X2 and Y in this study come from a normally distributed population.

**c. Homogeneity Test**

The homogeneity test in this study used posttest data from both classes to ensure homogeneity of data variance. The calculation results showed a Sig. value of 0.774, which is well above 0.05. This confirms that both classes have homogeneous variance.

**Table 4.6 Results of the Homogeneity Test of Students' Problem-Solving Abilities**

**Tests of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Nilai Postest | Based on Mean | .668 | 1 | 40 | .419 |
| | Based on Median | .520 | 1 | 40 | .475 |
| | Based on Median and with adjusted df | .520 | 1 | 38.761 | .475 |
| | Based on trimmed mean | .665 | 1 | 40 | .420 |

Based on the results of the homogeneity test using *Test of Homogeneity of Variances* (*The Lichen Test*) in Table 4.6, it is known that the significance value (Sig.) for the value data *posttest.* The students' problem-solving ability is 0.419 based on the average value. Because the significance value is greater than the standard value of the specified significance value, which is 0.419>0.05, it can be concluded that the data variance from both classes (the differentiated learning class and the PBL model class) is homogeneous or has the same variance.

**5. Hypothesis Testing**

After ensuring the data were normally distributed and homogeneous, hypotheses 1, 2, and 3 were tested using parametric statistics. The testing tools used included the Independent T-Test and Simple Linear Regression using SPSS 31.

**a. Hypothesis 1**

This section contains an explanation related to the proof of the hypothesis regarding whether there is a significant difference between the influence of differentiated learning and the PBL model on students' problem-solving abilities. The hypotheses to be proven are: H1: There is a significant difference between the influence of the PBL model on students' problem-solving abilities, while H0: There is no significant difference between the influence of the PBL model on students' problem-solving abilities. The results of the first hypothesis test are presented in the following table:

**Table 4.7 Hypothesis Test Results**

**Independent Samples Test**

| | | t-test for Equality of Means | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Significance | | | | 95% Confidence Interval of the Difference | |
| | | t | df | One-Sided p | Two-Sided p | Mean Difference | Std. Error Difference | Lower | Upper |
| Hasil Posttest | Equal variances assumed | -2.347 | 40 | .012 | .024 | -8.905 | 3.795 | -16.574 | -1.235 |
| | Equal variances not assumed | -2.347 | 39.177 | .012 | .024 | -8.905 | 3.795 | -16.579 | -1.230 |

The results of the hypothesis test in Table 4.7 show a calculated t value of -2.347 with a degree of freedom (df) of 40. The test was carried out on the Equal row *variances were assumed because* the previous homogeneity test proved that the data were homogeneous. The significance value obtained through the two-sided t-test was 0.024. Considering that the significance value is smaller than the required significance level (0.024 <0.05), it can be said that H0 is rejected and Ha is accepted.

Thus, it can be concluded that there is a statistically significant difference between the problem-solving abilities of students taught using differentiated learning and those taught using the PBL model. The negative sign (-) on the calculated t-value mathematically confirms that the average score of the differentiated learning class is lower than that of the PBL model class. This difference range is then reinforced by the 95% Confidence Interval of the Difference value, where the estimated population mean difference is in the range of -16.574 to -1.235.

**b. Hypothesis 2**

Regarding the answer to hypothesis 2 regarding the influence of differentiated learning (X1) on students' problem-solving abilities (Y), this is presented in the table below:

**Table 4.8 The Effect of Differentiated Learning on Students' Problem-Solving Abilities**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1014.534 | 1 | 1014.534 | 9.480 | .006[b] |
| | Residual | 2033.276 | 19 | 107.015 | | |
| | Total | 3047.810 | 20 | | | |

a. Dependent Variable: Postest Kemampuan Pemecahan Masalah

b. Predictors: (Constant), Pembelajaran Berdiferensiasi

The analysis results obtained a calculated F value of 9.480 with a significance level of 0.006 (<0.05). This confirms the influence of the differentiated learning variable (X) on the problem-solving ability variable (Y). To determine the percentage of the influence of the differentiated learning model variable (X) on the problem-solving ability variable (Y), see the following table.

**Table 4.9 Hypothesis Conclusion**

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .577[a] | .333 | .298 | 10.345 |

a. Predictors: (Constant), Pembelajaran Berdiferensiasi

Based on the data in the table, a correlation value (R) of 0.577 was found. The resulting coefficient of determination (R-Square) value was 0.333, indicating that the differentiated learning model variable contributed 57.7% to students' problem-solving abilities (Y). Statistically, this figure indicates that the influence between the two variables is in the moderate category.

**c. Hypothesis 3**

Regarding the answer to hypothesis 3 regarding the influence of the PBL model (X2) on students' problem-solving abilities (Y), this is presented in the table below:

**Table 4.10 Effect of PBL Model on Students' Problem-Solving Ability**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1269.977 | 1 | 1269.977 | 11.918 | .003[b] |
| | Residual | 2024.594 | 19 | 106.558 | | |
| | Total | 3294.571 | 20 | | | |

a. Dependent Variable: Kemampuan Pemecahan Masalah

b. Predictors: (Constant), Model PBL

Based on the results of the ANOVA test in Table 4.10, the calculated F value was 11.918 with a significance level (Sig.) of 0.003. Since the significance level is less than 0.05, it can be concluded that there is a significant influence of the use of the PBL learning model on students' problem-solving abilities.

**Table 4.11 Conclusion of the hypothesis results**

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .621[a] | .385 | .353 | 10.323 |

a. Predictors: (Constant), Model PBL

The analysis for the PBL Model showed a correlation value (R) of 0.621. The coefficient of determination (R-Square) obtained was 0.385. This indicates that the influence of the PBL Model on students' problem-solving abilities is 62.1%, with the remainder influenced by other external factors. In line with the results of the previous analysis, the level of relationship between the PBL Model variable and problem-solving abilities is also in the moderate category.

## Discussion

This study tested two learning models/methods: differentiated learning and problem-based learning (PBL). Both have advantages in stimulating students' problem-solving abilities. The main characteristic of both models is their learner-centered approach, where the teacher plays more of a facilitator role. The findings of this study indicate that the implementation of differentiated learning contributes positively and has a significant impact on students' problem-solving abilities. This aligns with the basic concept initiated by Tomlinson (2010), which states that differentiated learning is an approach that recognizes individual student differences, including learning readiness, interests, and learning profiles. Furthermore, these findings align with Maharani (2021) who stated that there is an increase in motivation and mathematical problem-solving abilities when students are involved in a learning process tailored to their learning styles.

Theoretically, differentiated learning is also in line with Howard Gardner's Theory of Multiple Intelligences (Almujab, 2023), which states that every individual is endowed with diverse intelligences, including logical-mathematical intelligence, which plays a crucial role in problem-solving. When teachers adapt learning components such as materials, methods, and strategies to students' characteristics, students gain a more meaningful learning experience. Adapting content, processes, and products in differentiated learning allows each student to learn in a way that best suits their strengths, ultimately enhancing their motivation and ability to solve mathematical problems.

Related to research results regarding the influence of the model, *Problem-Based Learning* (PBL) has been proven to be effective and has a statistically significant influence on students' problem-solving abilities. Based on ANOVA data, the significance value obtained is <0.001 (far below 0.05), which proves that the PBL model has a very real influence. The PBL model places real problems as the main context for students to learn critical thinking. As stated by Firdaus et al. (2017), PBL helps students practice problem-solving skills through a process of discussion and exploration. Students not only memorize formulas, but are trained to construct new knowledge through active interaction with the environment, in accordance with the principles of Jean Piaget's Constructivism.

The systematic stages in PBL, from problem orientation to evaluation, help encourage students to actively think analytically. As students engage in individual and group investigations, they learn to gather information and conduct experiments to derive logical explanations. This process directly hones their critical thinking skills before arriving at a final solution.

The hypothesis test findings indicate that the PBL model has a more positive impact than differentiated learning in fifth-grade mathematics. This can be explained by the characteristics of mathematics at the elementary level. Mathematics is often considered the "core" of problem-solving, requiring strict procedural steps. While differentiated learning is excellent at facilitating individual needs (inclusiveness), the PBL model provides a stronger cognitive "pressure" or push that is more specific to the problem-solving structure.

In PBL, students are confronted with authentic and relevant problems that increase learning motivation. The advantage of implementing the PBL model in elementary schools likely lies in the use of contexts closely related to everyday life, such as calculating the area of a garden or the volume of a toy box. As stated by Krajcik and Blumenfeld (2006), the use of relevant contexts helps students understand the application of mathematical concepts more concretely, which is sometimes more difficult to achieve through content differentiation alone without a strong problem-based focus.

The improvement of students' problem-solving abilities in this study can be seen from four main indicators according to Polya (1973); understanding the problem where students can determine what is known and asked, planning a solution where students identify appropriate strategies, solving problems related to how students carry out plans with accurate technical skills and rechecking where students evaluate the results to ensure there are no contradictions.

The PBL model consistently trains these four stages through its learning syntax. Conversely, differentiated learning supports this process by providing a variety of media (visual, audio, and kinesthetic) so that students' obstacles in the "understanding problem" stage can be minimized from the start. Several other studies that align with this research were conducted by Oktaviana and Haryadi (2020), who compared PBL with direct methods. The results showed that the PBL model had a significantly greater impact on students' problem-solving abilities.

Despite differences in effectiveness, the results of this study reinforce the notion that the two approaches should be viewed as complementary strategies. Differentiated learning provides a foundation for inclusivity (who learns), while PBL provides a cognitive framework. The use of diverse technology and media (posters, videos, modules) in the product differentiation stage allows students to demonstrate their problem-solving skills according to their interests. This reduces student frustration with material perceived as too difficult and prevents boredom with material perceived as too easy.

Based on the findings showing the strong significance of the PBL model (Sig < 0.001) on the problem-solving abilities of students at SDN 5 Gondang, there is an important implication that fifth-grade elementary school teachers must begin to shift their focus from direct learning to differentiated problem-based learning.

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