



The Application of Problem-Based Learning (PBL) Model to Improve Literacy Skills of Grade XA Students at SMANOR Tadulako Palu

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ABSTRACT

This study aims to test the effectiveness of the Problem-Based Learning (PBL) model in improving the literacy skills and reading interest of students in class XA at SMANOR Tadulako Palu. This study used a classroom action research design conducted in two cycles involving 22 students. Data were collected through literacy tests and reading interest questionnaires, then analyzed descriptively and through ANOVA and Tukey's HSD tests. The results of the study show a significant increase in literacy skills, with the average score increasing from 38.18 in the pre-cycle to 65.91 in Cycle I and 90.91 in Cycle II ($p < 0.05$). In terms of reading interest, the median score increased from 44 in Cycle I to 65 in Cycle II, with a wider score range and a more even distribution. ANOVA analysis confirmed that the increase was statistically significant ($p < 0.05$). These findings indicate that the implementation of PBL is not only effective in strengthening students' literacy skills, but also in fostering a more equitable interest in reading across different achievement groups. Thus, PBL is recommended as an alternative learning strategy to improve literacy and motivate reading in secondary schools.

Keywords: *Problem-Based Learning (PBL), Literacy, Reading interest*

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INTRODUCTION

The application of appropriate instructional models plays a crucial role in developing students' literacy skills, as effective strategies help students better understand, analyze, and interpret texts (Aulia et al., 2023). Instructional models can also serve as benchmarks in creating active, innovative learning environments that support the development of 21st-century skills, including literacy (Suwanda et al., 2024). One such model is Problem-Based Learning (PBL) (Hindun et al., 2024).

PBL is a student-centered learning model that emphasizes solving authentic problems as the basis of the learning process (Aulia et al., 2023). This approach can improve literacy skills by requiring students to read, comprehend, analyze information, and generate solutions to the given problems (Fajarini et al., 2023). Through PBL, students engage more actively in meaningful reading, group discussions, and reflection, which foster both critical and scientific literacy (Idris et al., 2025). Previous studies also

show that PBL enhances student motivation, collaboration, and digital literacy (Menggo & Ndiung, 2024).

The effectiveness of PBL in improving literacy has been reported in several studies. Fajarini (2023) found that PBL significantly enhanced the literacy skills of fifth-grade students at SDN 1 Ponorogo Regency. Students' test scores improved from an average pretest score of 63.2 to a posttest score of 74.95 in cycle I, with a further increase to 80 in cycle II. Similarly, Syafitri et al (2021) reported that students at SMP Negeri 9 Jambi showed significant improvements in mathematical literacy ($p < 0.05$). Salma et al (2023) also demonstrated that PBL improved scientific literacy among eleventh-grade students at SMAN Balung, with mastery learning rates increasing from 75% in cycle I to 83% in cycle II. These findings indicate that PBL has broad potential for improving literacy across various educational levels.

SMANOR Tadulako Palu is a sports-based senior high school in Palu City, where students' primary focus tends to be non-academic. Observations of grade XA students showed low reading interest toward learning materials, even though the materials included both concepts and problem-solving guidance. Students often struggled to understand basic concepts and complete tasks independently. Interviews further revealed that students were easily bored with long texts without illustrations and preferred teacher explanations over independent reading. These conditions highlight the need for a more interactive learning model to enhance student engagement with texts. While instructional models such as direct instruction, cooperative learning, and discovery learning have been applied, the systematic implementation of PBL for improving literacy among grade XA students at SMANOR Tadulako Palu has not been reported, making further research necessary.

METHOD

This study employed classroom action research, conducted at SMANOR Tadulako Palu, located on Soekarno-Hatta Street, Tondo, Mantikulore, Palu, Central Sulawesi. The subjects were 22 students in grade XA, consisting of 11 male and 11 female students. The study aimed to evaluate the implementation of the Problem-Based Learning (PBL) model in enhancing students' literacy skills. The classroom action research design consisted of two cycles, each comprising four stages: planning, action, observation, and reflection (Arikunto, 2012). The research instruments included literacy tests and reading interest questionnaires. The indicators for the literacy test and reading interest questionnaire are presented in Table 1.

Table 1. Research Instruments and Indicators

No	Instrument	Indicators
1	Literacy Test	Identifying and locating relevant information in texts; Assessing credibility, bias, or validity of data; Applying information to solve contextual problems; Connecting parts of the text and making logical inferences.
2	Reading Interest Questionnaire	Reading Regularity; Reading Enjoyment; Perceived Benefits; Preferred Reading Types; Reading Barriers.

Sources: Adapted from Leu et al. (2015); Guthrie et al. (2000).

The data from the literacy tests and reading interest questionnaires were analyzed using descriptive statistics by calculating mean scores and percentages. Additionally, inferential statistics (ANOVA and Tukey's HSD) were employed to determine significant differences

RESULTS AND DISCUSSION

Results

The average literacy test scores of Grade XA students improved at each research stage. In the pre-cycle, cycle I, and cycle II (Figure 1). The ANOVA analysis results indicate a significant difference between treatments in improving students' literacy scores (Table 2). These results show that the intervention positively and consistently improved students' literacy skills from pre-cycle to cycle II.

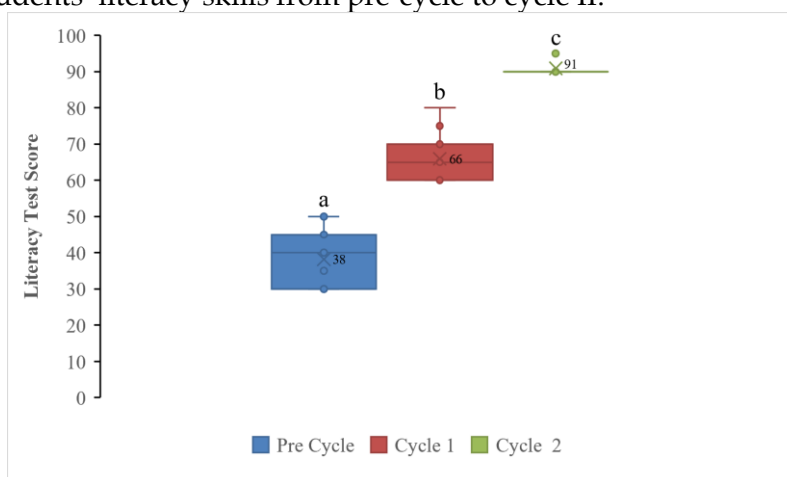


Figure 1. Box plot showing the distribution and average literacy test scores at three stages (Pre-Cycle marked in blue, Cycle 1 marked in red, and Cycle 2 marked in green). The letters 'a', 'b', and 'c' indicate significant differences in the data from the ANOVA test and the BNJ (Beda Nyata Jujur or Honest Difference) follow-up test. The average scores for each cycle are shown by the symbol 'x' on the box plot, with the numbers next to them being 38 (Pre-Cycle), 66 (Cycle 1), and 91 (Cycle 2).

Table 2. ANOVA Table for Literacy Test Scores

Source of Variation	df	Sum Square	Mean Square	F	P-value	F crit
Treatment	2	30609,09	15304,55	538,3782	2,45E-40	3,142809
Error	63	1790,909	28,42713			
Total	65	32400				

The treatment has a degree of freedom (df) of 2, a sum of squares of 30609.09, and a mean square of 15304.55. The F value obtained is 538.3782 with a P-value of 2.45E-40, which is smaller than the significance level of 0.05, indicating that there is a significant difference between the treatment groups. Thus, H0 (no difference) can be rejected.

The error has a degree of freedom of 63, with a sum of squares of 1790.909 and a mean square of 28.42713. The critical F value obtained is 3.142809, which is smaller than the calculated F value of 538.3782, supporting the conclusion that the difference between treatments is significant.

The Tukey's post hoc test further supports these findings by showing that each cycle was significantly different, with cycle II achieving the highest average score compared to cycle I and the pre-cycle (Table 3).

Table 3. Tukey's Post Hoc Test for Significant Differences (BNJ)

Treatment	Average	BNJ value $\alpha_{0,05} = 3,864$
Cycle 2	90,909	a
Cycle 1	65,909	b
Pre Cycle	38,182	c

BNJ table $\alpha_{0,05} = 3,399$

Description: Numbers followed by different letters are stated to be significantly different in the BNJ test at the 5% level.

The questionnaire results show that before the intervention, the majority of students were in the low reading interest category, namely 13 students (59%), while 5 students (23%) were in the medium category and 4 students (18%) were in the high category (Figure 2). In addition, the results of the boxplot analysis show an increase in students' reading interest from Cycle I to Cycle II. In Cycle I, the median score was 44, with a score range of approximately 28 to 75. Meanwhile, in Cycle II, the median score increased to 65, with a higher distribution range, namely 42 to 92 (Figure 3). This increase in students' reading interest was also proven to be significant based on the results of the ANOVA analysis, which showed a clear difference between Cycle I and Cycle II (Table 4).

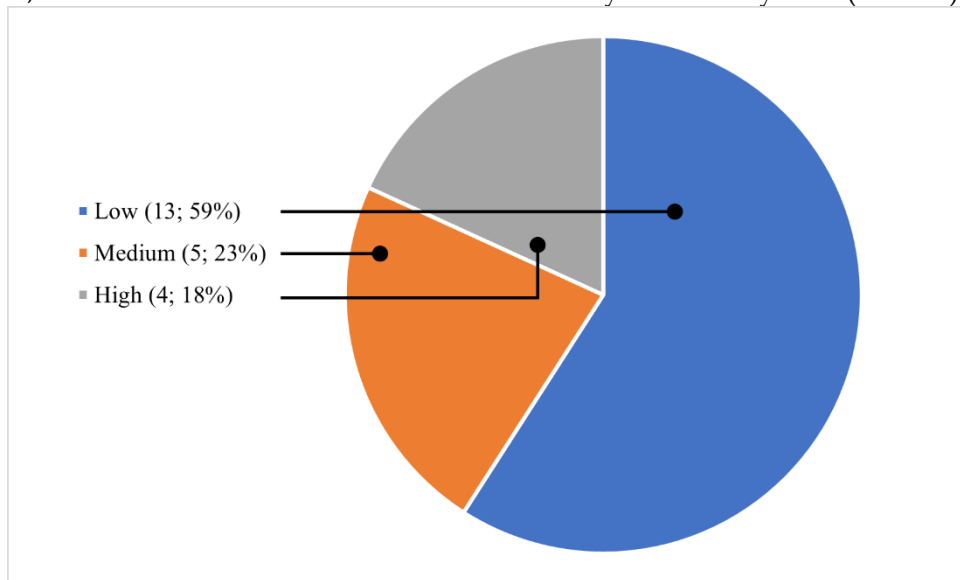


Figure 2. Distribution of reading interest divided into three categories, namely Low (13 students or 59%), Medium (5 students or 23%), and High (4 students or 18%).

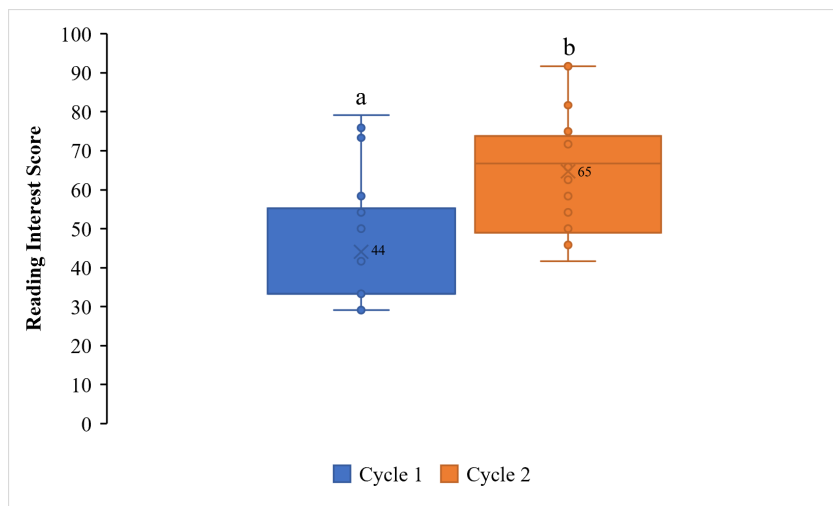


Figure 3. Box plot showing the distribution and average reading interest scores in two stages (Cycle 1 is marked in blue, and Cycle 2 is marked in orange). The letters 'a' and 'b' indicate significant differences in the data from the ANOVA test and the BNJ (Beda Nyata Jujur) follow-up test. The average scores for each cycle are shown by the symbol 'x' on the box plot, with the numbers next to them being 44 (Cycle 1) and 65 (Cycle 2).

Table 4. ANOVA Table for Reading Interest Scores

Source of Variation	df	Sum Square	Mean Square	F	P-value	F crit
Treatment	1	4670,707	4670,707	17,91855	0,000123	4,072654
Error	42	10947,85	260,6632			
Total	43	15618,56				

The treatment has a degree of freedom (df) of 1, a sum of squares of 4670.707, and a mean square of 4670.707. The F value obtained is 17.91855 with a P-value of 0.000123, which is smaller than the significance level of 0.05, indicating that there is a significant difference between the treatment groups. Thus, H₀ (no difference) can be rejected.

The error has a degree of freedom of 42, with a sum of squares of 10,947.85 and a mean square of 260.663. The critical F value obtained is 4.072654, which is smaller than the calculated F value of 17.91855, supporting the conclusion that the difference between treatments is significant.

Discussion

The results of the study indicate that the implementation of the Problem-Based Learning (PBL) model has a positive effect on improving the literacy skills of students in grade XA at SMANOR Tadulako. The average literacy score increased gradually from the pre-cycle to Cycle I and reached its highest value in Cycle II (average = 38.18 in the pre-cycle; 65.91 in Cycle I; and 90.91 in Cycle II). ANOVA analysis showed a very significant difference between treatments $F(2,63) = 538.38$; $p = 2.45 \times 10^{-40}$, and the BNJ (Tukey) follow-up test showed that each stage was significantly different from one another, with Cycle II providing the greatest improvement.

Interpretation of these results shows that PBL systematically encourages student engagement in authentic reading and problem-solving activities – activities that require information seeking, text analysis, group discussion, and reflection. This combination of activities likely improves students' ability to identify relevant information, connect parts of a text, and apply information to solve contextual problems, thereby increasing literacy scores. These findings are consistent with previous research showing the effectiveness of PBL in improving students' literacy and analytical skills (Fajarini, 2023; Salma et al., 2023).

In terms of reading interest, the questionnaire data before the intervention showed that the majority of students were in the low category (13 students, 59%), while after the intervention there was a shift. Boxplot analysis shows an increase in the median reading interest from 44 (Cycle I) to 65 (Cycle II), with an increase in the range of values from approximately 28–75 in Cycle I to 42–92 in Cycle II. ANOVA analysis also showed a statistically significant increase in reading interest $F(1,42) = 17.92$; $p = 0.000123$, and further tests showed significant differences between cycles. These findings indicate that the increase in reading interest did not only occur in students who initially had a high interest but also spread to the group of students with low interest, so that the distribution of reading interest became more even.

Pedagogically, PBL provides a learning context that requires students to engage in purposeful reading because the material is directly related to real-world problems and group assignments. Consistent information-seeking activities and group discussions are likely to increase the perceived benefits of reading and the enjoyment of reading, which is then reflected in an increase in reading interest scores. This is consistent with the presentation of learning motivation theory and field findings that link active participation with increased reading interest (Jumaidin et al., 2024). Based on quantitative data and interpretation of score distributions, the application of PBL has been proven effective in significantly and comprehensively improving students' literacy skills and interest in reading in the context of this study. Therefore, PBL is recommended as an alternative learning model to strengthen literacy quality and reading motivation at the secondary school.

CONCLUSION

Based on the results of classroom action research conducted in two cycles, it can be concluded that the application of the Problem-Based Learning (PBL) model has proven effective in improving the literacy skills and reading interest of students in grade XA at SMANOR Tadulako. The improvement in literacy is reflected in the increase in the average score from 38.18 in the pre-cycle to 65.91 in Cycle I and 90.91 in Cycle II. ANOVA analysis and BNJ follow-up tests show significant differences between stages, confirming that PBL intervention has a real effect on students' literacy achievement.

In terms of reading interest, there was a significant shift marked by an increase in the median from 44 in Cycle I to 65 in Cycle II, as well as a more even distribution of scores across all student groups. ANOVA analysis also confirmed that there were significant differences between cycles. These findings confirm that the implementation of PBL not only improves literacy comprehension, but also successfully fosters students' reading interest gradually and comprehensively. Thus, the PBL model can be recommended as an effective learning strategy alternative to strengthen literacy and motivate students in reading activities at the secondary school.

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