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Learning Problem Based Assisted *Culturally Responsive Teaching* (CRT) and Responsiveness Culture towards Learning Outcomes Elementary School Students

Alman [1], Desti Rahayu [2], Trisna [3]

[1] Muhammadiyah University of Education Sorong, Sorong, Indonesia
[2] Muhammadiyah University of Education Sorong, Sorong, Indonesia
[3] Muhammadiyah University of Education Sorong, Sorong, Indonesia
[a] Alman23@gmail.com
Corresponding Author

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Abstract : Research This aim For study influence implementation of the integrated Problem - *Based Learning (PBL)* model with approach *Culturally Responsive Teaching (CRT)* towards results Study Mathematics student fifth grade at an elementary school in the Sorong area . Research This use method quasi experiment with Nonequivalent Control Group Design . Subject study consists of from two groups : class VA as group experiments that receive PBL learning and VB class as group taught control use method conventional . Data collected through test as many as 25 questions that have been tested validity and reliability previously . Research results show that the average value *N-Gain* on group experiment is 77, while group control get value 69. The t-test results show that mark t_hitung (2.68) more big from t_table (1.99773), which indicates existence significant influence from integration of the PBL model towards results Study students . Findings This strengthen that combination learning based issues and responsive pedagogy to culture can in a way effective increase involvement as well as achievement academic student in eye lesson mathematics .

Keywords : *Responsive culture* , Learning Outcomes , Learning Problem Based .

Abstract: *This study aims to examine the effect of the implementation of the Problem-Based Learning (PBL) model combined with the Culturally Responsive Teaching (CRT) approach on the Mathematics learning outcomes of fifth grade students in an elementary school in the Sorong area. This study used a quasi-experimental method with a Nonequivalent Control Group Design. The subjects of the study consisted of two groups: class VA as the experimental group that received PBL learning and class VB as the control group that was taught using conventional methods. Data were collected through a test of 25 questions that had been tested for validity and reliability previously. The results showed that the average N-Gain value in the experimental group was 77, while the control group obtained a score of 69. The results of the t-test showed that the t_count value (2.68) was greater than the t_table (1.99773), which indicated a significant effect of the integration of the PBL model on student learning outcomes. These findings reinforce that the combination of problem-based learning and culturally responsive pedagogy can effectively increase student engagement and academic achievement in mathematics. Keywords: Cultural Responsiveness, Learning Outcomes, Problem Based Learning.*

INTRODUCTION

Education at school base is foundation important in formation character and abilities academic students . In the context of multicultural society , approach learning that only focus on aspects cognitive without consider background behind culture student risky create gap understanding and motivation learn . Therefore that , it requires a learning strategy that is not only emphasize on skills think level high , but also responsive to diversity culture student .

Basic education own role strategic in form base personality , attitude , and skills think students . At this stage here it is foundation learning throughout life start planted , good from aspect cognitive , affective , and psychomotor . Therefore that , approach learning used at the level school base must capable accommodate need diverse students as well as push involvement active they in the learning process . In the context mentioned , learning No only sued For convey material in a way effective , but also must be capable adapt self with background behind students so that learning become meaningful and contextual .

Problems main thing that often found in practice learning at school base is approach learning that is still ongoing nature conventional , one direction , and less involving student in a way active . The teacher is still dominant as the only one source knowledge , while student play a role passive as recipient information . Learning model like This not enough capable grow ability think critical and skills 21st century which is very necessary in face global challenges . In addition , the material presented often No associated with context life real students , especially with background behind culture those who are diverse . As a result , many student feel difficulty understand material lessons , less motivated , and experienced results low learning .

Indonesia is a country that is rich in diversity culture . Diversity This No only reflected in language , customs customs and values local , but also in method thinking and ways Study students . Unfortunately , this aspect diversity culture This Not yet fully integrated in the learning process . Teachers tend to use uniform approach without consider background behind social and cultural students . In fact , some study show that the learning process is not responsive to culture student can cause low involvement students , gaps results learning , and lack of sense of belonging to environment school .

One approach that has shown promising results in improving student achievement is the application of the Problem- Based model. Learning (PBL). PBL engages students through the exploration of real-world problems, helping them gain conceptual understanding while connecting knowledge to meaningful and authentic contexts (Francisca et al. , 2024; Afni, 2020; Hidayah, Nurmalasari, & Ahmad, 2019). PBL also encourages deeper collaboration and student engagement during the learning process.

Learning Problem-Based Learning (PBL) has long been known as effective approach in increase ability think critical , collaborative , and problem-solving problem . However , its effectiveness can improved with enter element culture in context learning . With Thus , a responsive approach culture become very relevant . Research This focuses on the integration of PBL with approach responsive culture in learning at school basic . The goal is For know to what extent does it influence approach This to results Study students , especially in context multicultural environment

However, a gap in the literature remains, as most studies have implemented PBL and CRT separately. This study attempts to fill this gap by integrating PBL and CRT into an integrated learning model while incorporating culturally contextual learning media,

such as traditional games, to enhance engagement and understanding (Hidayah & Khunaivi , 2022; Lourenço , Duarte, Silva, & Batista, 2025).

Observations at an elementary school showed that 55% of students had not met the minimum learning achievement criteria in mathematics. This was due to several factors, including monotonous learning strategies, low student engagement, and the continued dominance of teacher-centered learning. Conventional learning approaches used in the classroom were unable to effectively motivate students and support the achievement of holistic learning outcomes.

This research is positioned as a continuation and development of previous findings on the effectiveness of PBL and CRT, offering novelty through the combined application of both in a culturally grounded pedagogical design. Diagnostic assessments conducted prior to the study revealed that the majority of students were from the Sundanese ethnic group, supporting the relevance of using local cultural elements in the learning process (Nur Sekreningsih & Juliana, 2021; Azzahro, Handayani, & Winarsih, 2015; Adela & Al-Akmam , 2024).

Therefore, this study aims to test the effect of integrating the Problem- Based model. Learning with a cultural approach Responsive Teaching on the learning outcomes of fifth-grade students in mathematics . Furthermore, this study also examines how the use of traditional games as a learning medium contributes to the creation of engaging, contextual, and meaningful learning experiences.

METHOD

This study used an experimental research design with a quantitative approach, which aims to evaluate the effectiveness of a theory, concept, or model by administering a treatment to one group of subjects and comparing the results with those of another group that serves as a control group. Experimental research is used to explore phenomena by manipulating certain variables and observing their effects on other variables. The primary goal is to determine the presence of an influence or causal relationship by comparing the results between the treatment and non-treatment groups (Husna, 2021).

The researchers used a quasi -experimental method commonly used to test differences in learning outcomes between the experimental and control groups. This study implemented a quasi -experimental design consisting of two groups, namely the experimental group and the control group (Rusdi et al. al. , 2020). The experimental group received learning through the Problem Based model. Learning (PBL) integrated with a culturally approach Responsive Teaching (CRT), while the control group was taught using conventional learning methods. In this context, the PBL model with CRT acts as the independent variable (X) and mathematics learning outcomes act as the dependent variable (Y).

This study uses a quantitative approach with a quasi-experimental design known as Nonequivalent Control Group Design. This design involves two non-randomly assigned groups: an experimental class and a control class. Both groups were given pretests and posttests to measure changes in learning outcomes before and after the treatment. The experimental group was instructed using the PBL model with a CRT

approach, while the control group was taught using conventional methods, including lectures and structured discussions. The research design is illustrated as follows:

Table 1 Research Design

Group	Pre-exam	Treatment	Post-exam
Test	O_1	X (PBL with CRT approach)	Around $_2$
Control	O_3	- (conventional learning)	Around $_4$

Notes:
O_1 and O_3 = Pre-test results of the experimental and control groups
O_2 and O_4 = Posttest results of the experimental and control groups
X = Treatment using the Problem Based model Learning (PBL) integrated with the Culturally approach Responsive Teaching (CRT).

RESULTS AND DISCUSSION

Application of *the Problem Based Learning (PBL)* model with Culturally Responsive Teaching (CRT) towards results Study student Grade V Elementary School material Mathematics . Research This implemented in the odd semester year 2025/2026 academic year with class VA as group experiments and VB classes as group controls , each consisting of 33 students .

Instrument evaluation results Study tested to 21 students from Class VIA. Analysis validity grains question show that of 40 questions election initial , 25 grains question considered valid, while 15 items question the rest stated invalid . The reliability test was conducted with using Cronbach's Alpha produces coefficient of 0.86 which includes very high category . The result , 25 grains valid questions are considered in accordance For used in study main . Examination average pretest score and N-Gain results from class experiments and controls show clear differences in results Study students . Variations This served in the table below This :

Table 2 Summary of Average Scores

Score Recapitulation		Comparison Group Class	
		PBL Class	Class Conventional
Lowest Score	*Pre-exam*	45	32
	Post- exam	76	72
Highest Score	*Pre-exam*	82	80
	Post- exam	100	96
Average Score	*Pre-exam*	53	54
	Post- exam	89	86
Mastery Learning Criteria (%)		100%	94%

Before do testing hypothesis , data undergo testing assumptions beginning For verify that condition For analysis valid statistics have been fulfilled . This process involving implementation of normality and homogeneity tests on data sets .

1) Normality Test

Before continue testing hypothesis , examination assumptions done For ensure that the data meets necessary requirements For analysis reliable statistics . Examination This covers evaluation normality and homogeneity in data set .

- H_0 : L_hitung > L_tabel → the sample comes from a non-normally distributed population.
- H_a : L_hitung < L_tabel → the sample comes from a normally distributed population.

Normality Test Results

No	aspect	L_calculated	L table	Conclusion
1	Getting to know money (PBL Model)	0.0 38	0.1 54	The data normally distributed
2	Getting to know money (PBL Model)	0.04 1	0.1 54	The data normally distributed

normality test showed that the experimental group received instructions through the Problem- Based model. Learning (PBL) has an L_count value of 0.038. This value is compared with the L_table value of 0.154 at a 5% significance level. Because L_count is smaller than L_table , it can be confirmed that the data for the experimental group follows a normal distribution.

Similarly, the control group, taught using conventional methods, produced an L_calculated value of 0.043. When evaluated against the same L_table value (0.154) at a 5% significance threshold, it was found that L_calculated < L_table , confirming that the data for the control group also exhibited a normal distribution.

2) Homogeneity Test

To test the consistency of variance between groups, a homogeneity test was conducted on learning outcomes related to the Pancasila Education topic "Myself and My Surroundings." The purpose of this test was to assess whether the two sample groups exhibited the same variance, indicating homogeneity. The analysis was conducted using Levene's Test in SPSS version 21.

Table 4 Homogeneity of Variance Test

		Levene Statistics	df1	df2	Signatur e.
Pancasila Education Learning Outcomes	Based on Average	2,472 people	1	64	0.121 seconds
	Based on Median	1,418 years	1	64	0.238

Based on Median and with adjusted df	1,418 years	1	63,222 people	0.238
Based on the trimmed mean	2,352 people	1	64	0.130

The results of the homogeneity test of the post-test scores of Pancasila Education on the topic "Myself and My Surroundings" showed a significance value (Sig .) based on the mean of 0.121, greater than 0.05. Thus, it can be concluded that the variance of the post-test scores of the experimental and control groups is homogeneous, which means that both groups come from a population with the same variance.

After the prerequisite tests, where the data are confirmed to be normally distributed and homogeneous, the next step is to conduct hypothesis testing. This analysis is conducted to determine whether the null hypothesis (H_0) will be accepted or rejected. The hypothesis is formulated as follows:

Independent t-Test Results

Hypothesis testing aims to evaluate the differences in average N-Gain scores between experimental groups, which were taught using the Problem- Based model. Learning (PBL), and a control group, which received instruction through traditional teaching methods. The results of the t-test analysis are summarized in the table below:

Table 5 Mean N-Gain t-Test: PBL Class Group vs. Conventional Class

Group	N	Dk	*N Benefits*	t_calculated	t_table
PB L	33	66	7 7	2.68	1.99773
conventional	33		69		years

Statistical analysis yields a calculated t-value ($t_o b_s$) of 2.68, with degrees of freedom (df) = 64 (calculated as 33 + 33 – 2). According to the t-distribution table at a significance level of $\alpha = 0.05$ for a two-tailed test, the critical value ($t_{a/2}$) is ±1.99773. Since hypothesis testing follows a two-tailed approach, the decision rule dictates that the null hypothesis (H_0) should be rejected if $t_o b_s$ exceeds 1.99773 or falls below -1.99773.

Considering $t_o b_s = 2.68 > 1.99773$, the result is within the rejection region, leading to the rejection of H_0 and acceptance of the alternative hypothesis (H_a). This finding supports the conclusion that there is a statistically significant difference in learning outcomes between students taught using the Problem-Based Learning model integrated with the Culturally Responsive Teaching approach and those taught using conventional teaching methods.

Analysis results show that t - value of 2.68 is outside range critical -1.99773 to 1.99773. With Thus , the hypothesis null (H_0) is rejected , and the hypothesis alternative (H_a) is accepted . Because the calculated t (2.68) exceeds the table t (1.99773), then can concluded that there is difference significant in a way statistics on achievements learning topic “Self and Environment Around " in Pancasila Education between students

being taught through an integrated Problem-Based Learning (PBL) model with Culturally Responsive Teaching (CRT) approach with students being taught using learning strategies traditional .

The data furthermore show that group experiment , which received learning integrated PBL and CRT, showing higher N-Gain score tall than group control . Quantitative results This reinforced by classroom observations , which revealed that student in group experiment show level enthusiasm and participation high active . Desire knowledge and involvement they especially seen when the teacher introduces game traditional congklak . For many people, this is First the first time they play , but they with enthusiastic request For Keep going play even after time given session .

In addition , the merger song Sunda region in the learning process get response positive . Although a number of student No fully understand lyrics , music the create atmosphere a lively and rich class culture . These results in line with research by Patras et al . (2025), which highlights How integrate element culture local and device learning gamification to in Pancasila Education can in a way effective increase involvement students and develop competence multicultural .

Findings This in line with study previously . Barrows and Tamblyn (1980) argued that PBL encourages thinking critical and independent students through exploration real -world problems . Similarly , Francisca et al. (2024) found that PBL supports development knowledge in a way collaborative . While that , Ladson-Billings (2012) emphasized the importance of CRT in promote relevant teaching in a way culture with align content education with identity students . Fitriah et al. (2024) further confirm that CRT increases connection emotional and achievement academic student with grow environment inclusive and respectful learning .

As Conclusion , integration of PBL and CRT in study This push creation atmosphere class that is not only challenge in a way intellectual but also responsive in a way cultural and emotional approach combination This succeed bridge gap between draft education abstract and experiential citizenship experienced culture students , so that optimize results learning cognitive and affective .

Conclusion

Based on the results of the research and discussion, it can be concluded that the application of *the Problem Based Learning* (PBL) model integrated with the Culturally Responsive Teaching (CRT) approach has a statistically significant influence on the learning outcomes of fifth grade students in the Pancasila Education subject on the topic "Myself and My Surroundings" at SDN Panaragan 1 Bogor in the odd semester of the 2025/2026 academic year .

The data showed a clear difference in performance between the two groups. The experimental group (Class VA) recorded an average N-Gain score of 77, while the control group (Class VB) scored 69. Furthermore, 100% of students in the experimental group achieved the minimum mastery criterion, compared to 94% in the control group.

The results of the hypothesis test show that the calculated t (2.68) exceeds the t table (1.99773) with 64 degrees of freedom at a significance level of 0.05, so that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. These results confirm that the integration of PBL and CRT is more effective in improving student learning achievement than conventional learning methods, especially in elementary school students in the specified learning period.

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