



Application of Problem-Based Learning with a Culturally Responsive Teaching Approach to Improve Mathematics Learning Outcomes at Junior High School

¹ Novita Dwi Ilmawati, ² Danang Setyadi, ³ Mahmudi

^{1,2} Satya Wacana Christian University, Salatiga, Jawa Tengah Indonesia

ABSTRACT

This research is in the form of classroom action research which aims to improve mathematics learning outcomes for students by implementing the Problem Based Learning learning model and the approach used, namely Culturally Responsive Teaching. This research was carried out in two cycles, each of which contained planning, action, observation and reflection stages. The subjects in this research were 31 students in class VII H of SMP N 2 Salatiga. Data sources were obtained from teachers and students through observation methods, evaluation tests and documentation. By using qualitative descriptive data analysis techniques, the research results show that there is an increase in mathematics learning outcomes for students at the stages of the cycle carried out. Classically, 31 students before the action (pre-cycle) showed learning outcomes of 32.26%, then in cycle I showed learning outcomes of 61.30% and in cycle II showed learning outcomes of 83.87%. Classroom action research by applying the Problem Based Learning learning model with a Culturally Responsive Teaching approach can be concluded as successful in efforts to improve students' mathematics learning outcomes because based on the results it can be seen that the percentage of success indicators has been achieved, namely more than 75%, so that this value exceeds the KKM or 75.

Keywords:

Culturally Responsive Teaching, Learning Outcomes, Mathematics, Problem-Based Learning

Contact: rahayuningsihdewi1@gmail.com

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A. Introduction

Education has a very important contribution to human survival. According to Bangun (2016), education is not just a teaching and learning activity, but is also one of the basic needs that needs to be sought by various parties to provide provisions for a more dignified life. This approach emphasizes that education does not just teach knowledge, but also helps in developing and exploring individual potential.

In the 21st century era of education, the main focus of learning is deep and relevant understanding that can be implemented in everyday society. A key skill such as critical thinking, collaboration, creativity, and communication known (as the 4Cs) is considered very important for students. The Indonesian government has made efforts to improve the education system to face global challenges. One of the initiatives taken is the Merdeka Curriculum, which focuses on a student-centred approach. In this effort, Culturally Responsive Teaching (CRT) is the approach used. This approach incorporates students' cultural backgrounds into the teaching and learning process, helps in the development of critical thinking, improves the skills needed in everyday life, and strengthens social awareness, self-awareness, culture, social empathy, communication, a sense of responsibility, and discipline (Gustiwi, 2017).

Mathematics, referred to as "the basis of all knowledge", is required in various scientific disciplines and can shape human self-awareness and knowledge (Sa'dullah). Therefore, mathematics has become a teaching material from elementary school level to a scientific discipline in universities (Wijaya & Yusup, 2023). Mathematics is a scientific discipline that involves formulas, numbers and mathematical symbols, and is a subject that is used as teaching material at all levels of education, starting from elementary school (Agustyaningrum & Simanungkalit, 2016). In this era of globalization, numeracy skills alone are no longer sufficient; Muzaki & Masjudin (2019) explain that learning mathematics does not only pay attention to skills when doing calculations, but also the ability to implement mathematical concepts in facing real life problems. This view is in line with the opinion of Lukito et al. (2019) considers mathematics to be a subject that is very relevant in everyday situations. So, it is important for students to learn this lesson so they can face challenges in everyday life. Even though it is important in living life, quite a lot of students do not like mathematics because some feel afraid or have difficulty understanding the concepts (Supriatna & Zulkarnaen, 2019). This can result in low mathematics learning outcomes and difficulty achieving expected achievements (Taspiah & Hasan, 2021).

Learning outcomes are skills obtained by students after carrying out various learning activities, which can be analyzed and recorded as an assessment of the knowledge value, skill value and attitude value of those who experience various behaviors (Nurrita, 2018). Komariyah & Laili (2018) explain that learning outcomes are the result of students' hard work, whether carried out individually or in groups, then based on a series of learning activities. Suprihatin & Manik (2020) added the definition of learning outcomes as the skills that students have after participating in learning activities, whether the process is assisted by another party or carried out by themselves. Thus, learning outcomes are transitions that occur in students' levels of knowledge and skills after following the learning process.

Based on the results of observations and interviews with mathematics teachers in class

VII H of SMP N 2 Salatiga, it was found that students' motivation to learn mathematics was very low, so that students' learning outcomes only reached a level below the set average KKM score, namely 75. Thus, only around 38.7% of 31 students were able to complete the comparison material. This limitation is one of the important reasons for conducting this research, with the aim of improving their mathematics learning outcomes.

The learning method in class VII H of SMP N 2 Salatiga uses the Small Group Discussion method, which involves discussions in small groups. However, teaching staff are not optimal in implementing this learning model, because group activities in the student learning process do not participate actively in making contributions. This can be seen during the discussion, students are passive to the point of daydreaming, and during learning they engage in other activities such as chatting with those in their same seat, disturbing their friends, and feeling sleepy when the discussion starts. In accordance with the opinion of Navia & Yulia (2017), students' level of discipline and learning concentration has a direct influence on final learning outcomes. If the level of discipline and concentration in learning is high, the better learning results that can be obtained. However, apart from this, if the level of discipline and concentration in learning is low, then mathematics learning outcomes tend to be low.

There is a way to adopt innovative learning, namely by practicing learning models that are fun and motivate students (Larson, 2018). Teachers must place students as the main subject when teaching material so that they can be maximally involved in the learning process in class (Alghany, 2021). Determining appropriate learning and teaching methods must pay attention to the student's character, the goals to be achieved, and the facilities to support the learning process (Rezeki et al., 2015). One learning model that can be used to improve mathematics learning outcomes is Problem Based Learning (PBL), which, according to Handayani & Koeswanti (2021), can increase knowledge and skills as well as have creative thinking power and improve learning outcomes. The PBL model emphasizes student creativity in solving problems in real life, so it is considered efficient in efforts to improve learning outcomes.

Problem Based Learning (PBL) is a learning method where students are given challenges in the form of contextual problems that require investigation to find solutions (Hendriana, 2018). This approach provides students with a view in connecting lesson material to realistic life situations (Fauzia, 2018). In PBL, students learn by finding solutions to given problems, using the knowledge they already have or making efforts to obtain new perspectives needed to solve the problem. Thus, the learning carried out prioritizes meaning for students. Taspiah & Hasan (2021) in their research explained that the PBL method was used as an effort to improve students' mathematics learning outcomes.

Based on the problems found, the author decided to turn this discussion into a research entitled "Application of PBL (Problem Based Learning) with the CRT (Culturally Responsive Teaching) Approach to Improve Student Mathematics Learning Outcomes in Class VII H of SMP Negeri 2 Salatiga". The aim of this research is to understand the results of applying the Problem Based Learning (PBL) learning model in improving students' learning outcomes in mathematics, especially in comparative material in class VII H of SMP N 2 Salatiga.

B. Research Methods

This Classroom Action Research (PTK) research aims to improve students' learning outcomes in mathematics by applying the Problem Based Learning (PBL) learning model with a Culturally Responsive Teaching (CRT) approach, especially in comparative material. PTK is a type of research used by teachers to improve learning practices in the classroom (Sutama, 2019). The PTK model used follows Kemmis and Mc. Taggart which includes four stages: Plan, Action, Observer, and Reflection, which are carried out in each cycle. The first stage is that planning will be revised for the next cycle based on reflections on the implementation of the previous cycle. Classroom action research is carried out on an ongoing basis and can be stopped if the success criteria are achieved (Maliasih et al., 2017). Kemmis and Mc model. Taggart can be depicted through Figure 1 below.

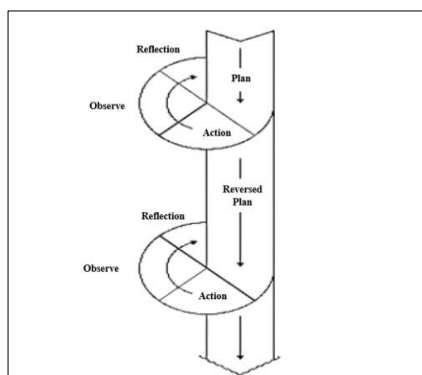


Figure 1. Kemmis & Mc. Taggart PTK Cycle Design (Asrori et al., 2020)

This Classroom Action Research (PTK) was carried out in two cycles and involved 31 students in class VII H of SMP Negeri 2 Salatiga in the 2023/2024 academic year as research subjects. In cycle I, there is a planning stage which includes preparing learning objectives, learning media, curriculum analysis, preparing teaching modules, LKPD, mathematics learning outcomes in phase D, and post-test questions to describe students' learning conditions. Stages of classroom research actions carried out during learning using the Culturally Responsive Teaching (CRT) approach. The next stage is observation carried out simultaneously with action activities using field notes. Then, the reflection stage was carried out in order to evaluate the advantages and disadvantages of the first cycle activities carried out with the tutor. Next, cycle II, namely the planning stage, is carried out by compiling the results of reflection based on the implementation of learning in cycle I. The action stage of cycle II, in learning activities, is carried out by implementing PBL with the CRT approach to mathematics comparative material based on the evaluation that has been designed. At the observation stage, it is carried out by observing changes in behavior as a result of learning in cycle II. Then, in the reflection stage of cycle II, an analysis of the results of changes in learning design on learning outcomes in cycle II was carried out. After cycle II has been completed, the final stage is to analyze the test results and observations that have been carried out.

Data collection techniques in this research include 1) Observation, which involves the practice of observing when carrying out PTK. The focus of this observation focuses on learning and teaching processes and activities, while preparations are made to record

the learning process (Suyoto, 2021), 2) Field Notes are authentic evidence obtained directly from observations in the field. This evidence is in the form of comprehensive master notes, or detailed notes that focus on certain aspects (Nisya, 2019), 3) Tests are carried out to find out how students have achieved their mathematics learning outcomes, 4) Documentation is the collection of classroom action research (PTK) data in the form of photos or videos of learning activities, and other documents that can support research objectives.

The data analysis technique uses descriptive statistical analysis, which aims to define data that has been put together as stated by Sugiyono (in Sari, 2023). The data obtained from the observations was then analyzed for the percentage of completeness using the following formula.

$$\% = \frac{ft}{\Sigma f} \times 100\% \quad (1)$$

Information:

% : Percentage

ft : Completed students

Σf : Total number of students

The percentage of students' mathematics learning outcomes after implementing the PBL model with the CRT approach is calculated and qualified based on the table explained by Purwanto (in Sari, 2023). Students' mathematics learning outcomes can be said to be good if the scores listed on the criteria for completing mathematics learning outcomes are good. The following is a table of qualifications that are used as criteria for completing mathematics learning outcomes in this research.

Table 1. Qualifying Criteria for Completeness of Mathematics Learning Outcomes

Percentage %	Criteria
86 - 100	Sangat Tinggi
76 - 85	Tinggi
60 - 75	Sedang
55 - 59	Rendah
≤ 54	Sangat Rendah

Purwanto (in Sari, 2023)

This PTK is considered successful if the learning results show that the class average score has been exceeded with the specified KKM, namely a score of ≥ 75 with the percentage of students who succeed exceeding the provisions of $\geq 75\%$.

C. Results and Discussion

Result

Students' mathematics learning outcomes in knowledge aspects are obtained from students' post test scores in each cycle. The learning test carried out aims to see the teacher's success in implementing the PBL learning model using the CRT approach in

learning mathematics on comparative material. The following are the results of mathematics learning which are summarized in the recapitulation table including pre-cycle, cycle I and cycle II activities.

Table 1. Recapitulation of Student Learning Results

No	Aspects	Pre-Cycle	Cycle I	Cycle II
1	Total number of students	31	31	31
2	Number of values	1.695	2.265	2.565
3	KKM	75	75	75
4	Average value	54.68	73.7	82.75
5	The highest score	90	100	100
6	Lowest value	10	20	60
7	Complete number of students	10	19	26
8	The number of students is incomplete	21	12	5
9	Percentage of learning completeness	32.26%	61.30%	83.87%

Pre-Cycle Conditions

The author carried out this pre-cycle action with the aim of knowing the mathematics learning outcomes of class VII H students at SMP N 2 Salatiga. Students are given questions related to comparative material to determine their ability to understand the material. Based on Table 1, it can be understood that in pre-cycle conditions, the average student score was 54.68, and only 32.26% of students succeeded in meeting the completion criteria. These results indicate that student learning achievement in the pre-cycle is included in the very low category. To improve learning achievement, the author made changes to the learning approach by applying the PBL model with a CRT approach in cycle I.

Cycle I Conditions

Based on pre-cycle conditions, in cycle I the author introduces the PBL learning model with the CRT approach to improve mathematics learning achievement. Based on Table 1. after implementing the PBL model with a CRT approach at the beginning of cycle I, it was seen that students' mathematics learning outcomes had increased. The average post-test score reached 73.7, with 20 students meeting the success criteria of 61.30%. However, the research has not achieved success according to the indicators set, because there are still some children who still need guidance to achieve the criteria for completeness, so it is necessary to implement cycle II to make improvements by providing special guidance for students who have not yet achieved completeness.

Cycle II Conditions

Based on the conditions of cycle 1, in cycle II, there were post-test results which showed further improvement with an average score reaching 82.75. Of the 26 students, 83.87% succeeded in meeting the success criteria. This shows that in cycle II student learning outcomes were in the high category, in accordance with the success criteria that had been set. Thus, this research succeeded in achieving its objectives.

Thus, it can be concluded that there is a significant increase in student learning outcomes from pre-cycle to cycle I and then to cycle II. This was shown pre-cycle, the average student score was only 54.68 with a very low learning completion percentage,

32.26%. Thus, improvements were carried out in cycle I. Furthermore, in cycle I, the students' average score increased to 73.7 with a learning completion percentage of 61.30%, which showed quite a significant increase. The increase in the average student score was 19.02 and the percentage of learning completion increased by 29.04%, indicating that the improvements made in the first cycle stage had a significant effect on student learning outcomes.

Next, the research continued with cycle II, where student learning outcomes showed a significant increase. The students' average score increased to 82.75, and the learning completion percentage reached 83.87%, which is in the high category. The increase in learning outcomes from cycle I to cycle II was very significant, with an increase in the average student score of 10.05 and an increase in the percentage of learning completion of 22.5%. Thus, the average student score and student completeness learning outcomes in cycle II have met the established standards, namely the minimum average score for student learning outcomes is 75 and the minimum score for the percentage of complete learning outcomes is 75%. So, this research was stopped at cycle II stage because the success criteria had been met. The results of this research show that based on efforts to apply the Problem Based Learning (PBL) model with a Culturally Responsive Teaching (CRT) approach, it can improve student learning outcomes significantly.

Discussion

This research was conducted by applying the Problem Based Learning (PBL) learning model with a Culturally Responsive Teaching (CRT) approach which aims to improve the mathematics learning outcomes of class VII H students at SMP Negeri 2 Salatiga. This statement is in line with research conducted by Dahlia (2022) which states that using the Problem Based Learning (PBL) learning model can improve students' mathematics learning outcomes. Apart from that, Hendriana (2018) also stated in his research that by implementing the Problem Based Learning (PBL) learning model there was an influence as evidenced by the increase in student learning outcomes reaching above the average, namely 82.44.

The interpretation of this research shows that the application of the Problem Based Learning (PBL) learning model with the Culturally Responsive Teaching (CRT) approach can improve the mathematics learning outcomes of class VII H students at SMP Negeri 2 Salatiga. After conducting this research, the author found that the results of this research showed that students who took part in learning using the Problem Based Learning (PBL) model with a Culturally Responsive Teaching (CRT) approach had a significant increase in mathematics learning outcomes.

This interpretation is based on the results of data analysis which shows that students have better abilities in applying mathematical knowledge in real life. Apart from that, this research shows that students who take part in learning using the PBL model with a CRT approach can actively participate in the learning process.

The difference between this research and previous research is that this research has integrated a more specific CRT approach and focuses on local culture such as Wiwitan Culture, so the results of this research are more relevant and have broad implications in improving students' mathematics learning outcomes. The difference between this research and previous research is that this research adds more specific local cultural aspects and focuses on improving students' mathematics learning outcomes.

Based on this, it is important for schools to provide an environment that supports student development, especially in applying values in real life. In other words, all school institutions and teachers have a shared commitment to integration in order to jointly facilitate students. Mathematics education is not just for students to be able to count, but

also learning for application in society. Through the methods and methods in this research, schools can prepare to understand the challenges of the times and provide insights that students can use both in the school environment and in the community.

D. Conclusions and Suggestions

Based on the PTK results, it was found that the integration of the PBL model with the CRT approach was proven to improve students' mathematics learning outcomes in comparative material in class VII H of SMP N 2 Salatiga. This effort allows students to solve problems related to the culture surrounding their life, so that learning activities become more meaningful and relevant to life situations. The results of the research show an increase in students' mathematics learning outcomes after taking action in each cycle. This can be seen from the pre-cycle, there were 10 students or 32.26% of students who completed. Then during cycle I, an increase occurred with 19 students completing, increasing to 61.30%. In cycle II, further improvement occurred with 26 students completing, increasing to 83.87%.

The results of the research suggest to several related parties, namely: (1) Teachers need to adopt a more innovative teaching approach to provide knowledge that is relevant to what happens in their daily environment, (2) The Problem Based Learning learning model is recommended as a special strategy in order to improve the quality of learning and teaching in schools, and (3) Further research can expand the scope by incorporating alternative learning models.

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