

# The Impact of PBL with CRT-TaRL Approach on Mathematics Learning Outcomes at SMKN 1 Madiun

**Khuznul Ma'rifah Hasbullah**

<sup>1</sup>Universitas PGRI Madiun, Indonesia

\*email Koresponding; [khuznulsyarif2@gmail.com](mailto:khuznulsyarif2@gmail.com)

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## ABSTRACT

This Classroom Action Research (CAR) aims to improve mathematics learning outcomes for 33 students of class XI AV 1 at SMK Negeri 1 Madiun by implementing the Problem-Based Learning (PBL) model combined with a Culturally Responsive Teaching (CRT)-based Teaching at the Right Level (TaRL) approach. PBL was utilized to foster active problem-solving, while TaRL addressed diverse initial ability levels through grouping. CRT integrated local cultural values to make learning more relevant. The study was conducted in two cycles following the planning, implementation, observation, and reflection stages. Data were collected through Student Worksheets (LKPD), individual formative tests, and observation sheets. The motivation indicator was measured using an observation scale focusing on student engagement, persistence in tasks, and enthusiasm toward cultural-based learning. The results showed a significant increase in mastery learning (ketuntasan). In Cycle I, 72.7% of students achieved the minimum criteria, which increased to 87.8% in Cycle II. Furthermore, observation data confirmed improved student motivation, evidenced by higher participation levels and a positive response to the integration of cultural values in the classroom

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## Corresponding Author:

**Khuznul Ma'rifah Hasbullah**

email Koresponding; [khuznulsyarif2@gmail.com](mailto:khuznulsyarif2@gmail.com)

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## 1. INTRODUCTION

Education is one of the paths to a person's success in achieving success in the future. This success can be easily achieved if students are successful in their education. Success in education certainly cannot be separated from the learning outcomes obtained by students. Learning outcomes can be defined as learning achievements that can be achieved by students in the teaching and learning process activities by bringing a change and shaping of a person's behavior in a certain educational system (Maharani et al., 2019). Learning outcomes can be obtained from learning outcome tests at the end of learning in the form of independent or group assessments given by the teacher of each subject. The assessment has the purpose of determining learning ability, namely mastery of the subject

matter that has been studied and to determine the achievement of learning goals by students. Mathematics learning is one of the supporting subjects to support the process of achieving maximum student learning outcomes. Mathematics plays a role as a support for other sciences and a support for technological advancement (Mayawati, 2020). Susanti and Susiani (2023) said that the capacity of students to learn mathematics and solve mathematical problems depends on their ability to understand mathematical concepts or ideas. Mathematics learning also plays a role in developing logical, critical, and creative thinking skills that every human being needs to face all challenges in the future. However, this is different from the thinking of students who think that mathematics is difficult to learn, so many of them do not like learning mathematics.

Based on interviews conducted with mathematics teachers in grade XI of SMK Negeri 1 Madiun, it shows that the mathematics learning outcomes of students in grade XI AV-1 have not shown significant development. In fact, there are still many students who get low scores when formative and summative assessments are carried out. They consider that math subjects are difficult for them. This is in accordance with the opinion of Kusumaningsih et.al (2019), who explained that there are still difficulties for students in learning mathematics material so that it affects their learning outcomes. The material studied by students was statistics on group data, but it was found that the prerequisite material regarding mean, median and mode in single data had not been understood in depth by students. The teacher also said that there has been no implementation of the initial assessment so that the initial abilities of students have not been mapped. This will affect the use of the application of an approach that is in accordance with the initial ability.

After observations were made on the mathematics learning process in class XI AV 1 SMK Negeri 1 Madiun. Students look less enthusiastic when the learning process takes place, they still often operate cellphones when the teacher gives explanations and when the discussion process takes place they rely on their friends for answers. This happens because the learning model used by teachers is not student-centered and the discussion group is only given a Student Worksheet (LKPD) containing questions about the teacher's explanation, not in the form of problems that can increase students' interest in providing creative ideas they have in solving these problems. So there needs to be an improvement in the use of learning models that can

Questions on LKPD are also still common and do not adjust to students' initial abilities. The use of LKPD that is not in accordance with the initial ability of students will result in a gap in ability in the classroom. Students who feel that their abilities are brought on average will find it difficult with the LKPD given by the teacher. Moreover, the LKPD is the same between one group and another so that there is no difference in the questions. The LKPD used by teachers is not in accordance with the implementation of the independent curriculum which emphasizes deepening concepts and strengthening competencies in essential material content to improve student learning outcomes (Wahyudin et al., 2024). Therefore, there needs to be an improvement in the use of LKPD to improve student learning outcomes using *the Teaching at the Right Level* (TaRL) approach. Students in the 21st century also understand the development of technology and technology will lead them to know foreign culture. In order to preserve regional culture, the LKPD must be equipped with a *Culturally Responsive Approach* (CRT) so that students can also help preserve their respective regional cultures.

*Problem based Learning* (PBL) is one of the learning models that can encourage active involvement of students in the learning process. *The Problem Based Learning* (PBL) learning model is a

learning process that starts with ideas and builds an understanding of the ideas that students already have (Widayanti, 2020). PBL is a learning model that has the characteristics of real problems as a context to learn to think critically for students and hone problem-solving skills, as well as gain knowledge (Duch in Rahmawati, 2020). The PBL learning model aims to provide challenges for students to pose problems and solve more complex problems so that they can increase their activeness in expressing their opinions, rallying cooperation, developing leadership, and developing students' analytical skills (Rahmat, 2018). The PBL model also provides meaningful learning because students can gain understanding based on their own experience after finding the right solution to a problem. Teachers only act as facilitators in the learning process, for example, providing LKPD facilities as discussion materials. The Student Worksheet (LKPD) is a sheet that contains guidelines for students to carry out their learning activities, LKPD is an order for students to carry out learning activities such as reading, calculating, writing, discussing, and even analyzing and/or evaluating (Soekamto, 2020). In addition, LKPD is also a tool that can help teachers to find out whether the material taught has been understood by students or not. LKPD is one of the learning resources that can be developed by educators as facilitators in learning activities (Sari et al., 2020). This is because LKPD is an easy-to-use means of learning (Saryantono & Noviyana, 2017).

*Teaching at the Right Level* (TaRL) is a learning approach that focuses on the initial abilities that students have. TaRL is learning that pays attention to the capacity and needs of students' interests (Ningrum et al., 2023). This TaRL approach adjusts learning based on students' abilities rather than their age. The *Culturally Responsive Teaching* (CRT) approach is a learning method that requires the equal rights of every student to receive instruction regardless of the student's cultural background (Gay, 2000). The integration of CRT applied in learning provides another view of CRT, which emphasizes the improvement of cultural competence through the formation of sensitivity to the diversity of students (Pedroso et al., 2023). The use of the CRT approach is also felt to increase the motivation of students because students will better understand the learning material if it is associated with the cultural conditions of their school environment.

Based on the description above, the researcher feels the need to apply a PBL learning model that uses the TaRL and CRT approaches to improve students' mathematics learning outcomes. Therefore, the researcher conducted a class study entitled "Application of the Problem Based Learning Model with a *Taching at the Right Level* (TaRL) Approach based on *Culturally Responsive Teaching* (CRT) to Improve Mathematics Learning Outcomes of Grade XI Students of SMK Negeri 1 Madiun".

## 2. METHODS

This research was carried out in 2 mathematics learning cycles, namely cycle I and cycle II. Each cycle includes 4 stages, namely planning, action, observation, reflection (Sugiyono, 2016). The initial knowledge of students is also very important to know so that the group formed is appropriate and in accordance with the approach used. Diagnostic tests are carried out before the learning cycle is carried out, so that groups that are in accordance with the initial abilities have been formed when the learning cycle is carried out. This research instrument uses the scores from the Student Worksheet (LKPD) which is used in the discussion process and the students' individual test result sheets. After learning is completed in each cycle, the learning outcomes of students obtained from the instrument are evaluated by comparing their achievements that have been processed with the minimum standards set, namely

the KKM (Minimum Completeness Criteria). Students are said to be complete in learning if they get the same score or above the KKM that has been agreed upon by the subject teacher, at SMK Negeri 1 Madiun, the KKM for mathematics subjects is 76. A class is considered successful if at least 85% of its students have reached the KKM (Saidi, 2022). Considering that there are two instruments used in this study, namely LKPD and individual test sheets, then from the two results are averaged to get the final score of each student, after which the score obtained by the student can only be seen and compared with the KKM.

The data analysis used in this study is quantitative descriptive. This technique is carried out by organizing the data obtained in the form of numbers and percentages so as to get common conclusions. The indicator of success in this study is the progress of student learning outcomes in each learning cycle that has been carried out.

### 3. FINDINGS AND DISCUSSION

In this study, an analysis of 582 data in the form of articles related to the management of Christian religious education in the last 5 years, namely from 2020 to 2024. The results show that almost half or around 45.44% of the total data comes from 2022 and 2023. 2021 was the year with the highest data percentage, at 26.46%, while 2020 had the lowest data percentage with only 17.24%. This illustrates the increasing trend in the number of publications related to Christian religious education management in recent years, especially in 2022 and 2023.

Before starting the cycle, the researcher has conducted a diagnostic assessment carried out before the cycle to determine the initial ability of the students. Furthermore, based on the results of the diagnostic assessment, students were divided into 6 groups with 3 levels of ability, namely 2 groups of low ability, 2 groups of medium ability and 2 groups of high ability. This research is carried out in 2 learning cycles, each cycle goes through 4 stages, namely *planning*, *implementation*, *observation*, and *reflection*. The results of the research in each cycle that has been carried out on students in grade XI AV – 1 SMK Negeri 1 Madiun can be seen in the table below:

**Table 1.** Improvement of Mathematics Learning Outcomes Class XI AV - 1

Cycle	Number of Students		Percentage
	Conclusion	Incomplete	
Cycle 1	24	9	72,7%
Cycle 2	29	4	87,8 %

Based on the table above, it can be seen that students whose scores are less than KKM amounted to 9 participants in the first cycle and decreased to 4 students in the second cycle. In addition, there was an increase in the percentage of completeness of student learning outcomes from 72.7% to 87.8%. The percentage is in accordance with the expected standard of completeness, which is more than 85%, so that the class has been said to be successful in learning mathematics. It can be said that this success is in line with research conducted by (Asrobanni et al., 2024) and (Jauhari et al., 2023) that the implementation of TaRL with PBL results in a significant increase in student learning achievement as well as increasing students' active participation during the learning process. In addition, cultural integration also makes it easier for students to understand problems and get to know the culture of the surrounding community more closely.

*Discussion: The discussion is highlighted through the title and subtitles of the section when needed*

#### Cycle I

The steps at the planning stage in the first cycle begin with consultation with the teacher regarding learning tools including teaching modules, learning materials, learning media and LKPD that will be

used for research. The implementation of cycle I uses the syntax of the PBL learning model. The researcher who is also a learning teacher has prepared three types of LKPD that have different assistance provided on the answer sheet and are equipped with the culture of the surrounding community which is implemented in the problems in the LKPD. The assistance or *scaffolding* provided to the group of students who have the ability to develop is more than the group of students who have proficient and very proficient abilities. In addition, developing groups are also given assistance when working on LKPD. The observation stage is carried out by paying attention to the activities of students from the beginning of learning to the end of learning. In the reflection stage, the researcher evaluates and improves the implementation of the first cycle before starting the second cycle.

This first cycle was held in two meetings, each meeting lasted 3 x 45 minutes. The implementation of learning and observation is carried out at the first meeting and then for reflection to be carried out at the second meeting based on the results of observations that have been obtained. The learning results and observations of students in the pertama cycle there were 9 students who got scores below the KKM. The highest score obtained by students in this cycle was 92 and the lowest score was 35. There has been progress in this first cycle compared to the achievement of the learning outcomes of the previous students, but the presentation of completeness is not in accordance with the classical presentation, which is more than 85%. There are still many things that need to be improved in the first cycle of this learning, for example, the activeness of students in groups and their individual activity. In addition, the learning model using the problem-solving process is still relatively new for them so there are still groups who experience confusion in finding the right solutions and learning resources, for which teachers make some improvements in the second cycle.

#### Cycle II

The steps in each stage in cycle II are the same as cycle I, only at the planning stage the teacher is more mature in preparing for the LKPD, besides that at the implementation stage the teacher motivates students more so that they are enthusiastic in learning and play an active role in it. This second cycle was carried out in one meeting, namely 3 x 45 minutes. Based on the results of implementation and observation, there were 4 students who had scores less than KKM, the lowest score of students in class XI AV – 1 was 70, and the highest score was 100. The percentage of completeness in the classroom is 87.8%. The presentation has shown that the mathematics learning in the class can be said to be successful because it has exceeded 85%.

Based on the discussions in cycle I and cycle II, researchers can be determined to successfully improve student learning outcomes by conducting learning using the PBL model and the CRT-based TaRL approach. Most of the research that has been carried out does not include cultural elements in it only using the TaRL approach, but when cultural elements are integrated, the results obtained from the research do not disappoint, in this case students actually get more benefits because they can get to know the culture of the surrounding community. This is also strengthened by research (Kholifah, Wijayanti, & Faulina, 2022) which states that mathematics is found in various fields of life and can be conveyed through culture.

#### 4. CONCLUSION

Learning using the *Problem Based Learning* (PBL) model with *the Teacher at The Right Level* (TaRL) approach based on *Culturally Responsive Teaching* (CRT) has been proven to improve the learning outcomes of grade XI students of SMK Negeri 1 Madiun. This can be seen from the increase in the number of students who get scores above the KKM in the two learning cycles that have been carried out. The presentation of students' completeness increased by more than 10% from 72.7% to 87.8%. In addition, the lowest score obtained by students also increased rapidly, which was initially 35 in the first cycle, increasing to 70 in the second cycle. The PBL learning model provides a new experience for

students to find solutions to a problem, teachers act as facilitators to help students who have difficulties in the process of finding solutions to the given problems. The TaRL approach helps teachers to be fair to students because each student has different initial abilities. So it is appropriate to be given different treatment in the learning process to adjust what they need. In addition, cultural integration implemented on problems also provides many benefits. Students become more familiar with the culture around them and can preserve the culture.

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