Journal of Indonesian Primary School

**Journal of Indonesian Primary School**
Volume 1 (4) 93 – 104 December 2024
ISSN: 3047-7212
The article is published with Open Access at: https://journal.mgedukasia.or.id/index.php/jips

# Problem Posing as a Learning Model to Improve Primary School Students' Mathematics Learning Outcomes in Gayo Lues

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**Abstract:** Mathematics is one of the most important subjects for students to master in elementary school. However, there are many students who do not like mathematics learning which has an impact on their low learning outcomes in mathematics learning. The results of the preliminary study of this study indicate that students' mathematics learning outcomes are still very low. This is evidenced by the results of the documentation of student grade lists, there are still many students who do not reach the minimum completion criteria set by the school. This study aims to improve students' mathematics learning outcomes in elementary schools by applying the problem posing model. This study is a classroom action research with the Kemmis & Mc Taggart design. This study was conducted in three cycles with the stages of each cycle being planning, action, observation and reflection. The subjects of this study were fourth grade elementary school students. Data were collected using test and observation techniques. The data obtained were then analyzed using descriptive statistical techniques. The results of the study indicate that the problem posing model can improve students' mathematics learning outcomes in elementary schools. This is evidenced by looking at the results of the first cycle test which achieved a classical completion percentage of 52.63%. Then in the second cycle the classical completion percentage increased to 68.42%. The achievement in the third cycle increased again to 84.21%. The results have reached the target indicator of the success of this study. Thus, the problem posing model can be used as an alternative for use by teachers in mathematics learning in elementary schools.

**Keywords:** Problem posing, learning outcomes, mathematics learning.

**Received** October 30, 2024; **Accepted** December 21, 2024; **Published** December 31, 2024

**Citation**: Rahmah, S., & Lubis, A. H. (2024). Problem Posing as a Learning Model to Improve Primary School Students' Mathematics Learning Outcomes in Gayo Lues. *Journal of Indonesian Primary School*. 1(4). 93 – 104.

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## INTRODUCTION

Mathematics is a science that trains reasoning skills to think logically and systematically in solving problems and making decisions (Khatimah & Sugiman, 2019). This shows that mathematics is a science that is closely related to reason or reason. Mathematics is formed empirically based on human experience which is solved by analyzing through reasoning until it forms concepts that are easily understood by others and can be applied appropriately (Agustina, 2019). Furthermore, mathematics learning is interpreted as one

of the processes of providing students with experience through a planned activity, so that students understand the mathematics material being studied (Kurniawati & Ekayanti, 2020; Lubis, 2019). Teachers need to plan activities that can attract students' interest in learning during the mathematics learning process from the beginning to the end of learning, so that students can achieve the expected learning outcomes (Cahyati & Rhosalia, 2020; Dasopang et al., 2023; Lubis & Wangid, 2019). In the process of learning mathematics, student activity is needed to achieve learning outcomes (Jagom et al., 2020; Laksono et al., 2016). Therefore, teachers need to know how to encourage student activity during the learning process (Nurliza et al., 2024; Putra et al., 2023; Silvia et al., 2023).

According to Ausubel (Wolfolk, 2016), mathematics learning must be meaningful to students, so that they can solve problems in their lives. Meaningful learning can be realized through student involvement in concept formation and problem solving (Lubis et al., 2022; Santi et al., 2019). Teachers must actively involve students during the learning process, and the concepts to be taught must be related to the students' prior knowledge so that students can follow the lesson without any obstacles. The mathematics learning process in elementary schools, both for lower and higher grades, must also be planned by teachers by considering the stages of students' cognitive development (D. D. Pratiwi, 2019). The stages of cognitive development of elementary school students according to Piaget (Barrouillet, 2015) are at the Concrete Operations stage. Where at this stage students act and think based on concrete phenomena or real events that exist in life. This shows that in the learning process, especially in mathematics learning which has abstract characteristics, the use of concrete media is needed (Istiqlal, 2017).

Mathematics learning must also be linked to real life so that students can easily achieve mathematics learning goals (Tampubolon et al., 2019). Therefore, the theme or topic of the lesson should be around real-life events of students so that students can think and understand the lesson well. Teachers must be able to use various learning models in mathematics learning, especially at the elementary school level (Nourhasanah & Aslam, 2022). Learning models play an important role as a guide in carrying out the steps of learning activities (Kuntarto, 2017; Siraj et al., 2023). In implementing the steps of the learning model, there are approaches, methods, techniques, and tactics used by teachers to improve learning (Lubis & Dasopang, 2021; Santrock, 2011). The application of learning models is very important for teachers, this is because learning models function to help teachers create changes in student behavior as expected, and can help teachers determine the methods and means that can create an appropriate learning environment (Fatwa et al., 2023; Lubis, 2023).

However, before applying a learning model to a lesson, of course, the teacher must first understand the material to be taught and adjust it to the model to be used. Learning outcomes reflect the abilities possessed by students after receiving their learning experiences (Santrock, 2011). Furthermore, student learning outcomes can be interpreted as one of the measuring tools used to review students' mastery of the material presented and the achievement of learning objectives (Yunita & Wijayanti, 2017). Learning outcomes include three aspects of abilities, namely cognitive, affective and psychomotor aspects (Schunk, 2012). Learning outcomes can also be interpreted as a result achieved by students after following a series of learning processes (Lubis & Lubis, 2024). Learning outcomes can be reviewed in various forms, starting from daily exam results, mid-term exams to final semester exams.

Based on the results of a preliminary study in class IV of SDN 6 Kutapanjang Gayo Lues, it showed that students' mathematics learning outcomes were very low. This is evidenced by the results of interviews with the relevant class teachers regarding the documentation of student grades that have not reached the standard score set at elementary school 6 Kutapanjang Gayo Lues, which is 70. The results of the interview were then combined with cross-documentation data carried out on the documentation of student learning outcomes. The results of the cross-documentation showed that only 5 students (26%) exceeded the set standard score, while 14 other students (74%) failed to

exceed the standard score. Then, the researcher obtained information that there were several obstacles during the mathematics learning process so that more than half of the students (50%) in class IV had difficulty understanding the material being taught. The use of inappropriate learning models is one of the causes of students' difficulty in achieving learning objectives. This has an impact on low student learning outcomes.

Learning Models are very necessary during the learning process as a guideline for teachers to prepare and implement learning (Kuntarto, 2017). Learning models include planning, stages or arrangements of teacher and student activities that show the relationship between related components in learning, namely teachers, students, media, teaching materials or lesson materials (Hanafiah et al., 2021). There are several learning models that can be applied in the learning process for students, namely the problem posing model, problem solving, TGT type cooperative, mathematical investigation, problem solving, teacher discovery, and CTL. One of the learning models that can be used to improve the mathematics learning outcomes of grade IV students of elementary school 6 Kuta Panjang Gayo Lues is the Problem Posing model.

The Problem Posing learning model is a type of activity where students pose and solve problems based on the situations provided (English et al., 2005). Furthermore, Sari & Surya (2017) stated that problem posing is a learning model that accommodates the submission of new mathematical problems based on mathematical problems that have been explained by the teacher. Furthermore, problem posing can be interpreted as a model that focuses on formulating questions or asking questions from available situations, whether done before, during, or after solving problems or questions (Rosli et al., 2014).

Based on several definitions, it can be concluded that the Problem Posing learning model is a learning activity that focuses on the process of students asking and solving problems based on the given situation. This activity can attract students' interest and curiosity in the learning process, so that students are expected to achieve satisfactory learning outcomes. Based on the description above, the Problem Posing Model is feasible to be applied to improve the mathematics learning outcomes of grade IV students of elementary school 6 Kuta Panjang Gayo Lues. Therefore, the application of the Problem Posing model can encourage students' interest in learning and can make it easier for students to understand questions because the questions are made by the students themselves, and can help students gain a deeper understanding during the learning process. By increasing students' understanding in learning, students' learning outcomes will also increase.

## METHODS

This study aims to improve elementary school students' learning outcomes in mathematics learning by applying the problem posing learning model. This study is a study that applies a mixed approach with the type of classroom action research. The classroom action research design used in this study is the Kemmis & Mc Taggart design which consists of 4 stages, namely planning, action, observation and reflection. This classroom action research was conducted to determine the results of the application of the Problem Posing model as an activity that is deliberately created and occurs in the classroom. The classroom action research design cycle can be seen in the picture below.

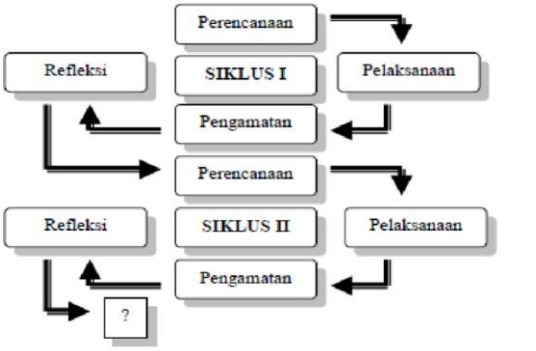


**Figure 1.** *Research Design*

The research planning carried out by the researcher was by selecting students of class IV-1 as research subjects, observing the situation in the classroom, determining the material in mathematics learning that would be taught by applying the Problem Posing model, compiling a learning implementation plan with teachers of class IV-1, compiling observation sheets for teacher and student activities, and compiling a Post-Test question sheet as an evaluation tool as a final test. Meanwhile, for the implementation stage of the action, the researcher presented the material that had been determined by referring to the Learning Implementation Plan that had been prepared in order to achieve the desired research success. The observation stage was to pay attention to and record all activities that occurred during the action process. Observations were made on all student activities and the activities of the researcher who acted as a teacher to see the results that arose as a result of the actions taken against students. And the reflection stage was an activity where the researcher thought and discussed with the observer about the results of the actions that had been taken. This reflection was carried out at the end of the cycle to determine the progress that had been achieved and the weaknesses that needed to be fixed in order to improve in the next cycle.

The data for this study consisted of two types, namely quantitative data and qualitative data. Quantitative data were obtained from test results and observations, while qualitative data were obtained from interview results. The test used in this study was an essay test to measure student learning outcomes in mathematics learning. The observation used in this study is non-participant observation to measure learning activities. Furthermore, the interviews conducted in this study were structured interviews. The research data obtained were then analyzed using descriptive statistical techniques by comparing the results with indicators of research success.

## RESULTS

The results of the study in grade IV-I of SD N 6 Kutapanjang Gayo Lues used descriptive statistical rules to describe observations of teacher activities and observations of student activities and student learning outcomes. In order to conduct the study, the researcher first met the principal and submitted a research permit letter from the Faculty of Education and Culture of UlIN Ar-Raniry on January 16, 2024 so that the researcher could obtain permission to conduct the study at the school. The process of implementing the Problem Posing learning model in this study was carried out in three cycles. This study did not obtain the success indicators set by the researcher in cycles I and II, and the research success indicators were obtained in cycle III. Data on the increase in teacher activity in managing learning can be seen in the following diagram.

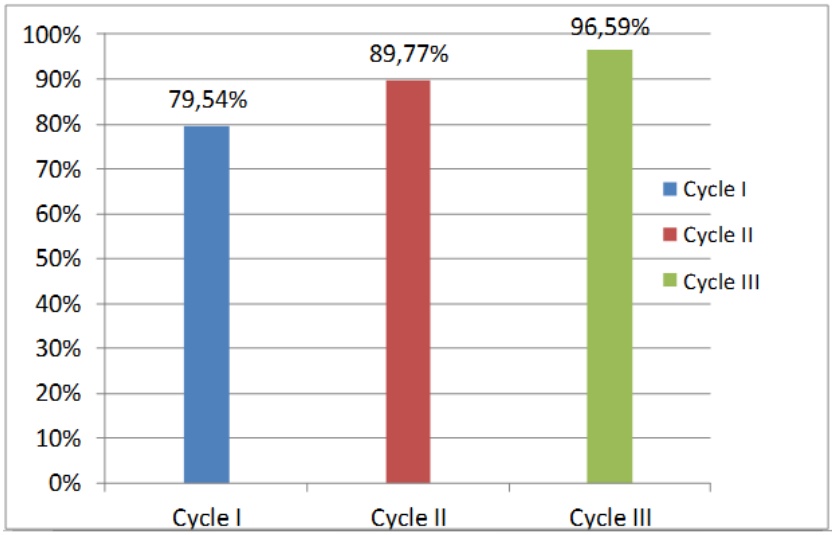


**Figure 1.** *Teacher Activities*

The results of the observation of teacher activity in the diagram show an increase that occurred during the learning process. The percentage of 79.54% in cycle I increased in cycle II by 10.23% or it can be said that in cycle II the percentage of teacher activity was 89.77%. However, improvements must still be made in several activities such as guiding students who are less enthusiastic in doing assignments and guiding other groups to respond to groups that are presenting. Then in cycle III, teacher activity achieved an even better increase with a percentage of 96.59%. This increase can occur due to the reflection stage carried out by researchers to see and improve weaknesses and deficiencies that occur during the action process or learning process by applying the Problem Posing model. This increase is also due to the role of teachers who guide students in the learning process, especially in asking questions based on problems that have been solved, so that students look active and motivated in participating in learning activities. Based on this explanation, it can be said that the application of the Problem Posing model can make students more active in learning mathematics both in groups and individually, this can be seen from student involvement in learning activities, namely by asking questions and the results of student post-tests. The achievement of learning implementation can be increased if teachers carry out all learning steps properly and correctly.

Furthermore, in addition to teacher activities, this study also observed student activities in the learning process. This was done so that all variables involved in learning could be controlled. The increase in student activity in each cycle based on the data that has been collected can be seen in the following diagram.

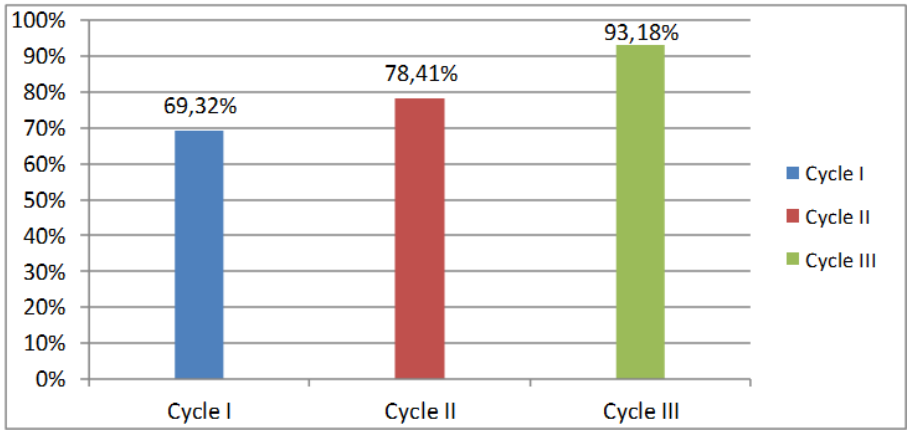


**Figure 2.** *Student Activities*

The results of the observation of student activity in the diagram show an increase that occurs in each cycle. Student activity in cycle I was obtained 69.32%, in cycle II it increased to 78.41%, and in cycle III it increased further to reach 93.18%. The increase was due to the improvement of existing deficiencies and the influence of the application of the Problem Posing model. In cycle I, there were several activities that had not been carried out well, such as students who were less active in asking and answering, less paying attention to how to ask questions by modifying questions that had been completed, students seemed less confident in presenting the results of group work, and less in responding to groups that did presentations.

So in cycle II, the group made improvements to these shortcomings. Student activities in cycle II generally increased. However, there were still several students who were still hesitant in asking and answering. Student activities in cycle III increased again and achieved the completion set by the study, namely > 80%. This Problem Posing learning model provides an opportunity for students to improve their understanding of student concepts. Problem Posing in this study is a post-solution posing type of learning. Students are guided by the teacher to work together in groups to solve problems, then submit new problems by modifying the problems that have been solved. Submitting problems can provide benefits to the development of concepts received by students. The activity of Telrselbult actively involves students and arouses students' interest in learning mathematics, so that students' activities from each lesson increase.

The improvement of learning outcomes is also part of the formulation of research problems that must be measured. The improvement of student learning outcomes in each cycle based on the data that has been collected can be seen in the cycle diagram image.

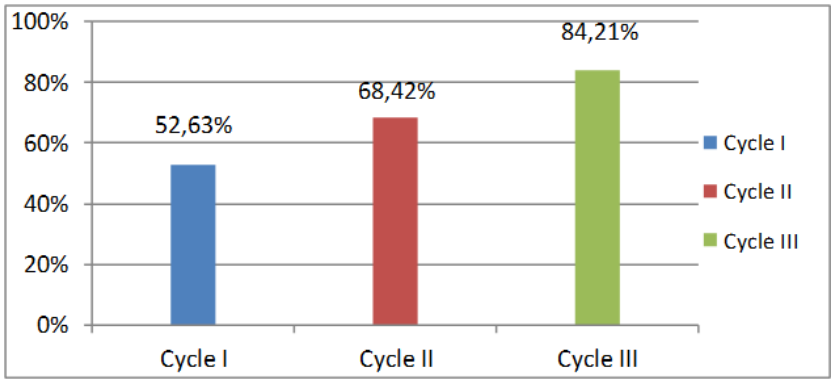


**Figure 3.** *Student Learning Outcome*

Based on the above picture, it can be concluded that in each cycle, students' learning outcomes increased. Based on learning outcomes in cycle I, there were 10 students who were included in the passed category with a score of 52.63% and 9 students who did not pass with a score of 47.37%. In cycle II, there were 13 students who passed with a score of 68.42% and 6 other students who did not pass with a score of 31.58%. In cycle III, students who passed had reached 16 students with a score of 84.21% and 3 students who did not pass with a score of 15.79%. The data obtained shows that there is an increase in student learning outcomes in class IV-1 Kutapanjang Gayo Lues by implementing the Problem Posing model in mathematics lessons on polygons, circumference and area of polygons and long polygons.

The improvement of students' learning outcomes by implementing this model cannot be separated from the factors that support the achievement of students' learning outcomes, namely, students appear very enthusiastic and enthusiastic during the learning process because students get a new learning situation that students have never gotten in learning activities and cooperation in groups that can help students understand the learning material. Submission of questions based on problems that have been solved can help students develop skills in developing mathematical concepts so that students can

understand the problems they are working on. This is in line with the opinion of Cankoy and Darbaz that problems based on posing can improve understanding. The activity of posing questions involves students actively, because in formulating or posing mathematical problems indirectly, it will make students understand the concepts taught and students will be more familiar with the questions being studied so that students can solve the questions given to them. This activity causes students' learning outcomes to increase because students understand the concepts taught. It can be concluded that the learning outcomes of students in grades IV-I of SD N 6 Kutapanjang Gayo Luesmel through the implementation of the Problem Posing model are complete.

## DISCUSSION

The problem posing learning model is an approach that involves students in the learning process by designing, posing, and solving their own problems. This approach encourages students to be more active in critical thinking, understanding concepts, and exploring various possible solutions in mathematics learning. By getting students used to formulating questions or problems from a concept being studied, they will be more involved in the learning process, thereby increasing their activity and thinking skills (Rosli et al., 2014).

One of the advantages of the problem posing model is its ability to increase students' curiosity. In mathematics learning, students often find it difficult to understand concepts because of their lack of involvement in finding solutions. With problem posing, students not only receive the questions that are already available, but also learn to create their own questions based on their understanding of the material. This makes them more curious and motivated to dig deeper into the concepts being studied (Baumanns & Rott, 2022). In addition, this model also helps increase students' creativity in solving mathematics problems. In the process of formulating problems, students will try various ways to formulate meaningful and challenging questions. They will think more and connect concepts that have been previously studied. This creativity is very important in forming logical and analytical thinking patterns, which are key skills in understanding mathematics.

Students' learning activities also increase because they are more active in discussions and collaboration with their friends. In problem posing learning, students often work in groups to design and solve problems that they create themselves. This triggers effective communication, cooperation, and sharing understanding of mathematical concepts. This active discussion helps students understand the material better than just listening to the teacher's explanation passively (Cai & Hwang, 2021). Students' courage in expressing ideas also increases through the problem posing model. Often, students feel afraid or hesitate to ask questions when they have difficulty understanding a mathematical concept. With this approach, they are used to asking questions and trying to answer them themselves. They are more confident in expressing their thoughts and ideas, which ultimately increases their courage in facing academic challenges. In addition to increasing learning activity, the problem posing model also trains high-level thinking skills or higher order thinking skills (HOTS). Students not only memorize formulas or problem-solving procedures, but also think more deeply about how a concept can be applied in various situations. Thus, they are better prepared to face questions that require conceptual understanding and in-depth analysis (Wang et al., 2022).

This model also contributes to increasing students' learning motivation. When they feel in control of their own learning through problem-making and problem-solving, they will be more motivated to learn. Mathematics that was previously considered difficult and boring becomes more interesting because students are actively involved in creating their own challenges. This high motivation has a direct impact on their learning outcomes. In terms of evaluation, the problem posing model allows teachers to see the extent to which

students understand a concept. By analyzing the problems created by students, teachers can find out whether students really understand the material or are still having difficulties in certain aspects. Teachers can also provide more targeted guidance according to students' needs, so that learning becomes more effective (Zhang et al., 2024).

The implementation of problem posing also helps students develop reflective thinking habits. After formulating a problem and trying to solve it, they can evaluate the answers that have been given and consider other alternative solutions. This trains them not to just accept the answer, but also to reflect on their own thinking process (D. J. Pratiwi et al., 2022). With these various benefits, the problem posing learning model has been proven to be able to increase student learning activities in elementary school mathematics learning. In addition to making students more active, creative, and confident, this approach also fosters critical and logical thinking skills that are very much needed in understanding mathematical concepts in depth. Therefore, the implementation of this model in elementary schools is highly recommended so that students have a more meaningful and enjoyable learning experience.

The problem posing learning model is an approach that involves students in compiling, submitting, and solving their own problems. By applying this model in elementary school mathematics learning, students have a greater opportunity to understand concepts more deeply. Compiling their own questions helps them think more critically and reflectively about the material being studied, thereby improving their conceptual understanding and learning outcomes (Sasmita & Harjono, 2021). One of the main reasons why problem posing can improve learning outcomes is because this approach encourages students' active involvement in learning. When students are directly involved in creating problems, they not only receive information passively but also try to understand the concept in their own way. This process helps strengthen memory and improve their understanding of mathematical material (Yao et al., 2021). In addition, the problem posing model allows students to develop high-level thinking skills. They do not only memorize formulas or follow problem-solving procedures, but also learn to analyze concepts, connect ideas, and formulate relevant questions. Thus, they are better prepared to face exam questions that require deep understanding and not just memorization.

Students' creativity in compiling questions also plays a major role in improving their learning outcomes. By designing their own problems, students are encouraged to understand concepts more broadly and try different ways to solve them. They can also explore various forms of questions and solutions, thus having a richer understanding of the material being taught (Mukaromah et al., 2023). The problem posing model also helps students overcome learning difficulties. When they formulate questions from concepts that are still difficult to understand, they are forced to find out more and discuss them with friends or teachers. This process helps them identify weaknesses in their understanding and improve them gradually (Baumanns, 2022). Thus, they can more easily master material that was previously considered difficult.

The application of this model also increases students' motivation in learning mathematics. Often, students feel that mathematics is a difficult and boring subject. However, with problem posing, they feel more in control of their own learning. They are more interested in learning because they are actively involved in the process of thinking and finding solutions, which ultimately has a positive impact on their learning outcomes (Emre-Akdoğan, 2023). In addition, the problem posing model helps students build confidence in solving math problems. When they are able to formulate questions and find their own answers, they feel more competent in facing academic challenges. This confidence is very important in improving their performance in exams and other academic assignments.

Another advantage of this approach is its ability to improve students' reasoning skills. By getting used to composing their own problems, students learn to think more logically and systematically (Lee, 2021). They can recognize patterns in mathematics, understand relationships between concepts, and develop more effective solution

strategies. This contributes directly to improving their learning outcomes. In the context of evaluation, the problem posing model allows teachers to assess students' understanding more comprehensively. By looking at the types of problems created by students, teachers can identify the extent to which they understand certain concepts. Teachers can also provide more specific feedback and help students overcome their learning difficulties. With these various benefits, it can be concluded that the problem posing learning model is very effective in improving elementary school students' learning outcomes in mathematics learning. By encouraging active involvement, improving critical thinking skills, and strengthening conceptual understanding, this model helps students achieve better academic achievement. Therefore, the application of problem posing in mathematics classes needs to be encouraged so that student learning outcomes are increasingly optimal.

## CONCLUSION

Based on the results of the research that has been conducted with the title "Implementation of the Problem Posing Model Can Improve Students' Mathematics Learning Outcomes in Class IV D N 6 Kultapanjang Gayo Lulels" with a total of 19 students, the researcher got several conclusions, namely: Learning activities in mathematics learning by implementing the Problem Posing model increased from cycle I with a score of 79.54% which is included in the good category, and in cycle II obtained a score of 89.77% with a good category, and increased again in cycle III with a score of 96.59%. Student activity in mathematics learning by applying the Problem Posing model experienced an increase from cycle I with a score of 69.32% which was included in the good category, and in cycle II obtained a score of 78.41% with a good category, and increased again in cycle III with a score of 93.18% and included in the good category once. The results of students' mathematics learning by applying the Problem Posing model experienced an increase. This can be proven by looking at the results of cycle I with a score of classical passing grade of 52.63%. In cycle II, the classical pass rate reached 68.42%. In cycle III, the classical pass rate reached 84.21%, and has achieved the research success indicator with pass rate > 80%.

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