

## **The Effect of the Problem-Solving Learning Method on The Mathematical Critical Thinking Skills of Fifth-Grade Students at SDN 11 Tulang Bawang Tengah**

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### **Abstract**

This study aims to determine the effect of the Problem Solving learning method on the mathematical critical thinking skills of fifth-grade students at SDN 11 Tulang Bawang Tengah. The study used a quantitative method with a quasi-experimental design (one-group pretest-posttest design). The study sample consisted of 25 students who first took a pretest to assess their critical thinking skills, then received instruction using the Problem Solving method, and finally took a posttest to measure improvements in their skills. The results of the data analysis showed a significant difference between the pretest and posttest scores with a p-value of 0.000 ( $< 0.05$ ). The average score difference of 23.2 points indicates a significant improvement in mathematical critical thinking skills. Furthermore, the effect size calculated using Cohen's d of -1.275 falls into the "large" category, suggesting that the Problem-Solving method not only has a significant effect but also exerts a strong impact on enhancing students' skills. Thus, the application of the Problem Solving learning method has proven effective in improving the mathematical critical thinking skills of elementary school students.

**Keywords:** Problem Solving, Critical Thinking, Mathematics, Elementary School.

### **Abstrak**

Penelitian ini bertujuan untuk mengetahui pengaruh metode pembelajaran Problem Solving terhadap kemampuan berpikir kritis matematika peserta didik kelas V di SDN 11 Tulang Bawang Tengah. Penelitian menggunakan metode kuantitatif dengan desain eksperimen semu (one group pretest-posttest design). Subjek penelitian berjumlah 25 peserta didik yang terlebih dahulu diberikan tes awal untuk mengetahui kemampuan berpikir kritis, kemudian mendapat perlakuan berupa pembelajaran dengan metode Problem Solving, dan akhirnya diberikan tes akhir untuk melihat peningkatan kemampuan. Hasil analisis data menunjukkan adanya perbedaan signifikan antara nilai pretest dan posttest dengan signifikansi 0,000 ( $< 0,05$ ). Selisih rata-rata skor sebesar 23,2 poin memperlihatkan adanya peningkatan yang nyata dalam kemampuan berpikir kritis matematika. Selain itu, perhitungan efek menggunakan Cohen's d sebesar -1,275 termasuk kategori besar, sehingga dapat disimpulkan bahwa metode Problem Solving tidak hanya berpengaruh secara signifikan, tetapi juga memiliki dampak kuat terhadap peningkatan kemampuan peserta didik. Dengan demikian, penerapan metode pembelajaran Problem Solving terbukti efektif dalam meningkatkan kemampuan berpikir kritis matematika peserta didik sekolah dasar.

**Kata kunci:** Problem Solving, Berpikir Kritis, Matematika, Sekolah Dasar.

## Introduction

Mathematics education plays a crucial role in developing students' logical, analytical, systematic, critical, and creative thinking skills. However, many students still view mathematics as a difficult and boring subject. This aligns with the opinion of Nurholis (2020), who state that most students still view mathematics as a daunting and difficult-to-understand subject. Students' difficulties in understanding mathematics can stem from various factors, one of which is the use of inappropriate teaching methods. According to Prayitno and Kurniawan (2020), selecting the right teaching method can help students understand mathematical concepts and boost their motivation to learn. The use of innovative, student-centered teaching methods can be a solution to improve the quality of mathematics instruction. One such method that can be applied is problem-solving. This method can help students develop critical thinking and problem-solving skills. As stated by Sumartini (2020), the application of the problem-solving method in mathematics instruction can improve students' ability to analyze problems, formulate solution strategies, and evaluate solutions. Critical thinking is one of the most important skills to develop in mathematics education.

According to the results of the 2018 Programme for International Student Assessment (PISA) study, Indonesia ranked 72nd out of 78 participating countries in mathematics proficiency (Schleicher, 2019). This indicates that Indonesian students' higher-order thinking skills, including critical thinking, still need to be improved. One approach that can be taken to improve students' critical thinking skills is to implement appropriate teaching methods. The problem-solving method is one such alternative. Problem-based learning can enhance students' mathematical critical thinking skills because, throughout the process, students are trained to analyze problems, gather relevant information, and develop solutions" (Wahyuni et al., 2018).

Research conducted by Suarsana et al. (2019) shows that the application of the problem-solving method has a positive effect on the mathematical critical thinking skills of elementary school students. The results of the study revealed that there is a significant difference between the mathematical critical thinking skills of students who learn using the problem-solving method and those who learn using conventional methods. Critical thinking is a higher-order thinking skill, particularly for solving problems, enabling students to make appropriate and logical decisions in resolving those problems. The critical thinking process aims to foster a deep understanding and help students grasp the underlying meaning of the problems presented. In critical thinking, one must use sound reasoning and firm convictions to view matters objectively, distinguish between correct and incorrect issues, and draw conclusions that can serve as a foundation for determining steps toward change. The use of strong critical thinking skills enables students to evaluate arguments. Therefore, fostering students' critical thinking skills in the learning process is an effort to improve their learning outcomes.

Based on observations conducted at SDN 11 Tulang Bawang Tengah, it was found that the mathematics learning process does not yet fully emphasize the development of students' critical thinking skills. Although teachers have carried out their teaching duties according to the established schedule, some students reported difficulty understanding the explanations provided. The classroom learning process is still dominated by conventional methods, namely direct instruction, which tends to be one-directional and lacks active student participation. The use of active and varied teaching methods remains suboptimal. Consequently, students lack opportunities to develop problem-solving skills and critical thinking abilities, which are actually essential components of mathematics learning. These learning conditions hinder the development of students' critical thinking skills. In fact, critical thinking plays a very significant role in supporting learning success, particularly in mathematics. Students tend to be passive recipients of information, without being given sufficient opportunities to analyze, evaluate, and apply the knowledge they have acquired in the context of problem-solving.

## Method

This study employs a quantitative method. According to Machali (2021), quantitative research is research that relies heavily on numerical data throughout the research process – from data collection and interpretation to the results and drawing of conclusions. In experimental research, the researcher manipulates a stimulus, treatment, or experimental conditions and then observes the effects resulting from that treatment or manipulation. This study uses a pre-experimental design in the form of a one-group pretest-posttest design.

A population is the scope of generalization consisting of objects or subjects that possess certain qualities and characteristics defined by the researcher for study, from which conclusions are subsequently drawn. The population in this study consists of all fifth-grade students at SDN 11 Tulang Bawang Tengah, totaling 25 students. The research sample consisted of 25 students. Data collection techniques included tests, observations, and documentation. Data analysis was performed using the Paired Sample T-Test.

## Results and Discussion

After conducting research by applying the Problem-Solving learning method in mathematics classes, data on student learning outcomes were obtained through a pretest and a posttest. The pretest was administered to assess students' critical thinking skills before the intervention, while the posttest was administered after the application of the Problem-Solving method to measure the improvement in their critical thinking skills. The pretest and posttest data were then analyzed to determine whether there were significant differences and to assess the impact of the Problem-Solving method on the improvement of critical thinking skills in mathematics among fifth-grade students at SDN 11 Tulang Bawang Tengah. The students' learning outcomes are presented in the following pretest and posttest tables.

Table 1. Pretest

| <b>Pretest</b> |    |           |         |               |                    |
|----------------|----|-----------|---------|---------------|--------------------|
|                |    | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid          | 30 | 2         | 8.0     | 8.0           | 8.0                |
|                | 40 | 2         | 8.0     | 8.0           | 16.0               |
|                | 50 | 6         | 24.0    | 24.0          | 40.0               |
|                | 60 | 6         | 24.0    | 24.0          | 64.0               |
|                | 70 | 5         | 20.0    | 20.0          | 84.0               |
|                | 80 | 3         | 12.0    | 12.0          | 96.0               |
|                | 90 | 1         | 4.0     | 4.0           | 100.0              |
| Total          |    | 25        | 100.0   | 100.0         |                    |

Table 2. Posttest

| <b>Posttest</b> |     |           |         |               |                    |
|-----------------|-----|-----------|---------|---------------|--------------------|
|                 |     | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid           | 60  | 1         | 4.0     | 4.0           | 4.0                |
|                 | 70  | 5         | 20.0    | 20.0          | 24.0               |
|                 | 80  | 9         | 36.0    | 36.0          | 60.0               |
|                 | 90  | 7         | 28.0    | 28.0          | 88.0               |
|                 | 100 | 3         | 12.0    | 12.0          | 100.0              |
| Total           |     | 25        | 100.0   | 100.0         |                    |



appropriate teaching strategies. Teachers are encouraged to continue integrating the problem-solving method into mathematics instruction so that students are not only able to achieve good grades but also become skilled in critical thinking and capable of tackling real-life challenges that require analytical skills.

### Conclusion

Based on the results of the study, it can be concluded that the implementation of the Problem Solving learning method has an effect on the mathematical critical thinking skills of fifth-grade students at SDN 11 Tulang Bawang Tengah. This is evidenced by the results of the Paired Sample t-test, which showed a significance value of 0.000 ( $< 0.05$ ).

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