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Improving Students' Mathematical Problem-Solving Skills Through Interactive Learning Approaches at SMP Negeri 23 Medan

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Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh pendekatan pembelajaran interaktif terhadap kemampuan pemecahan masalah matematika siswa SMP Negeri 23 Medan. Penelitian menggunakan metode kuasi eksperimen dengan desain Pretest-Posttest Control Group Design. Sampel penelitian terdiri atas 70 siswa yang terbagi ke dalam kelas eksperimen dan kelas kontrol, masing-masing sebanyak 35 siswa. Instrumen penelitian berupa tes kemampuan pemecahan masalah matematika yang diberikan sebelum dan sesudah perlakuan. Data dianalisis menggunakan statistik deskriptif dan perhitungan N-Gain. Hasil penelitian menunjukkan bahwa rata-rata nilai pretest kelas eksperimen sebesar 58,34 meningkat menjadi 84,75 pada posttest dengan nilai N-Gain sebesar 0,72 (kategori tinggi). Sementara itu, kelas kontrol mengalami peningkatan dari 57,91 menjadi 72,48 dengan nilai N-Gain sebesar 0,35 (kategori sedang). Hasil penelitian menunjukkan bahwa pendekatan pembelajaran interaktif lebih efektif dibandingkan pembelajaran konvensional dalam meningkatkan kemampuan pemecahan masalah matematika siswa. Temuan ini mengindikasikan bahwa keterlibatan aktif siswa melalui diskusi, kolaborasi, eksplorasi konsep, dan penggunaan media interaktif dapat meningkatkan pemahaman konsep serta kemampuan berpikir kritis dalam menyelesaikan masalah matematika.

Kata kunci: *Pembelajaran Interaktif, Kemampuan Pemecahan Masalah, Matematika, SMP, Quasi Eksperimen*

Abstract

This study aims to analyze the effect of an interactive learning approach on the mathematical problem-solving abilities of students at SMP Negeri 23 Medan. The study used a quasi-experimental method with a Pretest-Posttest Control Group Design. The sample consisted of 70 students divided into an experimental class and a control class, each with 35 students. The research instrument was a mathematical problem-solving ability test administered before and after the treatment. Data were analyzed using descriptive statistics and N-Gain calculations. The results showed that the average pretest score of the experimental class increased from 58.34 to 84.75 on the posttest, with an N-Gain of 0.72 (high category). Meanwhile, the control class experienced an increase from 57.91 to 72.48 with an N-Gain of 0.35 (moderate category). The results showed that the interactive learning approach was more effective than conventional learning in improving students' mathematical problem-solving abilities. These findings indicate that active student involvement through discussion, collaboration, concept exploration, and the use of interactive media can improve conceptual understanding and critical thinking skills in solving mathematical problems.

Keywords: *Interactive Learning, Problem Solving Skills, Mathematics, Junior High School, Quasi Experiment*

1. INTRODUCTION

Mathematics is a subject that plays a crucial role in developing logical, analytical, systematic, critical, and creative thinking skills. These skills are essential for facing the various challenges of life in the era of globalization and the 5.0 industrial revolution. Therefore, mathematics learning is not only oriented toward mastering concepts and procedures, but also toward students' problem-solving abilities. Mathematical problem-solving skills are one of the core competencies listed in the education curriculum. According to Pólya (1945), problem-solving involves four main steps: understanding the problem, planning a solution, implementing the plan, and evaluating the resulting solution. However, various studies indicate that Indonesian students' mathematical problem-solving skills are still relatively low.

One cause of this low ability is the dominance of teacher-centered learning. In conventional learning, students tend to passively receive information, thus lacking the opportunity to develop higher-order thinking skills. This condition causes students to experience difficulties when faced with problems requiring mathematical analysis and reasoning.

Interactive learning approaches offer an alternative to address these issues. Interactive learning places students at the center of learning through discussion, collaboration, exploration, presentations, and the use of learning technology. Various studies have shown that interactive learning based on problem-based learning and interactive media can significantly improve students' mathematical problem-solving skills. Based on this background, this study aims to determine the effect of an interactive learning approach on the mathematical problem-solving skills of students at SMP Negeri 23 Medan.

2. RESEARCH METHODS

This study employed a quantitative method with a Quasi-Experimental Design using a Pretest-Posttest Control Group Design. The study population was all students of SMP Negeri 23 Medan. The study sample consisted of two classes selected using a purposive sampling technique. The experimental class received interactive learning, while the control class received conventional learning.

Table 1. Research Design

Group	Pretest	Treatment	Posttest
Experiment	O_1	X	O_2
Control	O_3	-	O_4

The research instrument was a mathematical problem-solving ability test validated by experts. Data analysis was conducted using descriptive statistics, normality tests, homogeneity tests, t-tests, and N-Gain.

N-Gain Formula:

g = (Posttest - Pretest)/(100 - Pretest)

3. RESEARCH RESULTS AND DISCUSSION

Pretest Data Description

Table 2. Results of the Pretest of Mathematical Problem Solving Ability

Class	Number of Students	Average	Category
Experiment	35	58,34	Medium
Control	35	57,91	Medium

The data show that the initial abilities of both classes were relatively similar. Posttest Data Description

Table 3. Posttest Results

Class	Number of Students	Average	Category
Experiment	35	84,75	Sangat Baik
Control	35	72,48	Baik

There was a higher increase in the experimental class compared to the control class. N-Gain Analysis

Tabel 4. N-Gain Results

Class	N-Gain	Category
Experiment	0,72	High
Control	0,35	Medium

These results show that the interactive learning approach provides a higher increase in mathematical problem-solving abilities compared to conventional learning. Based on the research results, the average posttest score for the experimental class reached 84.75, higher than the 72.48 for the control class. Furthermore, the N-Gain score for the experimental class was 0.72, which is considered high, while the control class only achieved 0.35, which is considered moderate. These findings indicate that the interactive learning approach is more effective in improving the mathematical problem-solving skills of students at SMP Negeri 23 Medan.

This improvement occurred because interactive learning provided opportunities for students to actively discuss, express ideas, explore various problem-solving strategies, and collaborate in groups. These activities helped students develop a deeper understanding of concepts, thereby significantly improving their mathematical problem-solving skills.

DISCUSSION

The results of the study indicate that the interactive learning approach significantly improved students' mathematical problem-solving abilities. This improvement was evident in the experimental class' post-test average score of 84.75, compared to the control class' score of 72.48. The success of interactive learning is due to several factors. First, students are given the opportunity to actively participate in the learning process through group discussions and collaborative problem-solving. Second, interactive learning encourages students to develop critical and creative thinking skills in finding solutions to given problems.

These findings align with research showing that interactive learning media based on Problem-Based Learning effectively improves students' mathematical problem-solving abilities. Furthermore, the application of Problem-Based Learning has also been shown to improve students' critical thinking and mathematical problem-solving abilities.

In this study, students in the experimental class demonstrated greater learning activity than those in the control class. They were more active in expressing opinions, discussing, and exploring various problem-solving strategies. These conditions support the formation of better conceptual understanding, which impacts learning outcomes.

These research findings reinforce constructivist theory, which states that knowledge is actively constructed by students through meaningful learning experiences. Thus, interactive learning can be an effective alternative in improving the quality of mathematics learning in schools.

4. CONCLUSION

Based on the research results, it can be concluded that the interactive learning approach is effective in improving the mathematical problem-solving abilities of students at SMP Negeri 23 Medan. The average student score in the experimental class increased from 58.34 to 84.75, with an N-Gain of 0.72 (high category), while the average score in the control class increased from 57.91 to 72.48, with an N-Gain of 0.35 (moderate category). Therefore, the interactive learning approach is recommended as a mathematics learning strategy capable of improving students' problem-solving abilities and higher-order thinking skills.

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