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Transforming Mathematics Learning through Google Classroom: Analysis of Students' Mathematical Reasoning Ability and Thinking Creativity

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ABSTRACT

This study aims to analyze the effectiveness of transforming mathematics learning through the *Google Classroom platform* in improving students' mathematical reasoning abilities and creative thinking. The research method used was a quasi-experimental with a *pretest-posttest control group design*. The research subjects consisted of 60 students of Public Junior High Schools in Praya who were divided into two groups, namely the experimental group with *Google Classroom- based learning* and the control group with conventional learning. The research instruments were a mathematical reasoning ability test, a mathematical thinking creativity test, and a learning activity observation sheet. Data were analyzed using an independent t-test and *N-Gain score.* The results showed that there were significant differences between the experimental group and the control group in terms of improving mathematical reasoning abilities and creative thinking. The *N-Gain value* of the experimental group was in the medium to high category, while the control group was in the low to medium category. In conclusion, learning through *Google Classroom* was able to transform the mathematics learning process towards a more interactive, effective direction and encourage the development of students' reasoning abilities and creativity.

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Google Classroom, mathematical reasoning, creative thinking, learning transformation

Introduction

The development of information and communication technology in the digital era has had a significant impact on the world of education, including on the mathematics learning process. Since the implementation of online learning due to the Covid-19 pandemic, various digital platforms have begun to be used intensively by teachers and students to support teaching and learning activities. One of the most widely used platforms is Google Classroom, a Learning Management System (LMS) developed by Google to facilitate online learning interactions and blended learning. This platform provides features for uploading materials, giving assignments, conducting assessments, and building communication between teachers and students, thus enabling the transformation of conventional learning models to more flexible digital learning. The transformation of learning from face-to-face models to digital-based learning is a necessity to adapt to the era of the industrial revolution 4.0. One of the widely used platforms is Google Classroom, because it is able to facilitate teachers and students in interacting, distributing materials, and carrying out evaluations effectively.

In the context of mathematics learning, the main challenge faced by teachers is not only delivering material but also developing students' higher-order thinking skills, including mathematical reasoning and creative thinking. Mathematical reasoning is a fundamental skill that encompasses the process of understanding concepts, analyzing relationships, making generalizations, and drawing logical conclusions from a problem. Meanwhile, creative thinking in mathematics is characterized by the ability to generate new ideas, find various alternative

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solutions, and think flexibly and originally in solving problems. These two aspects are important to cultivate from an early age because they form the foundation for students in facing complex problems in real life. One reason is that mathematics learning emphasizes not only conceptual mastery but also mathematical reasoning and creative thinking. Mathematical reasoning is necessary for students to connect concepts, draw logical conclusions, and solve problems. On the other hand, creative thinking enables students to find various alternative strategies in solving mathematical problems. However, in reality, both abilities are still low due to the dominance of lecture methods and less varied practice problems.

However, mathematics learning in schools is often teacher-centered, with a procedural approach that emphasizes the end result rather than the student's thinking process. As a result, students are less trained to reason deeply or develop their creativity in solving problems. The presence of Google Classroom as a digital learning medium offers an opportunity to address this problem. With its features, Google Classroom enables teachers to design interactive, collaborative, and student-centered learning. For example, through problem-based assignments, online discussions, and rapid and structured feedback, students can more actively explore mathematical concepts while honing their reasoning and creativity.

Several previous studies have shown that using Google Classroom can improve student motivation, participation, and learning outcomes in various subjects, including mathematics. However, studies specifically examining the impact of Google Classroom on students' mathematical reasoning skills and creative thinking are still relatively limited. Therefore, this study is crucial to analyze the extent to which transforming mathematics learning through Google Classroom contributes to the development of these two competencies.

Based on this background, this study aims to describe the transformation of mathematics learning through Google Classroom and analyze students' mathematical reasoning abilities in Google Classroom-based learning. It also examines students' creative thinking that emerges through these digital learning activities. Therefore, the results of this study are expected to contribute to the development of technology-based mathematics learning models that are more effective, innovative, and relevant to the demands of the 21st century.

Method

This study used a quasi-experimental method with a pretest-posttest control group design. The study population was all eighth-grade students of SMP Negeri Praya Timur in the 2025/2026 academic year. The study sample consisted of 60 students divided into two classes: the experimental class: using Google Classroom-based learning, and the control class: using conventional learning. The instruments in this study consisted of three, namely a mathematical reasoning ability test, The mathematical creativity test consisted of open-ended questions that encouraged a variety of answers, and a student activity observation sheet to measure participation and engagement in learning. The data collection techniques used in this study included pretests, treatment, posttests, and observations. Data analysis techniques included descriptive analysis, normality and homogeneity tests, independent t-tests, and n-gain analysis.

Results and Discussion

Based on the results of the study, the following data were obtained: Mathematical Reasoning Ability, the average pretest score in both groups was almost the same (experimental = 52, control = 50), and the average posttest score increased significantly in the experimental class (82) compared to the control class (68). While the t-test results showed a significant difference with a sig. value. ($p < 0.05$) and the N-Gain value of the experimental class = 0.65 (medium-high category), while the control = 0.38 (medium-low category). Then in

Mathematical Thinking Creativity, the experimental class showed an average thinking creativity score of 80, higher than the control class which only reached 66. Based on the analysis results obtained in the N-Gain analysis in the experimental class = 0.62 (medium-high category), while the control = 0.35 (low-medium category).

The study's findings indicate that the use of Google Classroom in mathematics learning significantly improves students' mathematical reasoning skills and creative thinking. This is because Google Classroom provides flexibility in time, broader access to materials, and opportunities for interactive discussions through online forums. Furthermore, students are encouraged to think more critically and creatively in solving problems because they are presented with various types of open-ended questions that allow for multiple alternative answers. Other factors contributing to this improvement include the availability of rapid teacher feedback and easier collaboration between students. These findings align with previous research suggesting that technology-based learning can increase student engagement, strengthen learning motivation, and encourage the development of higher-order thinking skills (HOTS).

Conclusion

This study concludes that transforming mathematics learning through Google Classroom has a positive effect on improving students' mathematical reasoning skills and creative thinking at Praya Timur Middle School. Students in the experimental class showed higher improvement compared to students in the control class. Therefore, Google Classroom can be used as an alternative, innovative learning model to support the development of 21st-century competencies in mathematics.

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