



Improving students' mathematical understanding through contextual learning in fourth-grade elementary school students

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ABSTRACT

Abstracts This research is motivated by the low level of students mathematical understanding. The purpose of this study is to determine the improvement in the mathematical understanding of fourth-grade students in State Elementary School 1 Pasalakan through contextual learning. The type of research used is Classroom Action Research (CAR). This research consisted of pre-cycle, cycle I, and cycle II activities. The data collection techniques used were tests and observation. Data analysis employed qualitative analysis. The research result indicate an increase in students mathematical understanding through the application of contextual learning. The results of the pre-cycle analysis showed that only 9 students (28,8%) met the learning achievement criteria with a class average score of 53,84. In cycle I, student understanding increased to 14 students (53,8) achieving mastery with an average of 64,23. Subsequently, in cycle II, there was an increase of 21 students (80,7) achieving mastery with an average score of 78,26. Based on the research result, it can be concluded that the application of contextual learning can improve students mathematical understanding.

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1. INTRODUCTION

PISA (*Programme for International Student Assessment*) is one of the global indicators of mathematical literacy, showing that the abilities of Indonesian students are below the OECD average, making it important to improve the quality of elementary school mathematics learning. The urgency of mathematical understanding in elementary school students lies in its role in shaping the logical, systematic, and critical thinking skills needed to solve problems in everyday life. Mathematics is a fundamental subject in basic education because it plays a role in developing students' logical, critical, and creative thinking skills (Afifah, et al., 2024) . However, conventional methods that do not connect the material to real-life experiences make it difficult for many students to understand mathematical concepts in depth. According to Rahayu et al., using conventional methods such as lectures, question and answer sessions, and homework makes students passive, unconfident, and reluctant to express their opinions because learning is teacher-centered, limiting their ability to apply the material to real-life situations (Rahayu et al., 2024). Learning that is dominated by lectures makes students passive and only memorize procedures without understanding, resulting in low learning outcomes (Tarigan, 2022) .

Mathematics education has undergone reforms aimed at improving the overall quality of students and the effectiveness of teaching (Hanafia et al., 2023) . Schools strive to internalize mathematical concepts through their relevance to everyday life. However, limited resources in schools, such as teachers who lack innovation and teaching facilities, as well as students' difficulties in understanding the material, pose obstacles to student learning activities. The success of the teaching and learning process is marked by students' understanding of the material taught and their learning outcomes achieving the set objectives (Ningsih et al., 2020) . To achieve this, the learning process must be packaged in an interesting and enjoyable way (Ermawati et al., 2023) . The main objective of mathematics learning in elementary school is to form a strong understanding of basic mathematical concepts through various integrated elements. The essence of mathematics learning is to train students not only in arithmetic but also in solving everyday contextual problems using logical and critical reasoning (Miftahul Jannah & Miftahul Hayati, 2024) .

Observation activities are effectively used to measure student understanding because they assess the learning process directly, not just the final product, so that teachers can understand the extent to which students have mastered the material. Based on the results of observations at SD Negeri 1 Pasalakan, it was found that the mathematical understanding of fourth-grade students in class A was relatively low. In general, the average mathematics score, especially for fractions, was still below the minimum competency standard. Lack of enthusiasm, boredom, and complaints about difficulty in calculating often characterized mathematics learning because students viewed mathematics as an abstract and challenging subject. The material presented in a monotonous manner without any connection to real life makes it difficult for students to understand the meaning of the concepts being studied. Therefore, learning innovation is crucial for teachers to create learning activities that are effective, enjoyable, easy to understand, and motivate students.

Based on the above problems, the researcher sought to improve the mathematical understanding of fourth-grade students at SD Negeri 1 Pasalakan. To overcome these problems, teachers have various strategies, one of which is to provide a variety of learning methods, such as applying a relevant contextual learning paradigm. The contextual learning approach offers a solution by linking learning materials to real-world situations experienced by students. This approach encourages students to actively build their understanding of concepts through direct experiences that are relevant to their lives. At every opportunity, mathematics learning should begin with the introduction of problems that are relevant to the daily lives of students (Dharmayanti, 2019) . Teachers present real situations and utilize concrete media around students to support the learning process, so that students can connect mathematical concepts with their daily lives(Azaria, Indryani,& Nugraha, 2024) . Therefore, the contextual learning approach is an effective alternative to improve students' mathematical understanding because students often find it difficult to understand abstract mathematical concepts. This approach emphasizes linking learning materials to students' real-life situations so that mathematical concepts become more meaningful and easier to understand (Awang et al., 2021) .

Teachers play an important role in managing contextual learning so that students can be optimally involved, which ultimately improves their learning outcomes (Rismayanti et al., 2024) . Teachers' consistency in applying the principles of contextual learning also greatly determines the success of learning (Setyanti et al., 2022) . Thus, the application of contextual learning is expected to improve the mathematical understanding of fourth-grade students at SD Negeri 1 Pasalakan,

so that students not only understand the concepts but are also able to apply them in their daily lives.

Based on research conducted by Afiani and Faradita, contextual learning can increase students' motivation and ability to understand mathematical concepts (Afiani & Faradita, 2022) . In line with the research conducted by Utami, contextual learning provides a real context so that students find it easier to understand and are more motivated. Therefore, the application of this approach is a positive step towards more innovative and relevant elementary school mathematics teaching (Utami, 2024) .

Therefore, this study aims to improve the mathematical understanding of fourth-grade students at SD Negeri 1 Pasalakan through contextual learning. This research is important to contribute to the development of more effective and contextual mathematics learning strategies in line with the current needs of students. Thus, it can demonstrate an improvement in students' mathematical abilities using a contextual approach.

2. METHOD

This research is a classroom action research (CAR). Classroom Action Research (CAR) is one of the efforts made by professional teachers to improve the quality of learning (Yudha & Rahmad, 2020) . Classroom Action Research (CAR) was first introduced by Kurt Lewin in 1946. The core concept of CAR introduced by Kurt Lewin consists of four steps, namely:

Planning. In the planning stage, researchers and teachers prepare contextual learning strategies to overcome students' low mathematical understanding.

Action. The implementation stage is carried out by applying learning that links mathematical concepts to real situations so that students are more active and can easily understand the material.

Observation. During the process, researchers observe student activities or responses to collect data on student engagement and understanding.

Reflection. The results of the observation are then analyzed in the reflection stage to evaluate the effectiveness of the actions and determine the improvements needed in the next cycle.

The PTK cycle according to Kurt Lewin can be seen in Figure 1

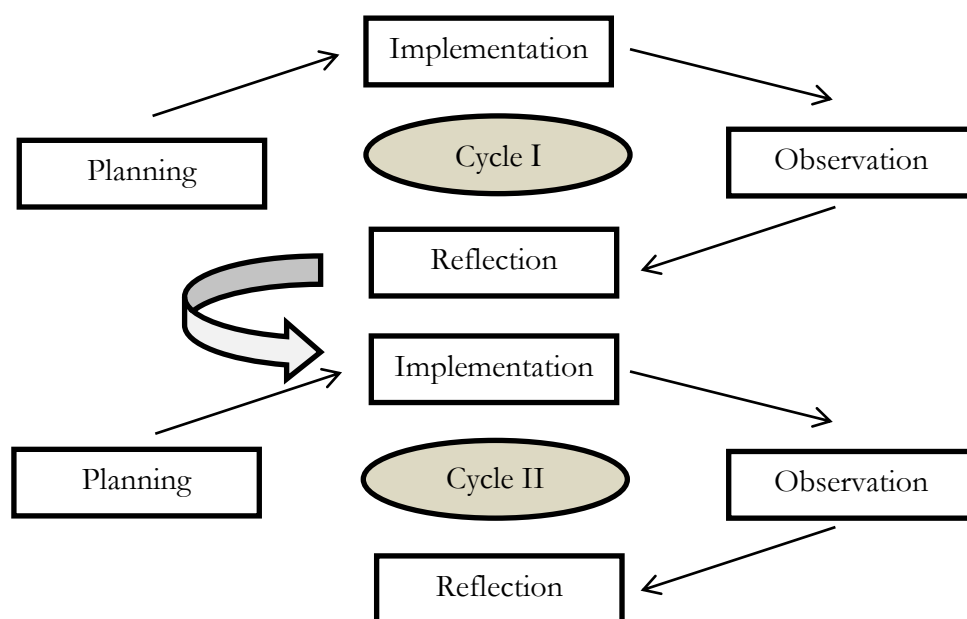


Figure 1 Kurt Lewin's Classroom Action Research Model

The researcher conducted this Classroom Action Research on fourth-grade students with the aim of improving the mathematical understanding of fourth-grade students who were classified as low achievers. The subjects of this study were 26 fourth-grade students from Class A of Pasalakan 1 Public Elementary School in the 2024/2025 academic year, consisting of 8 male students and 18 female students.

The instruments used in this study were tests and observations. The test instrument consisted of a test sheet containing questions to measure students' level of mathematical understanding of the material. There were 5 essay questions related to mathematical comprehension skills. There were two types of observation sheets used: student activity observation sheets and teacher observation sheets. The student activity observation sheet was used to measure student activity during the learning process. The aspects assessed were attention and motivation, active participation, group work, concept understanding, use of learning media, and reflection on learning outcomes. The indicator of students' mathematical understanding focused on how students could explain why one fraction was greater or smaller than another. Meanwhile, the teacher observation sheet is used to measure the teacher's performance in implementing the learning process, whether it is in accordance with the learning implementation plan or not. The aspects assessed in teacher observation are initial activities, delivery of material, providing examples and guidance, asking comprehension questions, facilitating group discussions, providing feedback, and reflection and closing. In teacher activities, emphasis is placed on how teachers ask questions that lead students to reason and explain the reasons for determining which fraction is larger or smaller. The data analysis used is qualitative, which is a data analysis technique consisting of three stages of activity, namely data reduction, data presentation, and conclusion drawing or verification (Millah et al., 2023). Student test results were analyzed descriptively and quantitatively. Each assessment was calculated using the average score.

Student assessment results were obtained using the following formula:

$$\text{Final score} = \frac{\text{skor perolehan}}{\text{skor maksimal}} \times 100$$

The average of the learning outcomes can be calculated using the formula:

$$M = \frac{\sum x}{\sum N}$$

Explanation:

M = Mean (average)

$\sum X$ = Total number of scores

$\sum X$ = Number of students

The completion rate can be calculated using the formula:

$$\text{Percentage of mastery} = \frac{\text{jumlah siswa tuntas}}{\text{jumlah seluruh siswa}} \times 100$$

The next step is to categorize the learning outcomes in the following table:

Table 1 Learning Outcome Categories

No.	Score	Category
1	86 – 100	Very good
2	71 – 85	Good
3	66 – 70	Fair
4	56 – 65	Insufficient
5	> 55	Very Low

After obtaining the research results, they need to be interpreted by comparing the pre-action results and each cycle. Then, relate the changes that occurred to the application of the contextual approach that was implemented. Through this, it can be concluded that the actions implemented were effective in improving students' mathematical understanding.

3. RESULT AND DISCUSSION

This classroom action research was conducted in class IV A of SD Negeri 1 Pasalakan, Sumber District, Cirebon Regency. The research subjects were all 26 students in class IV A of SD Negeri 1 Pasalakan, consisting of 8 male students and 18 female students. Before conducting the research, the author obtained initial data in the form of students' preliminary tests on fractions, which showed that 28.8% of the students had mastered the material, meaning that 9 out of 26 students had met the learning objectives with a class average score of 53.84.

In cycle I, the classical completion rate of students was 53.8% or 14 students who met the criteria for achieving learning objectives and 12 students did not complete with an average class score of 64.23. The implementation of cycle I by implementing contextual learning, there were several indicators that were still not apparent in teacher activities, such as not fostering students' enthusiasm for learning and curiosity. Students were not yet interested in the mathematics lessons. Therefore, in the implementation of cycle I, student activity in participating in learning was not yet apparent. Many students were still passive during lessons, both in individual and group activities. In addition, there were also several students who were inactive in group activities to solve the problems presented. Shouib and Aslam revealed that the application of well-designed group work will improve students' academic performance in mathematics. Implicitly, if the group is not active, the learning outcomes will be less than optimal (Shouib & Aslam, 2024). After analysis, there were several things that needed to be improved in the next cycle, namely that teachers needed to provide incentives for students to ask questions about material they did not understand and create more contextual learning in accordance with the model, method, and approach that had been developed, so that learning would be more interactive and enjoyable.

In the implementation of cycle II, the completeness of students' mathematical understanding increased, reaching 80.7% or 21 students completed and 5 students did not complete with a class average score of 78.26. This happened because during the learning process, the students followed the teacher's instructions well. Students paid attention to the teacher when the material was being explained, and several students dared to ask questions about material they did not understand. In cycle II, the teacher improved the learning design by including more concrete learning media. Students were able to work together to complete the worksheets well. This had an impact on the results of the evaluation test of students' mathematical understanding, which increased to a mastery level of 80.7%. Students' efforts to learn were evident in their higher level of engagement compared to cycle I. Students began to show seriousness in following the lessons. This is in line with the research by Saputri et al entitled "The Application of Contextual Teaching and Learning (CTL) Approach on Mathematics Learning Outcomes in Spatial Volume Material for Grade V Students at UPT SPF SD Inpres Kampus IKIP Kota Makassar," which concluded that there was a significant increase in student learning outcomes and student engagement during the learning process (Saputri et al, 2024).

Based on the data obtained in this study, it can be concluded that the application of contextual learning can improve the mathematical understanding of fourth-grade students at SD

Negeri 1 Pasalakan. There was an increase in the results of student learning activities from the pre-cycle, cycle I, and cycle II. Data from the pre-cycle to the implementation of cycle I showed an increase in the number of students who achieved mastery by 25%, and in cycle II, there was an increase in student mastery by 26.9%. This means that through contextual learning, students find it easier to understand concepts and solve mathematical problems. Students find it easier to understand abstract concepts when learning begins with concrete experiences that are close to their lives. In contextual learning, students are invited to relate mathematical material, such as comparing and ordering fractions, to everyday situations, such as dividing cakes or fruit. This process helps students understand concepts through reasoning, discussion, and problem-solving activities.

4. CONCLUSION

Based on the research results, it can be concluded that the application of contextual learning in mathematics lessons on comparing and ordering fractions in class IV A of SD Negeri 1 Pasalakan proved to be effective in improving students' mathematical understanding. This is demonstrated by the improvement in learning outcomes in each cycle, where learning completeness increased from 53.8% (14 students with an average of 64.3) in cycle I to 80.7% (21 students with an average of 78.26) in cycle II. Theoretically, these findings contribute to the development of knowledge in the field of mathematics education, particularly in strengthening empirical evidence of the effectiveness of contextual approaches to building conceptual understanding in elementary school students. Practically, the results of this study can be used as a reference for teachers to implement more meaningful learning, linking mathematical concepts to real-life contexts so that students are more active and understand concepts more deeply. This research can be used as a basis for educational decision makers to encourage the integration of contextual approaches in the implementation of the independent curriculum, especially in the design of mathematics learning oriented towards strengthening critical thinking and problem-solving competencies at the elementary school level. Future research could focus on developing more varied and adaptive contextual learning models tailored to student characteristics, as well as exploring the effectiveness of contextual learning on other aspects of mathematical competence, such as reasoning, mathematical communication, and problem-solving skills.

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