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# Collaborative Demonstration Method: An Effective Strategy to Enhance Science Learning Outcomes in Grade 4

## *Metode Demonstrasi Kolaboratif: Strategi Efektif untuk Meningkatkan Hasil Belajar Sains di Kelas 4*

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**Abstract:** This study was motivated through the low science learning outcomes of fourth-grade students, caused by a lack of variety in teaching methods, which made the learning process monotonous and resulted in minimal interaction between teachers and students. The study aimed to improve fourth-grade students' science learning outcomes through the application of the Collaborative Demonstration Method. The research was conducted on 24 fourth-grade students, consisting of 12 male and 12 female students, over two cycles that included planning, implementation, observation, and reflection phases. Data were collected through observation sheets, learning outcome tests, and student response questionnaires. The analysis showed that in Cycle I, the students' average score was 69.5, with 16 students meeting the learning criteria and 8 students not yet meeting it, the highest score being 85 and the lowest 50. In Cycle II, all students achieved mastery, with an average score of 81.7, the highest score of 95, and the lowest 65. Thus, the application of the Collaborative Demonstration Method was proven effective in improving the science learning outcomes of fourth-grade students. Teachers are encouraged to implement the collaborative demonstration method in teaching, especially in science subjects, to enhance interaction, understanding, and student learning outcomes.

**Keywords:** Demonstration; learning outcomes; science; collaborative

***Abstrak:*** *Penelitian ini dilatarbelakangi oleh rendahnya hasil belajar IPA siswa kelas IV, yang disebabkan oleh kurangnya variasi metode pembelajaran sehingga proses belajar menjadi monoton dan minimnya interaksi antara guru dan siswa. Penelitian ini bertujuan untuk meningkatkan hasil belajar IPA siswa kelas IV melalui penerapan Metode Demonstrasi Kolaboratif. Penelitian dilaksanakan pada 24 siswa kelas IV, terdiri dari 12 siswa laki-laki dan 12 siswa perempuan, dalam dua siklus yang meliputi tahap perencanaan, pelaksanaan, pengamatan, dan refleksi. Data dikumpulkan melalui lembar observasi, tes hasil belajar, dan angket respons siswa. Hasil analisis menunjukkan bahwa pada Siklus I, rata-rata nilai siswa mencapai 69,5 dengan 16 siswa yang tuntas dan 8 siswa belum tuntas, nilai tertinggi 85 dan terendah 50. Pada Siklus II, seluruh siswa mencapai ketuntasan dengan rata-rata nilai 81,7, nilai tertinggi 95, dan terendah 65. Dengan demikian, penerapan Metode Demonstrasi Kolaboratif terbukti efektif meningkatkan hasil belajar IPA siswa kelas IV. Disarankan kepada para guru untuk menerapkan metode demonstrasi kolaboratif dalam pembelajaran, khususnya pada mata pelajaran IPA, guna meningkatkan interaksi, pemahaman, dan hasil belajar siswa.*

***Kata kunci:*** *Demonstrasi; hasil belajar; IPA; kolaboratif*

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## INTRODUCTION

Education serves as a cornerstone for human development and societal progress, aiming to nurture individuals' potential holistically across cognitive, affective, and psychomotor domains. At the elementary school level, education provides a crucial foundation for shaping basic knowledge, skills, and character (Darmayanti et al., 2022; Ginting, 2024; Warlim et al., 2024). This foundational stage is critical as it prepares students for higher levels of education and equips them with the competencies needed to navigate life in an increasingly complex society. Consequently, the success of education at this level significantly influences students' future academic and personal achievements (Gamage et al., 2021; Hamaideh & Hamdan-Mansour, 2014; Ozcan, 2021).

In the context of education, learning outcomes are vital indicators of the effectiveness of the teaching and learning process. Learning outcomes reflect not only the acquisition of knowledge but also the development of essential skills and attitudes. According to Catherine (2023) and Scholl & Olsen (2014), these outcomes serve as a measure of students' understanding and mastery of subject matter. Specifically, in science education, learning outcomes encompass three key domains: cognitive (knowledge of scientific concepts), psychomotor (experimental skills), and affective (scientific attitudes such as curiosity and critical thinking) (Nurhayati et al., 2023). Assessment of these outcomes typically involves a combination of tests, projects, and observational tools, which provide a comprehensive picture of student achievement.

Despite its importance, achieving optimal learning outcomes in science remains a challenge in many elementary schools. Initial evaluations reveal a concerning trend: a significant number of students fail to meet the minimum competency standards. For example, only 4% of students score in the excellent category (81–90), while 42% achieve good scores (71–80). The remaining students fall into the fair (21%, scores of 61–70) and poor (33%, scores of 51–60) categories. These figures highlight not only deficiencies in academic performance but also issues such as low engagement and motivation among students during science lessons. This lack of motivation and active participation further hampers their ability to grasp scientific concepts effectively.

A major contributing factor to these issues is the reliance on traditional teaching methods, particularly lecture-based approaches. In these methods, the teacher assumes the role of the primary source of information, while students are relegated to passive recipients of knowledge (Mbonambi et al., 2023; Nouah et al., 2023). Such approaches often fail to foster active student engagement, critical thinking, or deep comprehension of the material. Furthermore, the monotonous nature of one-way instruction can lead to disengagement, boredom, and a superficial understanding of key scientific concepts. This underscores the need for more dynamic and participatory teaching strategies that can actively involve students in the learning process.

One promising approach to address this challenge is the Collaborative Demonstration Method. This method involves the direct demonstration of a process or concept, either by the teacher or the students themselves, to make abstract ideas more concrete and relatable (Blackburn & Stair, 2022; Walters et al., 2018). When paired with collaborative learning, the method becomes even more powerful, as it allows students to work in groups, conduct experiments, and engage in discussions. This interactive approach not only enhances students' comprehension but also fosters social skills, teamwork, and critical thinking. Unlike traditional demonstrations where students passively observe, the collaborative variant actively involves them in the process, making learning more meaningful and enjoyable.

Previous studies have documented the effectiveness of demonstration methods in improving learning outcomes. For instance, Sobon & Lumowa (2018) reported that students who participated actively in group demonstrations and experiments exhibited better comprehension of scientific concepts and stronger scientific skills compared to their peers who merely observed. Similarly, Umara (2022) found that incorporating demonstration methods in science lessons led to increased engagement, precision, and mastery of subject matter among students. However, many of these studies primarily focused on teacher-led demonstrations, with limited attention to methods that actively involve students.

This study addresses this gap by emphasizing the Collaborative Demonstration Method, where students are key participants in group-based demonstrations and experiments. By shifting the focus from teacher-centric to student-centric learning, this research introduces an interactive and participatory approach that has the potential to transform science education at the elementary level. The aim of this was to improve fourth-grade students' science learning outcomes through the application of the Collaborative Demonstration Method. Additionally, the study seeks to provide insights into innovative teaching strategies that enhance student motivation and active participation. By promoting a more engaging and interactive learning environment, this research contributes to the ongoing discourse on effective pedagogical practices in elementary education, particularly in the domain of science.

## METHODS

This study employed a Classroom Action Research (CAR) approach to improve students' science learning outcomes through the Collaborative Demonstration Method. The research was conducted in two cycles, with each cycle comprising four stages: planning, implementation, observation, and reflection. This iterative process allowed the identification of challenges during the learning activities and facilitated the implementation of strategies to address these issues for better results. The participants in this study were 24 fourth-grade students (entailing of 12 boys and 12 girls) at Banjarnegeri 2 Elementary School, who were actively involved in all stages of the research and engaged in collaborative learning activities to enhance their understanding of scientific concepts.

To gather data, various instruments were used, including observation sheets, learning outcome tests, and student response questionnaires. The observation sheets helped monitor and evaluate the activities of both teachers and students throughout the learning process. The learning outcome tests, presented in a multiple-choice format, assessed the students' comprehension of the science material, while the questionnaires collected feedback on their engagement, motivation, and overall perception of the Collaborative Demonstration Method.

The data collected were analyzed systematically through reduction, presentation, and conclusion drawing. In the reduction phase, raw data were simplified to focus on key findings. The presentation phase involved displaying the data in narrative descriptions, tables, and graphical representations for clarity. Lastly, the conclusions were drawn by interpreting the fallouts to determine the efficiency of the implemented method in enhancing learning outcomes. Quantitative data, such as test scores, were analyzed using percentage calculations to evaluate the students' performance and categorize their achievements into various levels, as outlined in the Table 1.

**Table 1. The Categorize of Students' Achievements**

| Score Interval | Description |
|---|---|
| 91-100 | Excellent |
| 81-90 | Very Good |
| 71-80 | Good |
| 61-70 | Fair |
| 51-60 | Poor |

From the analysis, the results were used to determine whether the Collaborative Demonstration Method had a significant impact on improving students' learning outcomes. If the results showed improvement across cycles, the research would be concluded. Otherwise, further iterations would be implemented. These findings formed the basis of the study's recommendations for applying this method in similar educational contexts.

## RESULTS AND DISCUSSION

The analysis of the collected data was based on the implementation of observations and evaluations in each cycle, as planned at the beginning of the study. The data consisted of both quantitative results from evaluation outcomes and qualitative data derived from observations. The quantitative data provided insight into the success or failure of the teaching-learning process using the Demonstration Method. This analysis was measured through assessing the complete capability attainments of the fourth-grade students. Meanwhile, the qualitative data was obtained from the observations that documented the activities of both the students and the teacher, which were recorded and analyzed during each session in the fourth-grade classroom. The results from separately cycle were then obtainable by the researcher.

The observations showed that the fourth-grade teacher successfully implemented the planned lessons in Cycle I. However, the materials and teaching aids used were not yet ideal or concrete enough, and the teaching methods lacked variety. As a result, many students still struggled with completing assignments and evaluation tests. The teacher should have employed more appropriate and effective techniques to encourage students to engage in the learning process. In particular, students needed more support to feel confident in asking questions and participating actively in discussions. During Cycle I, the evaluation results showed that eight students did not meet the minimum competency standard (KKM) of 65.

To address these issues, the teacher and collaborator worked together to find solutions, including explaining the material more clearly using simpler language that students could easily understand. The teacher also needed to introduce more diverse teaching techniques and incorporate more concrete teaching aids. Additionally, the teacher could motivate students to focus more on the lessons and actively participate in class. Creating an environment where students felt contented asking questions and appealing in discussions was also essential for improving their learning experience. The reflection from Cycle I provided a foundation for the improvements to be made in Cycle II, where similar steps would be taken with adjustments based on the lessons learned from Cycle I.

In Cycle II, the lessons were revised based on observations and reflections from Cycle I. Although the basic framework of the teaching process remained the same, the questions and instructional methods were adjusted to improve the effectiveness of the lesson and ensure better student comprehension of the topic "Heat Energy Around Us" in the science curriculum. The goal was to help students master the material more effectively. As a result of these improvements, the data showed significant progress, with an increase in both student activity and learning achievement. Students were more engaged in observing the teacher's explanations, asking insightful questions, and actively answering questions.

The results specified that the use of the demonstration method had a positive impression on students' understanding of the concept of heat energy. In Cycle II, the achievement of students significantly improved compared to Cycle I. The percentage of students who scored above the KKM increased, with fewer students remaining in the "insufficient" category. This improvement is shown in the Table 2.

**Table 2. Frequency of Achievement in Cycle I Learning Activities**

| No. | Interval | Frequency | Percentage | Description |
|---|---|---|---|---|
| 1 | 91–100 | 0 | 0% | Excellent |
| 2 | 81–90 | 1 | 4% | Very Good |
| 3 | 71–80 | 10 | 42% | Good |
| 4 | 61–70 | 5 | 21% | Fair |
| 5 | 51–60 | 8 | 33% | Poor |
| | **Total** | **24** | **100%** | |

In Cycle I, the achievement results were as follows: 1 student (4%) scored between 81-90 (very good), 10 students (42%) scored between 71-80 (good), 5 students (21%) scored between 61-70 (fair), and 8 students (33%) scored below the KKM (poor). These results indicate that eight students did not meet the expected standard, highlighting the need for further improvement in the second cycle.

**Table 3. Frequency of Achievement in Cycle II Learning Activities**

| No. | Interval | Frequency | Percentage | Description |
|---|---|---|---|---|
| 1 | 91–100 | 5 | 21% | Excellent |
| 2 | 81–90 | 5 | 21% | Very Good |
| 3 | 71–80 | 11 | 46% | Good |
| 4 | 61–70 | 3 | 12% | Fair |
| 5 | 51–60 | 0 | 0% | Poor |
| | **Total** | **24** | **100%** | |

In Cycle II, the achievement results improved significantly. 5 students (21%) scored between 91-100 (excellent), 5 students (21%) scored between 81-90 (very good), 11 students (46%) scored between 71-80 (good), and only 3 students (12%) scored between 61-70 (fair) (scored 65, 67, and 68). Notably, no students scored below the KKM in Cycle II. These results show a substantial improvement in student performance compared to Cycle I, with the majority of students now meeting or exceeding the KKM. If there are still students who score below the KKM, the learning process is evaluated further. Although the class may not meet the classical success criterion, learning improvements are analyzed based on the proportion of students meeting the KKM compared to the previous cycle. The process also includes identifying challenges faced by students with lower scores and implementing targeted interventions to ensure better outcomes in the next cycle.

The comparison between the two cycles demonstrates that the use of the Collaborative Demonstration Method was effective in improving student learning outcomes. The percentage of students meeting or exceeding the KKM increased from 67% in Cycle I to 100% in Cycle II. This suggests that the improvements

made in the second cycle, such as providing clearer explanations, using more varied teaching techniques, and offering more concrete teaching aids, had a significant impact on student achievement.

The use of the Collaborative Demonstration Method in teaching science to fourth-grade students has proven to be highly effective in improving their understanding of the topic "Heat Energy Around Us." This method not only enhanced students' comprehension of the material but also fostered increased engagement, curiosity, and participation in class discussions. Students became more proactive in asking questions and demonstrating their knowledge, indicating a deeper grasp of the subject matter. Furthermore, the academic performance of students showed significant improvement, particularly in terms of meeting the KKM (Minimum Mastery Criteria) and exceeding it, which underscores the positive impact of this teaching method.

These findings align with previous studies that have investigated the effectiveness of demonstration-based learning in various educational settings. For example, Schneider et al. (2022) found that demonstration methods significantly enhanced science achievement among primary school students, particularly in subjects like physics and chemistry. Similarly, research by Schlafer et al. (2021) also emphasized the role of hands-on and demonstration-based teaching in helping students to visualize complex concepts and engage in active learning. These studies suggest that the use of the Collaborative Demonstration Method provides a dynamic learning experience that encourages students to develop critical thinking skills and foster a greater understanding of scientific principles.

The success of this approach in this study suggests that future lessons should continue to incorporate the Collaborative Demonstration Method, particularly for complex topics like energy and forces. By using this method, teachers can create an interactive and supportive learning environment where students feel more comfortable participating and taking ownership of their learning. Additionally, the collaborative nature of the demonstrations allows students to work together, further enhancing their communication skills and their ability to collaborate effectively in problem-solving tasks.

It is important to note, however, that while the Collaborative Demonstration Method showed positive results, it should be complemented with other strategies to address the diverse needs of students. As each student has their unique learning style and pace, a mixed-method approach that combines demonstrations with discussions, group activities, and multimedia resources can cater to a wider range of learning preferences (Ferlina & Fratiwi, 2024). For instance, visual learners may benefit from diagrams and videos, while kinesthetic learners might be more engaged with hands-on activities and interactive demonstrations (Abdellatief et al., 2014; Bărbuceanu, 2020).

The Collaborative Demonstration Method holds great promise for enhancing students' understanding of scientific concepts and improving their overall academic performance. As the education sector continues to evolve, it is crucial for educators to adopt innovative and research-backed strategies like this to foster a more engaging, effective, and inclusive learning environment. The findings from this study, combined with supporting literature, suggest that teachers should continue to integrate demonstration-based learning into their teaching practices to promote deeper student engagement and achievement in science education.

## CONCLUSION

Based on the research findings, it can be concluded that the application of the collaborative demonstration method effectively improves students' learning outcomes and their ability to understand the material in science lessons, specifically in grade IV. By using this method, teachers can facilitate the improvement of student learning achievements, as reflected in the increase of student performance according to the KKM (65) standard in each cycle. In cycle I, 8 students did not meet the KKM, while in cycle II, only 1 student remained at the KKM standard. This demonstrates that the demonstration method can be effectively applied to students with varying levels of ability, including both higher and lower-level students.

Based on the conclusion, the researcher suggests that the demonstration method should be tailored to the material being taught and presented in a way that is already familiar to the students to facilitate better understanding and retention. Additionally, conducting easy-to-understand dialogues with students is necessary to help them engage more actively with the material. Creating a varied classroom environment will make the learning process more communicative and effective. Educators are encouraged to keep up with the developments in the field of education to continually improve their teaching quality. Consistent use of the demonstration method as a teaching medium is also crucial for further enhancing students' learning achievements.

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