



Implementation of the Cooperative Learning Model Type TSTS Assisted by Concrete Media to Improve Mathematics Learning Outcomes

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ABSTRACT

This study was conducted to improve the learning outcomes of second-grade students in mathematics at SD IT Rumah Anak Soleh Buton. The research applied classroom action research carried out in two cycles. Each cycle consisted of the stages of planning, implementation, observation, and reflection. The learning process was designed by applying the Cooperative Learning Model type Two Stay Two Stray, assisted by concrete media, to make mathematical concepts more accessible and meaningful for students. Data collection techniques included observation sheets, test instruments, and documentation, which were analyzed descriptively to capture both the process and the results of student learning. The findings of the study revealed that student learning outcomes improved across the cycles. Initially, many students had difficulty achieving the expected mastery in addition and subtraction, but after the implementation of the model, a significant improvement was observed. The cooperative approach encouraged active participation, peer learning, and better conceptual understanding. The use of concrete media also helped students relate abstract mathematical ideas to real-life contexts, thus strengthening their comprehension and motivation. Based on these results, it can be concluded that the Cooperative Learning Model type Two Stay Two Stray with concrete media is effective in improving mathematics learning outcomes among second-grade students.

Keywords: Cooperative Learning, Two Stay Two Stray, Concrete Media, Learning Outcomes

1. Introduction

Education is a process of learning and development aimed at improving knowledge, skills, and character. It covers many aspects, one of which is learning. In the learning process, several important elements must be considered, including skills, application, synthesis, and evaluation. Among the various subjects taught in schools, mathematics plays a crucial role. Mathematics is the study of structure, numbers, and the relationships among them. It involves reasoning, logic, and problem solving to understand and analyze natural and social phenomena. Since mathematics is often considered abstract, its teaching requires the use of appropriate learning models and instructional media that match the subject matter. For this reason, the

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implementation of the Cooperative Learning Model type Two Stay Two Stray assisted by concrete media is necessary to enhance students' learning outcomes in mathematics.

According to Harahap (2024), the TSTS model is a learning strategy that can be applied to all subjects and to students of various ages. This model provides opportunities for groups to share information and results with other groups. The use of the TSTS model in mathematics learning is highly beneficial because it encourages learners to solve problems collaboratively. However, to solve problems effectively, instructional media must be incorporated so that the learning model becomes more efficient and meaningful. The integration of concrete media is particularly important, as it helps students grasp mathematical concepts more clearly, making the learning process more engaging and effective.

Learning outcomes are defined as changes in behavior that encompass cognitive, affective, and psychomotor domains. These changes occur within specific contexts as a result of continuous and repeated learning experiences. The achievement of learning outcomes is not instantaneous but rather a gradual process that can be observed as students engage in teaching and learning activities. Evaluation plays an important role in assessing these outcomes, as it provides educators with a clear picture of students' progress and level of mastery. Tests are among the most common instruments used to measure learning outcomes, allowing teachers to determine whether the learning objectives have been successfully achieved. The success or failure of learners in achieving the expected outcomes is influenced by a variety of factors. Some of these are internal factors, which originate from within the students themselves, such as motivation, interest, and physical or psychological conditions. Others are external factors, which come from outside the students, including the learning environment, instructional strategies, available media, and support from teachers or parents. Both internal and external factors interact dynamically, shaping the extent to which students are able to reach their full potential in the learning process (Sana & Bachri, 2022).

Previous studies have highlighted the importance of cooperative learning models in improving student outcomes, particularly in mathematics. Johnson and Johnson (2019) demonstrated that cooperative learning encourages collaboration and significantly enhances students' cognitive achievement. Similarly, Slavin (2020) emphasized that cooperative structures foster positive interdependence and individual accountability, which are critical for academic success. Research by Gillies (2021) also showed that students engaged in cooperative learning display better problem-solving skills and higher motivation compared to those in traditional settings. In the Indonesian context, Putra (2022) found that applying the Two Stay Two Stray (TSTS) model improved both conceptual understanding and student participation in elementary mathematics classes. These findings suggest that cooperative learning can effectively address the challenges posed by the abstract nature of mathematics by making the learning process more interactive and meaningful.

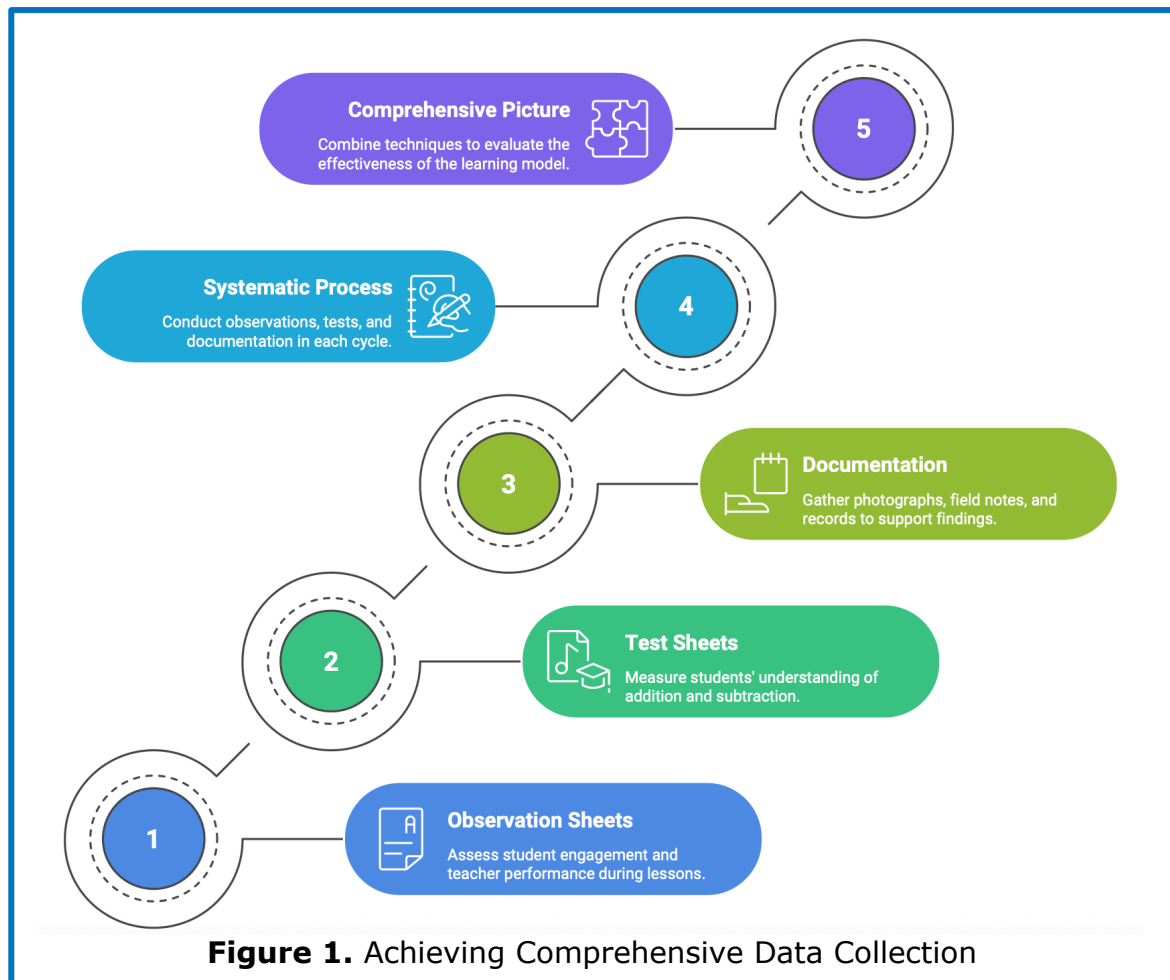
Other scholars have examined the role of learning media in enhancing the effectiveness of cooperative models. According to Arends (2018), the integration of concrete media strengthens students' ability to connect abstract mathematical concepts with real-world applications. Harahap (2024) further argued that TSTS combined with suitable media provides students with opportunities to share and

refine knowledge collaboratively, leading to improved outcomes. A study by Widianita (2023) revealed that concrete media not only supports conceptual mastery but also stimulates active engagement during group discussions. Meanwhile, research by Hernandez and Brown (2021) underscored that when cooperative models are reinforced with visual or tangible media, students experience deeper comprehension and increased retention. Collectively, these studies reinforce the argument that combining cooperative learning, particularly TSTS, with concrete media can significantly enhance mathematics learning outcomes across diverse educational contexts.

One of the main problems in mathematics learning at the elementary level is that students often perceive mathematics as abstract and difficult to understand. This condition creates a gap between the expected learning objectives and the actual outcomes achieved in the classroom. Teachers frequently face challenges in designing learning models that not only deliver content but also encourage active participation and deeper comprehension. As a result, students' motivation tends to decline, and their ability to apply mathematical concepts in problem-solving remains limited. The impact of this situation is that mathematics learning outcomes are often below the expected standards, which in turn affects students' confidence and long-term academic performance. To address these challenges, innovative learning approaches are needed that can make mathematics more engaging and meaningful. The Cooperative Learning Model type Two Stay Two Stray assisted by concrete media offers a potential solution, as it combines collaborative interaction with tangible learning tools to bridge abstract concepts. This strategy helps students share knowledge, discuss problems collectively, and relate mathematics to real-life contexts. The choice of this research title is particularly interesting because it does not only focus on improving academic achievement but also responds to the urgent need for interactive, student-centered learning in elementary schools. By integrating cooperative structures and concrete media, this study provides both theoretical contributions and practical solutions for enhancing mathematics education.

2. Methods

This study employed classroom action research conducted during the even semester of the academic year 2024 to 2025 at SD IT Rumah Anak Soleh Buton. The aim of the research was to improve mathematics learning outcomes through the application of the Cooperative Learning Model type Two Stay Two Stray assisted by concrete media. The subjects of the research were all second grade students consisting of fourteen participants, which allowed for a detailed observation of the learning process and the improvement of student outcomes. The research procedure followed the design of classroom action research which consisted of four main stages, namely planning, implementation, observation, and reflection. The research was carried out in two cycles, with each cycle consisting of two meetings. In the planning stage, the teacher prepared lesson plans, concrete media, and research instruments. In the implementation stage, the teacher applied the Two Stay Two Stray model according to the prepared scenario. Observation was conducted to monitor student activities and teacher performance, while reflection was carried out to evaluate results and determine improvements for the next cycle.



The data were collected using several instruments relevant to the objectives of the study. Observation sheets were used to assess student engagement and teacher performance during the lessons. Test sheets were administered to measure students' understanding of addition and subtraction after participating in learning activities with the Cooperative Learning Model type Two Stay Two Stray assisted by concrete media. Documentation in the form of photographs, field notes, and records of activities was also gathered to strengthen the findings of the study. The process of data collection was carried out systematically in each cycle. Observations were conducted throughout the learning process to examine interaction, participation, and student responses. Tests were administered at the end of each cycle to assess the improvement of learning outcomes, while documentation was collected continuously as supporting evidence. The combination of these three techniques provided a comprehensive picture of the effectiveness of the learning model applied in the classroom.

The collected data were analyzed using both quantitative and qualitative approaches. Quantitative analysis was applied to process students' test results through the calculation of average scores, percentages of mastery, and progress across cycles. This analysis was intended to measure the extent to which the implementation of the Two Stay Two Stray model with concrete media improved students' academic performance. Qualitative analysis was applied to data obtained from student and teacher observations as well as documentation. The process included data reduction, data presentation, and conclusion drawing. This

analysis provided insights into the dynamics of the learning process, student responses toward the use of concrete media, and the teacher's role in facilitating learning. By combining both quantitative and qualitative approaches, the study offered a comprehensive understanding of the effectiveness of the implemented model.

3. Findings and Discussion

3.1 Findings

The Cooperative Learning Model type Two Stay Two Stray assisted by concrete media has the potential to improve learning outcomes in mathematics based on students' abilities. This model encourages collaboration among students, allowing them to exchange ideas and strengthen their understanding of abstract mathematical concepts. The use of concrete media provides a tangible representation of problems, which helps students to better grasp the material and apply it to problem solving. As a result, the learning process becomes more engaging, interactive, and meaningful for students at the elementary level. The effectiveness of this model can be observed through the progress achieved in the first and second cycles of the study. The application of the Two Stay Two Stray strategy combined with concrete media showed significant improvement in students' learning performance compared to the initial condition. The details of students' progress in each cycle can be seen in Table 1, which illustrates the increase in both participation and mastery of the learning material. This indicates that the integration of cooperative learning and concrete media is effective in enhancing mathematics learning outcomes.

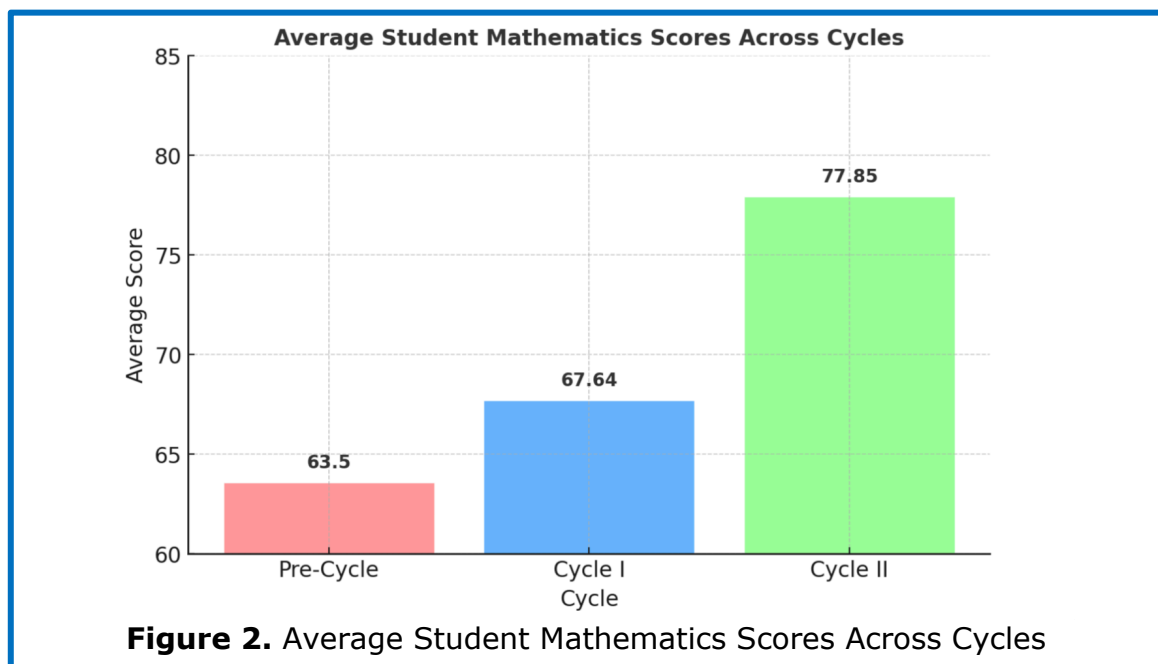
Table 1. Mathematics Learning Outcomes of Students in the Pre-Cycle, Cycle I, and Cycle II

No	Cycle	Total Score	Average Score	Mastery Percentage
1	Pre-Cycle	890	63.5	42%
2	Cycle I	947	67.64	64%
3	Cycle II	1090	77.85	85%

Table 1 presents the mathematics learning outcomes of students in the pre-cycle, the first cycle, and the second cycle. The results show a steady increase in both the average scores and the percentage of mastery. During the pre-cycle, students obtained an average score of 63.5 with only forty two percent of students achieving the minimum mastery level. This initial result illustrates that many students still struggled with mathematical concepts, which indicated the need for improvement in the learning process. In the first cycle, there was a notable improvement compared to the pre-cycle. The total score increased to 947, with an average score of 67.64 and a mastery percentage of sixty four percent. This progress suggests that the implementation of the Cooperative Learning Model type Two Stay Two Stray assisted by concrete media began to have a positive impact on students' understanding. However, the results also revealed that more than one third of the students had not yet reached mastery, which highlighted the importance of refining the strategy and strengthening the use of media in the following cycle.

The second cycle demonstrated a significant enhancement in learning outcomes. The total score reached 1090, with an average score of 77.85 and a mastery percentage of eighty five percent. This substantial increase indicates that most students were able to grasp the mathematical concepts more

effectively through the collaborative learning activities supported by concrete media. The cooperative structure allowed students to share knowledge with peers, while the use of tangible media helped bridge abstract ideas with practical understanding. Overall, the data confirm that the combination of the Two Stay Two Stray model and concrete media is effective in improving mathematics learning outcomes. The consistent progress across the cycles illustrates how active engagement, peer collaboration, and the integration of visual and concrete aids can support students in achieving higher levels of comprehension and mastery. These findings suggest that this model can serve as a reliable alternative strategy for mathematics learning in elementary schools.



The bar chart shows a clear upward trend in students' mathematics learning outcomes from the initial stage to the first cycle and then to the second cycle. At the beginning, students demonstrated relatively low levels of mastery, but after the introduction of the Cooperative Learning Model type Two Stay Two Stray with the support of concrete media, their performance improved. This suggests that the approach gradually helped students to understand mathematical concepts more effectively, as reflected in the steady increase across the cycles. The visual also highlights that the most significant improvement took place after the second application of the model. At this stage, students appeared more confident, actively engaged in the learning process, and benefited from peer collaboration. The use of concrete media played an important role in making abstract concepts more meaningful and easier to apply. Overall, the figure reinforces the effectiveness of combining cooperative learning with concrete materials in improving students' mathematics achievement.

From the description above, it can be seen that the comparison of student learning outcome percentages shows a consistent improvement across the three stages. In the pre-cycle, only a smaller portion of students had achieved mastery, while in the first cycle the percentage increased noticeably, and in the second cycle the majority of students successfully reached the expected level of mastery.

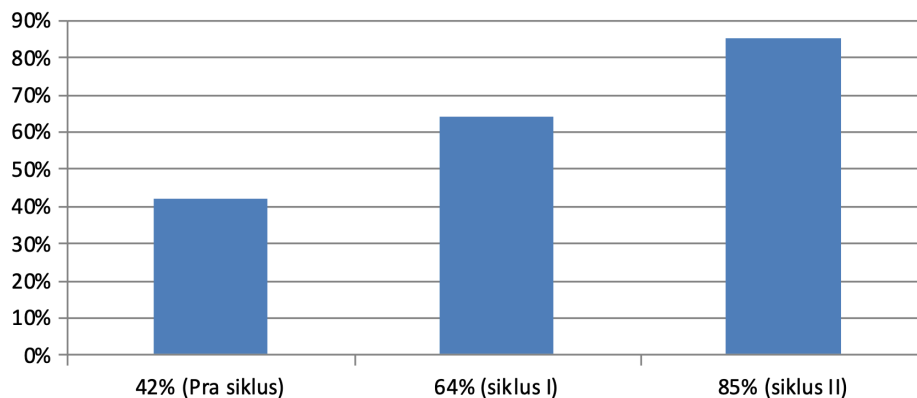


Figure 3. Diagram of Comparison of Student Learning Outcomes Percentages in the Pre-Cycle, Cycle I, and Cycle II

This progression demonstrates that the application of the Cooperative Learning Model type Two Stay Two Stray supported by concrete media was effective in gradually enhancing students' mathematics achievement. The increase across cycles indicates that repeated implementation of this model not only improved understanding but also strengthened student participation and confidence in learning.

3.2 Discussion

The findings of this study demonstrate that the application of the Cooperative Learning Model type Two Stay Two Stray (TSTS) assisted by concrete media was effective in improving students' learning outcomes in mathematics. The steady improvement from the pre-cycle to the first and second cycles indicates that students became more engaged in the learning process. This model provided opportunities for active participation, peer collaboration, and meaningful interaction, which contributed to a better understanding of abstract mathematical concepts.

The improvement in students' performance also highlights the role of concrete media in bridging abstract ideas with real-life experiences. Mathematics, often perceived as complex and difficult, became more accessible when students were able to visualize and manipulate concrete objects. This approach not only strengthened comprehension but also enhanced students' motivation, as they were more eager to participate actively in classroom discussions and group activities. Furthermore, the collaborative structure of the TSTS model created a learning environment where students learned to share knowledge, listen to peers, and solve problems collectively. Such interactions encouraged the development of communication skills and teamwork, which are essential competencies in the twenty-first century. The increase in mastery levels across the cycles reflects the effectiveness of combining cooperative learning strategies with tangible learning aids.

Another important aspect observed during the implementation was the improvement of students' confidence. Initially, many students hesitated to express their ideas or participate in discussions. However, with the gradual application of the TSTS model, they became more confident in sharing their thoughts and engaging with their peers. This change demonstrates that cooperative learning not only benefits academic achievement but also fosters social and emotional growth among students. These results are consistent with

previous research. Johnson and Johnson (2019) revealed that cooperative learning fosters positive interdependence and individual accountability, leading to significant academic improvement. Slavin (2020) emphasized that structured group activities enhance both comprehension and motivation. Gillies (2021) found that cooperative learning encourages deeper engagement in problem solving. Arends (2018) pointed out that concrete instructional media make abstract concepts more accessible, while Widianita (2023) highlighted that the integration of concrete materials increases participation and retention in mathematics classes. In line with these findings, the current study confirms that the combination of cooperative learning and concrete media is a promising strategy to address the challenges of mathematics learning in elementary schools. It not only improves learning outcomes but also supports the holistic development of students. Therefore, teachers are encouraged to adopt similar approaches in their classrooms, adapting cooperative strategies and instructional media to the needs of their students to ensure more effective and meaningful learning experiences.

4. Conclusion

The results of this study lead to the conclusion that the implementation of the Cooperative Learning Model type Two Stay Two Stray supported by concrete media was effective in improving mathematics learning outcomes among second grade students. The improvement observed from the initial stage to the first and second cycles shows that this approach not only enhanced students' cognitive understanding but also encouraged greater participation and engagement in the learning process. The combination of cooperative structures and concrete media successfully addressed the abstract nature of mathematics by making concepts easier to grasp and apply in practice. In addition, the findings highlight that this learning model does not only contribute to academic achievement but also supports the development of confidence, communication, and collaborative skills among students. The consistent progress throughout the cycles indicates that repeated application of this strategy creates a more interactive and meaningful classroom environment. Therefore, the Cooperative Learning Model type Two Stay Two Stray with concrete media can be considered a practical and effective alternative for mathematics instruction in elementary schools, offering both theoretical contributions and direct benefits for teaching practice.

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