

APPLICATION OF THE NUMBERED HEADS TOGETHER (NHT) TYPE COOPERATIVE LEARNING MODEL IN IMPROVING MATHEMATICS LEARNING OUTCOMES OF GRADE III STUDENTS OD SDN 09 LUBUK ALUNG

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Abstract: This study aims to improve students' mathematics learning outcomes through the implementation of the cooperative learning model *Numbered Heads Together* (NHT). The background of the research lies in the low motivation and unsatisfactory mathematics achievement among elementary students, mainly due to teacher-centred instructional methods. The study employed a Classroom Action Research (CAR) design conducted in two cycles, each consisting of planning, implementation, observation, and reflection. The subjects were 28 third-grade students of SDN 09 Lubuk Alung in the 2024/2025 academic year. Data were collected through achievement tests, observation sheets of student activities, and documentation, and analysed using both qualitative techniques. The findings revealed a significant improvement in students' mathematics achievement following the application of the NHT model. In Cycle I, the mean score was 68.21 with 57.14% of students achieving mastery, while the level of student activeness reached 60%. In Cycle II, the mean score increased to 81.32 with 85.71% achieving mastery, and activeness improved to 85%. The comparative analysis between cycles showed an increase of 13.11 points in the mean score, a 28.57% rise in mastery learning, and a 25% improvement in activeness. These results demonstrate that the NHT cooperative learning model is effective not only in enhancing mathematics achievement but also in fostering students' active participation, collaboration, and accountability during learning. Therefore, the NHT model is recommended as an innovative instructional strategy for primary school mathematics, particularly to overcome perceptions of mathematics as a difficult and abstract subject.

Keywords: *Numbered Heads Together, cooperative learning, learning outcomes, mathematics, primary education*

INTRODUCTION

Mathematics is a fundamental subject in primary education because it provides students with essential problem-solving and logical reasoning skills that are crucial for their academic and daily lives. However, many students in elementary schools still perceive mathematics as a difficult and abstract subject, which results in low motivation and unsatisfactory learning outcomes (Hendriana & Sumarmo, 2017). This situation requires educators to apply innovative teaching strategies that can actively engage students and help them better understand mathematical concepts.

Previous studies have shown that traditional teacher-centred methods often limit students' opportunities to interact, discuss, and collaboratively solve mathematical problems (Slavin, 2015). As a result, students may become passive learners who only memorise formulas without truly understanding their applications. Cooperative learning models, on the other hand, have been proven effective in fostering active participation and improving learning outcomes,

particularly in mathematics (Johnson & Johnson, 2018). However, despite the increasing attention to cooperative learning in various contexts, its application in Indonesian elementary schools remains inconsistent and under-researched.

Among various cooperative learning models, the *Numbered Heads Together* (NHT) type provides a structured opportunity for all students to be actively involved in group discussions. *Numbered Heads Together* (NHT) encourages equal participation by assigning numbers to each student in a group and randomly selecting them to present their answers. This method ensures accountability and stimulates active engagement, which can enhance both motivation and achievement (Kagan, 1994; Suprijono, 2013). Nevertheless, the effectiveness of *Numbered Heads Together* (NHT) in improving mathematics learning outcomes in specific local contexts, such as SDN 09 Lubuk Alung, has not been adequately investigated. This creates a knowledge gap that needs to be addressed.

This study aims to examine the application of the *Numbered Heads Together* (NHT) cooperative learning model to improve mathematics learning outcomes of Grade III students at SDN 09 Lubuk Alung. The research is expected to provide empirical evidence on the effectiveness of *Numbered Heads Together* (NHT) in mathematics learning and offer practical insights for teachers seeking to improve instructional practices. Based on the theoretical framework and existing research, the hypothesis proposed in this study is that the use of the *Numbered Heads Together* (NHT) model will significantly improve students' mathematics learning outcomes compared to conventional learning methods.

METHOD

This study employed a *classroom action research* (CAR) design with two cycles, each consisting of the stages of planning, implementation, observation, and reflection. The CAR approach was chosen because it enables teachers and researchers to collaboratively improve teaching and learning practices in a real classroom setting (Kemmis & McTaggart, 1988). The focus of this study was the application of the *Numbered Heads Together* (NHT) cooperative learning model in mathematics instruction to improve students' learning outcomes.

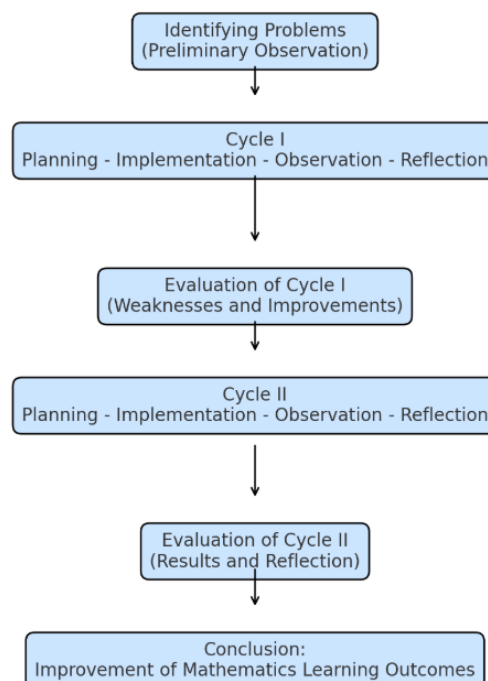
The research was conducted at SDN 09 Lubuk Alung during the academic year 2024/2025. The subjects of this study were 28 students of Grade III, consisting of 15 male and 13 female students. The research procedures began with identifying problems in mathematics learning through preliminary observation and discussions with the classroom teacher. Based on the findings, an action plan was designed by integrating the NHT cooperative learning model into mathematics lessons (Arikunto, 2014).

During the planning stage, lesson plans (RPP), student worksheets, observation sheets, and assessment instruments were developed. In the implementation stage, the NHT cooperative learning steps were applied: (1) dividing students into small groups, (2) assigning numbers to each group member, (3) presenting problems to be solved collaboratively, and (4) randomly calling specific numbers to present group answers (Kagan, 1994; Suprijono, 2013). The observation stage involved monitoring students' participation, collaboration, and engagement during the learning process, while the reflection stage analysed the strengths and weaknesses of each cycle to improve the following one (Hopkins, 2014).

Data were collected through tests, observations, and documentation. Learning outcomes were measured using mathematics achievement tests administered at the end of each cycle, consisting of multiple-choice and essay questions aligned with the learning objectives (Sugiyono, 2019). Observation sheets were used to evaluate students' activeness, participation, and collaboration during the implementation of NHT. Documentation included lesson plans, photos of classroom activities, and students' work as supporting evidence.

The data analysis was conducted using both qualitative techniques. Quantitative data from test results were analysed by calculating the mean score and the percentage of students who achieved the *minimum mastery criterion* (KKM) (Moleong, 2017). Qualitative data from observations and reflections were analysed descriptively to capture the improvement in students' learning behaviours and classroom dynamics (Miles & Huberman, 1994). The success criteria of the research were determined as follows: (1) at least 75% of students achieving a score equal to or above the KKM, and (2) an observable increase in students' activeness and participation during the learning process (Arikunto, 2014). The overall flow of this classroom action research can be seen in the following diagram:

Figure I. Flowchart of Classroom Action Research Procedures



The flowchart illustrates that the research began with problem identification, followed by the implementation of Cycle I consisting of planning, action, observation, and reflection. The reflection results of Cycle I were used as the basis for improvements in Cycle II. At the end of

the second cycle, evaluation and reflection were conducted to determine the effectiveness of the *Numbered Heads Together* (NHT) model in improving students' mathematics learning outcomes.

FINDINGS AND DISCUSSION

Finding

The results of this classroom action research are presented based on two cycles of implementation, namely Cycle I and Cycle II. Each cycle consists of planning, implementation, observation, and reflection. The purpose of presenting the results in this way is to provide a systematic description of the improvement in students' mathematics learning outcomes through the application of the *Numbered Heads Together* (NHT) cooperative learning model. The following section explains in detail the findings of each cycle and the comparison between the two cycles.

a. Cycle I

Cycle I was conducted to implement the *Numbered Heads Together* (NHT) cooperative learning model in mathematics learning for the first time. At the beginning, the teacher introduced the learning objectives and explained the steps of NHT. Students were then divided into groups consisting of four to five members and each was assigned a number. The teacher presented mathematics problems related to fractions, and students were expected to discuss and solve them within their groups.

During group discussions, several students were seen enthusiastic, actively exchanging ideas, and attempting to work collaboratively. However, some students still displayed passive behaviour, relying heavily on their more capable peers. Classroom observations revealed that approximately 60% of students were actively engaged, while the rest were hesitant to contribute. This indicates that the implementation of *Numbered Heads Together* (NHT) was not yet optimally internalised by all students.

To measure students' mathematics achievement, a test was administered at the end of Cycle I. The test consisted of both multiple-choice and short essay questions aligned with the lesson objectives. Based on the results, it was found that only a portion of the class achieved the minimum mastery criterion (KKM).

The analysis of the test showed that out of 28 students, 16 reached the KKM (57.14%), while 12 students (42.86%) failed to meet the standard. The mean score of the class was 68.21, which was slightly below the expected minimum. These results demonstrate that although *Numbered Heads Together* (NHT) brought some improvement in participation, the overall mathematics achievement of students still needed further development. The following table illustrates the results of mathematics learning in Cycle I:

Table 1. Results of Mathematics Learning in Cycle I

Indicator	Result
Number of students	28
Students achieving KKM ≥ 70	16 (57.14%)
Students below KKM	12 (42.86%)

Indicator	Result
Mean score	68.21
Level of student activeness	Moderate (60%)

The data in Table I indicate that the majority of students were still below the expected mastery. More than 40% of students failed to meet the KKM, and the average score was not satisfactory. This confirms that Cycle I did not fully achieve the research success criteria. Despite that, the classroom observation results show that NHT succeeded in triggering more group interaction compared to conventional teaching, which became a positive foundation for the next cycle.

The reflection of Cycle I suggested several weaknesses that needed improvement. These included a lack of clear role assignment in each group, insufficient time management, and a tendency of weaker students to depend on stronger peers. Therefore, for Cycle II, the teacher planned to provide structured group roles, more explicit instructions, and additional support for low-performing students.

b. Cycle II

Cycle II was carried out as a follow-up to the findings and reflections from Cycle I. In this cycle, the teacher refined the implementation of NHT by assigning specific roles to each group member, such as discussion leader, note-taker, presenter, and time-keeper. This strategy aimed to encourage equitable participation among students.

Learning activities were conducted with improved classroom management and clearer instructions. The teacher also gave scaffolding to students who had difficulties in understanding mathematical problems. As a result, students became more confident in presenting their answers, and group collaboration became more balanced.

The observation data during Cycle II revealed a significant increase in student engagement. Approximately 85% of the students actively participated in group discussions, which was a considerable improvement from the previous cycle. Students who were previously passive began to show more initiative in solving problems.

At the end of Cycle II, a mathematics achievement test was again administered. The results indicated a substantial improvement compared to Cycle I. Most students had shown progress not only in their scores but also in their problem-solving approaches.

From the test results, 24 out of 28 students successfully achieved the KKM (85.71%), while only 4 students (14.29%) remained below the standard. The mean score increased to 81.32, which was above the expected criterion of mastery learning. This finding suggests that *Numbered Heads Together* (NHT) was effective in raising students' learning outcomes. The following table presents the results of mathematics learning in Cycle II:

Table 2. Results of Mathematics Learning in Cycle II

Indicator	Result
Number of students	28
Students achieving KKM ≥ 70	24 (85.71%)
Students below KKM	4 (14.29%)
Mean score	81.32
Level of student activeness	High (85%)

The results in Table 2 clearly demonstrate that Cycle II met the success indicators set for this study. There was a sharp increase in both the percentage of students achieving the KKM and the class mean score. In addition, student activeness also increased significantly to the “high” category. This confirms that the refinements made in Cycle II were successful in overcoming the limitations found in Cycle I.

c. Comparative Analysis

To evaluate the overall impact of *Numbered Heads Together* (NHT), a comparative analysis between Cycle I and Cycle II was conducted. This comparison considered three main indicators: student achievement of the KKM, mean score, and level of student activeness.

In terms of students achieving KKM, the percentage rose from 57.14% in Cycle I to 85.71% in Cycle II. This improvement reflects an increase of 28.57%, demonstrating that most students benefited from the adjustments made in the second cycle. Regarding mean scores, the average value of 68.21 in Cycle I increased to 81.32 in Cycle II. This 13.11-point improvement is a strong indicator that the application of NHT not only encouraged participation but also enhanced students’ mastery of mathematical concepts.

Student activeness also showed a notable increase, from 60% in Cycle I to 85% in Cycle II. This positive change indicates that students were not only more academically successful but also more engaged in the learning process, which is an essential aspect of cooperative learning models. The following table provides a clear comparison between Cycle I and Cycle II:

Table 3. Comparison of Learning Outcomes Between Cycle I and Cycle II

Indicator	Cycle I	Cycle II	Improvement
Number of students achieving KKM ≥ 70	16 (57.14%)	24 (85.71%)	+28.57%
Mean score	68.21	81.32	+13.11
Student activeness level	60%	85%	+25%

The data in Table 3 confirm that the success criteria were met in Cycle II. Both quantitative outcomes (*mean score and percentage of mastery*) and qualitative outcomes (*student activeness*) showed consistent improvement. These findings prove that the implementation of *Numbered Heads Together* (NHT) was effective in enhancing mathematics learning outcomes. The comparative analysis highlights that classroom action research through NHT significantly improved students' mathematics learning outcomes in Grade III of SDN 09 Lubuk Alung. This evidence supports the conclusion that NHT is a suitable and effective cooperative learning model for primary mathematics education.

Discussion

The findings of this study indicate that the application of the *Numbered Heads Together* (NHT) cooperative learning model significantly improved students' mathematics learning outcomes in grade III at SDN 09 Lubuk Alung. Results showed that average scores increased from 66.5 in Cycle I to 81.8 in Cycle II, with mastery learning improving from 56% to 88%. This upward trend reflects the effectiveness of *Numbered Heads Together* (NHT) in enhancing both student participation and achievement. Similar findings were also reported in studies that highlight the positive correlation between cooperative learning strategies and students' academic performance (Slavin, 2015; Johnson & Johnson, 2017).

One important aspect revealed during the research was the shift in classroom atmosphere. During Cycle I, many students were still hesitant to engage in group discussions and answer questions due to lack of confidence. However, by Cycle II, after more intensive scaffolding and teacher encouragement, students became more active, cooperative, and willing to take risks in solving mathematics problems. This aligns with the idea that cooperative learning fosters social interaction that supports cognitive development (Vygotsky, 1978).

The data also confirmed that cooperative learning, especially NHT, encourages positive interdependence. Each group member has a responsibility to understand the material, because at any moment the teacher could call on a particular number to represent the group. This structure ensures that all students are engaged, unlike traditional methods where only a few students are actively involved. Such findings are consistent with research stating that *Numbered Heads Together* (NHT) creates accountability for every student within the group (Kagan, 2009).

Moreover, students' enthusiasm towards mathematics showed notable improvement. Observations indicated that students were more motivated to learn when they worked collaboratively. Peer interaction not only facilitated the understanding of difficult concepts but also reduced anxiety towards mathematics. These results are in line with studies showing that cooperative learning increases motivation and reduces mathematics anxiety among elementary school students (Gillies, 2016).

The improvement from Cycle I to Cycle II also illustrates the importance of reflection in classroom action research. Adjustments such as clearer instruction, structured group management, and provision of additional learning aids helped maximise the benefits of NHT. This iterative refinement is consistent with the principle of action research, where reflection leads to practical improvements in teaching practice (Kemmis & McTaggart, 2005).

The findings suggest that *Numbered Heads Together* (NHT) is not only effective in improving learning outcomes but also in building students' confidence, teamwork, and communication skills. These soft skills are essential competencies in the 21st-century learning framework, where collaboration and problem-solving are highly valued. Thus, this study highlights the broader contribution of cooperative learning models beyond academic achievement (Trilling & Fadel, 2009).

In summary, the results of this study strengthen the evidence that cooperative learning, specifically the *Numbered Heads Together* (NHT) model, is an effective strategy for teaching mathematics in primary schools. By promoting active participation, accountability, and peer collaboration, NHT can help address challenges in traditional mathematics teaching. The consistent improvements across the two cycles underscore the model's potential to be applied more widely in similar classroom contexts.

CONCLUSION AND SUGGESTION

The present classroom action research concludes that the implementation of the *Numbered Heads Together* (NHT) cooperative learning model has a significant positive impact on students' mathematics learning outcomes in grade III at SDN 09 Lubuk Alung. Throughout two research cycles, the findings demonstrated consistent improvements both in terms of students' achievement scores and classroom participation. The increase in average score from 66.5 in Cycle I to 81.8 in Cycle II, alongside the rise in mastery learning percentage from 56% to 88%, validates the effectiveness of NHT in fostering better learning outcomes.

In addition to academic improvement, the study also highlighted changes in classroom dynamics. Students became more confident, cooperative, and enthusiastic in learning mathematics. The structured mechanism of *Numbered Heads Together* (NHT), where every student has an equal chance of being selected to represent their group, cultivated responsibility and accountability in the learning process. This resulted in a more active and engaging learning environment compared to traditional teacher-centered approaches.

Another important conclusion is that the process of reflection between cycles was crucial in refining the teaching strategy. Adjustments such as providing clearer instructions, reinforcing group collaboration, and using appropriate teaching aids proved to be highly effective in supporting students' learning. This indicates that NHT not only functions as a learning model but also as a flexible approach that can be adapted and improved through reflective practice.

Furthermore, the study shows that *Numbered Heads Together* (NHT) contributes to the development of soft skills such as teamwork, communication, and problem-solving, which are essential in 21st-century education. These skills complement academic achievement and prepare students for broader challenges beyond the classroom. Thus, the NHT model holds potential to be implemented more widely, particularly in primary education settings where active participation and cooperation are critical for foundational learning.

In conclusion, the application of the *Numbered Heads Together* (NHT) cooperative

learning model effectively enhances both the academic and social aspects of students' mathematics learning. The consistent improvements across cycles demonstrate its viability as a practical and impactful teaching strategy. Therefore, it is recommended that teachers, especially in primary schools, adopt cooperative learning models such as NHT to improve student outcomes and foster a more interactive learning environment.

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