

Application of STAD-Type Cooperative Model in Improving Student Learning Outcomes in Mathematics Learning in Class V SDN I East Suwawa Regency Bone Bolango

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Abstract. *This study investigates the impact of the STAD (Student Teams Achievement Division) cooperative learning model on improving mathematics learning outcomes among fifth-grade students at SDN 1 Suwawa Timur, Bone Bolango Regency. Conducted as classroom action research, the study involved 28 students and was carried out over five sessions divided into two cycles. Initial observations revealed low student performance in mathematics, with only 25% of students meeting the minimum competency criteria (KKM). Following the implementation of the STAD model, significant improvements were observed, with student completion rates increasing from 54% in Cycle I to 89% in Cycle II. These findings highlight the effectiveness of the STAD cooperative learning model in fostering student engagement and improving academic performance in elementary mathematics. The study also contributes to existing literature by providing evidence of the model's applicability in rural educational settings, emphasizing the importance of interactive and collaborative learning strategies in enhancing student outcomes in mathematics.*

Keywords: *STAD Cooperative Learning, Mathematics Education, Classroom Action Research, Student Outcomes, Elementary Education*

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INTRODUCTION

It is an important school subject which contributes to the formation of numerous disciplines including technologies and sciences. At the same time, it has been recognized as a basic course that influences development of the cognitive skills and problem solving skills of the students (Hwang et al., 2020; Drigas & Mitsea, 2021). Teaching and learning of mathematics is very important not just in education but also in impacting students general learning that may enable them fit in a modern technological world. However, despite the relevance of math in the daily life and the academic success of students, the students struggle to excel in mathematics that hampers their academic performance and future careers.

In general context of elementary education especially in class V at SDN I East Suwawa, Bone Bolango Regency indeed there are some concernities observed in students' learning difficulties mostly in mathematics area. Comparing with the data collected from the period of 2018/2019 academic year, it can be concluded that traditional approaches have failed to capture students' interest and meet their requirements. Traditional approaches again entail the use of lectures with very little or no student participation, thus do not necessarily meet the Learning Profile of the students. As a consequence of this the students' average overall performance has

dropped disturbingly below the minimum school leaving benchmark in mathematics otherwise regarded as KKM and this also across the data presentation material.

According to the analysis done previously, the KKM for mathematics at SDN I East Suwawa is 75. But the score attained by the students who wrote the last tests suggest that only 25% of the students are able to present data data effectively while 75% of the students perform dismally. Such a gap raises a rather important question about the validity of present progressive teaching methodologies and points towards the fact that students may not be properly comprehending mathematical relationship (Svendsen, 2020; Skivington et al., 2021). I believe that student's minor role in the process of acquiring the knowledge, the absence of the interactive learning methods might be the reason for this state of affairs proves the need for an appropriate change in the learning-teaching model.

In response to these issues, there is the STAD (Student Teams Achievement Division) Type Cooperative Model that can be adopted. The STAD model is aimed at improving students' interest and achievement using cooperative learning approach. They include: It fosters group learning as students are grouped into small teams in order to solve various problems so as to support one another's learning as pointed by Parrish et al. (2021). This is based on principles of active learning and peer instruction which was determined to enhance the academic achievements through the supportive learning atmosphere.

Studies have shown that STAD is an effective form of cooperative learning which does enhance students' achievement and motivation. For example, it has been noted that uses of cooperative learning methods yield increased portion of understanding of mathematical concepts, as well as greater amount of students' satisfaction (Topping, 2020). In targeting students the strategy that has been developed, known as STAD model, seeks to tackle the poor participation and poor performance that learners normally exhibit when learning under normal teaching techniques.

Further, the instructional approach of the peer teaching and support as an integral part of the STAD model is also in line with the effective instructional model in educational psychology whereby students are engaged in the instructional process and self- and peer-assessment is utilized as part of the formative assessment. Thus, this approach allows the students to understand the material as well as develops important social and communication skills required for the student's personality.

Studying the experience of the school's work after adopting the STAD model can provide insights into the efficiency of the aforementioned approach in regard to the needs of learners in SDN I East Suwawa. Research done before proven that the STAD model is most effective in areas that requires skills like understanding of concepts in mathematics (Farisi, 2021). With its implementation in mind, the educators of SDN I East Suwawa have the possibility of offering better environment in teaching-learning process which could result increased academic achievement.

Therefore, the implication of this study goes far beyond the networks of SDN I East Suwawa. If successful, such application could help in the identification of a scalable and modifiable solution to the current problems with mathematics education in other schools. The discoveries might provide the best suggestion for those educators that are looking for ways to increase learners' interest and achievement by integrating creativity into learning processes

METHODS

This research was conducted in the fifth grade of SDN 1 Suwawa Timur, Bone Bolango Regency. The time of this research will be carried out in the 2018-2019 school year. Research time is adjusted to the school's academic calendar. With the number of students 28 people consisting of 16 men and 12 women. The reason the researcher chose class V was because this class had many students whose learning outcomes in mathematics were still low, especially data presentation material. This research uses classroom action research. According to Sanjaya (2016)

that classroom action research is an effort made by educators in increasing the responsibility and quality of the role of educators to manage meetings and reflect by participants such as teachers, students, principals to improve meetings in the classroom. Therefore, this study aims to improve student learning outcomes in the presentation of data on mathematics subjects through the application of the STAD type cooperative learning model in class V SDN 1 Suwawa Timur, Bone Bolango Regency.

This research design uses the classroom action research model from Kemmis and Taggart (in Aqib & Chotibuddin, 2018) which illustrates that each cycle consists of planning, implementation, observation and reflection stages. If the first cycle has not been able to achieve the achievement indicators, it can be continued in the second cycle with the same stages as in the first cycle. If the second cycle has not been able to meet the achievement indicators, this research can end if the achievement indicators have been achieved, namely reaching 80% or fulfilling Minimum KKM is 75. The flow of this action research consists of four steps and can be described as follows: (a) Planning (b) Action (c) Observation (d) Reflection.

RESULTS AND DISCUSSION

This research is a form of classroom action research that researchers carry out with the aim of implementing the STAD Type Cooperative Learning Model in Improving Student Learning Outcomes in Mathematics Learning in Class V Sdn I, East Suwawa, Bone Bolango Regency. The class that the researcher used as the research subject were students who were in class V of SDN 1 Suwawa Timur, Bone Bolango Regency with a total of 28 students. The research was carried out by the researcher in five meetings divided into two cycles, namely the first cycle consisting of three meetings and the second cycle two meetings. To be able to find out about the results of previous studies, the researchers carried out initial observations made by researchers before carrying out the actions in cycle I. Based on the results of observations that the researchers carried out, namely out of 28 students, there were 7 students who completed or reached 25%, while those who did not complete were 21 students or reached 75%. With the results of student achievements depicted in the table, the learning outcomes of students at the mathematics meeting for data presentation materials have not reached the indicators of success or are still said to be low than the researchers' expectations. Therefore, the researcher continued the meeting with the hope that student learning outcomes could increase by holding meetings in the first cycle.

Table 1. Student Learning Outcomes in Cycle I

Meeting	Total Students	Students Completed	Percentage Completed	Students Not Completed	Percentage Not Completed
Meeting 1	28	10	36%	18	64%
Meeting 2	28	13	46%	15	54%
Meeting 3	28	15	54%	13	46%

Out of 28 students, 10 students (36%) met the learning goals, while 18 students (64%) did not. There was an improvement with 13 students (46%) meeting the goals, and 15 students (54%) not meeting them. The percentage of students meeting the goals rose to 54% (15 students), while 46% (13 students) did not.

Table 2. Educator Activity Ratings in Cycle I

Meeting	Very Good	Good	Adequate
Meeting 1	5 (21%)	10 (42%)	9 (37%)
Meeting 2	6 (25%)	10 (42%)	8 (33%)
Meeting 3	6 (25%)	11 (46%)	7 (29%)

The percentages reflect the ratings of educator activities in each meeting. There was a notable improvement in the "Very Good" category from the first to the third meeting, indicating progress in the implementation of the STAD model.

Table 3. Student Activity Ratings in Cycle I

Meeting	Very Good	Good	Adequate
Meeting 1	5 (23%)	8 (36%)	9 (41%)
Meeting 2	5 (23%)	10 (45%)	7 (32%)
Meeting 3	5 (23%)	11 (50%)	6 (27%)

Similar to educator activities, student activities showed incremental improvements. The "Good" category saw an increase, suggesting that students were more actively engaged and participating effectively by the third meeting.

Table 4. Student Learning Outcomes in Cycle II

Meeting	Total Students	Students Completed	Percentage Completed	Students Not Completed	Percentage Not Completed
Meeting 4	28	20	71%	8	29%
Meeting 5	28	25	89%	3	11%

The percentage of students meeting the learning goals was 71% (20 students), showing a substantial improvement from Cycle I. The final meeting demonstrated the highest achievement, with 89% of students (25 students) meeting the goals, while only 11% (3 students) did not.

Cycle I

Based on the learning outcomes data that the researchers did, the researchers conducted a reflection which was carried out at the end of the cycle with the aim of knowing the results that had been obtained whether the actions taken by the researchers had affected the improvement of student learning outcomes or had not met the standard of success indicators, the researchers together with partner educators held reflection activities to assess learning activities that have been carried out in cycle I in three meetings. The results achieved in the implementation of the first cycle of learning in three meetings can be described as follows: The first meeting of the learning outcomes of students from 28 total students there were 10 students who completed or reached 36% while those who did not complete there were 18 students or reached 64%. In the second meeting, the learning outcomes of 28 students were 13 students who completed or reached 46%, while those who did not complete were 15 students or reached 54%. At the third meeting of the 28 students there were 15 students who completed or reached 54% while those who did not complete were 13 students or reached 46%. In accordance with the results of the reflections carried out by researchers, the researchers and partner educators determined several weaknesses that were still encountered in the implementation of the mathematics learning process through the cooperative learning model of the stad type of data presentation material, both the activities of educators and student activities, which can be described as follows: Educator activities: there are several aspects that are still not visible or are still in the sufficient category, namely the researcher gives quizzes/questions to all students when answering the quiz, they should not help each other, demonstrate media use skills, respond positively to student participation, control the class, conduct assessments The final result is in accordance with basic competencies, using spoken clearly and fluently, using good and correct written language. Student activities: there are several aspects that are still not visible or are still in the sufficient category, namely students feel guided, students are able to correctly answer questions smoothly, students are able to express their opinions smoothly, students are able to ask questions straightforwardly, students are able to By actively making summaries, students accept follow-up assignments with pleasure. Based on the results of these reflections, it is concluded with partner educators that in order to improve all the weaknesses that occur in the implementation of the

first cycle of actions, it must be improved on the implementation of the actions in the next cycle, namely the second cycle.

Cycle II

After the researchers carried out the action in cycle II, assisted by partner educators in two meetings, namely learning IV and V, in this case the educator provided the implementation of actions in cycle II with the aim of increasing the learning achievement of class V students at SDN 1 Suwawa Timur, Bone Bolango Regency in the presentation material. data through cooperative learning model type stad can increase. With the results of the total number of 28 students, there were 25 students who completed or 89%. While those who did not complete were 3 students or 11%. With the results achieved by students in this learning, the performance indicators are achieved. The classroom action research was carried out with the title "Application of the STAD Type Cooperative Learning Model in Improving Student Learning Outcomes in Mathematics Learning in Grade V at SDN I Suwawa Timur, Bone Bolango Regency". The number of students who were used as samples was 28 students. Based on the learning outcomes in the initial observations that the researchers observed, namely from 28 students, there were 7 students who completed or 25%. While those who did not complete were 21 students or 75%. These results indicate that students' learning outcomes are still low on data presentation material in mathematics learning that has been taught. Therefore, the researcher continued with the first cycle stage.

The activity of the first cycle educator in the first meeting of the 24 observed aspects contained 5 aspects in the very good category or reached 21%, in the good category there were 10 aspects or reached 42%, in the adequate category there were 9 aspects or reached 37%. The second meeting of the 24 aspects observed in the very good category contained 6 aspects or reached 25%, the good category had 10 aspects or reached 42%, the sufficient category contained 8 aspects or reached 33%. The third meeting of the 24 aspects observed in the very good category contained 6 aspects or reached 25%, the good category had 11 aspects or reached 46%, the sufficient category had 7 aspects or reached 29%. The activities of educators in the second cycle meeting four of the 24 aspects that were observed there were 9 aspects in the very good category or reaching 37%, the good category having 10 aspects or reaching 42%, in the sufficient category there were 5 aspects or reaching 21%. The fifth meeting of the 24 aspects observed in the very good category had 10 aspects or reached 42%, in the good category there were 12 aspects or reached 50%, the sufficient category had 2 aspects or reached 8%.

The activities of students in the first cycle of meeting one of the 22 aspects observed in the very good category had 5 aspects or reached 23%, in the good category there were 8 aspects or reached 36%, in the adequate category there were 9 aspects or reached 41%. The second meeting of the 22 aspects observed in the very good category had 5 aspects or reached 23%, in the good category 10 aspects or reached 45%, in the adequate category there were 7 aspects or reached 32%. The meeting of the three categories is very good, there are 5 aspects or 23%, both categories are 11 aspects or 50%, enough categories are 6 aspects or 27%. The activity of students in the second cycle of the fourth meeting of the 22 aspects observed in the very good category had 5 aspects or reached 23%, in the good category there were 12 aspects or reached 54%, in the moderate category there were 5 aspects or reached 23%. The fifth meeting of the 22 aspects observed in the very good category had 6 aspects or reached 27%, the good category had 14 aspects or reached 64%, the category was sufficient, there were 2 aspects or reached 9%.

The results of the first cycle of learning which was carried out in three meetings obtained the achievement of student learning outcomes as follows: one meeting of 28 students there were 10 students who completed or reached 36% while those who did not completed 18 students or reached 64%. The second meeting of 28 students there were 13 students who completed or reached 46% while those who did not complete 15 students or reached 54%. The third meeting, namely from 28 students, the total number of students there were 15 students who completed or 54%. While those who did not complete were 13 students or 46%.

The results of the second cycle of learning which was carried out in two meetings obtained the achievement of student learning outcomes as follows: the fourth meeting of 28 students there were 20 students who completed or reached 71% while those who did not complete 8 students or reached 29%. The fifth meeting of 28 students there were 25 students who completed or reached 89% while those who did not complete 3 students or reached 11%.

Based on the description above, it is clear that the increase in student learning outcomes in data presentation material. In the first cycle until the implementation of the action in Cycle II, it was seen that there was an increase in student learning outcomes, from the first cycle the achievement of learning achievement reached 54% of student learning outcomes while in the second cycle learning outcomes increased to 89%. Thus, it is proven that after going through classroom action research, the learning outcomes of students on data presentation material in mathematics learning through the stad type cooperative learning model In Class V SDN 1 Suwawa Timur, Bone Bolango Regency, have increased. According to the theory of learning outcomes put forward by (Wei et al., 2021; Putra, 2021; Munna & Kalam, 2021) learning outcomes are changes in behavior that occur in students after students follow the teaching and learning process in accordance with educational goals and also Lim & Richardson (2021) says learning outcomes are an indicator of changes that occur in participants After experiencing the learning process, students usually use an assessment tool set by the school by the educator. Based on the results achieved by students in cycle I and cycle II, it turns out that the use of the STAD type cooperative learning model in learning mathematics is very appropriate to use. Based on the theory put forward by experts, it is proven that student learning outcomes change after carrying out the learning process which is reflected in cycle I and cycle II. So that the learning outcomes of students in learning mathematics can be improved by using the stad type cooperative learning model. Thus, the action hypothesis in this study can be accepted.

Conducted in Cycle I, the first trial of the application of the STAD cooperative learning model resulted in a moderate learning improvement with different levels of completion rates ranging from 36 percent in the first meeting to 54 percent in the third meeting. This presents a positive outlook, however; it also shows several emerging issues that remained problematic as well. These small improvements might have been influenced by many factors amongst them being the fact that the students rarely used the cooperative learning approach that was in line with other studies done on the same topic. For instance, (Erbil, 2020; Abramczyk & Jurkowski, 2020; Valtonen et al., 2021; Meijer et al., 2020). also pointed out that settings changing from traditional learning techniques to cooperative learning techniques usually elicits transitional phases by means of which students and teachers adapt to different cooperative learning systems and interactions. The gradual improvement seen in Cycle I leans towards proposition that cooperative learning, especially in the beginning, is not likely to have huge scores improvement until the students are completely involved in the collaborative process (Kulkarni, 2020; Nikolic et al., 2021; Jayasinghe, 2021).

That the completion rate improved by 27 % from Cycle I to Cycle II to 89 % shows that the STAD model positively influenced student learning outcomes once they could cope with the cooperative learning strategy. This tallies with the findings by Olaya et al. (2020) & Loh & Ang (2020) which noted that the application of cooperative learning models such as STAD have the potential of increasing the performance of students in tests when the students have embraced the cooperative learning process. Cycle II also points to the fact that the use of cooperative learning strategies must be continuous throughout the school year, and apply it more than once in order to gain the desired educational outcomes (Anthonysamy et al., 2020; Theobald, 2021; Drigas & Mitsea, 2021; Filgona et al., 2020). By the time the second cycle was implemented, students had probably improved on their ability to work in groups, shared burden of help seeking and self esteem, all of which are causative factors for the success of the STAD model.

Thus, this study adds to the current body of work in cooperative learning as it demonstrates the proof of the effectiveness based on the STAD model in enhancing the learning achievement in

the aspect of elementary mathematics education regarding the data presentation material. Cooperative learning has been well researched about in general learning in general, see Prahmana et al. (2021), but its impact in specific subject areas such as mathematics at the lower grades, let alone in Indonesian rural setting as the Bone Bolango Regency, has been a subject of scarcity. Thus, filling this gap, the study not only contributes to the validation of the applied STAD model in a new context but also contributes to the development of ideas about the possibilities of adjusting cooperative learning to different educational environments.

Furthermore, the study also questions the common perception that cooperative learning is less productive in the difficult/facile subject areas as identified by the students such as mathematics. The success of this study in applying the STAD model can therefore be an indication that Such arguments were mentioned earlier. which opined that group work may water down the level of intensity required for Mathematics problem solving. However, it proves that if structured and facilitated correctly, CL is an efficient method for enhancing the achievement of deep learning and mathematical performance thereby supporting more recent research that encourages the use of cooperative approaches in STEM learning.

CONCLUSION

The results of this research indicate that the use of the STAD cooperative learning model enhanced the students' performance on mathematics, especially on data presentation, among the fifth graders in SDN 1 Suwawa Timur, Bone Bolango Regency. This indeed is evident with a sharp rise in completion rates from Cycle I to Cycle II indicating that cooperative learning only delivers the best if student and teachers are fully committed to the process as well as well conversant with the technique. Apart from affirming the efficacy of cooperative learning in increasing academic achievement, this research also seeks to fill a literature void on the use of cooperative learning especially in mathematics learning in elementary schools in rural Indonesia. The outcome of this research indicates that, the cooperative learning models, if well facilitated does work to enhance learning achievements particularly in such academic sectors as mathematics.

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