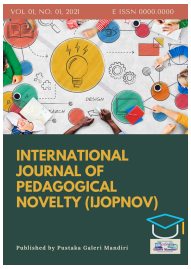

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Efforts to Improve Mathematics Learning Activities and Outcomes through the STAD Model in Grade VI

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Abstract

This study aims to improve the mathematics learning outcomes of sixth-grade students at MIN 3 Solok Selatan by using the STAD (Student Teams Achievement Divisions) Cooperative Learning Model. This study is a Classroom Action Research (CAR) conducted in two cycles. Each cycle consists of four stages: planning, action, observation, and reflection. The research subjects were 20 sixth-grade students at MIN 3 Solok Selatan. Data were collected through tests, observations, and documentation. The results showed that the application of the STAD learning model could improve students' mathematics learning outcomes. This improvement was evident from the students' average scores, which rose from 80 in cycle 1 to 90 in cycle 2. In addition, students' learning activities and motivation also increased.

Keywords: Classroom Action Research (CAR), Cooperative Learning Model, STAD Learning Model, Mathematics Learning Outcomes

1. Introduction

Mathematics is a universal science that underpins the development of modern technology. As an important science, mathematics plays a vital role in various disciplines and advances human thinking. The rapid development in the field of information and communication technology today, for example, cannot be separated from a strong foundation in mathematics, including number theory, algebra, analysis, probability theory, and discrete mathematics. Therefore, a strong grasp of mathematical concepts from an early age is essential for mastering and creating technology in the future. Mathematical skills are not just about calculating, but also training logical, analytical, and systematic thinking skills that are very much needed in this era of globalisation [1], [2]. The education curriculum in Indonesia has underlined the importance of mathematics as an essential subject, not only to support the development of science, but also to shape students' character and critical and structured reasoning skills.

However, the reality in the field shows that the noble goals of mathematics learning, namely understanding concepts, using reasoning, solving problems, and communicating ideas, are often hampered by the reality in the field. Mathematics learning is often considered ineffective and boring, as evidenced by low learning outcomes and minimal active participation of students in class. This problem is a major concern that must be addressed. The learning process, which tends to be teacher- centred, makes students passive and merely recipients of information without being involved in the process of knowledge construction. This is exacerbated by material that is abstract and complex for students at the Madrasah Ibtidaiyah (MI) level [3]. The monotonous classroom

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atmosphere and lack of interaction between students often make them feel stressed and unmotivated, thereby hindering the learning process, which should be an enjoyable and interactive experience.

Based on initial observations and interviews with sixth grade teachers at MIN 3 Solok Selatan, it was found that students' mathematics learning outcomes were still below the minimum passing grade (KKM) of 75. For example, out of 20 students, only 8 students (40%) managed to achieve a score above the KKM. In addition, the classroom atmosphere tended to be passive; students were not motivated to ask questions, discuss, or try to solve problems independently. Most students relied solely on the teacher and were reluctant to interact with their peers. This condition indicates a significant gap between the learning practices in place and the expectation of optimal learning outcomes.

This problem is not merely a matter of grades, but also an indication of obstacles in the learning process itself. Students feel bored and unchallenged by teaching methods that do not actively involve them. They do not see the relevance of the material to their daily lives, and the lack of social interaction in the classroom deprives them of the opportunity to learn from their peers. This phenomenon creates a vicious circle: students are uninterested, learning outcomes are poor, and teachers find it difficult to innovate.

Various studies have shown that cooperative learning models can be a solution to this problem [4]. This model allows students to learn in small groups and help each other, thereby increasing interaction and collaboration among them. Unlike conventional methods, cooperative learning makes students active participants who share knowledge and solve problems together [5]. This approach fundamentally changes the dynamics of the classroom, from one that focuses on individuals to one that focuses on teams, where the success of one student becomes the success of the entire group.

In the context of cooperative learning, there are various types of models that can be applied. Each model has specific characteristics and advantages that can be tailored to learning needs and objectives. However, from the various models available, selecting the most relevant and effective model is crucial to ensure the success of this study. Time and resource constraints require researchers to choose the most promising approach.

One popular and effective cooperative learning model is the STAD (Student Teams Achievement Divisions) model [6]. The STAD model was chosen because it has several advantages, namely: (1) it encourages students to take responsibility individually and as a team; (2) it facilitates interaction between students of various ability

levels; and (3) it has a group reward system that can motivate all members to achieve [7], [8]. With this approach, each student feels responsible for the success of their group, which encourages them to be more active in learning and helping their friends. The application of this model is expected to overcome the problems of low participation and mathematics learning outcomes that occur in class VI MIN 3 Solok Selatan.

The STAD model is based on the idea that team performance is determined by the individual improvement of each member. This creates dual motivation: students are motivated to learn for their own individual grades, and they are also motivated to help their groupmates so that the overall group grade improves. This mechanism ensures that no student is left behind, as each member has an incentive to ensure that everyone in the group understands the material.

The implementation of the STAD model in mathematics classes involves a series of structured steps. It begins with the formation of heterogeneous groups, presentation of material by the teacher, group work to complete worksheets, individual quizzes, and team recognition. Each stage is designed to maximise interaction and learning. The teacher acts as a facilitator, monitoring the process, providing guidance, and ensuring that each student receives the support they need.

Another advantage of the STAD model is its ability to create a positive and supportive classroom environment. When students know that their success depends on cooperation, they tend to develop communication, empathy, and conflict resolution skills. These are valuable social skills that are often overlooked in traditional learning models. This increase in social interaction can also reduce students' anxiety and fear of mathematics.

Therefore, based on the existing problems and strong theoretical justification, this study aims to overcome the problem of low activity and learning outcomes in mathematics among sixth-grade students at MIN 3 Solok Selatan by applying the STAD Cooperative Learning Model.

2. Method

This study used the Classroom Action Research (CAR) method, which was designed in two

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cycles. CAR was chosen as the research method because allows researchers to be directly involved in the process of improving learning in a repetitive and systematic manner [9]. Each cycle consisted of four stages, namely:

Planning: At this stage, researchers developed a Lesson Plan (RPP) that integrated the STAD Cooperative Learning Model. Detailed steps were outlined, including material distribution, group discussion scenarios, and the creation of student worksheets (LKS) designed to facilitate interaction between group members.

1. **Action**: The action stage is the direct implementation of the lesson plan that has been prepared. The researcher divided 20 students into several heterogeneous learning groups based on their ability levels. The teacher then explained the material and group work mechanisms, then guided the students during discussions and collaborative completion of the worksheets. After completing the task, each group presented their work.
2. **Observation**: During the action phase, the researcher was assisted by a collaborator to conduct observations. These observations focused on student learning activities, participation levels, interactions between group members, and the role of teachers in facilitating the learning process. The observation data was recorded on observation sheets that had been prepared in advance.
3. **Reflection**: At the end of each cycle, researchers and collaborators conduct joint reflections to analyse the collected data. The results of this analysis are used to identify successes and obstacles that arose during the implementation of the action. These findings form the basis for developing improvement plans for the next cycle to make learning more effective.

The research subjects were 20 sixth-grade students at MIN 3 Solok Selatan. Data was collected through **learning outcome tests** to measure students' understanding of concepts, **observation sheets** to observe their activities and participation during the learning process, and **documentation** in the form of photographs and field notes to reinforce the data that had been collected.

3. Findings and Discussion

The application of the STAD cooperative learning model can improve the mathematics learning outcomes of sixth-grade students at MIN 3 Solok Selatan. This improvement is shown in the following table:

Table 1. Comparison Table of Average Results and Classical Mastery

CYCLE	AVERAGE RESULTS	CLASSICAL MASTERY
1	80	65
2	90	85

From the table above, it can be seen that the average score of students increased from 80 in cycle I to 90 in cycle II. In addition, classical mastery also increased from 65% to 85%. This shows that the STAD cooperative learning model is effective in improving students' mathematics learning outcomes [42], [43].

This improvement in learning outcomes can be linked to the learning theory underlying STAD. This theory emphasises that teamwork and individual responsibility reinforce each other [10]. This approach is also in line with the social learning theory proposed by Vygotsky [11], in which learning occurs through social interaction [44], [45]. In addition, Bandura (1977) also explains that learning can occur through observation [12].

The significant increase from an average score of 80 to 90 proves that the STAD model has successfully bridged the gap in student understanding. This 10- point increase is not just a number, but a reflection of an even improvement in conceptual understanding among students. This achievement confirms that a collaborative approach, in which students support each other, is superior to conventional learning methods that focus on one- way instruction from the teacher.

The achievement of 85% classical mastery in Cycle II is an important indicator that the majority of students have achieved the minimum expected competency. This 20% increase from Cycle I shows that the STAD model has not only succeeded in improving average scores, but also in ensuring that students with diverse abilities can achieve the set standards. This confirms that this learning system is capable of reducing the number of students who fall behind and creating a more inclusive learning environment.

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In cycle I, observations showed that group dynamics still faced several significant challenges. Some of the more intelligent students tended to dominate the discussion, while less confident students became passive and merely followed along. There was also awkwardness among some group members who were not yet accustomed to working together, so that interactions were not yet optimal. This atmosphere showed that although there was a group structure, active participation had not yet been fully established.

Thanks to deep reflection at the end of Cycle I, specific corrective measures were taken to address the issues of dominance and participation. Teachers assigned more structured and specific roles to each group member, such as "spokesperson," "note- taker," or "liaison." Rotating these roles ensured that every student had the opportunity to lead and contribute, so that no member was left as a mere observer. The improvements made in Cycle II yielded very positive results. The classroom atmosphere became more lively and collaborative. Students who were initially passive became more confident in expressing their ideas and helping their classmates. This active participation occurred not only during discussions, but also during presentations in front of the class [46].

The *peer tutoring* system is a key mechanism in the success of this model. When a student helps a friend who is struggling, they not only help their friend understand, but also reinforce their own understanding of the material. This process, known as the "teacher effect," is highly effective because students can explain concepts in simpler language that is easier for their peers to understand.

Individual responsibility, which is an integral part of the STAD model, ensures that no student can "free ride" on the work of the group. With individual quizzes at the end of each learning unit, students are forced to truly understand the material, as their scores will contribute to the group's score. This effectively prevents *social loafing* or the tendency to slack off [47].

In addition to academic results, the application of the STAD model also significantly improves students' social and emotional skills. Through collaboration, students learn to communicate effectively, resolve conflicts, and respect the opinions of others [48]. They also develop empathy and mutual trust. These improvements will be very beneficial for their lives outside of school.

The role of teachers as facilitators has also undergone a significant transformation. Teachers are no longer the sole source of knowledge, but rather mentors who monitor group dynamics, provide guidance, and ensure that learning proceeds according to plan. This role allows teachers to give more focused attention to groups or students who need extra help [49].

The success of this study has broad implications for education, particularly at the primary level. These findings indicate that shifting the learning approach from teacher-centred to student-centred with the support of collaboration can result in significant improvements in student learning outcomes, motivation, and social skills. This is clear evidence that innovative learning methods can have a tangible positive impact [50].

4. Conclusion

Based on the research results, it can be concluded that the application of the STAD cooperative learning model can improve learning outcomes, activities, and learning motivation of sixth-grade students at MIN 3 Solok Selatan.

Some suggestions to consider are:

1. Teachers can use the STAD model as an alternative in mathematics learning.
2. Thorough preparation is required before implementing the learning process.
3. Further research can be conducted to test the effectiveness of the STAD model in other subjects.

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