JPPIPA 11(2) (2025)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Application of the STAD-Type Cooperative Model to Improve Student Learning Outcomes

Heni Yulita[1*], Nazurty[1], Sukendro[1]

[1] Teacher Training and Education, Master of Elementary Education, Jambi, Indonesia.

Received: October 07, 2024
Revised: January 21, 2025
Accepted: February 25, 2025
Published: February 28, 2025

Corresponding Author:
Heni Yulita
heniyulita87@guru.sd.belajar.id

DOI: 10.29303/jppipa.v11i2.9370

Abstract: The purpose of this study is to determine the improvement in the learning outcomes of mathematical elements through the implementation of a STAD-type cooperative learning model. The research subjects are the students of Class V-A at SDN 1 Sindang Marga, Bayung Lencir District, Musi Banyuasin Regency, for the 2024/2025 academic year. The research objects are the students' learning activities and their mathematics learning outcomes. Data on the students' learning activities were collected using observation sheets, while data on their learning outcomes were gathered through achievement tests. The data obtained were subsequently analyzed descriptively and qualitatively. The research findings are as follows: (1) Mathematics learning using the STAD-type cooperative learning model improved the learning outcomes of mathematical elements from Cycle I to Cycle II, and students' learning activities increased from Cycle I to Cycle II, (2) The learning mastery achieved by the students in Cycle I was 76.47% with a class average score of 78.32, and in Cycle II it increased to 91.18% with a class average score of 86.41; (3) The students' learning activeness, measured classically, was 65.45% in Cycle I, which increased to 81.82% in Cycle II. Based on these results, and considering the indicators of a fully implemented learning process, it can be concluded that the objectives of this study have been achieved and the formulated action hypothesis is accepted.

Keywords: Activity; Learning outcomes; STAD

Introduction

Education is the foundation for the progress of individuals and society. As a learning process, education aims not only to enhance knowledge and skills but also to shape positive character. It is the gateway to a better life, advocating for everything from the smallest details to the greatest challenges that every person typically encounters (Aspi et al., 2022). Education plays a key role in preparing individuals to face complex and diverse global challenges. It can be defined as the learning, knowledge, skills, and habits of a group of people passed down from one generation to the next through teaching, training, or research (Sinaga, 2023). In Indonesia, the diversity of educational pathways offers flexibility for each individual to pursue education according to their needs and interests. Nevertheless, formal education remains the primary choice for many, with the journey from elementary school to higher education becoming the norm.

Mathematics, as a universal field of study, plays a significant role in various aspects of life. Mathematics instruction begins early with basic concepts such as addition, subtraction, multiplication, division, and other numerical skills. Learning mathematics is akin to learning logic, because mathematics holds a position as a fundamental or tool science in the realm of knowledge (Rahmaini et al., 2024). Mathematics plays an important role in shaping students' character and ways of thinking (Lestari et al., 2021; Sun, 2018; Toropova et al., 2019). According to Ali (2020), mathematics is organized from undefined elements, definitions, axioms, and theorems—where theorems, once proven, hold

How to Cite:
Yulita, H., Nazurty, N., & Sukendro, S. (2025). Application of the STAD-Type Cooperative Model to Improve Student Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *11*(2), 607–613. https://doi.org/10.29303/jppipa.v11i2.9370

universally. This is why mathematics is often referred to as a deductive science.

Mathematics is often considered a complex and intimidating subject—a perception that is usually formed as early as elementary school. As a result, students' interest in learning mathematics diminishes, and active participation in class declines. Teachers frequently encounter difficulties in overcoming these issues when teaching mathematics. They play a crucial role in ensuring that the subjects taught are well received by the students (Nurzannah, 2022). Beyond merely teaching the content, teachers fulfill many roles in the learning process. Mathematics education provides opportunities for students to actively participate, ask questions, and express opinions to enhance their mathematical abilities. The use of various models, strategies, and teaching methods is tailored to the subject matter and the characteristics of the students (Gusteti et al., 2022).

The low level of students' learning achievement indicates the teacher's inability to meet the desired learning standards. This condition is also experienced by the students of Class V-A at SDN 1 Sindang Marga, where test results show that only 45% of the students achieved the expected level of learning proficiency in mathematics. The desired standard is for at least 75% of the class to reach the expected level of achievement.

The methods used by teachers have been varied, including lectures, question-and-answer sessions, and recitations. However, student responses have not been satisfactory despite the use of various methods, resulting in suboptimal levels of student engagement and learning outcomes. If this situation continues, the achievement of learning objectives will not be optimal. Therefore, the author is seeking a solution to improve student learning outcomes as expected. One proposed solution is to give students the opportunity to express themselves in order to enhance their mathematics learning outcomes.

One solution frequently adopted by teachers to overcome these challenges is to implement a learning model that is considered appropriate for the subject of mathematics. One common learning model is the cooperative learning model. This model is designed to teach both academic skills and social skills, including interpersonal skills (Prihantoro et al., 2019). Cooperative learning is grounded in constructivist theory (Hogenkamp et al., 2021; Mishra, 2023; Qureshi et al., 2023). It is based on the idea that students are generally more capable of discovering and understanding complex concepts when they actively discuss these ideas with their peers. Since students routinely work in groups, social interaction and peer collaboration become the main aspects of cooperative learning (Trianto, 2010).

Deciding to use an effective learning model offers many benefits. The cooperative learning paradigm emphasizes group-based learning to achieve specific objectives. Students help one another, interact to present opinions, and discuss how to solve problems; these are the expected outcomes when engaging in group learning. There are various types of cooperative learning models, one of which is STAD. STAD, which stands for Student Teams Achievement Division, is one of the learning models that will be adopted in this study. In this model, students will be grouped into several teams consisting of 4–5 members.

Asmedy (2021) states that the cooperative learning model of the Student Team Achievement Division (STAD) is the simplest cooperative learning approach; it is described as such because the learning activities conducted remain closely related to conventional learning. The STAD model is a type of cooperative learning model that emphasizes team achievement derived from the sum of the individual progress scores of each team member (Berlyana et al., 2019; Sanai et al., 2018; Septian et al., 2020). In STAD-type cooperative learning, discussion and communication are fostered with the goal that students share their abilities, exchange opinions, help one another in learning, and assess both their own abilities and those of their peers (Suparsawan, 2021). The STAD-type cooperative learning approach is also frequently chosen by educators when teaching various subjects. Many studies have been conducted to investigate the use of this STAD-type cooperative learning model. One such study is by Made Suparmini (2021), titled "Implementation of the STAD-Type Cooperative Learning Model to Improve Student Activity and Learning Outcomes," which demonstrated an increase in the percentage of students achieving learning proficiency.

Based on the background presented above, the author will conduct a study entitled "Implementation of the STAD-Type Learning Model to Improve Student Learning Outcomes in Mathematics for Class V-A at SDN 1 Sindang Marga, Bayung Lencir District, Musi Banyuasin Regency."

Method

The type of research applied in this study is Classroom Action Research (CAR). Classroom Action Research is a type of research conducted by teachers within the classroom with the aim of improving the quality of the learning process. This research was carried out at one of the elementary schools, namely SDN 1 Sindang Marga, Bayung Lencir District, Musi Banyuasin Regency, South Sumatra Province. The research subjects are the students of Class V-A, totaling 20 students. The

research procedures will be implemented repeatedly in cycles. Each cycle is divided into four interrelated stages: planning, implementation, observation, and reflection.

The data collection methods in this research include both tests and non-test instruments. Data were collected during the learning process from the fifth-grade students at one of the public elementary schools in Musi Banyuasin Regency that implemented the STAD-type cooperative learning model. The research instruments used include test questions and observation sheets. Data analysis in this study involves both qualitative and quantitative analysis, and for the success indicators, the researcher used the learning achievement standards as a basis for assessing learning outcomes. The calculation formula is based on the KKTP learning achievement indicator, which is set at 70 for the subject of mathematics. The Minimum Completeness Criteria (KKM) for mathematics at SDN 1 Sindang Marga is 65.

Results and Discussion

The action in Cycle I was carried out in two meetings, beginning on October 2, 2024. The learning in Cycle I was based on the prepared module. During the learning process, students were given practice exercises to be completed both individually and in groups. Throughout the learning sessions, the students' activities were observed by the teacher-researcher acting as an observer. At the end of Cycle I, a final test was conducted to measure the students' learning abilities. The complete test results for Cycle I are shown in Table 1.

Table 1. Student Learning Outcome Data for Cycle I

Description	Score
Lowest score	53
Highest score	98
Class average score	78.32
Number of students who did not achieve learning	8
Number of students who achieved learning	26
Percentage of learning achievement	76.47%
Percentage of those not achieving	23.53%

Based on the data in the table above, it is evident that the students' average score in Cycle I reached 78.32 with a learning completion rate of 76.47%. Meanwhile, the data on students' learning activities can be found in the appendix, summarized in Table 2.

Table 2. Student Learning Activity Data for Cycle I

Description	Score 1	Score 2	Average score
Students who ask questions to the teacher	3	3	3
Students who arrive on time	4	4	4
Students who complete the student activity worksheet (LKPD)	3	3	3
Students who complete the quiz	4	4	4
Students who help check the work on their group members' worksheets	4	3	3.5
Students who help a group mate with difficulties	3	3	3
Students who pay attention to information conveyed by their peers	3	3	3
Students who pay attention to the teacher's explanation	4	3	3,5
Students who are active in group discussions	3	3	3
Students who maintain classroom calm during learning	3	3	3
Students who are enthusiastic in following the lesson	3	3	3
Total Score			36
Percentage			65.45%

The data on student activities during the learning process indicate that student engagement is still relatively low. Based on the data collected in Cycle I, the learning process was not very effective, as evidenced by the students' low level of activity—only 65.45%. However, the use of this method improved students' learning outcomes from 60.05% to 76.47%, with a class average score of 78.32. Nevertheless, these results have not met the target set by the researcher, so improvements in teaching are necessary for the next cycle.

In Cycle II, the researcher planned the lessons using the same model as in Cycle I, but with some modifications based on the reflections from Cycle I for the mathematics material. The actions in Cycle II were carried out in 2 sessions, on October 1 and 2, 2022. The implementation of the lessons in Cycle II also followed the prepared lesson plan. The principles of the learning process in Cycle II were almost the same as in Cycle I; however, the researcher placed more emphasis on providing practice exercises more frequently. At the end of Cycle II, a final test was conducted on October 3, 2024, which served to measure the students' learning abilities. The complete test results for Cycle II can be found in the appendix and are summarized in Table 3.

Based on the data in the table, it is evident that the students' average score in Cycle II reached 86.38 with a learning completion rate of 90%. Meanwhile, the data on student learning activities can be found in the appendix and is summarized in Table 4.

Table 3. Student Learning Outcome Data for Cycle II

Description	Score
Lowest Score	69
Highest Score	98
Average Score of Class	86.38
Number of Students Who Have Not Completed	3
Number of Students Who Have Completed	31
Percentage of Learning Completion	91.18%
Percentage of Incomplete	8.82%

From the data on student activities during the learning process, it can be seen that student engagement in Cycle II has increased and has met the target set by the researcher. In addition, in Cycle II the researcher was able to implement the learning model effectively, successfully creating a conducive learning environment for the students.

This classroom action research was conducted in Class V-A at SDN 1 Sindang Marga, Bayung Lencir District, Musi Banyuasin Regency, with mathematics as the subject. Cycle I consisted of three meetings (6 lesson hours), with each meeting lasting 2 lesson hours. The first meeting discussed the abundance of elements, the second meeting covered the properties of elements, and the third meeting was the implementation of the final test for Cycle I.

Table 4. Student Learning Activity Data for Cycle II

Description	Score 1	Score 2	Average Score
Students who ask questions to the teacher	4	5	4.5
Students who arrive on time	4	4	4
Students who complete the student activity worksheet (LKPD)	5	4	4.5
Students who complete the quiz	4	4	4
Students who help check the work on their group members' worksheets	4	4	4
Students who help a groupmate with difficulties	4	5	4.5
Students who pay attention to information conveyed by their peers	4	4	4
Students who pay attention to the teacher's explanation	4	4	4
Students who are active in group discussions	4	3	3.5
Students who maintain classroom calm during learning	4	3	3.5
Students who are enthusiastic in following the lesson	5	4	4.5
Score			45
Percentage			81.82%

The learning process in Cycle I, carried out by the researcher, aimed to optimize interactions among students as well as between the students and the researcher (acting as the teacher), so that the learning process was not merely one-way through group activities. During the lessons, the researcher provided practice exercises that the students completed both individually and in groups. The purpose of the group discussions was to enable students to interact more with their groupmates when solving problems provided by the teacher; if they encountered difficulties, they could ask their groupmates for help. However, if all the students in the group were unable to solve the problem, then the student could ask the teacher (Buana, 2021). At the end of the lesson, the researcher guided the students to draw conclusions from what they had learned and conducted an evaluation in the form of a final test for the cycle to determine the students' understanding of the material taught.

Based on the final test results of Cycle I, it was found that 76.47% of the students achieved mastery. This result indicates an improvement from 60.05% before the intervention to 76.47% after the intervention, demonstrating an increased understanding of the material among the students. This improvement in understanding is attributed to the active involvement of students throughout the learning process. Through group learning, students interact more with their peers—in other words, they are directly engaged during the lessons, so the knowledge they acquire is retained longer.

In addition to conducting cognitive assessments, the researcher also carried out an affective assessment using student observation data. The observation results showed that 35.30% of the students exhibited a very positive response to the learning process, 52.94% exhibited a positive response and were deemed to have achieved mastery in the affective domain, while 11.70% of the students showed only a moderate response and were considered not to have achieved mastery. Most of the students who did not achieve mastery had difficulties understanding the material on chemical elements and were less cooperative during discussions, often preferring to work alone rather than with their groupmates.

In Cycle I, student engagement during the learning process was still considered insufficient, as only about 65.45% of the students demonstrated active participation. The number of students who dared to ask questions or express their opinions in class remained low. Additionally, during group discussions, students

did not work well together; some still depended solely on their more capable peers within their group.

Another challenge was that the researcher may have presented the material too quickly, which resulted in a lower level of comprehension among the students. The limited available time was also a contributing factor, compounded by the fact that the material on chemical elements was too extensive. Therefore, improvements in the learning process are necessary for the next cycle so that in Cycle II a more engaging and less monotonous learning process can be created, ultimately resulting in greater student participation.

The implementation of Cycle II consisted of three meetings (6 lesson hours), with each meeting lasting 2 lesson hours. The final 2 lesson hours were allocated for the final test of Cycle II. The first meeting discussed the benefits of elements, and the second meeting focused on the process of creating elements. The learning process in Cycle II was not very different from that in Cycle I, except that the researcher made several improvements based on reflections on performance during Cycle I.

In Cycle II, the researcher provided more practice exercises for the students to complete in groups and presented the material in a more general manner, which encouraged more group discussions to solve the practice problems. These group discussions were supervised by the researcher, who circulated around the classroom to observe the students' activities and the discussion process within each group.

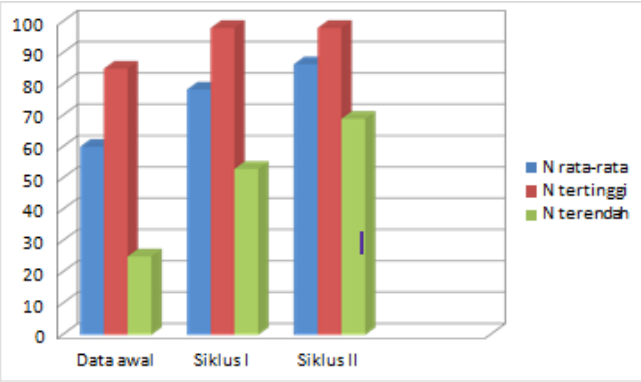

Figure 1. Diagram of improvement in student learning outcomes

The group discussions turned out to be quite effective, with each student able to share roles within their group and no longer relying solely on the more knowledgeable peers. The researcher also provided guidance when students encountered difficulties in solving the problems. In addition to being more willing to ask questions, students began to confidently present the answers from their group discussions in front of the class and to articulate their own responses during class discussions. As a result, the class average increased from 60.05% before the intervention to 78.32% in Cycle I, and further to 86.41% in Cycle II, as shown in Figure 1.

In Cycle II, the researcher also conducted an assessment of the students' affective aspects. This affective assessment was carried out by observing the students during discussions and presentations in class. The analysis of the Cycle II affective assessment indicates a very positive response from the students to the learning process, as evidenced by the increased number of students who achieved mastery in this assessment: 41.18% of the students showed a very positive response, 55.88% showed a positive response, and only 2.94% showed a moderate response, as illustrated in Figure 2.

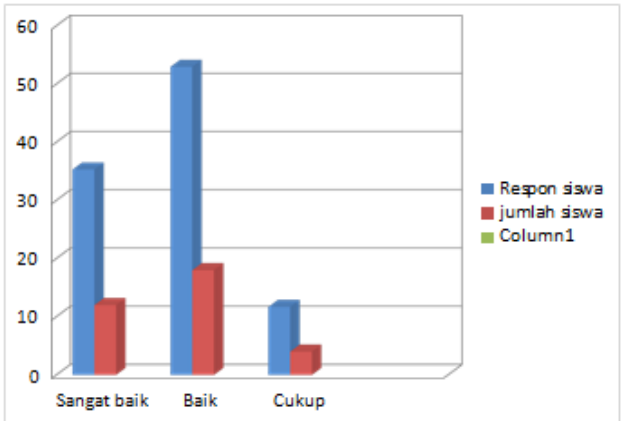

Figure 2. Diagram of the increase in students' affective scores

The implementation of the learning process using the Student Teams Achievement Division (STAD) method is, in principle, very similar to group learning methods. However, in the implementation of the method used by the researcher, there is an emphasis on optimizing students' interaction and on practicing solving exercises; this is what differentiates it from standard group learning methods. In this method, students are required to be active in group discussions and are given exercises to solve both individually and in groups.

Based on the results obtained, it can be concluded that the STAD learning model can improve students' learning outcomes. This is supported by a study conducted by Samaloisa et al. (2024), in which the Student Teams Achievement Division (STAD) learning model was shown to increase students' learning outcomes from a previously low level to higher levels in each cycle.

Based on the analysis and discussion, the involvement of students in the learning process using the Student Teams Achievement Division (STAD) method increased, thereby improving both the level of understanding and the learning outcomes of the students, as they personally experienced every learning

activity. They gained this experience by practicing the exercises provided by the teacher more frequently, so that when they encountered difficulties, they would ask their peers or the teacher.

Conclusion

Based on the research findings and the discussion presented by the researcher, it can be concluded that chemistry instruction using the Student Teams Achievement Division (STAD) method can improve students' learning outcomes in the subject of mathematics from cycle to cycle, and that student activity in the learning process increases with each cycle. The classical learning mastery achieved by the students is 91.18% with a class average of 86.41, and the classical student engagement rate is 81.82%.

Acknowledgments
I would like to express my gratitude to everyone who was involved in my research, including representatives from my educational institution, Universitas Jambi, and my workplace. I would also like to thank my two supervising professors, Prof. Dr. Dra. Nazurty, M.Pd and Prof. Dr. Drs. Sukendro, M.Kes AIFO. My sincere thanks also go to my parents, family, and relatives who have prayed for me and provided their utmost support.

Author Contributions
The research team contributed to the writing of this scientific paper in the following ways: idea, conception, data collection, analysis and interpretation of results, and manuscript preparation (DP); article writing supervision (ZKP and JJ); and funding acquisition (DP and ANS).

Funding
Funding for this research was provided by the independent funds of each researcher.

Conflicts of Interest
The author declares that there is no conflict of interest in the publication of this article.

References

Ali, M. (2020). Pembelajaran Bahasa Indonesia Dan Sastra (BASASTRA) di Sekolah Dasar. *PERNIK : Jurnal Pendidikan Anak Usia Dini*, *3*(1), 35–44. https://doi.org/10.31851/pernik.v3i2.4839

Asmedy, A. (2021). Pengaruh Model Pembelajaran Kooperatif Tipe STAD Terhadap Hasil Belajar Siswa Sekolah Dasar. *Ainara Journal (Jurnal Penelitian Dan PKM Bidang Ilmu Pendidikan)*, *2*(2), 108–113. https://doi.org/10.54371/ainj.v2i2.41

Aspi, M., & Syahrani. (2022). Profesional Guru Dalam Menghadapi Tantangan Perkembangan Teknologi Pendidikan. *Adiba: Journal of Education*, *2*(1), 64–73. Retrieved from https://adisampublisher.org/index.php/adiba/article/view/57

Berlyana, M. D. P., & Purwaningsih, Y. (2019). Experimentation of STAD and Jigsaw Learning Models on Learning Achievements in terms of Learning Motivation. *International Journal of Educational Research Review*, *4*(4), 517–524. https://doi.org/10.24331/ijere.628311

Buana, I. K. S. (2021). Upaya peningkatan prestasi belajar matematika melalui penerapan strategi pembelajaran open-ended. *Indonesian Journal of Educational Development (IJED)*, *2*(1), 187–194. https://doi.org/10.5281/zenodo.4781887

Gusteti, M. U., & Neviyarni, N. (2022). Pembelajaran Berdiferensiasi Pada Pembelajaran Matematika Di Kurikulum Merdeka. *Jurnal Lebesgue : Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*, *3*(3), 636–646. https://doi.org/10.46306/lb.v3i3.180

Hogenkamp, L., van Dijk, A. M., & Eysink, T. H. S. (2021). Analyzing Socially Shared Regulation of Learning during Cooperative Learning and the Role of Equal Contribution: A Grounded Theory Approach. *Education Sciences*, *11*(9), 512. https://doi.org/10.3390/educsci11090512

Lestari, F. P., Ahmadi, F., & Rochmad, R. (2021). The implementation of mathematics comic through contextual teaching and learning to improve critical thinking ability and character. *European Journal of Educational Research*, *10*(1), 497–508. https://doi.org/10.12973/EU-JER.10.1.497

Mishra, N. R. (2023). Constructivist Approach to Learning: An Analysis of Pedagogical Models of Social Constructivist Learning Theory. *Journal of Research and Development*, *6*(01), 22–29. https://doi.org/10.3126/jrdn.v6i01.55227

Nurzannah, S. (2022). Peran Guru Dalam Pembelajaran. *ALACRITY: Journal of Education*, *4*, 26–34. https://doi.org/10.52121/alacrity.v2i3.108

Prihantoro, A., & Hidayat, F. (2019). Melakukan Penelitian Tindakan Kelas. *Ulumuddin: Jurnal Ilmu-Ilmu Keislaman*, *9*(1), 49–60. https://doi.org/10.47200/ulumuddin.v9i1.283

Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2023). Factors affecting students' learning performance through collaborative learning and engagement. *Interactive Learning Environments*, *31*(4), 2371–2391. https://doi.org/10.1080/10494820.2021.1884886

Rahmaini, N., & Chandra, S. K. (2024). Pentingnya Berpikir Kritis dalam Pembelajaran Matematika. *Griya Journal of Mathematics Education and Application*, *4*(1), 1–8. https://doi.org/10.29303/griya.v4i1.420

Samaloisa, S., & Harjono, N. (2024). Penerapan Model Pembelajaran Kooperatif Tipe STAD untuk Meningkatkan Daya Kritis dan Hasil Belajar Matematika Siswa Kelas IV SD. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *7*(1), 955–959. https://doi.org/10.54371/jiip.v7i1.3809

Sanai, M., & Nair, S. M. (2018). Effects of utilizing the STAD method (Cooperative Learning Approach) in enhancing students' descriptive writing skills. *International Journal of Education and Practice*, *6*, 239–252. https://doi.org/10.18488/journal.61.2018.64.239.252

Septian, A., Agustina, D., & Maghfirah, D. (2020). Model Pembelajaran Kooperatif Tipe Student Teams Achievement Division (STAD) untuk Meningkatkan Pemahaman Konsep Matematika. *Mathema: Jurnal Pendidikan Matematika*, *2*(2), 10. https://doi.org/10.33365/jm.v2i2.652

Sinaga, R. (2023). Pengaruh Pendekatan Matematika Realistik Terhadap Hasil Belajar Matematika Siswa. *Algebra: Jurnal Pendidikan, Sosial Dan Sains*, *3*(1). https://doi.org/10.58432/algebra.v3i1.834

Sun, K. L. (2018). Brief Report: The Role of Mathematics Teaching in Fostering Student Growth Mindset. *Journal for Research in Mathematics Education*, *49*(3), 330–335. https://doi.org/10.5951/jresematheduc.49.3.0330

Suparmini, M. (2021). Penerapan Model Pembelajaran Kooperatif Tipe STAD untuk Meningkatkan Aktivitas dan Hasil Belajar Penjasorkes pada Siswa Kelas VI SD. *Journal of Education Action Research*, *5*(1). https://doi.org/10.23887/jear.v5i1.31559

Suparsawan, I. K. (2021). Implementasi Pendekatan Saintifik pada Model Pembelajaran Kooperatif Tipe STAD untuk Meningkatkan Keaktifan dan Hasil Belajar Matematika. *Indonesian Journal of Educational Development*, *1*(4), 607–620. https://doi.org/10.5281/zenodo.4560676

Toropova, A., Johansson, S., & Myrberg, E. (2019). The role of teacher characteristics for student achievement in mathematics and student perceptions of instructional quality. *Education Inquiry*, *10*(4), 275–299. https://doi.org/10.1080/20004508.2019.1591844

Trianto. (2010). *Mendisain Model Pembelajaran Inovatif-Progresif: Konsep, Landasan, dan Implementasinya pada Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Kencana Prenada Media Group.