Utilizing the Student Teams Achievement Division (STAD) Model and Counting Boards to Improve Mathematics Learning Results

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ABSTRACT

The low mathematics learning outcomes of third-grade students at SDIT Annisa in Bogor Regency, which only reached 41.17% in the initial cycle, became the focus of this research. This issue is attributed to the use of traditional teaching methods and a lack of innovative learning media. The aim of this study was to enhance students' mathematics learning outcomes through the implementation of the Student Teams Achievement Division (STAD) cooperative learning model and numbered scoreboard media. This research employed the Classroom Action Research (CAR) model, conducted over two cycles with several stages, including planning, action implementation, observation, and reflection. The subjects of the study were 17 third-grade students, and data were collected through observations, tests, interviews, and documentation. Data analysis techniques utilized both qualitative and quantitative approaches to assess improvements in learning outcomes. The results indicated a significant increase in learning outcomes, where the initial results of 41.17% in the pre-cycle rose to 64.70% in the first cycle and reached 94% in the second cycle. This improvement occurred as student engagement and motivation increased during the interactive and group-based learning process. These findings demonstrate that the STAD model combined with counting board media is effective in enhancing mathematics learning outcomes, as well as encouraging students to be more active and enthusiastic in their learning. This research contributes practically to the development of innovative teaching methods in elementary schools.

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1. Introduction

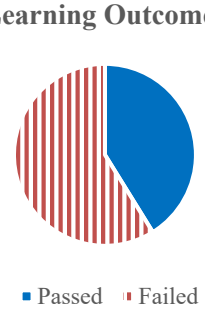
Education is a fundamental aspect in improving the quality of human life. Through the educational process, individuals are formed into individuals who are intelligent, characterful, moral, and have useful skills, both for themselves and the wider community. Education is also a means of developing the potential of each individual (Fitriani et al., 2024). To realize quality education, teachers are required to carry out their duties professionally, considering that they have an important role in guiding students and developing potential and creativity through active participation in learning (Wulandari & Aliyyah, 2024; Aliyyah, Mulyanah, et al., 2024; Sudargini & Purwanto, 2020).

Mathematics as one of the core subjects, taught from elementary school to college level, shows its significance in various aspects of life and technological development (Aliyyah, 2021; Aliyyah et al., 2021). Etymologically, mathematics comes from the Latin mathematica and Greek mathematike, which means related to learning or the process of thinking (Pratiwi et al., 2019; Siahaan et al., 2023). However, the nature of mathematics that tends to be abstract often makes students feel difficult and less motivated to learn it (Jawad et al., 2021; Marfu'ah et al., 2022). Therefore, the right learning approach is needed so that students can understand the material better and are motivated to learn.

One of the important factors in the learning process is the teacher's understanding of the initial characteristics of students, because this facilitates learning management and maintains the continuity of the learning process (Estari, 2020). Furthermore, choosing the appropriate media and learning model significantly impacts the attainment of student learning outcomes (Aliyyah, Fajriati, et al., 2024). The learning outcomes themselves are the final achievements of students after undergoing the learning process, which reflects the extent of their efforts in understanding the material (Yandi et al., 2023). The success of learning outcomes is influenced by internal and external factors, so a learning strategy is needed that supports students' active involvement and is able to overcome obstacles in the learning environment.

A situation that reflects this problem is also found in the 3rd grade of SDIT Annisa, Bogor Regency. From the results of observations and interviews, it is known that students consider learning mathematics as something difficult and boring. Such challenges primarily stem from conventional instructional approaches, characterized by teacher-centered lecture methods with limited methodological diversity. The minimal incorporation of educational tools and resources further compounds these difficulties in the learning environment. Teachers only rely on pictures from theme books because of the limitations of facilities such as teaching aids, so students have difficulty understanding abstract mathematical concepts.

Diagram 1 Pre-Research Score Results at SDIT Annisa Grade 3



Source : Grade 3 student scores at SDIT Annisa, Babakan Madang, Bogor Regency.

Initial data from the class showed that most students had not yet reached the set Minimum Completion Criteria (KKM) score of 70. Based on the pre-research grade chart, only 30% of students are actively paying attention to the lesson, while 30% feel bored, 20% chat frequently, and the other 20% go in and out of class during learning. This condition shows that the learning models and media used have not been able to attract students' interest in learning, so mathematics learning outcomes are still low.

Multiple prior studies have demonstrated that the Student Teams Achievement Division (STAD) learning model can significantly enhance student learning outcomes when complemented by suitable learning media. Hartati et al. (2025) applied STAD with flash card media and succeeded in improving mathematics learning outcomes of grade V students. Meanwhile, Ewut et al. (2024) combined STAD with crossword puzzle media in science learning and recorded a significant increase in learning completeness. Fatchiyah et al. (2024) also showed positive results through the application of STAD combined with rotary wheel media in thematic learning in grade III elementary school. However, these studies have not explored the use of concrete media such as spreadsheets, which are highly relevant and effective in helping low-grade students understand basic mathematical concepts more realistically.

Departing from these limitations, this research presents a novelty through the combination of the STAD model with the media of the numeracy board, which has not been widely researched at the same time. The STAD model is designed to increase students' active participation and avoid boredom in learning (Asmedy, 2021; Murthada & Sulubara, 2023), while the counting board is a two-dimensional manipulative medium that is very useful in helping students understand the operation of counting numbers through hands-on experience (Musfikaningrum, 2020; Amreta et al., 2023). This media also plays a role in stimulating students' motor activities and senses, which has an impact on increasing engagement in learning (Safitri & Rachmiati, 2023).

This research is focused on improving the mathematics learning outcomes of third grade students of SDIT Annisa, Bogor Regency, especially on the material on the properties of integer counting operations. The main problems faced are the low learning outcomes of students, lack of involvement in learning, and teaching methods that are still conventional without the use of adequate media. To answer these problems, the application of the STAD model that emphasizes cooperation in heterogeneous groups combined with the media of the scoreboard was chosen as a solution. This model allows students to help each other and take responsibility for completing group assignments, while the spreadsheet helps simplify abstract material to be more visually and practically understandable.

Thus, the main focus of this study is to identify the impact of the application of the combination of STAD and spreadsheet media on students' mathematics learning outcomes, both in terms of cognitive and participatory. This research is expected to be one of the choices of learning strategies that are more contextual, fun, and efficient for teachers in overcoming the low learning achievement of elementary school students, especially in mathematics subjects in the early grades.

2. Methods

This study uses the Classroom Action Research (PTK) methodology, which is known as reflective research that is often conducted in a single cycle by educators or prospective educators in the classroom (Susilo et al., 2022). The image below shows a model developed by Robyn McTaggart and Stephen Kemmis for the researchers to apply.

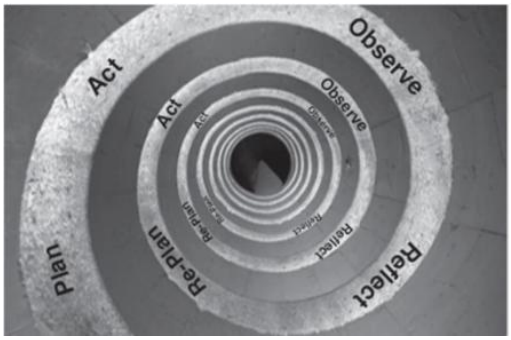


Figure 1 Model Kemmis & McTaggart

Source: Kemiss et al, 2014

This model comprises a cycle that includes three phases of action research, which are outlined in the Kemmis & McTaggart framework as follows: Plan, this phase emphasizes the development of an initial strategy for creating learning tools that align with the evaluations and insights from prior studies. Act & Observe, the second phase of this framework involves teachers implementing actions in the classroom through various learning activities. Concurrently, observations are conducted during the learning process to monitor student reactions. This activity aims to track changes in student behavior throughout the educational experience. Data collection for observation is performed using pre-prepared instruments that enable the classroom teacher to assess the implementation of the learning model by the researcher. Reflect, the final phase of this model involves evaluating and analyzing the collected data, which serves as the foundation for planning subsequent actions in the next cycle (Aliyyah et al., 2021).

This study was conducted with third-grade students at SDIT Annisa, situated in Kp. Banceuy RT 001/001, Babakan Madang, West Java. A total of 17 students participated in the research, comprising 11 girls and 6 boys. The research took place from October 10 to 21, 2024, and included 5 sessions. The aim of this study is to enhance student learning outcomes in theme 2, subtheme 1, focusing on introductory and problem-solving content that incorporates the properties of counting operations with integers, through the implementation of the STAD learning model and the use of integer scoreboards as media.

The information for this research was gathered through various methods, including direct observation, assessments, interviews, and documentation techniques. Observations were conducted in person to record student activities during the educational process, as well as their engagement and reactions to the learning materials utilized. Students were given essay questions in the form of assessments to evaluate their skills in addition and subtraction of integer concepts, both prior to the intervention (pre-test) and following the intervention (post-test). Interviews with teachers and students were conducted to obtain information about the learning methods previously applied, the obstacles faced, and input on the effectiveness of the actions taken. Documentation is used to capture the initial conditions, implementation, and learning outcomes, such as photos of activities and student evaluation results. Observation sheets are used in this study to assess student activities, assessment questionnaires are given to homeroom teachers as observers, and validated test questions are used to ensure the reliability and validity of the data.

The gathered information was examined using both qualitative and quantitative methods. Qualitative data obtained from observations, interviews, and documentation were assessed to demonstrate changes in student behavior, the effectiveness of the learning materials, and the success of the implemented instructional model. Quantitative data, represented by student assessment scores, were analyzed to determine the percentage of

student learning achievements.To analyze the test results, the researcher used a formula developed by Agung, A.A.G, 2010, which calculates the average student's understanding of concepts (M) with the formula:

$$M = \frac{\sum x}{N}$$

Information:

M : Mean

∑X : Amount of Data

N : Number of Frequencies

To achieve the average percentage (M%) the following formula is used:

$$M\% = \frac{M}{(SMI)} x100\%$$

Information:

M% : Average percent

M : Average score

SMI : Ideal maximum score (Suparya & Darmayoga, 2023).

The findings from the analysis in each cycle serve as a foundation for reflection, guiding the decision on whether to continue or enhance actions in the subsequent cycle. This research established a success criterion of 80% for third-grade students at SDIT Annisa, where students achieved scores above the minimum competency standard (KKM) or attained a score of ≥70 in mathematics. The study did not achieve a 100% success rate, as three students were absent during the research period.

3. Results and Discussion

In this research, the implementation of Classroom Action Research (PTK) aimed at enhancing student learning outcomes in mathematics is detailed based on findings from observations, assessments, interviews, and documentation involving various stakeholders, including teachers and students. The study was conducted at SDIT Annisa in Bogor Regency by utilizing the STAD model, complemented by the use of numeracy board media. This research was executed in phases, progressing from the pre-cycle to cycle 2, to achieve results that align with the completeness standards established in this study.

3.1. Results

Pre-Cycle

The average performance of third-grade students at SDIT Annisa in integer concepts remains in a very low category, as indicated by the results of the observation evaluation test. This unsatisfactory learning outcome is attributed to several factors, including students' challenges in grasping the material presented and difficulties in comprehending the process involved calculating integers, both in addition and subtraction operations. This difficulty occurs because the teacher has not provided a detailed explanation of the process of increasing and decreasing numbers in each calculation step. As a result, as shown in the following table, the average learning outcomes of students are still in very low groups. Testing is performed to ascertain the initial condition of the object of study.

Table 1 Pre-Cycle Data Results

KKM	Value	Percentage	Information
70	≥70	40%	Complated
70	≤70	60%	Incomplate

According to Table 1, the results from the pre-cycle indicate that out of 17 students, only 6 achieved scores above the minimum competency standard (KKM), representing 41.2%, while the remaining 11 students scored below KKM, accounting for 58.8%. The data reveals that student performance in mathematics, particularly in the addition and subtraction of integers, remains low. This can be attributed to insufficient explanations of each step in the calculation process and the lack of media and instructional models that encourage students to remain engaged in learning activities. By implementing the STAD model and utilizing number board media, the researcher attempted actions in line with the plan developed in the Classroom Action Research (PTK).

Cycle I

The initial cycle of action was conducted at SDIT Annisa in Bogor Regency. The focus of improvement was on mathematics lessons concerning the addition and subtraction of small numbers. A total of 17 third-grade students participated in this research. Four stages in the learning process were systematically implemented following the Kemmis and McTaggart model, which includes the planning stage, the action stage, the observation stage, and the reflection stage. The outcomes of the first cycle's implementation are detailed as follows:

Planning

The mathematics lesson plan (RPP) was prepared by the researcher to match the material to be taught. As part of the preparation, the researcher also designed and created learning media in the form of counting boards designed to help explain the topics to be discussed in class. In addition, the researcher designed a learning model that presents an interesting and interactive atmosphere. To support the learning process, the researcher prepared a learning video related to the topic to be discussed as well as triggering questions to encourage students' active participation.

Action

The first stage took place on Thursday, October 17, 2024, following the lesson plan that had been prepared in advance. The session began with the teacher leading a prayer, ensuring that students were ready to commence learning, taking attendance, and preparing the necessary teaching materials and tools. The teacher provided an initial overview and clarified the learning objectives to assist students in grasping the focus of the day's lesson. During the core activity, students were instructed to watch a learning video presented via a laptop. The teacher facilitated the session by posing thought-provoking questions to promote active engagement and enhance students' critical thinking abilities. After the material was delivered, a question-and-answer session was held, followed by assigning addition and subtraction problems for the students to solve. Subsequently, the students collaborated in groups using the counting board media, taking turns to tackle the assigned problems. Each group member participated, and the group that performed best received a

reward to boost student motivation. As the lesson drew to a close, the teacher allowed time for students to ask questions about any aspects of the material they did not understand. Once all inquiries were addressed, the teacher and students summarized the material covered. The learning process concluded with a prayer and the assignment of homework to be completed at home.

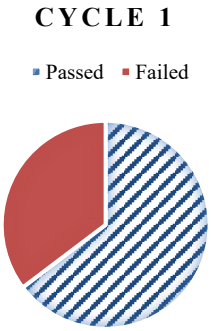
Observation

During the observation stage, the researchers tracked students' learning activities and the progression of the educational process by utilizing data collection methods in the form of field notes. According to the observations, there was a notable increase in student engagement and enthusiasm throughout the learning process. The use of counting board media positively impacted the students, as it was perceived as interesting and novel, thereby boosting their motivation to learn. Students' excitement was also apparent while watching the learning video, despite facing some technical difficulties. The video was only displayed on a laptop due to the absence of a projector, and the low sound volume made it challenging for some students to fully grasp the content presented in the video. This issue serves as a crucial point for enhancement in the subsequent cycle.

Reflection

The researchers reflected on the planning, execution, and observation phases to assess the strengths and weaknesses of classroom learning activities. During this reflection process, they also sought feedback from homeroom teachers, who acted as observers, to pinpoint corrective actions aimed at enhancing student learning outcomes. In the first cycle, several shortcomings still impacted the effectiveness of the learning process, resulting in less than optimal implementation. Consequently, student performance had not yet met the established success criterion of 80%. Below is a summary of the research findings from the first cycle.

Diagram 2 Results of Cycle I Scores



It is evident that out of the total number of students, only 11 achieved the success indicators, representing 64.7%, while the remaining students did not meet the standard. Therefore, it is essential to conduct a second cycle that takes into account the strengths and weaknesses identified in the first cycle, as well as the outcomes of the reflection process, with the goal of enhancing the quality of teaching and learning in the classroom.

Cycle II

Planning

The activity plan for the first cycle was revised for implementation in the second cycle. Based on the analysis and reflection regarding the shortcomings of the previous

implementation phase, the researcher, in the role of teacher, created an improved action plan for cycle II that was tailored to the learning process. The aim of this action was to ensure that students could enhance their learning outcomes in comparison to the results achieved in cycle I. During the implementation phase of cycle II, various strategies were employed to help students improve their learning outcomes. In this stage, several enhancements and additions were made, such as motivating students with the promise of rewards to increase their focus and engagement. This approach was intended to encourage students to feel comfortable asking questions about any material they did not understand and to be more enthusiastic about participating in the learning process. Additionally, the counting board media continued to be utilized, but it was supplemented with a new learning video that differed from that of cycle I, along with a sound amplifier to ensure that students' attention was more directed towards the material being presented.

Action

The planning for learning activities in the first cycle was revised for the implementation of the second cycle. Drawing from the analysis and reflection on the weaknesses identified in the previous implementation phase, the researcher, acting as the teacher, created an improved action plan for cycle II that was tailored to the learning process. The goal of this plan is to ensure that students can enhance their learning outcomes compared to the implementation of cycle I. During the implementation phase of cycle II, various enhancements and additions were introduced, such as incentivizing students with the promise of rewards to increase their focus and engagement. This approach was intended to motivate students to feel comfortable asking questions about any material they did not understand and to be more enthusiastic about participating in the learning process. Furthermore, the counting board media was still utilized, but it was supplemented with a new learning video that differed from that of cycle I, along with a sound amplifier to enhance students' attention to the material being presented.

Observation

In the observation stage of cycle II, researchers monitored student activities and the learning process using field note techniques. Based on the observation, there was a significant increase in students' involvement and enthusiasm compared to the previous cycle. The support of learning media such as the counting board continues to have a positive impact, helping students understand the material in a more interesting and interactive way. In addition, the use of loudspeakers to support the learning video is an important factor in increasing students' attention, as all students can now hear the material clearly without technical constraints as before. Students' enthusiasm is also influenced by a better understanding of the group work system. Students already know their roles and responsibilities in group activities, so collaboration is more structured and efficient. Group activities became more dynamic, with students discussing with each other, sharing their understanding, and helping their group mates. This not only increased students' active participation but also showed an increase in better learning outcomes compared to the previous cycle. These observations show that improvements in implementation techniques and learning approaches significantly support the improvement of student learning quality.

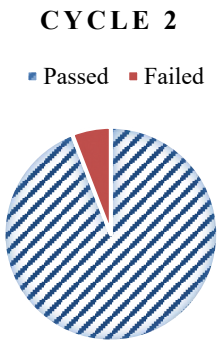
Reflection

Reflection on cycle II showed a significant increase in students' attention to learning compared to the previous cycle. The improvements made can be seen from the active involvement of students in every stage of learning, from listening to the learning video to participating in group activities using the counting board media. Technical improvements

in the form of using loudspeakers were able to overcome the obstacles experienced in cycle I, so that all students could hear the material clearly and stay focused on learning. This more conducive learning environment encouraged students to show greater interest in the material being taught. Students' understanding of the refined group work mechanism also contributed greatly to the success of the learning. Students become more active in discussing and working together in solving problems, creating effective group dynamics. The spirit of healthy competition among groups of learners also provides additional motivation for students to be more enthusiastic and effortful in learning.

Overall, the reflection on cycle II showed that the changes in strategy, both in terms of technical and pedagogical, succeeded in significantly increasing students' attention and engagement. The positive impact can be seen from the much higher percentage of student learning success, in accordance with the previously set success indicators. This increase reflects the success of optimizing the overall learning process, as seen in the following results diagram.

Diagram 3 Results of Cycle II Scores

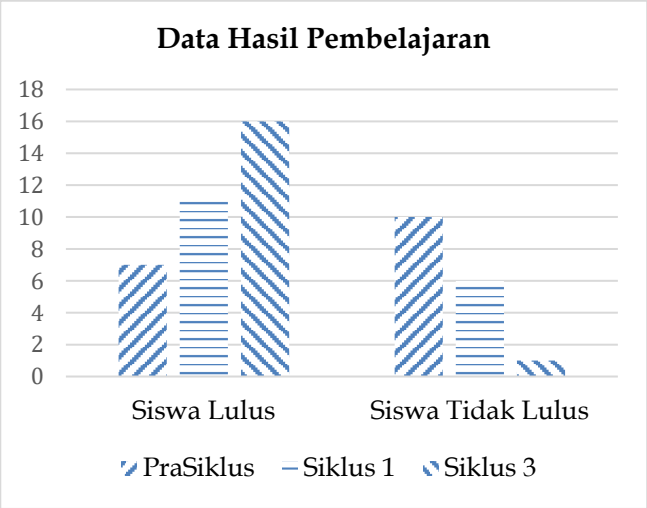


Based on diagram 3, the results of students' cycle II research show that 16 students have scored above the KKM with a percentage of 94%, and only one student scored below the KKM this happened because there was a student who did not go to school due to absence. The total student score is 1,350, with an average description of 84.375 which indicates that it is high. So it can be seen that cycle II shows better learning results than cycle I. Therefore, the researcher determined that there was no need for a second cycle. Therefore, researchers determined that there was no need for an additional cycle to improve student learning outcomes.

3.2. Discussion

Cooperative learning includes various models, such as jigsaw, STAD, TAI, and others. In this study, researchers chose to use the STAD type cooperative learning model (Hadi et al., 2024; Lumbantoruan et al., 2022). STAD is one of the widely used and quite popular learning models (Jundi et al., 2023; Kamid et al., 2022). In the STAD type cooperative learning model, students are placed as the center of learning activities, so they can play a more active role during the learning process (Khidr, 2022; Marliani et al., 2023). This model is also supported by learning media where this is an important element in helping the teaching and learning process (Ekayani, 2017). By utilizing various types of media, teachers are able to convey knowledge to students more effectively. In addition, the use of learning media can increase students' interest in learning new things, so that the material provided becomes easier to understand (Nurrita, 2018). This research proves that learning using the STAD model and counting board media can improve results from pre-cycle to cycle II, as shown in diagram 4.

Diagram 4 Data on learning outcomes from Pre-Cycle to Cycle II



Based on diagram 4, it is explained that student learning outcomes have increased significantly. In the pre-cycle increase, students who reached the KKM standard were 41.17% and then received learning treatment using the model and media that had been applied by the researcher, resulting in cycle I data which increased by 23.53%, namely 11 students met the KKM standard, making 64.70% of students. However, this still did not meet the success indicators set by the researchers so that cycle II was applied which resulted in a very large increase of 29.41%. That way from pre-cycle to cycle II has increased by 52.94% which shows that this research can improve student learning outcomes.

Cycle I

The implementation of Cycle I at SDIT Annisa in Bogor Regency, focusing on the addition and subtraction of integers, demonstrated an improvement in student participation and enthusiasm, particularly due to the incorporation of learning media such as counting boards and videos. However, limitations such as the lack of a projector and the low sound volume of the video posed challenges. Among the 17 students, only 11 achieved the success indicator, which did not meet the 80% target. This cycle highlights the need for teachers to introduce innovations that can enhance student motivation to combat boredom. One effective strategy for boosting motivation and improving learning outcomes is the use of diverse learning media (Fitria, 2014). The use of audio-visual learning tools is anticipated to enhance students' comprehension of instructional material delivered by educators (Ichsan et al., 2021; Sanulita et al., 2024) However, in its implementation, there are obstacles, namely students do not hear the contents of the learning video because the audio only relies on a leptop. Math learning in the classroom must be made interesting so that students are interested in being involved and active in the learning process (Abidin, 2020). In applying the learning model here, students still lack enthusiasm due to fear of being wrong. So that students must know their duties in a group in order to master the learning system (Kisworo et al., 2016). To successfully conclude cycle II, researchers must critically analyze both the positive and negative aspects of cycle I, while meticulously reviewing each procedural stage.

Cycle II

The implementation of Cycle II showed significant improvements in student engagement and learning outcomes, with 94% of students scoring above the KKM. Improved strategies, such as the use of loudspeakers, new learning videos, and a better understanding of group work, succeeded in creating a conducive and interactive learning atmosphere. Learning media such as the counting board remained effective in helping students understand the material. With an average score of 84.375, the learning outcomes in Cycle II were much better than Cycle I, so no additional cycle was needed.

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4. Conclusion

The results indicated a notable improvement in student learning outcomes from the pre-cycle phase to cycle II. During the pre-cycle phase, only 41.17% of students met the Minimum Completion Criteria (KKM). However, following the implementation of the STAD learning model and the use of spreadsheet media, the percentage of students achieving the KKM increased to 64.70% in cycle I and further rose to 94% in cycle II. This demonstrates that the STAD model and the counting board media are effective in enhancing student learning outcomes, fostering active participation, and making the learning experience more engaging and effective. Therefore, this study concluded that the application of the STAD cooperative learning model, combined with the number counting board media, was successful in improving the mathematics achievement of grade 3 students at SDIT Annisa in Bogor Regency.

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References

Abidin, Z. (2020). Belajar matematika asyik dan menyenangkan. Jurnal Pendidikan Dan Pembelajaran Matematika, January, 1–4. https://doi.org/10.31219/osf.io/2hkvm

Agustira, S., & Rahmi, R. (2022). Penggunaan media pembelajaran untuk meningkatkan hasil belajar siswa pada tingkat sd. MUBTADI : Jurnal Pendidikan Ibtidaiyah, 4(1), 72–80.

Ainun, N., Fadilah, S., & Marlina, R. (2021). Pengaruh alat peraga pacapi (papan pecahan pizza) terhadap hasil belajar untuk siswa sekolah dasar pada materi pecahan. Jurnal Maju, 8(2), 301–309.

Aliyyah, R. R. (2021). Training on writing scientific articels based on community service. JCES (Journal of Character Education Society), 4(2), 285–297.

Aliyyah, R. R., Fajriati, A. S., & Gani, R. A. (2024). Upaya meningkatkan hasil belajar bahasa indonesia menggunakan media audiovisual dan metode bernyanyi pada sekolah dasar. Jurnal Sosial Humaniora, 15(2), 171–186.

Aliyyah, R. R., Mulyanah, S., Sihombing, T., Kartika, R., Shidqie, K. S., Jenab, S., Pratama, P. S., Aqilah, A. S., Fahrudin, U. A., & Millenia, T. M. (2024). Pendampingan penggunaan media pembelajaran berbasis quizizz dan wordwall. Qardhul Hasan : Media Pengabdian Kepada Masyarakat, 10(2), 172–176.

Aliyyah, R. R., Saraswati, S., Ulfah, S. W., & Ikhwan, S. (2021). Upaya meningkatkan hasil belajar ipa pada materi sifat-sifat cahaya menggunakan media video pembelajaran. Aksara: Jurnal Ilmu Pendidikan Nonformal, 7(2), 317. https://doi.org/10.37905/aksara.7.2.317-326.2021

Asmedy. (2021). Pengaruh model pembelajaran kooperatif tipe stad terhadap hasil belajar siswa sekolah dasar. Jurnal Penelitian Dan Pengabdian Kepada Masyarakat Bidang Ilmu Pendidikan, 2(2), 108–113. https://doi.org/10.58536/j-hytel.v1i3.92

Astuti, L. F., Aliyyah, R. R., Gunadi, G., Subasman, I., & Gani, R. A. (2024). Upaya meningkatkan hasil belajar matematika menggunakan media papan pecahan pada materi bilangan pecahan kelas V. Jurnal Pengajaran Sekolah Dasar, 3(1), 75–94. https://doi.org/10.56855/jpsd.v3i1.913

Bayeck, R. Y. (2020). Examining board gameplay and learning: a multidisciplinary review of recent research. Simulation and Gaming, 51(4), 411–431. https://doi.org/10.1177/1046878119901286

Ekayani, N. L. P. (2017). Pentingnya penggunaan media pembelajaran untuk meningkatkan prestasi belajar siswa. Jurnal Fakultas Ilmu Pendidikan Universitas Pendidikan Ganesha Singaraja, March.

Estari, A. W. (2020). Pentingnya memahami karakteristik peserta didik dalam proses pembelajaran. Workshop Nasional Penguatan Kompetensi Guru Sekolah Dasar, 3(3), 1439–1444. https://jurnal.uns.ac.id/shes

Fadli, M. Z. (2021). Implementasi model learning cycle 5e berbantu media video pembelajaran di kelas online. AL-MURABBI: Jurnal Studi Kependidikan Dan Keislaman, 8(1), 34–44. https://doi.org/10.53627/jam.v8i1.4265

Fatchiyah S, R., Rondli, W. S., & Ermawati, D. (2024). Penerapan Student Teams Achievement Division untuk Meningkatkan Hasil Belajar Siswa Sekolah Dasar. Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI), 4(3), 1197–1206. https://doi.org/10.53299/jppi.v4i3.701

Fitria, A. (2014). Penggunaan media audio visual dalam pembelajaran anak usia dini. Cakrawala Dini, 5(2), 57–62. https://doi.org/10.17509/cd.v5i2.10498

Fitriani, I. N., Kurniawati, R. P., & Komaladewi, R. (2024). Penerapan model pembelajaran tgt untuk meningkatkan hasil belajar pada pelajaran ipas di kelas v sd. Jurnal Sekolah, 8(September), 583–591.

Hadi, L. H., Taufik, M., & Fitriana, M. A. (2024). The effect of the student teams achievement division (STAD) cooperative learning approach on mathematics learning outcomes at

sdn 6 Sokong. JISIP (Jurnal Ilmu Sosial Dan Pendidikan), 8(3), 1813–1815. https://doi.org/10.58258/jisip.v7i1.7151/http

Hartati, Y., Husniati, H., & Rahmawati, R. (2025). Upaya Meningkatkan Hasil Belajar Matematika Menggunakan Media Flash Card dengan Strategi Student Teams Achievement Division (STAD) Pada Materi Bangun Datar Kelas V di Sekolah Dasar. Jurnal Ilmiah Profesi Pendidikan, 10(1), 600–610. https://doi.org/10.29303/jipp.v10i1.3188

Ichsan, J. R., Suraji, M. A. P., Muslim, F. A. R., Miftadiro, W. A., & Agustin, N. A. F. (2021). Media audio visual dalam pembelajaran di sekolah dasar. Seminar Nasional Hasil Riset Dan Pengabdian Ke-III (Snhrp-III 2021), 183–188.

Jawad, L. F., Majeed, B. H., & ALRikabi, H. T. S. (2021). The impact of cats on mathematical thinking and logical thinking among fourth-class scientific students. International Journal of Emerging Technologies in Learning, 16(10), 194–211. https://doi.org/10.3991/ijet.v16i10.22515

Jundi, M., Fitriyani, L., & Aquil, A. (2023). Collaborative learning : boosting arabic learning with stad model. Jurnal Ilmu-Ilmu Pendidikan Dan Bahasa Arab, 11(1), 35–48.

Kamid, K., Winarni, S., Rohati, R., & Pratama, W. A. (2022). The relationship of student process skills to student responses with the student team achievement division (STAD) learning model in elementary schools and madrasah ibtidaiyah. AL-ISHLAH: Jurnal Pendidikan, 14(4), 5841–5852. https://doi.org/10.35445/alishlah.v14i4.1534

Kemmis, S., McTaggart, R., & Nixon, R. (2014). The Action Research Planner: Doing Critical Participatory Action Research.

Khidr, Z. H. (2022). The impact of stad strategy on the academic achievement of eighth-grade students in sciences subject and developing their scientific trends. Journal of Arts, Literature, Humanities and Social Sciences, 82. https://doi.org/10.33193/jalhss.82.2022.714

Kisworo, B., Ilyas, & Kriswanto, H. D. (2016). Model pembelajaran partisipatif melalui teknik pendampingan terhadap tugas diskusi kelompok mahasiswa dalam membentuk karakter santun berdiskusi. Journal of Nonformal Education and Community Empowerment, 2(1), 9–15.

Kristin, F. (2016). Efektivitas model pembelajaran kooperatif tipe stad ditinjau dari hasil belajar Ips siswa kelas 4 Sd. Scholaria : Jurnal Pendidikan Dan Kebudayaan, 6(2), 74–79. https://doi.org/10.24246/j.scholaria.2016.v6.i2.p74-79

Lumbantoruan, J. H., Dane, G., & Mahyar, B. (2022). Comparison of mathematics learning outcomes with student team achievement divisions and team assisted individualization model. Al-Hijr: Journal of Adulearn World, 1(3), 132–140. https://doi.org/10.55849/alhijr.v1i3.30

Marfu'ah, S., Zaenuri, Masrukan, & Walid. (2022). Model pembelajaran matematika untuk meningkatkan kemampuan penalaran matematis siswa. PRISMA, Prosiding Seminar Nasional Matematika, 5, 50–54. https://journal.unnes.ac.id/sju/index.php/prisma/

Marliani, N., Ambarsari, & Isnaningrum, I. (2023). Meningkatkan hasil belajar siswa melalui pembelajaran kooperatif student teams achievement division (STAD). Jurnal Ilmu Pendidikan Dan Sosial (JIPSI), 2(3), 329–334. https://doi.org/10.58540/jipsi.v2i3.436

Mulyani, E., & Yatri, I. (2022). Analisis kebutuhan penggunaan papan pecahan sebagai media pembelajaran matematika pada materi mengenal bilangan pecahan kelas II SD. Jurnal Cendekia: Jurnal Pendidikan Matematika, 06(02), 2191–2201.

Murthada, & Sulubara, S. M. (2023). Model pembelajaran kooperatif tipe stad (student teams achievement division) di smp it muhammadiyah takengon. Dewantara : Jurnal Pendidikan Sosial Humaniora, 2(1), 47–54. https://doi.org/10.30640/dewantara.v2i1.659

Musfikaningrum, L. . (2020). Pengaruh model pembelajaran group investigation berbantuan media papan hitung terhadap hasil belajar matematika. Universitas Muhamadiyah Malang.

Nurrita, T. (2018). Pengembangan media pembelajaran untuk meningkatkan hasil belajar siswa. MISYKAR : Jurnal Ilmu-Ilmu Al-Quran, Hadist, Syari'ah Dan Tarbiyah, 3(1), 171–187. https://doi.org/10.54065/jld.4.1.2024.448

Padu Ewut, E. ., Makaborang , Y., & Ndjoeroemana, Y. (2024). Penerapan Model Pembelajaran Tipe Student Teams Achievement Divisions Dengan Media LKS Teka-Teki Silang Untuk Meningkatkan Hasil Belajar Siswa SMP Negeri 1 Kanatang : (Application of the Student Teams Achievement Divisions Type Learning Model Using Crossword Puzzle LKS Media to Improve Student Learning Outcomes at SMP Negeri 1 Kanatang). BIODIK, 10(3), 358–364. https://doi.org/10.22437/biodik.v10i3.35157

Pratiwi, D. P. H., Nurimani, & Hatiarsih, R. (2019). Perbedaan hasil belajar matematika siswa menggunakan model problem-based learning dan problem solving. Prosiding Seminar Nasional Pendidikan STKIP Kusuma Negara, 1–7.

Sanulita, H., Hendriyanto, D., Citrawati Lestari, N., Ramli, A., & Arifudin, O. (2024). Analysis of the effectiveness of audio visual learning media based on macromedia flash usage on school program of increasing student learning motivation. Journal on Education, 6(2), 12641–12650. https://doi.org/10.31004/joe.v6i2.5121

Siahaan, E. Y. S., Muhammad, I., Dasari, D., & Maharani, S. (2023). Research on critical thingking of pre-service mathematics education teachers in Indonesia (201502023): A bibliometric review. Jurnal Math Educator Nusantara, 9(1), 34–50. https://pdfs.semanticscholar.org/53a3/ac678350d15ea7def07f876d1c09d54add6c.pdf

Sudargini, Y., & Purwanto, A. (2020). The effect of teachers pedagogic competency on the learning outcomes of students. Journal of Industrial Engineering & Management Research (Jiemar), 1(4), 2722–8878. https://doi.org/10.7777/jiemar

Suparya, I. K., & Darmayoga, I. W. (2023). Penerapan model pembelajaran discovery learning berbantuan media ulartangga untuk meningkatkan hasil belajar siswa. Edukasi: Jurnal Pendidikan Dasar, 4(2), 101–110.

Susilo, H., Chotimah, H., & Sari, Y. D. (2022). Penelitian Tindakan Kelas (4th ed.). Media Nusa Creative (MNC Publishing).

Wulandari, & Aliyyah, R. R. (2024). Praktik baik dalam mengelola kelompok dan rombongan belajar belajar: Studi implementasi kurikulum merdeka pada sekolah dasar. Karimah Tauhid, 3(1), 321–338. https://doi.org/10.30997/karimahtauhid.v3i1.11635