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Improving Mathematics Learning Outcomes with the Student Team Achievement Division Model Assisted by Colored Stick Media

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ABSTRACT

The application of Colored Stick Media to Mathematics subjects, especially for arithmetic addition and subtraction of integers at SD Negeri 2 Sidorejo, is motivated by the lack of students' ability to add or subtract positive and negative numbers. This study aims to determine whether the use of Colored Stick media in cooperative learning of the Student Team Achievement Division type can be used and can improve student learning outcomes at SD Negeri 2 Sidorejo. This study used a Spiral Class Action Research Technique, which was carried out in two cycles. Data processing is done using the average formula and the percentage of student success in learning. The study results of 20 students found an increase in each cycle. The pre-cycle results found that only 4 students completed with a completeness percentage of 20% in the very less category, which increased in Cycle I to 8 students who finished with a rate of 40% who entered the less class. There was a significant increase in Cycle II, with the student's level of completeness being 18 students, with a completeness percentage of 90% and falling into the very good category. From the student learning outcomes, it can be concluded that the use of colored stick media in cooperative learning of the Student Team Achievement Division type can improve student learning outcomes of SD Negeri 2 Sidorejo in the subject of Class IV Mathematics Operational Materials Count Addition and Subtraction of Integers.

Introduction

A quality educator is required to have the ability to channel knowledge, skills, and skills into the lives of students in their future lives. The skills of 21st-century teachers are very necessary in the learning process (Imran, 2010). The skills that 21st-century teachers must master are developing and using interactive

learning techniques and media to attract students' attention (Falahudin, 2014). Lack of knowledge for teachers in delivering interesting learning is one of the problems in the education process. Another common problem concerns the lack of support for facilities and infrastructure in developing and using interesting and interactive media or teaching aids (Fauziyah, n.d.). Using inappropriate models and techniques is a factor causing less than optimal achievement of predetermined educational goals. This happens for several reasons, including teachers who are less capable of delivering learning material and using appropriate models. Apart from that, the techniques, teaching aids, models, and approaches teachers use can influence this situation (Basyiruddin, 2002).

Learning media is a set of software and hardware that can be used to convey the content of teaching materials from learning sources to students. It can stimulate the mind and attract attention and interest, making the learning process more effective (Jalinus, 2016). Interesting media is very important in helping students understand and master learning, which can ultimately improve learning outcomes (Jalinus, 2016). Knowledge must enable students to recognize and use it in contexts outside of mathematics (Farhana et al., 2022). This includes connecting with the real world outside the classroom (Anggraena, 2019). One media used in this research is colored stick media, which will be applied in Student Team Achievement Division-type cooperative learning.

Colored Stick Media is an interactive and interesting media because it uses colored stick media, so it is easy to use in mathematics learning, especially in addition and subtraction of integer operations (Bahalia, 2022). The red represents positive values, and the blue represents negative values. The rule used in applying colored stick media is to combine several sticks with other sticks of the same color if the numbers both have a negative or positive value (Zuhri, 2020). If the numbers are different, this is done by combining several sticks with a positive value into a group of posts with a negative value if a positive number meets a negative number or vice versa. Then, pair the bars with positive and negative values to get a zero value. If you find a stick that doesn't have a pair, the post is the result of their addition.

Student Team Achievement Division type cooperative learning is the most basic type of collaborative learning and is suitable for use by new educators (Slavin, 2015). This learning is carried out by grouping students into several learning teams consisting of four people based on their performance level, gender, and ethnicity. The Student Team Achievement Division cooperative learning model is often used because it is easier to put into practice if the model is practical (Sulisto Andi, 2016). According to (Johnson', 2019). There are five characteristics of cooperative learning: Class presentation, assigning students to groups, tests, and quizzes, individual improvement scores, and group recognition.

The result is a real change in student behavior after the teaching and learning process is carried out by the learning objectives (Sugian Noor, 2020). Meanwhile, learning outcomes mean the overall activities students achieve after carrying out learning activities to complete the learning objectives set (Julhadi, 2021). Learning outcomes are generally grouped into 3 types: cognitive or knowledge domain,

affective or attitude domain, and psychomotor or skills domain (Fauhah, 2021). Using the Student Team Achievement Division type cooperative learning method with the help of Colored Stick Media is expected to help teachers learn so that student learning outcomes, especially in Mathematics subjects, material for counting whole number operations (Listyati, 2019). Apart from that, it is hoped that the use of Colored Stick Media can increase students' enthusiasm for learning, so that students are more active in carrying out assignments and are more courageous in expressing ideas, opinions, questions, suggestions and concluding research results.

According to research conducted by (Bahalia, 2022), Improving Students' Skills in Adding Whole Numbers with Stick Media in Class IV Even Semester at SDN Pembina Tataba for the 2019/2020 Academic Year achieved significant results in improving student learning outcomes. The results of this research were as follows: In cycle I, it was found that students' activeness in participating in learning was, on average 62.96 or in the poor category. Media use in education obtained an average score of 70.37 or in the good category. The learning outcome aspect in cycle I scored 72.22 or in the good category.

Meanwhile, the average result of observing student activities was 68.52 or poor. Then, in cycle II it was found that students' activeness in participating in learning was an average of 77.78 or in the good category. Media use in education obtained an average score of 81.48 or in the very good class. The learning outcome aspect in cycle II scored 83.33 or in the very good category. The average result of observing student activities was 80.86, or in a very good class. The results of this research show that the use of colored stick media can be used as a basis for analysis, meaning that in its use, the researcher will use the Student Team Achievement Division type cooperative learning model.

This research is also motivated by learning problems at SDN 2 Sidorejo, especially in the mathematics subject of integer counting operations. From the results of observations in class 4, information was obtained that the learning process was less effective, where of the 20 students who took the pretest, only 4 students achieved completeness of the specified KKM, namely 85 with an average score of 44 and classical completeness of 20%.

Method

This research is a form of Classroom Action Research (PTK). According to Kemmis, 1988 (Sanjaya, 2006). Action Research is a reflective and collective research to improve their social practice. Judging from the type of research, this classroom action research is a type of participant classroom action research where the researcher plays a direct role in class activities. This research uses a spiral model designed by Kemmis and Taggart, 1988 (Gustiana, 2022). The picture of the spiral model research stages in Classroom Action Research from Kemmis and Mc Taggart is as follows (Parnawi, 2020).

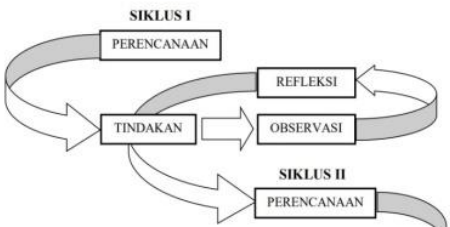

Figure 1.
Spiral Research Stages

Data collection techniques in this research are observation, tests, and documentation. The researcher observed initial conditions (pre-cycle) from Wednesday, 13 March 2023 until Monday, 15 May 2023. At this stage, the researcher observed the teacher's learning activities. At the pre-cycle stage, the teacher carries out learning as usual, namely using a conventional learning model with lecture and assignment methods without media or any media. After observing the activities of students and teachers, researchers carried out tests to determine the level of student completion after participating in learning activities. After obtaining the observation results and students' completeness scores, which were still below the desired completeness, the researchers improved Cycle I as a learning improvement. If Cycle I has not achieved the desired criteria, it will continue with Cycle II.

Data analysis techniques are carried out after data is obtained from observations and student scores at the end of each lesson. The formula used is as follows (Sudijono, 2008):

Average words of educator and student activities.

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

Information:
M = Average value of observation results
$\sum X$ = The sum of the results obtained
N = amount of data

Percentage of student completion.

$$P = \frac{f}{N} \times 100\%$$

Information:
P = Percentage of observation results
f = The percentage frequency being searched
N = The number of aspects

Table 1. Percentage Success Rate Criteria

No	Level of Mastery of Assessment Categories	Level of Mastery of Assessment Categories

1	90% - 100%	Very well
2	80% - 89%	Good
3	70% - 79%	Enough
4	60% - 69%	Not enough
5	≥ 59%	Very less

Research Results and Discussion

The research was carried out in two cycles, with pre-cycle activities, to determine the extent of students' abilities before improvements were made in Cycle I and Cycle II. Observations of teacher and student activities are carried out in each cycle and end by giving a test to determine the extent to which students have succeeded in the teaching and learning activities that have been carried out.

Observation Results of Implementing the Student Team Achievement Division Type Cooperative Model Assisted by Colored Stick Media.

Based on the results of pre-cycle observations without using the STAD type cooperative learning model assisted by colored stick media, several problems were found in the mathematics learning of integer counting operations in class IV at SDN 2 Sidorejo. During learning activities, educators only use classical methods, namely lectures and assignments, without using learning media, so students tend to get bored when learning in class. Observation of student activities in the pre-cycle consists of 4 aspects, including enthusiasm in participating in the learning process, activeness in participating in the learning process, courage in asking, answering and expressing opinions during learning, participation, and activeness in education. From these four aspects, it was found that the level of student activity in participating in activities carried out by the class teacher was 53%, which was in the sufficient category with an average of 2.11.

After improvements were made in Cycle I and Cycle II, it was found that there had been improvements in the class management process and the level of student activity. In Cycle I and Cycle II, learning activities use Colored Stick media by implementing Student Team Achievement Division type cooperative learning activities. The observations consisted of 5 aspects: students' interest and enthusiasm in learning, students' activeness when participating in learning activities, courage in asking, answering, and giving opinions during education, participation and activeness in working in groups, and students' accuracy in using learning media. In Cycle I, the student activity level was 70%, which was in the fair category, with an average of 2.8.

Student Learning Results using the Student Team Achievement Division Type Cooperative Model Assisted by Colored Stick Media in Mathematics Learning.

After the researchers carried out tests carried out in the pre-cycle, Cycle I and Cycle II on the mathematical learning of integer counting operations using the STAD model assisted by colored stick media, the following results were obtained:

Figure 2.

Percentage of Learning Results for Class IV Pre-Cycle, Cycle I and Cycle II Students

From the data above, it can be concluded that there has been a significant change in learning outcomes in class IV mathematics lessons at SDN 2 Sidorejo by implementing the STAD type cooperative learning model. Before the use of the STAD type unified learning model assisted by colored stick media, the results showed unsatisfactory results, it can be seen from the results of the pre-cycle pretest with an average score of only 44. Of the 20 students who took the test, only 4 students completed it and 16 students did not complete it. A learning completion percentage of 20% is in the very low category. Several problems arise, including learning that is monotonous and only teacher centered, making students tend to get bored in learning activities. Apart from that, without the media being used, students are less confident in their learning outcomes, which ultimately results in low learning outcomes and not reaching the specified KKM, namely 85.

There was an increase in learning outcomes in cycle I, where of the 20 students who took the final learning test, 8 students completed or met the KKM and 12 students did not complete it with an average of 73.75. Student learning outcomes have increased by reaching a score of 40% in the poor category. Even though there has been an increase, it still has not got the expected completion indicator, namely 90%. This happens because some students still do not understand the use of colored stick media optimally, therefore learning actions are needed in cycle II so that some of the deficiencies can be corrected and reach the learning completeness criterion of 90%.

Learning outcomes in cycle II saw a very significant increase. Of the 20 total students who took the test, 18 students completed it and only 2 students who did not complete it with an average score of 90.79. The results of the classical learning score also reached 90%, which is included in the very good category and has called the predetermined indicator of success in learning completion, namely 90%. This can happen because students are already proficient in using stick media as a

tool to calculate operations on positive and negative integers. Apart from that, maximum use of media also results in students being active and confident in conveying their learning results. These results align with the theory of (Apriliya et al., 2020) in their research entitled STAD Learning Model Assisted with Scrapbooks to Improve Primary School Student Learning Outcomes, where significant results were obtained in helping students improve their learning outcomes.

The STAD type cooperative learning model assisted by colored stick media has a satisfactory impact on student learning outcomes. This can be seen from the beginning of the pre-cycle, students were still confused about calculating whole numbers, whereas in the first cycle, students had begun to understand and could do each question better, although there were still some students who were not optimal. However, in cycle II where colored stick media was used again in learning, almost all students had begun to become proficient in using the media. This results in learning outcomes increasing rapidly with each cycle carried out so the application of the Student Team Achievement Division (STAD) cooperative learning model using colored stick media in mathematics learning material for counting whole number operations is very influential in improving student learning outcomes. class IV SDN 2 Sidorejo.

This research aligns with the theory (Listyati, 2019): "Application of the STAD Method to Improve Mathematics Learning Activities and Outcomes". This is shown by an increase in the results of observations of student activities in cycle I, with an average of 69 with a percentage of 67%, an increase in cycle II with an average of 81 with a rate of 93%. Therefore, the researcher conducted classroom action research using the STAD type cooperative learning model assisted by colored stick media because it is very suitable for students to play an active role in implementing learning. In its implementation, students will be able to directly calculate the addition and subtraction of integers using sticks that represent positive and negative forms.

Conclusion

Based on research that has been carried out by researchers regarding applying the Student Team Achievement Division (STAD) type cooperative learning model assisted by Colored Stick Media to improve student learning outcomes in mathematics subjects regarding positive and negative integers. It can be seen from the results of observations that student activity increased in cycle I with an average of 2.8 with a percentage of 70%, increasing in cycle II with an average of 3.76 with a rate of 94%. Likewise, the results of educators' observations in process I had an average of 3.05 with a percentage of 76%, increasing in cycle II to an average of 3.71 with a rate of 92%, so the application of the Student Team Achievement Division (STAD) type cooperative learning model assisted by Colored Stick Media can be achieved. Improving student learning outcomes in Mathematics lessons regarding integer counting operations.

After carrying out research at SDN 2 Sidorejo to improve the quality of learning in mathematics subjects, material on integer counting operations using a

cooperative learning model of the "Student Team Achievement Division (STAD)" type with the help of Colored Stick Media, the researcher conveyed several suggestions for students, hoping that students would be more focus and concentration, teachers are expected to apply varied and interesting learning models and media, schools provide support to teachers to develop their competencies, future researchers are expected to create more cooperative learning of the "Student Team Achievement Division (STAD)" type in the eyes of other lessons and use different media so that they can solve problems found in class.

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