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The Influence of STAD Learning Model on the Mathematics Learning Outcomes of Elementary School Students

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Abstract

The background of this research is motivated by low learning outcomes, low learning activity show by students and also math subjects are difficult to understand. To overcome these problems, it is necessary to apply Student Teams Achievement Division (STAD) learning model which is the simplest type of cooperative learning. This research purpose is to describe the results of learning mathematics in elementary schools using STAD model. The method that is used in this research is Systematic Literature Review (SLR). The data source that is used in this research is nine scientific journals related to mathematics learning outcomes using STAD model. The results show that the STAD model is very effective for mathematics learning outcomes on elementary school students. In the studies there is an effective influence and significance difference in upper grades (grade IV, V and VI) and lower grades (grade III) in learning outcomes for students who participate in using STAD model with average value of 81.15 and the percentage of completion reaches 95%.

***Keywords**: student teams achievement division, mathematics learning outcomes, elementary students*

INTRODUCTION

Mathematics learning is one subjects that is very important for students, this is because mathematics is a universal science that has an important role in everyday life and the capability in the development of other knowledge (Abidin et al., 2020; Resnick, 2020; Suardiana, 2021). Mathematics curriculum development is emphasized on design, implementation, and evaluation to support the child development in accordance with current development demands to be achieved from the basic abilities of mathematics

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(conceptual understanding, procedural fluency, productive disposition, strategic competence, and adaptive reasoning) which urgently needed to improve the ability to understand the basic concepts of mathematics that can be used to continue their studies to higher level. Furthermore, mathematics is the language of symbols to express qualitative relationships and space that can ease human to think in solving daily live problems (Borba et al., 2022; Murtiyasa & Perwita, 2020; Suardiana, 2021). For this reason, teachers in elementary schools must be able to communicate the subject effectively as well as recognize the characteristics of their students in order to meet the learning objectives in mathematics.

The success of learning can be seen from the changes in behavior and student learning outcomes (Eriyanto et al., 2021; Nugraha & Nugraha, 2020; Puspitarini, 2019; Rafiola et al., 2020). Learning outcomes can be interpreted as the maximum results that have been achieved by a student after experiencing the process of teaching and learning in studying a certain subject matter. Learning outcomes are not absolute in the form of grades only, but it can be in the form of changes, reasoning, discipline, skills and such that can lead to positive changes. Mathematics learning outcomes that are experienced an increase through the application of cooperative learning models type STAD is in accordance with results of research conducted by Suardiana (2021) which shows that the model STAD type cooperative learning is effectively used to improve mathematics learning outcomes for students (Vina & Amelia, 2023). The application of cooperative learning models STAD type is able to increase student mathematics learning outcomes(Dahlia, 2017; Depari et al., 2022; Dwiatmoko, 2019; Putri, 2018). According to (Ningsih et al., 2022) low mathematics learning outcomes not only caused by student's faults but also quality of learning and inappropriate learning strategies. Nowadays there are still many teachers who using conventional learning strategies with communication occurs in one direction only. Learning activities are dominated and tends to be teacher-centered. Teachers tends to dominate in the learning process can cause more students to be passive so they don't find their own skills and needed knowledge or their own attitude. According to (Anastasha et al., 2021) seeing how big the role of mathematics in human life, therefore as teachers at elementary schools/ ibtidaiyah madrasa who teach the fundamental of mathematics feel summoned to increase activities and mathematics

learning outcomes. Especially the reality in the field shows that the results of mathematics learning outcomes are always lower compared to other subjects.

Based on the publication of (Anastasha et al., 2021) in the process of teaching and learning mathematics for class V A SD MIN Punggung Lading is still low. From the observation results it is known that students experience a difficulty in learning mathematics due to lack of media experience and learning tendency that is teacher centered. Data that is obtained from interviews with VA class teachers, where he declared students tend to be passive and silent when learning mathematics. The reasons author raises the problem of a fraction because of how important this material is because as a muslim we are ordered to be fair and honest. Lots of student's class VA MIN Punggung Lading whose mathematics score is still below Minimum Completeness Criteria (KKM). Low learning outcomes in mathematics indicate a lack of teacher success in learning mathematics. Actually, this is not only related with the learning that the teacher does, but there are also other factors that play a role in the success of a lesson. There are several things that become the causes include a lack of understanding of the material lesson, the use of methods not quite precise, the media is less interesting or the teaching and learning process is less varied. The average score of students on Mathematics learning outcomes of 18 students who took the test were only 4 students in the "Very Good" category, 2 students in the "Good" category, 6 students in the "Enough" category, 3 students with the "Less" category, and 3 students with the category "Very less". However, this increase has not reached the criteria of completeness which is expected, because the average only reached 68.06 while the KKM is 70, so it is not in accordance with the target set by school. From this discussion it can be concluded that there is a need changes in learning mathematics. Mathematics learning can be effective and creative if the teacher can strive in determining a model because with the various learning models, the goals the desired learning can be achieved easily. According to (Wahidah, 2019), STAD is considered able to overcome learning problems in class.

Solutions to solve the problem, among the many types of cooperative learning strategy, STAD is one strategy of cooperative learning that emphasizes activity and interaction between students to be able to motivate each other. With implementation STAD type cooperative learning model in mathematics will add a variety of learning models that are interesting, fun and can involve all students in the class to participate

actively and as well can increase the activity and cooperation of students in groups. It is expected through the STAD type cooperative learning model can help make it easier for students to understand concepts and absorb material lesson that is taught so that it can affect student learning outcomes in subjects of mathematics. STAD learning model is a model of cooperative learning applied in the learning process in class. The process learning is to use groups with the number of group members 4-5 heterogeneous students. Regarding other thing in the STAD cooperative learning strategy is mutual help in mastering the subject matter in order to achieve success profusely and explains the advantages of the STAD model, i.e.: 1) Students work together to achieve goals by upholding the groups norms, 2) Active students help and motivate the spirit to succeed together, 3) Active role as peer tutors to further improve group success, 4) Improving individual and group skills, 5) Not competitive (Amelia et al., 2022).

METHODS

Research Method Types

The research method used in this research is a study literature review (SLR) method or a systematic literature review. Systematic Literature Review (SLR) is a term of way identification, evaluation, and interpretation of all available research relevant to the formulation of the problem or the topic area studied (Calderón & Ruiz, 2015). A systematic literature review or often called is a method of literature review that identifies, assesses and interprets all findings on a research topic, to answer predetermined research questions (Kitchenham & Charters, 2007). The Systematic Literature Review (SLR) method aims to identify, review, and evaluate all relevant research so that it answers a research question set (Triadini et al., 2019). Data collection techniques used in this study is as follows: 1) Compile research questions (clear problem formulation), 2) Conduct a search literature systematic review (input keywords into the journal search database to search for research journals), 3) Conduct selection of suitable research publications related to research titles and in accordance with research criteria and themes, 4) The data obtained is then analyzed in depth, especially the results and discussion section and the conclusion section, 5) Researchers and then compare the findings presented in the article and provide conclusions.

Inclusion Criteria

Inclusion criteria that are defined as the key features of the target population that the researcher will be used to answer this research question are presented in Table 1.

Tabel 1. Inclusion Criteria

Solution (X)	Student Teams Achievement Division Learning Model
Problem (Y)	Learning Outcomes
Educational stage	Elementary School
Publication year	2012-2022
Subject	Mathematics
Repository	*Google Scholar, Publish or Perish*

Stages of Systematic Literature Review (SLR)

First stage is literature search or review, in this research uses secondary data: the data is obtained from the results of previous studies. The search for journals reviewed in this study came from journals related to the research theme using the Google Scholar database using the keywords "Learning Outcomes" and "Student Teams Achievement Division" and "Elementary School Mathematics". Second stage is critical review or what can be called critical appraisal is a way to criticize a journal in assessing the validity (truth) and usefulness of an article or scientific journal. In conducting a critical quality review in this study, is used the Critical Appraisal Skills Program Checklist tool with the checklist assessment format adapted to the types of research methods from journals that can and be use, the importance of the journal it is used and the results of the contents of the journal. Third stage is data collection technique used to collect information and review articles/journals that have been published by previous researchers with a predetermined year according to the research topic chosen by the author. Then the authors reviewed the journals and grouped them according to the predetermined inclusion criteria and recorded the things needed to obtain information related to the research topic. After going through these stages, publications that are in accordance with the requirement of this research are obtained, shown in Figure 1.

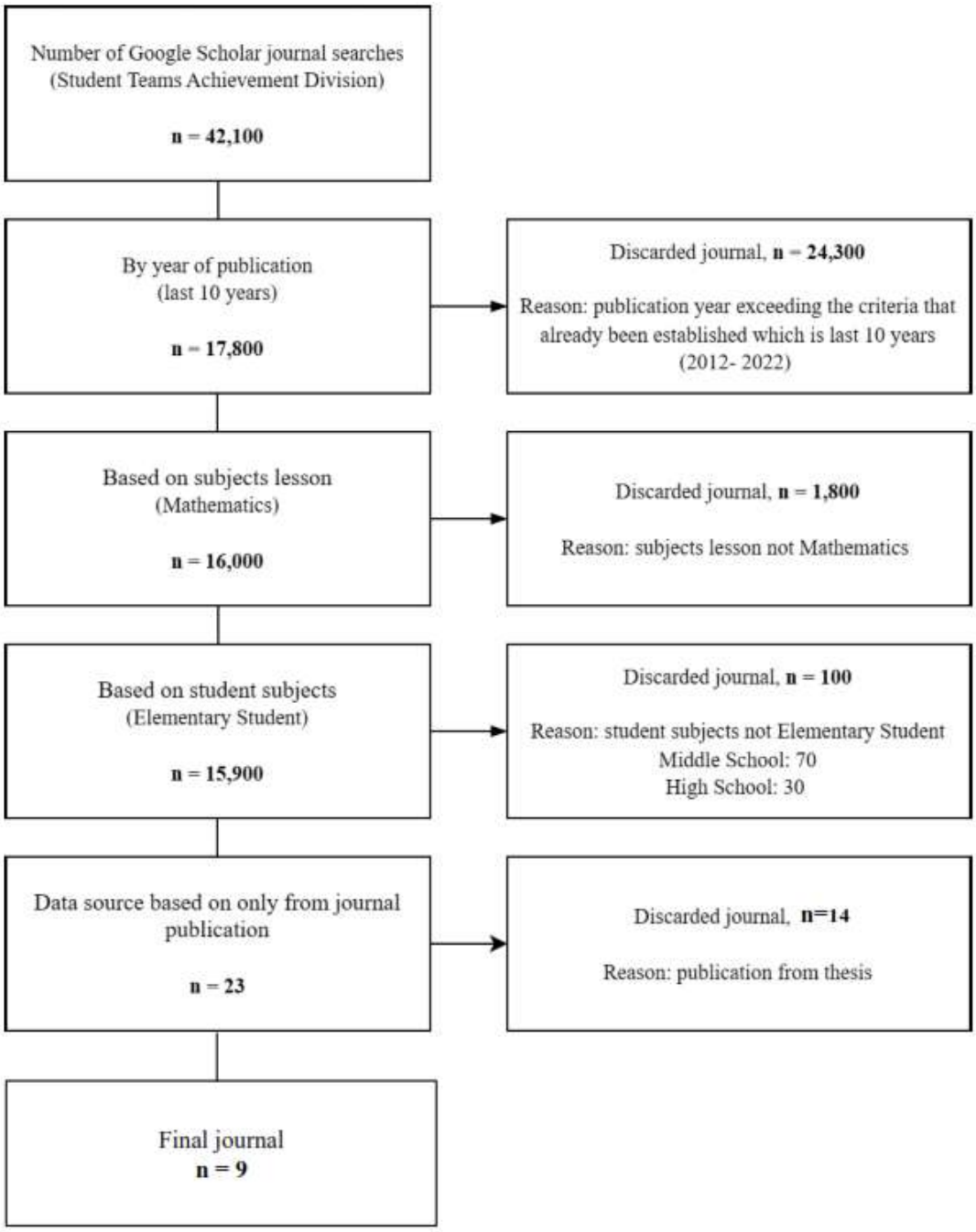

Figure 1. Stages of Systematic Literature Review (SLR)

RESULTS AND DISCUSSION

The literature that has been searched through the Google Scholar database using the keywords that have been determined and has obtained the total number of publication materials are 9 journals that meet all inclusion criteria and by using the type of research in the journals analyzed are Classroom Action Research (PTK) and Experiments as well

the data collected is an overview of "Student Team Achievement Division (STAD) on Mathematics Learning Outcomes of Elementary School Students".

Class Action Research (PTK) Methods

Of the 6 journal articles that used the Classroom Action Research (PTK) method, 3 journals used 2 cycles, 1 journal used pre-cycle and cycle 1, while 2 journals used all cycles (pre-cycle, cycle 1, and cycle 2). The following table shows an increase in the percentage of classical completeness from all of this research, as shown in Table 2:

Table 2. Classroom Action Research (CAR) Results

No	Research & Year	Class	Completeness Percentage			Increase
			Pre-Cycle	Cycle I	Cycle II	
1	Wahidah, 2019	III	51,50%	75,75%	100%	48,75%
2	Suardiana, 2021	IV	62%	68%	74%	6%
3	Suriat, 2022	V	60,47%	73,19%	-	12,72%
4	Anastasha et al., 2021	V	-	68,09%	83,61%	15,52%
5	Anisensia et al., 2020	V	-	60,50%	86%	25,50%
6	Purniwantini, 2022	VI	-	67%	93%	26%
Average Increase						23,09%

Experimental Methods

Based on the analysis of the overall pre-test and post-test, it has student learning outcomes in using the Student Teams Achievement Division (STAD) model to improve elementary school student learning outcomes. Table 3 has shown increasing the pre and post average values of all the experimental methods.

Table 3. Experimental Method Results

No	Research & Year	Class(V)	Average Values		Increase
			Pre	Post	
1	Syamsu et al., 2019	Control	-	-	23,16%
		Experiment	58,17	81,33	
2	Suryana et al., 2021	Control	-	-	14%
		Experiment	63,67	77,67	
3	Rohmani, 2022	Control	-	62,16	5%
		Experiment	-	78,5	
Average Increase					14,05%

Based on the analysis of the differences between Classroom Action Research and Experiments, specifically experimental research is generally carried out once, because in experimental research it is only testing hypotheses. While Classroom Action Research

(PTK) is carried out in several cycles, such as pre-cycle, cycle I and cycle II, because the research ends when the results obtained are maximized or in accordance with the learning completeness has been achieved. Experimental research emphasizes results, because the results of testing the hypothesis obtained are certain to be accepted even if they are nil. Meanwhile Classroom Action Research (PTK) emphasizes the learning process, because as long as the results have not been achieved it is possibility that there is shortage in the carried out process.

Based on the results of a review of 9 study materials, it can be concluded that the use of the Student Team Achievement Division (STAD) learning method is very effective for elementary school students' Mathematics learning outcomes. In the study material the average research subject was elementary school students 8 study is from high class study material (grades IV, V and VI) and 1 study from low class study material (class III), so it can be concluded that the use of the Student Team Achievement Division (STAD) method on the learning outcomes of elementary school students' Mathematics is more dominantly used for high grades. There is an effective and efficient influence from the use of the Student Teams Achievement Division (STAD) learning model on the mathematics learning outcomes of high and low grade elementary school students and there is a significant difference in learning outcomes for students who take part in learning using the Student Teams Achievement Division (STAD) learning model, namely by showing the average learning outcomes of Mathematics is higher from cycle I to cycle II.

Judging from the average learning outcomes in the low class (class III) in the pre-cycle of 68.87, in the first cycle of 75.69 and experienced an increase in the second cycle of 82.33. The percentage of completeness learning outcomes in the pre-cycle was 51.50% then increased in cycle I by 75.75% and experienced an increase in cycle II by 100%. Meanwhile, the application of the Student Teams Achievement Division (STAD) learning model in high grades (grades IV and V) averaged pre-cycle learning outcomes of 61.23 and experienced an increase in cycle I of 70.59. The percentage of complete learning outcomes in the pre-cycle was 30.78% and increased in the first cycle by 92.78%. Meanwhile, the application of the Student Teams Achievement Division (STAD) learning model in high grades (grades V and VI) averaged learning outcomes in cycle I of 66.39 and increased in cycle II of 81.15. The percentage of completeness learning outcomes in the first cycle was 46.08% and increased in the second cycle by 95%. The results of the

comparison of the average application of the Student Teams Achievement Division (STAD) learning model to the mathematics learning outcomes of elementary school students is more effective and efficient in the high class because it is widely used in research and can obtain an average score of 81.15 and a completeness percentage learning outcomes reach 95%. Indicators of learning outcomes in the cognitive, affective and psychomotor domains can also be achieved in the application of the Student Team Achievement Division (STAD) learning model. In the future, research can also be carried out using the SLR method to find out how the STAD learning model influences student mathematics outcomes at a higher level. this is because there are many studies on the effect of the STAD learning model on students' mathematical performance(Eminingsih, 2013; Hakai et al., 2019; Natalia et al., 2019; Solikhati et al., 2009). Furthermore, research using the SLR method can be carried out on other components in mathematics such as attitudes toward mathematics (Hajrah, 2018; Leonard & Supardi, 2010; Rohman et al., 2021), anxiety (Haerudin et al., 2021; Saputra, 2014), problem solving (Kumalasari et al., 2022; Zahara et al., 2022)

CONCLUSION

Based on the results of a review of 9 study materials, it can be concluded that the Student Teams Achievement Division (STAD) model is very effective for mathematics learning outcomes on elementary school students. In the studies there is an effective influence and significance difference in upper grades (grade IV, V and VI) and lower grades (grade III) in learning outcomes for students who participate in using STAD model with average value of 81.15 and the percentage of completion reaches 95%. Researchers provide recommendations in the application of the Student Teams Achievement Division (STAD) learning model in the lower and upper grades of elementary schools, such as the teacher must have careful planning, socialize, use steps in general, divide groups heterogeneously, the teacher always guides, motivates students, giving appreciation to students in teaching and learning activities using the Student Teams Achievement Division (STAD) model so that it can be effective and run well. The recommendations offered by researchers are based on an analysis of 9 journals regarding the learning process using the Student Team Achievement Division (STAD) model which consists of 6 stages. The following are the steps for the Student Teams Achievement Division (STAD) learning model: 1) Delivering goals and motivating students, 2) Presenting and

conveying information, 3) Organizing students into study groups, 4) Guiding the group in the learning process, 5) Evaluation, 6) Giving rewards.

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