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The effect of stad learning model (student teams achievement division) and achievement motivation on learning outcomes of mathematics in class v of sdn inpres dua, likupang timur district, north minahasa regency

Willy Stevanus Rambitan[1], R Palilingan[2], Syuul T Karamoy [3]
[1] Students of Elementary School Teacher Education Study Program, Postgraduate Program, Manado State University, Indonesia
[2] Elementary School Teacher Education Study Program, Postgraduate Program, Manado State University, Indonesia

Abstract
Efforts to improve the quality of mathematics learning in elementary schools require the ability and skills of teachers to take appropriate decisions through the creation of conducive learning conditions using various forms of learning strategies to improve student learning outcomes. This study aims to determine whether groups of students who take the STAD (Student Teams Achievement Division) learning model obtain different learning outcomes compared to groups of students who take classical learning, whether groups of students who have high achievement motivation show different learning outcomes compared to groups of students who have low achievement motivation, and is there an interaction between STAD learning models, classical learning, and achievement motivation levels towards Mathematics learning outcomes. The method used in this study is an experimental method with a 2x2 factorial design. There are two groups of students involved in this study, namely group A (P1) students who take small group learning and group B (P2) students who take classical learning. The procedure begins with the achievement motivation test followed by a pretest then followed by treatment and ends with a posttest. The subjects of the study were fifth grade students of SDN Inpres Likupang Dua, East Likupang District in the second semester of 2019/2020 academic year consisting of 71 students. The data analysis technique used is two-way ANAVA (2x2) to analyze data on learning outcomes by testing the difference in average scores between treatment groups, between high and low achievement motivation, and interactions between STAD learning models, classical learning, and achievement motivation levels towards acquisition of Mathematics learning outcomes. The results showed that the STAD learning model and classical learning had different effects on the learning outcomes of Mathematics. The STAD learning model shows better results because it is proven to improve learning outcomes compared to classical learning. High and low motivation of achievement gives a different effect on the acquisition of mathematics learning outcomes. In addition, there is no interaction between the STAD learning model, classical learning, and achievement motivation towards the acquisition of Mathematics learning outcomes.

Keywords: stad learning model, classical learning, achievement motivation, mathematics learning outcomes

1. Introduction
The development of educational science research suggests that the learning process is not just a passive transfer of knowledge. Student activities are the core of the learning process of the present and the future. Thus the position of the teacher in the learning system more as a facilitator than the instructor. The tendency of the learning paradigm requires creative steps from the teacher as a learning facilitator. The essence of change is oriented towards achieving the learning objectives, namely forming independent learners. Education has a very strategic role in improving the quality of human resources and efforts to achieve the ideals of the Indonesian people, namely to realize public welfare and educate the nation's life. One of the concerns raised by many circles regarding the implementation of the education system in Indonesia is the low quality of output produced by formal educational institutions. Widiastono (1991) [1] argues that the low quality of outputs of educational institutions in Indonesia is caused by external and internal inefficiency problems. Externally the low quality of formal educational institutions is caused by the centralized education system policies, while internally the practice of learning still uses traditional approaches where the teacher is still seen as the only source of knowledge. The symptoms of internal inefficiency as Widiastono meant can also be observed in learning strategies that are dominated by lecture teaching methods, as well as a lack of adequate facilities and learning resources. Such conditions, according to Radikum (1989) [2], cause students not to experience optimal learning experiences.

Indications of the low quality of learning as described by Widiastono and Radikun are very pronounced in learning mathematics in elementary schools. Some common problems encountered in learning mathematics in elementary schools, for example how to develop understanding or understanding of knowledge in students, as well as how to choose and use learning strategies that are suitable with the material to be taught. The research findings show that the main problem of learning mathematics in elementary schools is the occurrence of a clash between the knowledge and learning experiences that students have had before and the conceptual changes that are learned or taught by the teacher. From the description of the problems revealed above, it is seen the importance of alternative solutions to the problem of learning mathematics in elementary schools. The intended alternative is a learning

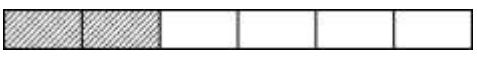
system that can improve understanding, critical thinking skills, and the ability to apply theories and concepts that have been understood to facilitate problem solving.

In order to tackle the problem of learning, experts pay attention to efforts to improve the learning process in order to improve student learning outcomes. One of the efforts made is to identify and manipulate learning variables that can increase the effectiveness of learning. The STAD (Student Teams Achievement Division) learning model is one of the learning strategies to make students active in learning (Good, Grouws, Mason, Slavings and Cramer, 1990) [3] with all student activities completing tests or exercises, teachers will more easily know where and when giving explanations that can lead students to find ways of solving problems correctly.

Operationally, this study examines the effect of the STAD learning model and learning conditions on mathematics learning outcomes. The learning model in this study refers to the delivery strategy and management strategy based on STAD group learning and classical learning. Learning outcomes in the form of learning or performance gains that can be shown by students in solving math problems. Achievement motivation is the desire or tendency of someone to do something as fast and as possible (Keller, Kelly & Dodge, 1978) [4]. The STAD learning model is hypothesized to have a positive influence on the learning process because the control for learning rests with students.

Students who have high achievement motivation will be more active in learning and not easily give up despite facing difficulties in solving problems. This is in accordance with the type of content in the field of mathematics studies that require perseverance from students to train themselves in solving problems using appropriate procedures. Referring to the background of the problem and the research findings of the experts, this study intends to examine the interactive influence between the STAD learning model and classical learning by involving achievement motivation as a moderating variable on student learning outcomes in mathematics, especially on the subject of fractions in elementary school.

Fraction as one of the subjects in elementary school mathematics lessons. The concepts and skills included are very strategic for appreciation and provide meaningful mathematics learning experiences for students. Fractions have been known and familiar to students since childhood, for example a cake divided in half, divided in three, and so on. The fact on the ground shows that fraction learning is still a concern, students often have difficulty in understanding and solving fraction problems. At the level of basic education there are still problems of understanding from students of several mathematical concepts related to fractions, geometry, and story problems (Soedjadi, 1999/2000) [5], as seen in the answers from students in solving the following questions:



(1)

A piece of paper divided by 6 parts of equal size, 2 of which are shaded, and 4 are not shaded, question: show what fractions are shaded?

Student answers are: $\frac{2}{4}$

(2) $\frac{1}{2}+\frac{3}{4}=\frac{4}{6}$

The average ability of elementary school students in mastering fraction counting operations is unsatisfactory. In general, the mistakes of students in understanding fraction counting operations are because they do not master the basic arithmetic operations on fractions. The purpose of this study was to analyze whether the group of students in the fifth grade SDN Inpres Likupang Two who followed the STAD learning model obtained different learning outcomes compared to the group of students who took classical learning, analyzing whether the group of students in the fifth grade SDN Inpres Likupang Two which has high achievement motivation shows different learning outcomes compared to groups of students who have low achievement motivation, and analyzes whether there is an interaction between STAD learning models, classical learning, and the level of achievement motivation towards mathematics learning outcomes in grade V SDN Inpres Likupang Two.

2. Research Methods

The method used in this study is an experimental method with a 2x2 factorial design. There are two groups of students involved in this study, namely group A (P1) students who take small group learning and group B (P2) students who take classical learning. The procedure begins with the achievement motivation test followed by a pretest then followed by treatment and ends with a posttest. The subjects of the study were fifth grade students of SDN Inpres Likupang Dua, East Likupang District in the second semester of 2019/2020 academic year consisting of 71 students. The data analysis technique used is two-way ANAVA (2x2).

3. Result and Discussion

A. Data Description

Table 1: Statistics Work Table (2x2)

		P	
		P1	P2
MB	MBT	Y	Y
	MBR	Y	Y

Information

P = Type of treatment manipulated (group learning and classical learning)

P1 = group learning (STAD)

P2 = classical learning

MB = Level of achievement motivation

MBT = group of subjects who have high achievement motivation

MBR = group of subjects who have low achievement motivation

Y = Learning Achievement which is the correct answer to the learning acquisition test

Level of achievement motivation in each class, divided into two groups, namely the level of high and low achievement motivation. A description of the subjects involved in statistical analysis can be seen in table 2.

Table 2: Subject Data Tables Involved in Statistical Analysis

Data Tabulation	Subject Group	
	P1	P2
MBT	17	17
MBR	19	18

Therefore, to find out the normality of distribution of groups of subjects can be seen in table 3.

Table 3: Normality Test Results from the Distribution of Subject Groups

Subject Group	Chi square (χ^2count)	Chi square (χ^2table)	Significance	Conclusion
A	3.11	9.49	P > 0.05	Normal
B	8.58	9.49	P > 0.05	Normal
A (MBT)	4.55	9.49	P > 0.55	Normal
B (MBT)	4.79	9.49	P > 0.05	Normal
A (MBR)	4.29	9.49	P > 0.55	Normal
B (MBR)	3.75	9.49	P > 0.05	Normal

Information
MBT = High achievement motivation level
MBR = Low achievement motivation level

Table 3 shows that A (P1) $\chi 2$ count = 3.11 < 9.49 at the significance level $\alpha = 0.05$. Thus, the group A (P1) pre-test IPA scores were normally distributed. For group B (P2) obtained $\chi 2$ count = 8.58 < 9.49 at the significance level a = 0.05. Thus, the pre-test score of mathematics on fraction group B (P1) shows a normal distribution. Referring to the results of the analysis, it can be said that the mathematics pretest scores of the two groups of subjects were normally distributed.Furthermore, the results of the variance homogeneity test in table 4 show that $\chi 2$ count = 1.13 <3.14 at the significance level $\alpha = 0.05$. Thus it can be said that the mathematical pretest variance of the experimental group and the homogeneous control group. A complete picture of the variance homogeneity referred to can be seen in table 4.

Table 4: Results of Variant Homogeneity Tests

Variant	F Count	F Table	Significance	Conclusion
Between groups of A/B	1.13	3.14	P < 0.05	Homogeneous
Between levels of achievement motivation in each group				
A: MB/MB	1.04	3.28	P < 0.05	Homogeneous
B: MB/MB	2.46	3.28	P < 0.05	Homogeneous

Information
Variants of subject groups are called homogeneous if there is no basis to reject the null hypothesis. In other words if Fcount <Ftable, then there is no basis for rejecting the null hypothesis.

Based on the results of normality testing and homogeneity tests coupled with the fulfillment of other assumptions, such as randomization of subject groups and the use of interval scale data, the criteria for using parametric test kits as statistical analysis are sufficient. In other words, the decision for the parametric test device is maintained. Thus, the statistical hypothesis (H0) in this study can be tested using the two-way ANAVA technique (Ferguson, 1989)[6].

B. Hypothesis Testing

The research hypotheses tested in this study consisted of three hypotheses as follows:

First hypothesis

H_0: The group of students who take group learning (STAD) and classical learning do not obtain different mathematical learning outcomes.

H_1: Groups of students who take group learning (STAD) and classical learning get different mathematics learning outcomes.

Second Hypothesis

H_0: Students who have high and low achievement motivation do not get different mathematics learning outcomes.

H_1: Students who have high and low achievement motivation get different mathematics learning outcomes.

Third Hypothesis

H_0: There is no interaction between group learning (STAD) and classical group learning with achievement motivation levels towards the acquisition of mathematics learning outcomes.

H_1: There is an interaction between group learning (STAD) and classical learning with the level of achievement motivation in obtaining mathematics learning outcomes Before testing hypotheses, a different Mathematics pretest test is conducted between groups of students who take group learning (STAD) (P1) and classical learning (P2) using two-way analysis of variance. Pretest difference test between groups of students who participated in group learning (STAD) (P1) and classical learning (P2) is shown in table 5.

Table 5: Results of ANAVA Calculation Pre-Test for Experiment Groups (P1) and Control Groups (P2)

Variant Resources	JK	db	RJK	Fh	Status
Between P	1.5303	1	1.5303	0.366	P > 0.05
Between M	1.2119	1	1.2119	0.288	P > 0.05
Between P.M	10.2049	1	0.2049	0.050	P > 0.05
Error	280.376	67	4.1847	-	-
Total	283.3239	70	-	-	-

From table 5 it can be seen that the price F ratio = 0.050 with p > 0.05. Thus it can be said that the statistical hypothesis (H_0) between cells (P), between cells (M) and interactions between cells (PM) is accepted. Because H_0 is accepted, there is no difference in the initial ability of students towards the field of study that is tried. Referring to the results of such different tests, the type of ANAVA statistics is appropriate for use in hypothesis testing.

The hypothesis of this study will be tested with a two-way variant analysis (ANAVA) technique. ANAVA decisions are presented in table 6 covering the number of subjects per group (N), the total number of data (ΣX), the number of quadratic data (ΣX^2), and the mean value of the group (X). The mean value of each treatment group was analyzed to determine whether statistically the group's mean value was significantly different or not. These statistical values are used as a basis for statistical decisions to test the null hypothesis.

If the statistical hypotheses (H_0) are rejected at the 0.05 significance level, there is a significant difference (Fcount> F table). In other words, the variable being manipulated gives a significantly different effect on the dependent variable. Conversely, if hypotheses (H_0) are accepted at a significance level of 0.05, it can be said that the variable being manipulated (as a cause) does not significantly influence the dependent variable (as a result). Statistical factorial ANAVA (2x2) data on learning outcomes in this study can be seen in table 6.

Table 6: Two-way ANAVA Statistics for Learning Acquisition Data

Level of Achievement Motivation	Statistic	Treatment group		Number of Rows
		P1	P2	
High (MBT)	N	17	17	34
	ΣX	567	460	1027
	ΣX^2	19183	12628	31811
	X	33.3529	27.0588	30.2059
Low (MBR)	N	19	18	37
	ΣX	544	431	975
	ΣX^2	15848	10917	26765
	X	26.6316	23.9444	26.3516
Number of Columns	N	36	35	71
	ΣX	1111	891	2002
	ΣX^2	35031	23545	58576
	X	30.8611	25.4571	-

A summary of the results of the analysis of variance as an answer to the hypotheses above, can be seen in table 7. In table 7 the differences between treatments, between high and low levels of achievement motivation, and whether there is interaction between treatment and achievement motivation levels towards results learn math.

Table 7: Summary of ANAVA Learning Outcomes

Variant Resources	JK	db	RJK	F_{ratio}	Status
Between P	518.2482	1	518.2482	26.26	P < 0.05
Between M	263.2482	1	263.2482	13.34	P < 0.05
Between P.M	21.5540	1	21.5540	1.093	P > 0.05
Error	1322.1890	67	19.7342	-	-
Total	2125.2394	70	-	-	-

On the basis of the results of the analysis of variance in table 7 above and based on the hypothesis acceptance criteria, i.e. if Fcount > Ftable for P < 0.05, the first statistical hypothesis (H_0) is rejected. The analysis showed that the observation value of F for testing the first hypothesis was 26.26 which means it was greater than the value of criticism F of 3.99 for P < 0.05 and 7.04 for P < 0.01. Thus it can be said that the two independent variables that are manipulated have different effects on the dependent variable. In this case, groups of students who take group learning (STAD) get different learning outcomes than groups of students who take classical learning. In other words, group learning (STAD) and classical learning have significantly different effects on Mathematics learning outcomes.

Based on the results of the analysis of variance it was also found that the second statistical hypothesis (H_0) was rejected. In this case, the observation value of F is obtained at 13.34 which means it is greater than the critical value of F of 3.99 for P <0.05 and 7.04 for P <0.01. On this basis, it can be said that high or low levels of student achievement motivation can have a significantly different effect on mathematics learning outcomes. In other words, groups of students who have high achievement motivation get different learning outcomes compared to groups of students who have low achievement motivation.

Furthermore, based on the results of the analysis of variance it was found that the third hypothesis (H_0) was accepted. The results of the third hypothesis testing (H_0) indicate that the observation value of F was obtained at 1.09, which means it was smaller than the critical value of F of 3.99 at a significance level of 0.05. On this basis, it can be said that the null hypothesis is accepted, which means there is no interaction between group learning (STAD) and classical learning with achievement motivation towards the

acquisition of mathematics learning outcomes. In other words, group learning (STAD) and classical learning have different effects on the acquisition of mathematics learning outcomes, apart from the high and low motivation of student achievement. Conversely, the level of achievement motivation gives a different effect on the acquisition of mathematics learning outcomes independent of manipulated independent variables (group and classical learning).

4. Discussion

A. Excellence Group Learning (STAD) to Increase Mathematics Learning Outcomes Compared to Classical Learning

In group learning (STAD) students will be more active in learning because each group only consists of 3-4 students so that the opportunity to express opinions and ask what is not yet known has greater opportunities (Sharan, 1980)[7]. In this case, because in group learning (STAD) consists of only 3-4 students, then in learning there is no opportunity for students to not be active in thinking about the learning problems they face.

Based on the description above, theoretically it can be said that group learning (STAD) and classical learning have different effects on student learning outcomes, because group learning (STAD) is more effective in encouraging students to be more active in learning. While classical learning can provide opportunities for students to only record what is on the blackboard. Furthermore, in group learning (STAD) students have the opportunity to compete in groups, in addition to competing individually. Whereas in classical learning, students can only compete individually.

B. High and Low Achievement Motivation Gives a Different Effect on Acquisition of Mathematics Learning Outcomes

The results of this study indicate that groups of students who have high achievement motivation get different learning outcomes compared to groups of students who have low achievement motivation. The results of this study have also been predicted beforehand. This can be predicted because high levels of achievement motivation have the potential to influence student learning outcomes. Thus students who have achievement motivation are more likely to achieve higher achievements compared to students who have low achievement motivation.

C. There Is No Interaction between Group Learning (STAD), Classical Learning and Achievement Motivation Levels for Learning Acquisition

The results of testing the hypothesis in this study indicate that there is no interaction between group learning (STAD), classical learning, and achievement motivation towards Mathematics learning outcomes. The results showed that group learning (STAD) and classical learning had different effects on the acquisition of loose learning outcomes and the level of student achievement motivation. Conversely, high achievement motivation gives a different effect on learning outcomes compared to low achievement motivation, apart from group learning strategies (STAD) and classical learning.

There is no interaction between group learning (STAD), classical learning, and achievement motivation towards learning outcomes. Most likely due to the uncontrolled certain variables such as learning processes within students (intervening variables). Thus, it is suspected that the effect of achievement motivation on learning outcomes is not caused by group learning (STAD) and classical learning.

5. Conclusion

1. Group learning (STAD) and classical learning can have different effects on the acquisition of mathematics learning outcomes. In other words, groups of students who take group learning (STAD) get different mathematics learning outcomes compared to groups of subjects who take classical learning. Thus, group learning (STAD) shows better results because it is proven to improve learning outcomes, compared to classical learning.
2. High or low student achievement motivation gives a different effect on the acquisition of mathematics learning outcomes. In other words, groups of subjects who have high achievement motivation get better mathematics learning outcomes compared to groups of subjects who have low achievement motivation.
3. There is no interaction between group learning (STAD) and classical learning with achievement motivation towards the acquisition of mathematics learning outcomes. In other words, group learning (STAD) and classical learning have different effects on the acquisition of mathematics learning outcomes apart from high or low achievement motivation. Conversely, the level of achievement motivation of students gives a different effect on the acquisition of mathematics learning outcomes apart from learning strategies (group and classical learning).

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