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Research Article

The Effect of the *Make A Match* Cooperative Model Assisted by *Matching Cards* on the Mathematics Learning Outcomes of Fourth Grade Elementary School Students

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ABSTRACT

The problem in this study is the low mathematics learning outcomes of fourth grade students at SD Negeri 2 Panjang Utara. This study aims to determine the effect of the *Make a Match* cooperative learning model assisted by *matching cards* on mathematics learning outcomes, as well as the difference between this model and the STAD cooperative model. The method used was *quasi-experimental* with a quantitative approach and *saturated sampling* technique involving 61 students. Data were collected through observation, interviews, documentation, and tests, and analyzed using simple linear regression. The results showed that the *Make a Match* model assisted by matching cards had an effect on mathematics learning outcomes. The STAD model also had an effect on mathematics learning outcomes. In addition, there were differences between the two learning models. Thus, the *Make a Match* model assisted by *matching cards* was more effective in improving mathematics learning outcomes than the STAD model.

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INTRODUCTION

Learning can be defined as an effort to influence a person's emotions, cognition, and spirituality so that they want to learn in line with their own desires. Learning is an activity that aims to help individuals or groups acquire knowledge, skills, and attitudes by using various objects in the environment (Paling et al., 2023). One of the subjects developed for teaching and learning activities to achieve learning objectives is mathematics.

Mathematics is one of the fields that improves students' skills. Mathematics is taught to students because it is believed to improve logical reasoning and accuracy in problem-solving. The two main objectives of mathematics learning in elementary school are to prepare students to use and apply mathematics correctly. The second objective is to teach students the reasoning process in mathematics (Ananda & Wandini, 2022).

Learning is required to be innovative and creative in choosing learning media and models. One problem in our education system is that students do not understand what is taught in school and have difficulty following lessons. The lack of educators' flexibility in using various learning models is a contributing factor. A learning model is a type of learning explicitly delivered by educators and that includes a broad, comprehensive approach. Learning models have a syntax that describes the main steps of learning, which are usually followed by a series of learning activities (Paling et al., 2023).

Based on preliminary research conducted by researchers at SD Negeri 2 Panjang Utara on November 4, 2024, several problems were identified during the learning process. For some students, understanding the material provided by the educator was difficult, resulting in learning outcomes that did not meet the 65 learning achievement criteria. The following is the percentage of summative scores for fourth-grade students at SD Negeri 2 Panjang Utara:

Table1. Percentage of Student Learning Outcomes Teach Grade IV

Grades	IVA	%	IVB	%
≥65 (Achieved)	2	6.5	25	80.6
<65 (Not achieved)	29	93.5	6	19.4
Total	**30**	**100**	**31**	**100**

Source: Homeroom Teachers of Class IV A and IV B, SDN 2 Panjang Utara

Table 1 above shows that most fourth-grade students at SDN 2 Panjang Utara have not met the Criteria for Achieving Learning Objectives. 93.5% of fourth-grade students in class IVA have not achieved the Criteria for Achieving Learning Objectives, and 19.4% of fourth-grade students in class IV B have not achieved the Criteria for Achieving Learning Objectives. According to the results, the students' scores are still below the Criteria for Achieving Learning Objectives. Information collected by the researcher from homeroom teachers during the learning process at SD Negeri 2 Panjang Utara shows that the learning models and media used by educators are not very varied. During the interview process, educators indicated that they have not used the cooperative learning model "make a match" and matching cards as learning aids for mathematics in the classroom.

One of the learning models that engages students, based on preliminary research at SD Negeri 2 Panjang Utara, is the Make a Match Cooperative Learning Model. Make-a-match is an attractive cooperative learning model that can improve students' understanding of concepts. This model allows students to understand lessons or material delivered through games and to find fun matches that help their understanding stick and not get lost (Lina, 2024).

Based on the above statement, it is hoped that the cooperative learning model of the make-a-match type, assisted by matching cards, will improve elementary school students' learning outcomes, especially in mathematics. Therefore, the researcher wants to investigate "The Effect of the Make a

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Match Cooperative Learning Model Assisted by Matching Cards on the Mathematics Learning Outcomes of Fourth Grade Students at State Elementary School 2 Panjang Utara."

METHOD

Type and Design of Research

This study uses *a quasi-experimental* design with *a nonequivalent control group design*. In this design, there are two groups, each receiving different treatments. This design uses two groups, namely the experimental group and the control group. The experimental group is the class that receives treatment in the form of applying the *Make a Match* cooperative learning type assisted by *matching cards,* while the control group is the control class, which receives treatment in the form of applying the STAD cooperative learning type.

Population and Sample

The population and sample consisted of 61 people, 30 people in class IV A and 31 people in class IV B. The sampling technique used *nonprobability sampling*, which is a sampling technique that does not provide equal opportunities for each element or member of the population to be selected as a sample. The type of sample used in this study was a saturated sample. According to Sugiyono (2019), a saturated sample is a sampling technique where the entire population becomes the sample.

Data Collection Techniques

Data collection techniques are methods used by researchers in their studies. The data collection techniques used in this study were tests consisting of 15 multiple-choice questions and non-tests in the form of observation and documentation.

Research Instrument Testing

Instrument Trial

The researcher conducted a test instrument trial at SD Negeri 2 Panjang Utara in class V C with 25 students. The researcher used 25 questions to determine the validity or invalidity of the instrument.

Instrument Prerequisite Test

a. Validity Test

The instrument trial was conducted at SD Negeri 2 Panjang Utara on April 26, 2025, with 25 students participating. Of the 25 questions, 15 were declared valid and 10 were declared invalid, so that 15 questions could be used in the study

b. Reliability Test

The results of the Cronbach's alpha formula (r11) were consulted with the r product moment table value, significant or α of 5%, resulting in a table r of 0.396. The reliability test results showed that the correlation coefficient r11 was 0.81782, while the r table was 0.396. r11 > r table, with the interpretation that the instrument test was reliable and could be used.

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RESULT AND DISCUSSION

Research Results

This study used two research samples consisting of an experimental class using a cooperative model of the *make a match* type assisted by *matching cards* and a control class using a cooperative model of the STAD type. The learning was conducted in 3 meetings in the experimental class and control class.

Data Analysis Techniques

a. Data Observation of Student Activities

Observations were conducted in the experimental and control classes, which implemented the *make a match* cooperative model assisted by *matching cards* and the STAD cooperative model for three meetings. The results of the recapitulation of student activities can be presented as follows.

Table 2. Recapitulation of Learning Activities Students Cooperative Model Type *Make a match* assisted by *Matching Card*

Success Rate	Description	Frequency	%
≥ 80	Very Active	19	63.3
60 ≤ 79	Active	9	30.00
50 ≤ 59	Fair	2	6.67
< 50	Insufficient	-	0
Total		30	100

Source: 2025 research results

Table 3. Recapitulation of Learning Activities Students Cooperative Model Type STAD

Success Rate	Description	Frequency	%
≥ 80	Very Active	21	67.74
60 ≤ 79	Active	7	22.58
50 ≤ 59	Fair	3	9.67
< 50	Insufficient	-	0
Total		31	100

Source: 2025 research results

b. Data on Learning Outcomes for the Experimental Class and Control Class

Student learning outcomes were obtained from the *pretest* and posttest results of the experimental class and the control class's pretest and posttest results. The following are the pretest and posttest data results.

Table 4. Learning Outcomes of the Experimental Class

Type of Test	*Pretest* Score	Posttest Score
Highest Score	87	100
Lowest Score	13	57
Total score	1208	2266
Average score	40.27	75.53

Source: Research results 2025

Table 5. Learning Outcomes of the Control Class

Type of Test	*Pre-test* Score	Posttest Score
Highest Score	73	93
Lowest score	20	47
Total score	1492	2112

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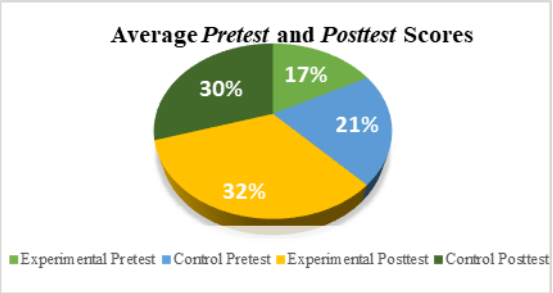
Average score	48.13	68.13

Source: 2025 research results

From Tables 4 and 5 above, a graph can be presented to provide a broader picture of the pretest and posttest learning outcomes of the experimental and control classes, as shown in the following figure.



Based on the comparison of the average increase in pretest and posttest scores in the experimental and control classes, it can be concluded that the application of the *make a match* cooperative model assisted by *matching cards* can improve the learning outcomes of fourth-grade students at SD Negeri 2 Panjang Utara.

c. Classification of *N-Gain Pre-test Post-test* Scores

Based on the N-Gain calculation results from the experimental class and the control class, the results are as shown in Table 6 below.

Table 6. Classification of N-Gain Values

Test Score	Experimental Class	Control Class
Pretest Average	40.27	48.13
Posttest average	75.53	68.13
N-Gain Score	0.60	0.37

Source: 2025 research results

Based on these results, it can be concluded that the increase in student learning outcomes in mathematics in the experimental class using the *make a match* cooperative model assisted by *matching cards* was higher than in the control class using the STAD cooperative model.

3.1.2 Research Hypothesis Test

a. Simple Linear Regression Test Model Assisted *matching* cooperative *Matching card*

This simple linear regression test was conducted to examine whether there was an effect of applying *the assisted matching card* cooperative *learning* model on the mathematics learning outcomes of fourth-grade students at SD Negeri 2 Panjang Utara. This hypothesis was tested using simple linear regression analysis with the help of SPSS version 25, where if the sig value was < 0.05, Ha was accepted, meaning that there was a significant effect, but if the sig value was > 0.05, Ho was rejected, meaning that there was no significant effect. The results of the simple linear regression test can be seen in Table 7 below.

Table 7. Results of Simple Linear Regression Test Calculations Cooperative model type Make a match assisted by Matching cards

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2407.471	1	2407.471	31,007	.000[b]

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Residual	2,173,996	28	77,643
Total	4,581,467	29	

a. Dependent Variable: Posttest Experiment

b. Predictors: (Constant), Activity

Source: Research results 2025

Based on Table 7 above, it can be seen that Fcount > nd Ftable 31.007 > 4.17, with a significance of 0.000, which means 0.000 < 0.05 Ha is accepted, so it can be concluded that there is an effect of *the make a match* cooperative model type assisted by *matching cards* (X) on the mathematics learning outcomes of fourth-grade elementary school students (Y). To determine the extent of the influence of the cooperative model variable type *make a match* assisted by *matching cards* (X) on the mathematics learning outcomes of fourth-grade elementary school students (Y), see Table 8 below.

Table 8. *R Square Results* Cooperative Model Type *Make a Match* Assisted by *Matching Cards*

Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.725[a]	.525	.509	8.812

a. Predictors: (Constant), *make a match-matching card*

Source: Research results 2025

Based on Table 8 above, the coefficient of determination (R Square) is 0.525, which means that the influence of the *make a match* cooperative model assisted by *matching cards* (X) on the mathematics learning outcomes of fourth-grade elementary school students (Y) is 52%. Therefore, it can be concluded that the *make a match* cooperative model assisted by *matching cards* affects student learning outcomes by 52%, while 48% is influenced by other factors.

Table 9. T-calculated *results* Cooperative Model Type *Make a Match* Assisted by *Matching Cards*

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	9.434	11.979		.788	.438
	Activity	.822	.148	.725	5,568	.000

a. Dependent Variable: Posttest Experiment

Source: 2025 research results

From the table above, we know that the Constant (a) value is 9.434, while the value of the *make a match* cooperative type assisted by *matching cards* (b / regression coefficient) is 0.822, so that the regression equation is written as:

$\hat{Y} = a + bX$

$\hat{Y} = 9.434 + 0.822\ X$

Simple Linear Regression Test for the STAD Cooperative Model STAD type

This simple linear regression test was conducted to examine whether there was an effect of applying the STAD cooperative model on the mathematics learning outcomes of fourth-grade students at SD Negeri 2 Panjang Utara. This hypothesis was tested using simple linear regression analysis with the help of SPSS version 25, where if the sig value was < 0.05, Ha was accepted, meaning that there was a significant effect, but if the sig value was > 0.05, Ho was rejected, meaning that there was no significant effect. The results of the simple linear regression test can be seen in Table 10 below.

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Table 10. Results of Simple Linear Regression Test Calculations STAD Cooperative Model

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	997.107	1	997.107	11.060	.002[b]
Residual	2,614.377	29	90,151		
Total	3,611,484	30			

a. Dependent Variable: Posttest Control

b. Predictors: (Constant), Activity

Based on Table 10 above, it can be seen that $F_{count} >$ F_{table} 11.060 > 4.16, with a significance of 0.002, which means 0.002 < 0.05 Ha is accepted, so it can be concluded that there is an effect of the STAD cooperative model variable (X) on the mathematics learning outcomes of fourth-grade elementary school students (Y). To determine the extent of the effect of the STAD cooperative model variable (X) on the mathematics learning outcomes of fourth-grade elementary school students (Y), see Table 11 below.

Table 11. R Square Results Cooperative Model Type STAD

Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.525[a]	.276	.251	9.495

a. Predictors: (Constant), STAD

Source: Research results 2025

Based on Table 11 above, it can be seen that the coefficient of determination (R Square) is 0.276, which means that the influence of the STAD cooperative model variable (X) on the mathematics learning outcomes of fourth-grade elementary school students (Y) is 27%. Therefore, it can be concluded that the STAD cooperative model affects student learning outcomes by 28%, while 72% is influenced by other factors.

Table 12. Calculated t-value s of the STAD Cooperative Model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	20.459	14.435		1.417	.167
	Activity	.569	.171	.525	3,326	.002

a. Dependent Variable: Posttest Control

Source: Research results 2025

From the table above, we know that the constant (a) value is 20.459, while the STAD cooperative value (b / regression coefficient) is 0.569, so the regression equation is written as:

$\hat{Y} = a + bX$

$\hat{Y} = 20.459 + 0.569\ X$

t-test (Independent Sample t-Test)

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The t-test is a statistical analysis method used to test whether there is a significant difference between the *make a match* cooperative model using *matching cards* and the STAD cooperative model. In this study, the t-test was conducted using the SPSS 25 program. From the results calculated using the SPSS program, if the t-test results based on Sig. (2-tailed) < 0.05, then Ha is accepted and Ho is rejected. The t-test results can be seen in Table 16 as follows

Table 16. Results of the *Independent Sample t-Test*

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error of the Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mathematics Learning Outcomes	Equal variances assumed	.904	.346	2.453	59	.017	7,404.30	3,017.99	1,365.32	13.44328
	Equal variances not assumed			2.448	57.379	.017	7.40430	3.02479	1,348.12	13.46048

Source: Research results 2025

Based on Table 16 above, it can be seen that the sig. (2-tailed) Equal value is 0.017 < 0.05, which means that there is a significant difference in mathematics learning outcomes between students who use the Make a match cooperative learning model assisted by Matching cards and students who use the STAD cooperative learning model.

Discussion

The Effect of the Cooperative Learning Model The *Make a Match* type assisted by Matching Cards Card on Mathematics Learning Outcomes

The success of this learning model is supported by statistical test results that show the effect of using the *make a match* cooperative model assisted by *matching cards* on the mathematics learning outcomes of fourth-grade students at SD Negeri 2 Panjang Utara. This is evidenced by the calculation results showing that F_{count} >, F_{table} 31.007 > 4.17 with a significance level of 0.000. Because the significance value of 0.000 is < 0.05, Ha is accepted. Thus, it can be concluded that the use of *the make a match* cooperative model assisted by *matching cards* (X) has an effect on the mathematics learning outcomes of fourth-grade students (Y). This means that. The use of the *make a match* cooperative model assisted by *matching cards* has a positive impact on improving student learning outcomes.

The Effect of the Cooperative Learning Model STAD Type

The success of this learning model is also supported by statistical test results that show the effect of using the STAD cooperative model on the mathematics learning outcomes of fourth-grade

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students at SD Negeri 2 Panjang Utara. This is evidenced by the calculation results showing that F_{count} >, F_{table} 11.060 and gt; 4.16 with a significance level of 0.000. Since the significance value of 0.002 < 0.05, Ha is accepted. Thus, it can be concluded that the use of the STAD cooperative learning model has an effect on the mathematics learning outcomes of fourth-grade students at SD Negeri 2 Panjang Utara. This means that the use of the STAD cooperative model has a positive impact on improving student learning outcomes.

Differences in Mathematics Learning Outcomes between the *Make a Match* and STAD Models

This study used two groups of classes, an experimental group and a control group with different treatments. The experimental group applied a cooperative model of the *make a match* type using *matching cards*, while the control class applied a cooperative model of the STAD type.

The results of the comparative analysis show that there is a difference between the learning outcomes of students who use the *make a match* model assisted by *matching cards* and students who use the STAD model. This is evidenced by the calculation results which show that the sig. value (2-tailed) is 0.017 < 0.05, so Ha is accepted. Thus, it can be concluded that there is a difference between the learning outcomes of students who use the *make a match* model assisted by *matching cards* and students who use the STAD model. Thus, it can be concluded that both learning models have a positive effect on mathematics learning outcomes, but the make a match model assisted by matching cards shows a greater effect than the STAD model.

CONCLUSION

Based on the results of the research, analysis, and discussion, the following conclusions can be drawn.

1. There is an effect on the application of the *Make a Match* cooperative learning model assisted by *matching cards* on the mathematics learning outcomes of fourth-grade students at SD Negeri 2 Panjang Utara. This is evidenced by the average *pretest* score of the experimental class of 40.27% and the average *posttest* score of 75.53%. With the results of the hypothesis test using simple linear regression, which showed Fcount > , and Ftable 31.007 > 4.17, Ha was accepted.
2. There is an effect on the application of the STAD cooperative learning model on the mathematics learning outcomes of fourth-grade students at SD Negeri 2 Panjang Utara. This is evidenced by the control class average on *the pretest* of 48.13% while the *posttest* average was 68.13%. Based on the results of the hypothesis test using simple linear regression, which showed that Fcount > , Ftable 11.060 > 4.16, Ha was accepted.
3. There was a difference in mathematics learning outcomes between students who used the Make a Match cooperative learning model with matching cards and students who used the STAD cooperative learning model. This was evidenced by a sig. (2-tailed) value of 0.017 > 0.05, so Ha was accepted..

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