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The Effect of the "Course Review Horay" Cooperative Learning Model on the Mathematical Understanding of Fourth-Grade Students at Demakijo 1 Public Elementary School

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Abstract
Mathematics learning in elementary schools often emphasizes procedural memorization rather than conceptual understanding, leading to students' difficulties in grasping fundamental mathematical concepts such as multiplication and division. This condition highlights the need for innovative learning models that actively engage students and foster deeper understanding. This research aims to analyze the effect of the *Course Review Horay* cooperative learning model on the mathematical understanding of fourth-grade students at SD Negeri Demakijo 1 in multiplication and division material. This study uses a quantitative approach with a quasi-experimental design of a nonequivalent control group design. The research sample consisted of one experimental class treated with the *Course Review Horay* model and one control class using the Student Team Achievement Division (STAD) model, selected using a total sampling technique. Data were collected through a mathematical understanding test in the form of a pretest and posttest, then analyzed using a t-test after fulfilling the prerequisite tests for analysis. The results showed that the *Course Review Horay* model had a significant effect on students' mathematical understanding, with a significance value of 0.006 (< 0.05). This model is effective in improving students' abilities to explain concepts, connect mathematical ideas, and solve mathematical problems. The *Course Review Horay* cooperative learning model is effective in enhancing elementary school students' mathematical understanding. This model can serve as an alternative learning strategy to improve the quality of mathematics instruction, particularly in multiplication and division topics.

INTRODUCTION

Basic education plays an important role in developing students' thinking skills, especially in mastering mathematical concepts as a foundation for learning more complex material at higher levels (Agbata et al., 2024; Jannah et al., 2025; Kristesia et al., 2025; Nanda & Rani, 2025). Education functions not only as a process of knowledge transfer but also as a means of optimally developing individual potential (Humiati & Budiarti, 2020). One of the essential competencies in elementary school mathematics is mathematical comprehension, which includes the ability to explain concepts, connect mathematical ideas, and solve problems (Gunur et al., 2019). However, mathematics instruction in elementary schools is still often oriented toward memorizing procedures, resulting in students' conceptual understanding not developing optimally (Mu et al., 2022; Ncube & Luneta, 2025; Rahayu &

Yuliana, 2025; Tuazon, 2025).

This problem was also found among fourth-grade students at SD Negeri Demakijo 1, who demonstrated a low understanding of multiplication and division concepts. Observations indicate that learning is still dominated by lecture-based methods and has not utilized varied instructional models, making students less active and easily bored.

This condition causes some students to rely on memorizing problem-solving steps without understanding the underlying concepts. In fact, mastery of multiplication and division concepts is a crucial foundation in elementary mathematics learning (Kristiani & Prasetyo, 2017). One alternative to improve students' mathematical understanding is the application of the Course Review Horay (CRH) cooperative learning model, which encourages active student involvement through engaging discussions and learning activities (Pratama et al., 2018).

This model can be combined with the use of concrete media such as dakon to help students visualize multiplication and division concepts more clearly (Zhang & Rivera, 2021). Previous research has shown that the Course Review Horay model can improve student learning outcomes and motivation; however, studies specifically examining its effect on elementary students' mathematical understanding with the support of dakon media remain limited. This indicates a research gap that underlies the present study.

Several previous studies have examined the application of cooperative learning models to enhance mathematical understanding. Pratama et al. (2018) found that the Course Review Horay (CRH) model improved learning outcomes, although their study focused on social studies rather than mathematics. Saleha et al. (2024) demonstrated that the CRH model positively influenced mathematical comprehension; however, their research was limited to third-grade students and did not address multiplication and division at the fourth-grade level. Similarly, Alfiani et al. (2023) confirmed the effectiveness of the CRH model in improving understanding of fractions among fourth-grade students, yet did not explore its application to multiplication and division concepts, which require different cognitive approaches.

Based on the review of previous studies, several research gaps are identified. First, research on the effect of the CRH model on mathematical understanding of multiplication and division at the fourth-grade level remains limited. Second, previous studies have not consistently compared the CRH model with other cooperative learning models, such as Student Teams Achievement Division (STAD), within a single experimental framework. Third, there is a lack of research integrating concrete media such as dakon within the CRH model to help students visualize multiplication and division concepts in Indonesian elementary schools. This study offers novelty by focusing on the effect of the Course Review Horay model on fourth-grade students' mathematical understanding of multiplication and division, a topic that remains underexplored in previous research. It employs a quasi-experimental design with a control group using the STAD model, enabling a comparative analysis of two cooperative learning approaches. Additionally, it integrates dakon as a concrete visual aid within the CRH model to enhance hands-on learning. This combination contributes a novel strategy to elementary mathematics education.

Based on this description, the research problem is formulated as follows: whether the Course Review Horay cooperative learning model influences the mathematical understanding of fourth-grade elementary school students regarding multiplication and division material. This study aims to analyze the effect of the use of the Course Review Horay cooperative learning model on the mathematical understanding of fourth-grade elementary school students. This research is expected to contribute to the development of more innovative and effective mathematics instruction in improving students' conceptual understanding in elementary school.

METHOD

This research used a quantitative approach with a quasi-experimental method through a nonequivalent control group design. The study was conducted at SD Negeri Demakijo 1 and involved two fourth-grade classes as research samples, which were selected using a total sampling technique based on the similarity of students' academic characteristics. The experimental class received treatment using the Course Review Horay (CRH) cooperative learning model with the support of dakon media, while the control class used the Student Teams Achievement Division (STAD) cooperative learning model.

The research subjects were fourth-grade students of SD Negeri Demakijo 1, while the research object was students' mathematical understanding of multiplication and division material, which included the ability to explain concepts, connect mathematical ideas, and solve problems. Data were collected through a mathematical comprehension test in the form of essay questions administered at the pretest and posttest stages to measure changes in students' abilities after the learning treatment.

This study used two classes, namely the experimental class and the control class. The experimental class participated in learning using the Course Review Horay cooperative model, while the control class participated in learning using the Student Teams Achievement Division cooperative model. To measure students' mathematical understanding, a pretest–posttest nonequivalent control group design was employed, in which a pretest was administered before the treatment and a posttest was administered after the treatment in each class.

Data analysis was conducted quantitatively using descriptive and inferential statistics. Before hypothesis testing, prerequisite tests were conducted, including tests of normality, homogeneity, and linearity. Hypothesis testing was carried out using an independent samples t-test to determine the effect of the Course Review Horay learning model on students' mathematical understanding. All data analyses were performed with the assistance of statistical software.

RESULTS AND DISCUSSION

The Influence of Horay's Course Review Model on Mathematical Comprehension

Table 1. Validity Test

Indicator	Item	r-count	r Table	Remarks
Explaining the Concept	QuestionA01	0.779	0.413	Valid
Explaining the Concept	QuestionA02	0.741	0.413	Valid
Explaining the Concept	QuestionA03	0.658	0.413	Valid
Explaining the Concept	QuestionA04	0.134	0.413	Invalid
Explaining the Concept	QuestionA05	0.780	0.413	Valid
Explaining the Concept	QuestionA06	0.801	0.413	Valid
Explaining the Concept	QuestionA07	0.758	0.413	Valid
Explaining the Concept	QuestionA08	0.075	0.413	Invalid
Connecting Ideas	QuestionB01	0.642	0.413	Valid
Connecting Ideas	QuestionB02	0.095	0.413	Invalid
Connecting Ideas	QuestionB03	0.602	0.413	Valid
Connecting Ideas	QuestionB04	0.719	0.413	Valid
Connecting Ideas	QuestionB05	0.140	0.413	Invalid
Connecting Ideas	QuestionB06	0.734	0.413	Valid

Connecting Ideas	QuestionB07	0.664	0.413	Valid
Connecting Ideas	QuestionB08	0.674	0.413	Valid
Connecting Ideas	QuestionB09	0.064	0.413	Invalid
Troubleshooting	QuestionC01	0.124	0.413	Invalid
Troubleshooting	QuestionC02	0.743	0.413	Valid
Troubleshooting	QuestionC03	0.785	0.413	Valid
Troubleshooting	QuestionC04	0.618	0.413	Valid
Troubleshooting	QuestionC05	0.829	0.413	Valid
Troubleshooting	QuestionC06	0.794	0.413	Valid
Troubleshooting	QuestionC07	0.028	0.413	Invalid
Troubleshooting	QuestionC08	0.806	0.413	Valid

Source: Primary data processed (2026)

Based on Table 1. above, it is known that the entire statement item for the Mathematical Comprehension variable has a value of r-count > r-table [0.413]. An item is declared valid if the r-count value is greater than the r-table, and invalid if the r-count value is smaller than the r-table.

In the indicator explaining the concept, most of the items are declared valid, namely Questions A01, A02, A03, A05, A06, and A07 because they have an r-count value greater than 0.413. However, there are two invalid items, namely Questions A04 and A08, because the value of r-count is smaller than the r-table.

In the indicator of connecting ideas, the majority of items were also declared valid, namely Questions B09, B11, B12, B14, B15, and B16. Meanwhile, there are three invalid items, namely Questions B10, B13, and B17, because the r-calculated value is smaller than the r-table.

Furthermore, in the problem solving indicator, most of the items were declared valid, namely Questions C19, C20, C21, C22, C23, and C25. However, there are two invalid items, namely Questions C18 and C24, because the r-calculated value is below the r-table value.

Table 2. Reliability Test

Indicator	Cronbach Alpha	Remarks
Explaining the Concept	0,806	Reliable
Connecting Ideas	0,815	Reliable
Troubleshooting	0,880	Reliable

Source: Primary data processed (2026)

Based on Table 2., the results of the reliability test show that all research variables have a value *Cronbach Alpha* > 0.60. The highest score is found in the Problem Solving indicator of [0.880], and the lowest in Connecting Ideas is [0.815]. Refer to the opinion Ghozali, (2018), where the *acceptable* for social research it is 0.60. Therefore, it can be concluded that the questionnaire instrument used in this study is reliable (consistent).

Table 3. Normality Test

N	Test Statistic	Asymp. Sig.	Remarks
Controls	0.947	0.197	Normal
Experiments	0.962	0.430	Normal

Source: Primary data processed (2026)

Based on Table 3. above, Since the sample number is 26 students (df = 26), then according to the suggestion (Ghozali, 2018), a more accurate test for small samples (less than 50) is Shapiro-Wilk. However, the Kolmogorov-Smirnov results also showed consistent results.

Based on the results of the normality test using the Shapiro-Wilk method, the three variables (Control and Experiment) had a significance value greater than 0.05. Thus, it can be concluded that all the data in this study are normally distributed, thus meeting the classical assumptions for the next parametric statistical analysis.

Table 4. Homogeneity Test

N	Levene Statistic	df2	Sig.	Description
Control	0,391	50	0.534	Homogenic
Experiment	0,428	50	0.516	Homogenic

Source: Primary data processed (2026)

Posttest:

Based on Table 4. Based on the results of the homogeneity test on the pretest data, the significance value (Sig.) in the Levene test was 0.534 and 0.516. All these significance values are greater than 0.05, so it can be concluded that the variance of pretest data between classes is homogeneous. This shows that before the treatment was given, the two classes had a relatively similar data dispersion rate and met one of the assumptions in parametric statistical analysis.

Furthermore, the results of the homogeneity test in the posttest data showed significance values of 0.114 and 0.116. All significance values are also greater than 0.05, so it can be concluded that the variance of posttest data between classes is homogeneous. Thus, both the pretest and posttest data have met the assumption of variance homogeneity, so the data is feasible to continue to hypothesis testing using parametric statistical analysis.

Table 5. Linearity Test

N	Levene Statistic	df2	Sig.	Description
Control	2,581	50	0.114	Homogenic
Experiment	2,561	50	0.116	Homogenic

Source: Primary data processed (2026)

Based on Table 5, Based on the results of the linearity test in the ANOVA Table, it is known that the Deviation from Linearity section of 23 provides "space" for statistics to see whether the variation of the data that does not form a straight line occurs by chance or indeed because the relationship is not linear. The greater the df value, the more stable the statistical estimate is because it is based on a larger number of data sets. The Mean Square value (0.454) is obtained from the Sum of Squares divided by df (10.452/23). The significance value of 0.591 is greater than the significance level of 0.05, so it can be concluded that there is no significant deviation of the relationship from the linear form. Thus, the relationship between the free variable and the bound variable is stated to be linear.

Based on the overall results of the test, it can be concluded that the research data has met the assumption of linearity, so that the analysis can be continued using parametric statistical tests that require a linear relationship between variables, such as regression or correlation analysis.

Table 6. Heteroscedasticity Test

Variable	Value t	Sig.	Remarks
Total_A	-0,862	0,398	Heteroscedasticity Free

Total_B	1,867	0,075	Heteroscedasticity Free
Total_C	-0,907	0,374	Heteroscedasticity Free

Source: Primary data processed (2026)

Based on Table 6., it is known that the significance value (Sig.) of all independent variables is greater than 0.05. According to (Ghozali, 2018), in the Glejser test, the regression model was declared to have no symptoms of heteroscedasticity if the significance value (Sig.) between the independent variable and Absolute Residual (ABS_RES) greater than 0.05.

Therefore, it can be concluded that there is no heteroscedasticity problem in the regression model.

Table 7. Simple Linear Regression Test

Variable	B	t count	Sig.
Stuttgart	-2,345	-0,693	0,495
Experiment_X	1,218	2,997	0,006

Source: Primary data processed (2026)

$$Y = \alpha + \beta 1X1$$

$$Y = [-2.345] + [1.218]X1$$

Description:

Y = [Mathematical Comprehension]

α = Constant

β1 = Regression Coefficient

X1 = [Cooperative Model of the Course Review Course Type]

In conclusion, the results of simple linear regression analysis obtained the regression equation Y = -2.345 + 1.218X. A constant value of -2.345 indicates the initial value of students' mathematical understanding when not given the treatment of the Course Review Horay model. The regression coefficient of the learning model variable of 1.218 has a positive value, which means that there is a unidirectional relationship between the use of the Horay Course Review model and the students' mathematical understanding. This means that the application of the Course Review Horay learning model can increase students' mathematical understanding by 1,218 units. In addition, a significance value of 0.006 is smaller than 0.05 indicating that the Horay Course Review learning model has a significant effect on students' mathematical understanding.

Table 8. Paired Sample Test T Test *Pretest* and *Posttest* Experimental Class

Uji Paired Sample T Test			Pair *Pretest* - *Posttest* Experiment (*Course Review Horay*)
Red			1,82692
Paired Difference	Std. Deviation		1,12254
	Std. Error Mean		0,22015
	95% Confidence Interval of the Difference	Lower	1,37352
		Upper	2,28033
t			8,299
df			25
Sig. (2-tailed)			0,000

Source: Primary data processed (2026)

Based on the output of pair 1 (experimental class pretest and posttest data) obtained a significance level (2-tailed) of 0.000 < 0.05, it can be concluded that there is a difference in the average student learning outcomes for the experimental class pretest with the experimental class posttest (*Course Review Horay type cooperative model*).

Table 9. Paired Sample Test T Test *Pretest* and *Control Class Posttest*

Uji Paired Sample T Test			**Pair *Pretest - Posttest* Control (*Student Team Achievment Division*)**
Red			0,73056
Paired Difference	Std. Deviation		0.93148
	Std. Error Mean		0.17926
	95% Confidence Interval of the Difference	Lower	0,36207
		Upper	1,09904
t			4,075
df			26
Sig. (2-tailed)			0,000

Source: Primary data processed (2026)

Based on the output of pair 2 (*pretest* and *posttest data of* the control class) obtained a significance level (2-tailed) of 0.000 < 0.05, it can be concluded that there is a difference in the average student learning outcomes for the *control class* pretest with the control class *posttest (*Student Team Achievment Division *type cooperative model*).

Based on the discussion of the output of Pair 1, it can be concluded that there is an influence of the *Student Team Achievment Division (STAD) type cooperative learning model* on the mathematical understanding of grade IV students of SD Negeri Demakijo 1.

Table 10. Average *Pretest Posttest* Experimental and Control Class

	Experiment Class (*Course Review Horay*)		**Control Class (*Student Team Achievment Division*)**	
	Pre-test	Post-test	Pre-test	Post-test
Red	70,96	89,23	71,49	78,79

Source: Primary data processed (2026)

Based on the average data above, it is known that there is an increase in the results of the pretest of the experimental class is 70.96, while the results of the posttest of the experimental class are 89.23, which means that there is an increase in the mathematical understanding of students of the experimental class. It can be concluded that the application of the Course Review Horay (CRH) type cooperative learning model is able to improve the mathematical understanding of grade IV students of SD Negeri Demakijo 1.

Table 11. Coefficient of Determination Test (R^2)

R	**R Square**	**Adjusted R Square**
0,522	0,272	0,242

Source: Primary data processed (2026)

Based on Table 11, it is known that the Adjusted R Square value is 0.272. This means that 27.2% of the variation of the variable [Mathematical Comprehension] can be explained by the variable [Course Review Horay] Type.

While the remaining 100% - 27.2% = 72.8% is explained by other variables outside this research model (such as other variables that were not studied).

Based on the results of the simple linear regression test, a significance value of 0.000 < 0.05 was obtained. This shows that the variables of the Course Review Horay type cooperative learning model have a significant effect on the Mathematical Comprehension of 4th grade students of SDN Demakijo 1. The magnitude of this influence (R Square) is 27.2%.

Table 12. Partial Test (Statistical Test t)

Variable	B	t count	Sig.	Remarks
Experiment_X	1,218	2,997	0,006	Significant

Source: Primary data processed (2026)

Based on the results of the SPSS test, a calculated t-value of [2.997] was obtained with a significance level of [0.006]. Because the value of Sig. 0.006 < 0.05 and t count [2.997] > t table [1.218], then statistically the variable Experiment_X has a significant effect on the variable control_Y.

Regression Coefficient Value (B): The Experiment_X variable has a positive coefficient value of 1.218. This shows a one-way relationship, where an improvement in the Course Review Horay type cooperative learning model will be followed by an increase in students' mathematical understanding.

Calculated t-value: The calculated t-value of 2.997 is greater than the t table (for df=24 it is about 2.063). This reinforces the decision that the null hypothesis (H_0) is rejected, and the alternative hypothesis Ha is accepted.

Based on the results of the t-test in the Coefficients table above, variable Experiment_X has a calculated t-value of 2.997. When compared to the t table (with df = n − 24) which is worth about 2.063, then 2.997 > 2.063.

In addition, the significance value of the variable Experiment_X shows the number 0.006, which is smaller than the significance level of 0.05 (0.006 < 0.05). Thus, it can be concluded that Ha is accepted, which means that there is a partially significant influence between the Experiment_X variable on Control_Y (Mathematical Comprehension). The direction of positive influence (1,218) shows that the more effective the application of the learning model, the more the mathematical understanding of 4th grade students of SDN Demakijo 1 will increase.

Table 13. Simultaneous Test (Statistical Test f)

F	Sig.	Remarks
Regression	0,006	Significant

Source: Primary data processed (2026)

Based on Table 13, an F value of 8.982 was obtained with a significance level of 0.006. Because the Sig. value is 0.006 < 0.05, it can be concluded that the independent variable (Experiment_X) simultaneously has a significant effect on the dependent variable (Kontrol_Y). This means that this regression model is suitable for predicting the Mathematical Comprehension of 4th grade students of SDN Demakijo 1.

These findings show that Horay's Course Review model is effective in improving students' mathematical understanding which includes the ability to explain concepts, connect mathematical ideas, and solve problems. The increase can be seen from the higher posttest

results in the experimental class compared to the control class. These results show that learning that involves group activities and a fun learning atmosphere can help students build a deeper understanding of concepts (Hotipah, P., & Pujiastuti, H. 2020).

Statistically, the Horay Course Review model was also shown to have a positive relationship with students' mathematical comprehension, as shown by a regression coefficient value of 1.218. This shows that the better the application of the Course Review Horay model, the higher the level of mathematical understanding of students.

These findings provide an empirical contribution that mathematics learning in elementary school will be more effective if students are actively involved in the learning process. Group discussion activities, the use of student worksheets, and evaluation through games provide opportunities for students to construct understanding gradually. Thus, mathematical understanding is not only obtained through the teacher's explanation, but through the interaction and learning experience of the students themselves.

The Role of Cooperative Activities in Improving Understanding of Concepts

The increase in mathematical understanding in this study occurred because the Horay Course Review model created an active and fun learning atmosphere. This model combines elements of play and group cooperation so that students are more involved in the learning process. Direct student involvement in learning activities helps students understand the concepts of multiplication and division more meaningfully.

The Horay Course Review Model provides students with the opportunity to discuss, exchange opinions, and correct misunderstandings through group work (Alfiani, Y., Fajrie, N., & Ismaya, E. A. 2023). This process allows students to build understanding gradually because they can compare the ways of thinking of each group member. Concept repetition activities through practice questions and group discussions also help strengthen students' cognitive structure so that mathematical concepts are easier to understand and remember over a longer period of time.

From the perspective of meaningful learning theory, the results of this study show that students understand the material more easily when new concepts are associated with knowledge that they already have. During the learning process, students relate the basic concepts of multiplication and division with learning activities that are carried out repeatedly through learning treatments. The process helps students build stronger conceptual relationships so that understanding becomes more stable.

In addition, students' active involvement in learning activities shows that mathematics learning does not have to be abstract and monotonous. The use of game activities and group discussions can increase students' motivation to learn so that students are more confident in solving math problems.

The Relationship of Research Results with Previous Studies

The results of this study are in line with previous research (Saleha, Z., Maulana, M., & Sunaengsih, C. 2024) which shows that the Course Review Horay type cooperative learning model is able to significantly improve student learning outcomes and concept understanding. Previous research has shown that group activities in the Horay Course Review model can improve problem-solving skills and mathematical comprehension compared to conventional learning.

The consistency of the results of this study with previous research (Rizki Destari et al., 2022) shows that the Horay Course Review model is a relevant learning model to be applied to mathematics learning in elementary schools. The success of this model lies in its ability to combine cognitive and affective aspects in learning. Students not only understand the material,

but also experience a pleasant learning experience so that the learning process becomes more optimal.

The results of this study also reinforce the view that cooperative learning can improve the quality of mathematics learning because it provides opportunities for students to learn socially. Social interaction in learning allows students to develop critical thinking skills and improve the ability to explain mathematical concepts orally and in writing.

Meaning and Contribution of Research

Academically, this research contributes to the development of mathematics learning in elementary schools, especially in the application of the Course Review Horay type cooperative learning model. The results of the study show that a learning model that integrates group cooperation and game activities can be an effective learning alternative to improve students' mathematical understanding.

The main meaning of the findings of this study is that the improvement of students' mathematical understanding is not only determined by the delivery of the material by the teacher, but also by the active involvement of the students in the learning process (Bryce, T. G. K., & Blown, E. J. 2024). The Horay Course Review model provides students with the opportunity to learn actively through discussions, practice questions, and games so that students can build a deeper understanding of concepts.

From a practical perspective, the results of this study show that elementary school teachers can use the Horay Course Review model as an alternative to mathematics learning, especially in multiplication and division materials. This model is relatively easy to implement because it does not require complex equipment and can be adapted to class conditions.

Overall, this study shows that the application of the Course Review Horay type cooperative learning model not only improves student learning outcomes, but also helps students build better mathematical understanding through active and meaningful learning experiences.

CONCLUSION

The results of the study indicated that the application of the Course Review Horay (CRH) cooperative learning model had a significant positive effect on fourth-grade students' mathematical understanding of multiplication and division, as evidenced by a significance value of 0.006 (< 0.05) and a t-value of 2.997. Furthermore, there was a significant difference in learning outcomes between students taught using the CRH model and those taught using the Student Teams Achievement Division (STAD) model, with the experimental class achieving higher average scores. Improvements were observed in students' ability to explain concepts, connect mathematical ideas, and solve problems, as reflected in the pretest and posttest results. Theoretically, these findings support the effectiveness of cooperative learning models that emphasize active and engaging learning experiences in enhancing elementary students' mathematical comprehension. Practically, the CRH model can serve as an alternative instructional strategy to optimize students' understanding of multiplication and division concepts. However, this study was limited to fourth-grade students in a single school; therefore, future research is recommended to involve larger and more diverse samples, as well as to explore the application of the CRH model to other mathematical topics and educational contexts.

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