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Effect Numbered Head Together Based on Agrarian Ethnomathematics on Students' Mathematical Communication Skills

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ABSTRACT

Mathematics instruction needs to be designed contextually so that students are not only able to solve problems but also able to communicate mathematical ideas, strategies, and reasoning clearly. One relevant approach is the Numbered Heads Together (NHT) cooperative learning model, integrated with agrarian ethnomathematics as a context closely related to students' lives. This study aimed to analyze the effect of implementing an agrarian ethnomathematics-based NHT model on students' mathematical communication skills in linear programming. The study employed a quantitative approach with a quasi-experimental nonequivalent control group pretest-posttest design. The participants were 11th-grade students at SMA Istiqlal Sumber Centeng, Kotaanyar, Probolinggo, consisting of 26 students in the experimental class and 25 students in the control class. Data were collected through an essay test designed to measure indicators of mathematical communication and were analyzed using normality tests, homogeneity tests, and an independent samples t-test. The results showed that the data were normally distributed and homogeneous, and that there was a significant difference between the two groups, with a p-value of less than 0.001. The mean score of students' mathematical communication skills in the experimental class reached 84.31, which was higher than that of the control class, at 76.92. This improvement was supported by the use of agricultural contexts, such as land planning and crop yield optimization, which helped students understand mathematical concepts more meaningfully. These findings indicate that integrating NHT with agrarian ethnomathematics can serve as an effective contextual learning approach.

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Introduction

Mathematics education is an educational process designed to develop students' logical, systematic, and communicative thinking skills (Amelia et al., 2026). One of the essential competencies that must be achieved is mathematical communication skills—that is, the ability to clearly convey ideas through mathematical language, symbols, representations, and reasoning (Munandar, 2023). In this study, indicators of mathematical communication include the ability to write down solution steps systematically, use mathematical symbols and models appropriately, and explain the reasoning or strategies behind the solution both in writing and orally (Lubis & Rahayu, 2023). However, various studies indicate that these skills remain relatively underdeveloped at the secondary school level. Empirical findings suggest that students tend to struggle with expressing mathematical ideas coherently, whether in writing or through verbal explanations. This situation suggests that current teaching practices do not fully support the development of mathematical communication skills, making it necessary to adopt more effective and context-based teaching approaches.

The issue of poor mathematical communication skills was also identified based on the results of initial observations in the 11th-grade class at Istiqlal High School in Sumber Centeng, Kotaanyar, Probolinggo. The data were obtained through an analysis of test results and interviews with 51 students on linear programming. The results show that approximately 65% of the students were not yet able to write down the solution steps systematically. The difficulties encountered included an inability to model problems as systems of inequalities, the inappropriate use of symbols, and a lack of clarity in explaining the solution steps. These issues stem from a teaching approach that remains teacher-centered and does not provide students with sufficient opportunities to discuss and express their ideas (Ruslandi et al., 2025). As a result, students tend to follow procedures without fully understanding the concepts, so their mathematical communication skills have not developed to their full potential.

One approach that can be used to address this issue is the Numbered Heads Together (NHT) cooperative learning model (Salu & Hardini, 2023). This model emphasizes group collaboration combined with individual responsibility through structured discussions. In practice, each student is assigned a number and has an equal chance of being called upon to represent their group in presenting the results of the discussion (Siburian & Pakpahan, 2026). This process encourages students to actively discuss, share ideas, explain their reasoning, and reach a consensus on the answer (Sa'diyah et al., 2022). Thus, the NHT model directly develops mathematical communication skills, both oral and written, as students are required to understand and communicate their reasoning clearly and systematically.

In addition to using the right teaching model, integrating cultural context into learning is also a key factor in improving students' understanding (Putri et al., 2025). An ethnomathematics approach, particularly one rooted in agriculture, enables students to connect mathematical concepts to everyday life (Khaerani et al., 2024). In this study, an agricultural context was applied to linear programming material through problems such as planning the area of cultivated land, allocating crop types, and optimizing crop yields given resource constraints (Ayu et al., 2025). This context helps students understand concepts in a concrete way and makes it easier for them to communicate mathematical models, graphs, and interpretations of solutions. As a result, learning becomes more meaningful and relevant to students' lives.

The integration of the Numbered Heads Together model with the agrarian ethnomathematics approach is expected to foster interactive and context-based learning (Siregar, 2025). The NHT model provides a framework for social interaction that encourages active discussion, while the agricultural context offers real-world situations that can serve as a foundation for understanding mathematical concepts (Zuhro & Sirait, 2025). Through

Kognitif: Jurnal Riset HOTS Pendidikan Matematika
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contextual problem-based group discussions, students not only engage in discussion but are also trained to present ideas, explain their reasoning, and articulate their thoughts in a structured manner (Husna et al., 2025). This indicates a strong conceptual relationship between the learning model, the context used, and students' mathematical communication skills.

Although various studies have examined the effectiveness of the NHT model in improving student learning outcomes and engagement, as well as ethnomathematics research in enhancing conceptual understanding, studies that integrate these two approaches to improve mathematical communication skills remain limited (Salsabila et al., 2025). Thus, there is a research gap regarding the integration of the NHT model with the context of agrarian ethnomathematics in mathematics education, particularly in the area of linear programming. Therefore, this study aims to analyze the effect of implementing an agrarian ethnomathematics-based Numbered Heads Together model on students' mathematical communication skills. This study is expected to contribute to the development of mathematics instruction that is more interactive, contextual, and focused on improving students' mathematical communication skills.

Method

Research Types and Designs

This study employs a quantitative approach using a quasi-experimental design which aims to examine the effect of implementing the Numbered Heads Together (NHT) cooperative learning model based on agrarian ethnomathematics on students' mathematical communication skills in the context of linear programming. The study employed a pretest-posttest nonequivalent control group design, in which two classes were selected as the experimental and control groups without full randomization. This approach was chosen because it accommodates the actual conditions in schools while still allowing for control over the research variables.

The experimental group was taught using an agrarian ethnomathematics-based NHT model over four sessions on linear programming, while the control group used conventional teaching methods. The agrarian context addressed includes issues related to planning the area of cultivated land, selecting crop types, and optimizing crop yields given resource constraints (such as land area and costs). The problem was then modeled as a system of linear inequalities and solved using the graphical method to determine the optimal value. The NHT model is implemented systematically through the following steps: numbering, in which students are divided into groups and each member is assigned a number; *questioning*, that is, the teacher presents contextual problems based on agriculture; *heads together*, that is, students discuss to solve problems, develop mathematical models, and agree on an answer; *answering*, that is, students with specific numbers are called on to present the results of their group discussions. This stage is designed to help students practice communicating mathematical ideas both orally and in writing. In general, the research design to be used in this study is similar to that in Table 1.

Table 1. Research Design

Group	Pre-test	Treatment	Post-test
Experiment	X_1	Y_1	X_2
Control	X_1	Y_2	X_2

Description :
X_1 = Pre-test
X_2 = Post-test

Y_1 = Agrarian Ethnomathematics-Based NHT Learning
Y_2 = Learning using conventional methods

Population and Sample

The population in this study consists of all 11th-grade students at SMA Istiqlal Sumber Centeng in Kotaanyar, Probolinggo, for the 2025–2026 school year. The research sample was selected using purposive sampling, taking into account the students' initial ability levels. Two classes were selected: Class XI A, consisting of 26 students, as the experimental group, and Class XI B, consisting of 25 students, as the control group. This adjustment ensures consistency between the population and the sample.

Instruments

The research instrument used in this study was an essay test of mathematical communication skills in linear programming. The test is designed based on indicators of mathematical communication skills, which assess students' ability to express mathematical ideas in written and symbolic form and to explain solution steps systematically. The instrument consists of 5 open-ended questions administered during the pretest and posttest. The aspects measured in the mathematical communication skills instrument include in Table 2.

Table 2. Instruments and aspect measured in mathematical communication.

Aspects	Instruments
1. The ability to express mathematical ideas in writing, specifically the ability of students to write down the known and unknown information in a problem in a clear and logical manner. 2. The ability to use mathematical symbols, models, and representations—that is, students' ability to transform contextual problems into mathematical models such as systems of linear inequalities, tables, or graphs. 3. The ability to explain solution steps systematically, that is, the ability of students to explain the problem-solving process using logical and easy-to-understand mathematical language. 4. The ability to interpret results, that is, the ability of students to draw conclusions and explain the meaning of calculation results in the context of the problem.	"A farmer has a plot of land measuring 100 m² that will be used to grow chili peppers and tomatoes. Each chili plant requires 2 m² of land, and each tomato plant requires 4 m² of land. The minimum number of plants to be grown is 30. The profit from each chili plant is Rp20,000, and from each tomato plant is Rp35,000. Determine the mathematical model for this problem and calculate the maximum profit the farmer can earn."

This question is designed to assess students' ability to translate contextual problems into mathematical form, use symbols correctly, plot solution sets, and explain the solution steps systematically. The instrument includes a test item matrix and a scoring-scale-based rubric. Content validity was assessed through expert judgment by mathematics education faculty members, while empirical validity was assessed using the product-moment correlation. Reliability testing was conducted using Cronbach's Alpha to ensure the internal consistency of the instrument.

Kognitif: Jurnal Riset HOTS Pendidikan Matematika
https://doi.org/10.51574/kognitif.v6i2.4952 Volume 6, No 2, April - June 2026, pp. 820 – 831

Procedure

The research procedure consists of three stages: preparation, implementation, and evaluation. During the preparation stage, the researcher develops instructional materials (lesson plans, worksheets, and test instruments) and conducts validity and reliability tests on the instruments. During the implementation phase, both groups were given a pretest to assess their initial abilities. Next, the experimental group was taught using an NHT model based on agrarian ethnomathematics, while the control group used conventional methods. After the entire lesson was completed, both groups were given a posttest to assess their mathematical communication skills. The evaluation phase involves processing and analyzing the research data. The research stages are shown in Table 3.

Table 3. Research Phases

Stages	Experimental Class	Control Class
Preparation	• Conducting a site visit • Developing instructional materials based on the Numbered Heads Together (NHT) model and agrarian ethnomathematics (worksheets, teaching materials, assessment tools) • Conduct validity and reliability tests on the instrument • Identifying the experimental class as the subject of the study	• Conducting a site visit • Developing conventional instructional materials (lesson plans, worksheets, teaching materials, assessment tools) • Conduct validity and reliability tests on the instrument • Identifying the control group as the subject of the study
Implementation	• Administer a pretest to assess students' initial proficiency • Conducting lessons using the NHT model based on agrarian ethnomathematics through group formation, numbering, discussion, and presentation • Administer a posttest to assess students' mathematical communication skills	• Administer a pretest to assess students' initial proficiency • Conducting instruction using conventional methods (lectures, question-and-answer sessions, practice exercises) • Administer a posttest to assess students' mathematical communication skills
Evaluation	• Processing and analyzing posttest data • Conducting tests for normality, homogeneity, and hypothesis testing • Summarizing the research findings • Preparing a research report	• Processing and analyzing posttest data • Conducting tests for normality, homogeneity, and hypothesis testing • Summarizing the research findings • Preparing a research report

Data Analysis

Data analysis was performed using IBM SPSS Statistics software. The initial step involved conducting prerequisite tests, specifically a normality test using the Shapiro-Wilk test and a homogeneity test using Levene's test. Once the data met the assumptions, a hypothesis test was conducted using an *independent samples t-test*. The analysis focused on comparing posttest scores between the experimental and control groups, and was supplemented by an analysis of improvement using N-gain values to assess the effectiveness of the treatment. The test criteria use a significance level of 0.05, whereby H0 is rejected if the sig. value is less than 0.05. Thus, this research method was systematically designed to generate valid and reliable data for testing the effect of an agrarian ethnomathematics-based NHT model on students' mathematical communication skills in linear programming.

Research Findings

The application of agrarian ethnomathematics in this study was carried out by linking linear programming material to agricultural activities that are relevant to the students' daily lives. An agrarian context was used as the source of mathematical problems so that students could understand the concepts in a more concrete and meaningful way.

During the learning process, the teacher presents contextual problems regarding the planning of planting area and the optimization of crop yields. One example of a problem used is determining the combination of chili peppers and tomatoes based on the available land area and capital. Students are asked to formulate a mathematical model in the form of a system of linear inequalities, plot the graph of the solution set, and determine the maximum harvest profit. For example, students are given the following problem:
"A farmer has a plot of land measuring 120 m^2 that will be used to grow rice and corn. Each rice plant requires 3 m^2 of land, while each corn plant requires 2 m^2 of land. The available capital is sufficient for a maximum of 50 plants. If the profit per rice plant is Rp25,000 and per corn plant is Rp15,000, determine the number of plants that should be grown to maximize profit."

During the questioning phase, the teacher presents the problem to each group. Next, during the heads-together phase, students discuss how to develop a mathematical model and determine the optimal solution using graphical methods. Students then present the results of their discussion during the answering phase in the order called by the teacher. The use of agricultural contexts helps students understand the connection between mathematical concepts and everyday life. In addition, students become more active in expressing ideas, explaining their reasoning, and using mathematical symbols correctly during group discussions. A descriptive analysis was conducted to provide an initial overview of the pretest and posttest data for students in both the experimental and control groups. This analysis includes the minimum, maximum, mean, and standard deviation for each group. Table 4 presents the results of the descriptive analysis using statistical software.

Table 4. Descriptive Statistics of Pretest and Posttest Results

Class	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test_Experiment	26	55	68	60.50	3.302
Post-test_Experiment	26	79	92	84.31	3.813
Pre-test_Control	25	48	60	54.40	3.317
Post-test_Control	25	69	85	76.92	4.051
Valid N (listwise)	25				

Based on the analysis results, it was found that the average pretest score for the experimental class was 60.50, with a minimum score of 55 and a maximum score of 68, while the control class scored 54.40, with a minimum score of 48 and a maximum score of 60. This indicates that the initial abilities of the two classes were relatively different, but still fell within the same category. After the intervention, there was an improvement in both classes. The average posttest score for the experimental class increased to 84.31, with a minimum score of 79 and a maximum of 92, while the control class increased to 76.92, with a minimum score of 69 and a maximum of 85. The standard deviation for the experimental class was 3.813 and for

Kognitif: Jurnal Riset HOTS Pendidikan Matematika
https://doi.org/10.51574/kognitif.v6i2.4952 Volume 6, No 2, April - June 2026, pp. 820 – 831

the control class was 4.051, indicating that the distribution of scores in the experimental class was more homogeneous than that of the control class.

Next, the results of students' mathematical communication skills were tested using a normality test to determine whether the data were normally distributed. The method used was the Shapiro-Wilk test, with the criterion that if the significance level (sig) was greater than 0.05, the data were normally distributed. Conversely, if the significance level (sig) was less than 0.05, the data were not normally distributed. Table 5 presents the results of the normality test for the pretest and posttest scores of students' mathematical communication skills.

Table 5. Results of the Normality Test for Students' Mathematical Communication Skills

Class		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Results	control pretest	.182	25	.032	.945	25	.190
	control posttest	.165	25	.077	.935	25	.111
	experimental pretest	.137	26	.200*	.963	26	.458
	experimental posttest	.134	26	.200*	.945	26	.173

From Table 5, we can see that the data for both the experimental and control groups—for both the pretest and posttest results—show that the significance value of the Shapiro-Wilk test is greater than 0.05. This indicates that the data are normally distributed.. After conducting a normality test and finding that the data were normally distributed, a homogeneity test was then performed. The purpose of the homogeneity test was to determine the uniformity or homogeneity of the sample used in this study (Muliana et al., 2025). Homogeneity was tested using Levene's test in SPSS 22, with the criterion that if the significance level (sig) is greater than 0.05, the data are considered homogeneous. Conversely, if the significance level (sig) is less than 0.05, the data are considered non-homogeneous. The results of the test of students' mathematical communication skills are presented in Table 6.

Table 6. Results of the Homogeneity Test for Students' Mathematical Communication Skills

		Levene Statistic	df1	df2	Sig.
Results	Based on Mean	.520	3	98	.669
	Based on Median	.472	3	98	.702
	Based on Median and with adjusted df	.472	3	90.120	.702
	Based on trimmed mean	.530	3	98	.663

Based on Table 6, we can see that the significance level based on the mean is 0.669, which is greater than 0.05. Thus, we can conclude that H0 is accepted and H1 is rejected, indicating that the experimental class using agrarian ethnomathematics instruction and the control class have homogeneous data. After testing for normality and homogeneity, we proceeded to conduct an independent samples t-test. Table 7 shows the results of the independent samples t-test on students' posttest scores for mathematical communication skills using statistical software.

Table 7. Results of the Independent Samples T-test for Students' Mathematical Communication Skills

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Results	Equal variances assumed	.012	.912	-6.708	49	.000	-7.388	1.101	-9.601	-5.175
	Equal variances not assumed			-6.700	48.512	.000	-7.388	1.103	-9.604	-5.171

Based on Table 7, the significance value (two-tailed) obtained is 0.000, which is less than 0.05. This indicates that there is a difference in the average learning outcomes between students in the control and experimental classes. The average learning outcomes of students in the experimental class are higher than those of students in the control class. The average posttest scores for both classes are shown in Table 8.

Table 8. Results of the Independent Samples T-Test for Students' Mathematical Communication Skills

	Class	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Value	control posttest	25	76.92	4.051	.810
	experimental posttest	26	84.31	3.813	.748

Discussion

The results of the study indicate that there is a difference in mathematical communication skills between the experimental class and the control class. Descriptively, the experimental class's posttest mean score of 84.31 was higher than the control class's score of 76.92. Furthermore, the pattern of score improvement from the pretest to the posttest in the experimental class appeared to be greater than that in the control class. These findings indicate that the implementation of the agrarian ethnomathematics-based Numbered Heads Together (NHT) model has a positive effect on students' mathematical communication skills.

The improvement in mathematical communication skills in the experimental class is closely linked to the role of the NHT model in facilitating interaction and communication among students (Sitepu & Samosir, 2022). Through the stages of numbering, questioning, heads together, and answering, students are encouraged to actively discuss, share ideas, and explain their reasoning in a systematic manner (Diana et al., 2023). During the "heads together" phase, students work with their groups to discuss problems and develop mathematical models, while during the "answering" phase, a designated student must present the results of the discussion. This process develops mathematical communication skills—both oral and written—because students not only understand the concepts but are also required to express their ideas clearly and in a structured manner.

On the other hand, the use of agrarian ethnomathematics also makes an important contribution to improving students' mathematical communication skills (Palayukan et al., 2024). The issues addressed—such as planning the area of cropland, selecting crop types, and optimizing crop yields in linear programming—encourage students to translate contextual

Kognitif: Jurnal Riset HOTS Pendidikan Matematika
https://doi.org/10.51574/kognitif.v6i2.4952 Volume 6, No 2, April - June 2026, pp. 820 – 831

information into mathematical models, such as systems of inequalities and solution set graphs. This process involves mathematical representation skills, the use of symbols, and the step-by-step explanation of the solution process. Thus, the agricultural context not only aids in understanding the concepts but also trains students to communicate mathematical ideas in a more concrete and meaningful way (Kurniati et al., 2025).

When examined based on mathematical communication indicators, improvements in the experimental class were observed in several aspects (Sudiman et al., 2023). First, students were better able to write down solution steps systematically after becoming accustomed to discussing and agreeing on group answers. Second, the use of mathematical symbols and models became more accurate because students practiced modeling contextual problems into mathematical forms. Third, the ability to explain the reasoning or solution strategies also improves, especially when students present the results of their discussions in front of the class. This indicates that the integration of the NHT model with an agrarian ethnomathematics context has a comprehensive impact on various aspects of mathematical communication (Habsyi et al., 2025).

The findings of this study are consistent with previous research showing that the NHT model is effective in enhancing student interaction and communication in mathematics learning. In addition, the ethnomathematics approach has also been shown to improve conceptual understanding through contexts that are relevant to students' daily lives (Dwianjani et al., 2022). However, this study is novel in that it integrates these two approaches into a single learning experience, particularly in the context of linear programming, thereby making a new contribution to the development of contextual and communicative mathematics instruction.

Nevertheless, this study has several limitations. First, the study was conducted at only one school with a limited sample size, so the results should be generalized with caution. Second, the ethnomathematics context used was limited to an agrarian environment, so it did not cover other cultural contexts. Third, the measurement of mathematical communication skills relied solely on written tests, so it does not fully capture students' oral communication skills in depth (Imam, 2023). Therefore, future research is recommended to involve a larger sample, explore a wider range of ethnomathematics contexts, and utilize a more diverse set of instruments. Thus, the results of this study indicate that the implementation of an agrarian ethnomathematics-based NHT model is effective in improving students' mathematical communication skills, both through group interaction and the use of real-world contexts relevant to students' lives.

Conclusion

The results of the study indicate that the implementation of agrarian ethnomathematics-based learning combined with the Numbered Heads Together (NHT) cooperative learning model has a positive effect on students' mathematical communication skills. This is indicated by the difference in average posttest scores, where the experimental class achieved a score of 84.31, higher than the control class's score of 76.92, as well as the results of the independent samples t-test, which showed a significance level of $0.000 < 0.05$. The integration of an agricultural context closely related to students' lives proved effective in concretizing previously abstract mathematical concepts, enabling students to more easily understand and communicate mathematical ideas both orally and in writing. In addition, the implementation of the NHT model encourages active student participation through structured group discussions, thereby improving students' ability to explain solution steps systematically. Thus, the combination of the agrarian ethnomathematics approach and the cooperative learning model is effective in strengthening students' mathematical communication skills.

Nevertheless, this study has several limitations, including a small sample size and the fact that it involved only one school, as well as the use of an ethnomathematics context that remains focused on an agrarian environment. In addition, the assessment of mathematical communication skills relied primarily on written tests, and thus does not fully reflect students' oral communication skills. Therefore, future research is recommended to involve a broader sample, explore more diverse ethnomathematical contexts, and use assessment instruments that more comprehensively cover aspects of oral and visual communication. Thus, the findings of this study are expected to serve as a reference for the development of contextual, interactive, and sustainable mathematics instruction.

Conflict of Interest

The author declares that there are no conflicts of interest in this study whether financial or non-financial that could influence the results or interpretation of the study.

Auhor Contributions

D.Q.A. contributed to the conceptualization of the research, the development of the research instruments, data collection, data analysis, and the writing of the initial draft of the article. A.A. contributed to the development of the research methodology, the validation of the research instruments, and the review and refinement of the article's content. E.R. contributed to the analysis of the results, the discussion, and the final revision of the manuscript. All authors have read and approved the final version of this paper. The total percentage of contribution is as follows: D.Q.A.: 40%, A.A.: 30%, and E.R.: 30%.

Data Availability Statement

The author states that data sharing is not possible, as no new data were generated or analyzed in this study.

References

Amelia, A. A., Nurhaswinda, N., Rianti, L., Jazilah, N., Ardelia, S. N., & Shalsabila, Y. A. Z. (2026). Pemahaman Logika Matematika dalam Pembelajaran Matematika. https://doi.org/10.31004/catha.v3i1.188

Diana, L. M., Arif, M., Stefany, E. M., & Aini, N. (2023). Model pembelajaran numbered head together untuk meningkatkan hasil belajar siswa. https://doi.org/10.21107/edutic.v9i2.20224

Dwianjani, N. K. V, Astawa, I. W. P., & Sukajaya, I. N. (2022). Pengembangan media pembelajaran berbasis android pada materi brsd berorientasi etnomatematika untuk meningkatkan pemahaman konsep siswa. *Jurnal Pendidikan Dan Pembelajaran Matematika Indonesia*, *11*(2), 69–80. https://doi.org/10.23887/jppmi.v11i2.1447

Habsyi, R., Suradi, S., & Rosidah, R. (2025). Integrasi Konteks Budaya Nusantara dalam Pembelajaran Matematika: Suatu Kajian Literatur tentang Pendekatan Etnopedagogi dan Etnomatematika. https://doi.org/10.37630/jpm.v15i4.3657

Husna, A., Ilmi, N., & Gusmaneli, G. (2025). Strategi pembelajaran berbasis masalah dalam meningkatkan kemampuan berpikir kritis peserta didik. https://doi.org/10.62383/katalis.v2i2.1532

Imam, S. (2023). Penerapan Model Pembelajaran Treffinger Berbantu Lkpd Berbasis

Kognitif: Jurnal Riset HOTS Pendidikan Matematika
https://doi.org/10.51574/kognitif.v6i2.4952 Volume 6, No 2, April - June 2026, pp. 820 – 831

Etnomatematika Terhadap Kemampuan Berpikir Kritis Matematis Dan Kemampuan Berpikir Kreatif Peserta Didik. https://repository.radenintan.ac.id/29271/

Khaerani, K., Arismunandar, A., & Tolla, I. (2024). Peran etnomatematika dalam meningkatkan mutu pembelajaran matematika. 10.51577/ijipublication.v5i1.579

Kurniati, R., Dahlan, T., Madubun, F. M., Afifa, R. N., Dahoklory, F. M., Dahliani, S., ... & Lubis, H. (2025). Pengaruh model pembelajaran kooperatif tipe teams games tournament berbasis kearifan lokal terhadap hasil belajar operasi hitung bilangan cacah siswa kelas iv sdn 102071 dolok masihuL. *Didaktik : Jurnal Ilmiah PGSD STKIP Subang*, *12*(02), 150 -161. https://doi.org/10.36989/didaktik.v12i02.12693.

Lubis, R. N., & Rahayu, W. (2023). Kemampuan komunikasi matematis siswa pada pembelajaran Matematika. *Jurnal Educatio FKIP UNMA*, *9*(2), 1100–1107. https://doi.org/10.31949/educatio.v9i2.5049

M., Ayu, I. W., Yuniwati, E. D., ... & Muta'ali, L. (2025). Prihartini, I., Dahliani, L., Rustiyana, R., Lubis, M. . Sistem Pertanian Berkelanjutan: Tantangan, Model dan Pengembangan. https://doi.org/10.5281/zenodo.17609587

Muliana, S., Ramadhani, R., Auliani, C., Zulpan, Z., Rusli, A., Wulandari, M. N., & Setyowati, H. (2025). Analisis Data dalam Pendidikan: Memahami Konsep Homogenitas Normalitas dan Pengujiannya untuk Peningkatan Kualitas Pembelajaran. *Teaching and Learning Research Journal*, *1*(4), 110–116. https://doi.org/10.66770/tlrj.v1i4.84

Munandar, D. R. (2023). Kemampuan komunikasi matematis siswa dalam pembelajaran matematika. 10.31949/educatio.v9i2.5049

Palayukan, H., Ikhlas, A., Tamagola, R. H. A., Wahyuni, L., & Sitopu, J. W. (2024). Analisis pemecahan masalah matematika dan komunikasi matematik mahasiswa dengan penerapan model Project-Based Learning (PjBL) terintegrasi etnomatematika. https://doi.org/10.47827/jer.v5i4.270

Putri, E. A. E., Aziz, A., & Rahayu, E. (2025). Efektivitas Pembelajaran Etnomatematika pada Tradisi Hasil Panen dalam Pemahaman Konsep Bilangan Bulat dan Pecahan. 10.51574/kognitif.v5i2.3137

Ruslandi, U., Qomariyah, S., & Sumitra, M. (2025). Peran metode pembelajaran diskusi dalam menciptakan keaktifan belajar siswa di MAS Tarbiyatul Islamiyah. 10.62383/katalis.v2i1.1203

Sa'diyah, H., Islamiah, R., & Fajari, L. E. W. (2022). Meningkatkan keterampilan berpikir kritis siswa melalui metode diskusi kelompok: Literature review. DOI:10.46306/jpee.v1i2.19

Salsabila, D., Luthfiana, M., & Nugroho, K. U. Z. (2025). Systematic Literature Review: Model Pembelajaran Jigsaw dengan Pendekatan Etnomatematika untuk Meningkatkan Pemahaman Konsep Siswa. https://doi.org/10.61553/abjme.v3i2.906

Salu, B. E., & Hardini, A. T. A. (2023). Efektivitas Model Pembelajaran Teams Games Tournament dan Numbered Head Together Terhadap Hasil Belajar IPS Siswa Kelas V Sekolah Dasar. 10.31949/educatio.v9i3.5158

Siburian, J., & Pakpahan, I. P. S. (2026). Penerapan Model Kooperatif Numbered Heads Together (NHT) Untuk Meningkatkan Partisipasi Siswa Dalam Pembelajaran PAK. *Jurnal LPendidikan Masyarakat Indonesia*, *2026*(2026). https://jumas.ourhope.biz.id/ojs/index.php/JM/article/view/153

Siregar, T. (2025). Integrasi etnomatematika dengan kearifan budaya lokal.

Sitepu, A. B., & Samosir, K. (2022). Pengaruh Model Pembelajaran Numbered Head Together (NHT) Terhadap Kemampuan Komunkasi Matematis Siswa Kelas VIII MTs Amaliyah Sunggal. 10.24114/jfi.v3i2.40674

Sudiman, A., Habsyi, R., & Saleh, R. R. (2023). Pembelajaran Geometri Berbantuan Goegebra

untuk Meningkatkan Kemampuan Komunikasi Matematis Siswa. 10.37630/jpm.v13i4.1390
Zuhro, A. M., & Sirait, R. (2025). Implementation of the Numbered Head Together Learning Model Based on Teaching Aids at Mts Panca Dharma Stungkit. 10.51276/edu.v5i2.906

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