

Implementation of the Numbered Heads Together Cooperative Learning Model in Mathematics Learning for Fourth Grade Students

Dwi Sari¹, Asep Sukenda Egok², Armi Yuneti³

¹ Universitas PGRI Silampari, Indonesia; dwiwi26@gmail.com

² Universitas PGRI Silampari, Indonesia; asep.egok91@gmail.com

³ Universitas PGRI Silampari Indonesia; armiyuneti@gmail.com

ARTICLE INFO

Keywords:

Learning Outcomes,
Mathematics,
Numbered Heads Together.

Article history:

Received: 2025-03-15

Revised: 2024-05-11

Accepted: 2025-07-24

ABSTRACT

Education plays an important role in developing character, improving critical thinking skills, and preparing oneself to face future challenges. This study aims to determine the completeness of mathematics learning outcomes of fourth-grade students of SD Negeri 21 Lubuklinggau. The research method used is quantitative, in the form of one group retest-posttest design. The population is all fourth-grade students of SD Negeri 21 Lubuklinggau and also the research sample of 22 students, data collection is carried out using a test technique consisting of 10 questions. The collected data are analyzed using the z-test, the average learning outcomes of the pre-test (44.98) and post-test (82.74). Based on the results of the z-test analysis, the average (x) value of the overall final test results based on the calculation is 82.74, the table is 11.070 and the count is 7.3005. Because $\text{count} = 7.3005 < \text{table} = 11.070$ then the data can be concluded to be normally distributed, the magnitude of $z \text{ count} = 4.86$ and $z \text{ table} = 1.64$ with a significance level of 5% and $dk = n-1$ because $\text{count} = 4.86 > z \text{ table} = 1.64$ H_a is accepted and H_0 is rejected, so it can be concluded that using the cooperative model of the Numbered Head Together type is significantly complete.

This is an open access article under the CC BY SA license.



Corresponding Author:

Dwi Sari

Universitas PGRI Silampari, Indonesia; dwiwi26@gmail.com

1. INTRODUCTION

Education is a forum for students to acquire knowledge through teaching provided by teachers. Teachers, as the primary educators in education, provide direct instruction to students to bring about changes in knowledge, behavior, and skills (Egok, 2021:200). Furthermore, education plays a crucial role in character development, enhancing critical thinking skills, and preparing students to face future challenges. Quality education will be optimally achieved if supported by a quality learning process (Sanjaya, 2020:2). Learning is the process by which a person acquires knowledge, skills, or expertise

through study, learning, or training. In an educational context, learning involves the sharing of knowledge from teachers to students as well as active interaction that enables understanding and retention of the material taught.

Mathematics is one of the most important subjects in education, especially at the elementary level. Good math skills are not only useful for understanding mathematical concepts, but also for developing critical thinking and logical skills that are very important in everyday life. However, it is often found that students at the elementary level have great difficulty understanding the material and applying it to more complex tasks. Therefore, to improve the quality of mathematics education as one of the subjects in elementary schools, efforts must be made so that mathematics can truly be mastered well by students (Fatimah, 2024:2).

Based on the results of the interview on page 96 in class IV of SD Negeri 21 Lubuklinggau on November 1, 2024, the researcher obtained information from the homeroom teacher of class IV, Mrs. Meilina Handayani, S.Pd. It is known that there are 22 students in class IV and the mathematics learning outcomes of class IV are still relatively low, the average value of completeness in mathematics learning in class IV of SD Negeri 21 Lubuklinggau is still below average, namely from 22 total students in class IV of SD Negeri 21 Lubuklinggau who completed or obtained a score according to the KKTP, only 9 people with a percentage of 40.90%, while students who obtained a score below the KKTP were 13 people with a percentage of 59.09%, with the KKTP value (Criteria for Achieving Learning Objectives) in the mathematics subject of class IV students of SD Negeri 21 Lubuklinggau is 70.

From the results of the data above, the level of student success in learning is still lacking, this is caused by the student learning process being less than optimal because the child's absorption capacity is different and the lack of student confidence to speak in front of the class, in addition to the differences in student abilities so that not all students are able to understand the material being taught, students still experience difficulties in understanding the material and can be an obstacle to student learning activity. In the teaching and learning process, teachers have not used interesting and innovative learning models, so that during the learning process, students feel less interested and make students less active. In addition, when working in groups, students do not cooperate with other friends to solve problems given by the teacher, students only rely on group friends who are considered capable.

To address the aforementioned issues, teachers can implement a learning model appropriate to the material being taught, thereby engaging students in the learning process. One such learning model that can engage students is the Numbered Heads Together (NHT) learning model. The Numbered Heads Together model encourages students to gain a more optimal understanding and develop better learning skills. This model can improve student collaboration. By engaging students in collaborative learning within groups, Numbered Heads Together has the potential to optimize mathematics learning outcomes at the elementary school level.

The Numbered Head Together learning model is suitable for application in mathematics learning, because by applying this learning model students can be directly involved in the learning process actively, so that it is expected that student learning outcomes can be improved optimally. Through discussions, students can work together to solve problems and find the most appropriate and correct answers. Through this learning, students will be more active in learning both individually and in groups. This is in line with research conducted by Nuryanti Hutabalian, Partohap Saut, and Yanti Arasi with the research title The Effect of the Numbered Head Together learning model on student learning outcomes in theme 7 subtheme 1 grade V.

Based on the background described above, the formulation of the problem in this study is "Are the Mathematics Learning Outcomes of fourth-grade students of SD Negeri 21 Lubuklinggau after the implementation of the cooperative learning model type numbered head together can be significantly completed?". The purpose of this study is to determine the completeness of the Mathematics learning outcomes of fourth-grade students of SD Negeri 21 Lubuklinggau after the implementation of the Numbered Head Together learning model. This study is expected to provide benefits to various parties

involved, especially to be useful and can increase knowledge and insight about the cooperative learning model type Numbered Head Together.

2. METHODS

This research is quantitative. The method used in this study is a quasi-experimental one. A quasi-experiment is a process of discovering knowledge that uses numerical data from an experimental class without a comparison class as a tool to analyze information about what is known. Based on the definition of a quasi-experiment, this study was conducted without a comparison class (only one class). The research design used in this study is a one-group pretest-posttest design, the research design can be seen in Table 1.

Table 1. Research Design

<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
O1	X	O2

(Sugiyono, 2019:115)

Information :

- O1 : Pretest (before treatment is given)
- X : treatment by applying the NHT model
- O2 : posttest after treatment is given.

This study consists of two variables, namely the independent variable (x) and the dependent variable (y). The independent variable is the variable that gives influence while the dependent variable is the variable that is influenced. The independent variable in this study is the Number Head Together learning model while the dependent variable is the Mathematics learning outcomes of fourth grade students of SD Negeri 21 Lubuklinggau. This research will be conducted at SD Negeri 21 Lubuklinggau located on Jalan Garuda Hitam, Pasar Pemiri, Lubuklinggau Barat II District, Lubuklinggau City. The time used in this research was carried out on the date of issuance of the research permit, namely November 1, 2024. This research will be conducted in the even semester of 2024/2025 in April.

The population used in this study was all fourth-grade students of SD Negeri 21 Lubuklinggau in the 2024/2025 academic year, totaling 22 students from one class. The overall population of this study can be seen in Table 2.

Table 2. Research Population

Class	Gender		Number of students
	Man	Woman	
IV	0	22	22

(Source: Attendance of class IV of SD Negeri 21 Lubuklinggau)

A sample is a portion of the population's population and its characteristics. A representative sample must possess the characteristics or traits found in the population. This data collection technique involves selecting objects from the sample, a process called sampling. This study involved the entire population, so the sample was the same as the population. This study used saturated sampling. Saturated sampling is a sampling technique where all members of the population are used as samples. This is often used when the population is relatively small, less than 30 people, or when researchers want to make generalizations with minimal error. The data analysis techniques used in this study are: 1) determining the average value and standard deviation, testing data normality (x), and testing hypotheses.

3. FINDINGS AND DISCUSSION

Writing with the cooperative learning model of the Numbered Head Together (NHT) type was implemented in class IV of SD Negeri 21 Lubuklinggau in the 2024/2025 academic year, starting from April 18, 2025 to May 18, 2025. This writing sample was taken using a saturated sampling technique, namely class IV, totaling 22 students, was selected as a sample and given mathematics learning treatment with the Numbered Head Together learning model. In this writing, the number of face-to-face meetings was carried out four times, with details of two teaching meetings using the Numbered Head Together learning model, one Pre-test and one post-test followed by all class IV students. After the learning process was carried out using the Numbered Head Together learning model, the teacher conducted an evaluation by giving a test (Post-test). The test was carried out to determine the abilities or learning outcomes of students after being given learning with the Numbered Head Together learning model in learning mathematics on flat shapes.

Based on the calculation results, it can be stated that only 1 student achieved a score reaching the KKTP, namely 71. The results of the calculation of the average value and standard deviation of the pre-test data can be seen in table 3;

Table 3. Mean and Standard Deviation of Pre-test

No.	Description	Student	Pre-test Results	Family Card (KKTP)
1.	Average value	-	44.98	-
2.	Standard deviation	-	10.19	-
3.	The highest score	1	71	-
4.	Lowest value	1	26	70

Based on table 3, the highest value is 71 and the lowest value is 26 with an average value ($\bar{x}$) Overall, the fourth grade students of SD Negeri 21 Lubuklinggau were 44.98 and the standard deviation was 10.19. From these results, it can be understood that many students' abilities in learning mathematics with the material of plane shapes are still incomplete, so learning activities were carried out with the Numbered Head Together learning model at the next meeting. After completing the learning, a final test was carried out with the aim of knowing the learning outcomes of fourth grade students of SD Negeri 21 Lubuklinggau in learning mathematics with the material of plane shapes.

The final student ability results were obtained through a post-test. The test questions used were 10 essay questions, and 22 students participated in the post-test. The results of the calculation of the average value and standard deviation of the post-test data can be seen in Table 4.

Table 4. Mean and Standard Deviation of Post-test

No.	Description	Student	Post-test Results	Family Card (KKTP)
1.	Average value	-	82.74	-
2.	Standard deviation	-	12.30	-
3.	The highest score	1	96	-
4.	Lowest value	1	36	70

Based on Table 4, it is known that the highest score was 96 and the lowest score was 36. The results of this post-test were obtained after following the mathematics learning process using the Numbered Head Together model. In the pre-test, the average obtained was ($\bar{x}$) is 44.98 and the standard deviation is 10.19, so there is an increase in the average value, in the post-test results (final test) the number of students who got a score of more than or equal to 70 was 20 and 2 who got a score of less than or equal to 70.

The research data obtained from the post-test results were used to test statistically. The hypothesis in this study is "The mathematics learning outcomes of fourth-grade students of SD Negeri 21 Lubuklinggau after the implementation of the Numbered Head Together (NHT) cooperative learning model are significantly complete." In testing this hypothesis, a statistical hypothesis test using a one-tailed z-test was used, because the sample in this study was saturated sampling.

This normality test aims to see whether the student test result data is normally distributed or not, for more details on this normality test can be seen in Appendix E page 172. Based on the provisions in statistical calculations regarding the normality test using a confidence level of $\alpha = 0.05$, if $x_{\text{count}} < x_{\text{table}}$, then the data is normally distributed. Then if $x_{\text{count}} > x_{\text{table}}$ then the data is not normally distributed. The recapitulation of pre-test and post-test scores can be seen in table 5.

Table 5. Post-test Normality Test Results

Data	x_{count}	x_{table}	Conclusion	information
Post-test	7,3005	11,070	$x_{\text{count}} < x_{\text{table}}$	Normal

Based on Table 5, it shows that the x-count test value of the post-test value data is smaller than the x-table so that the conclusion is that the post-test data is normally distributed at a confidence level of $\alpha = 5\%$ and degrees of freedom (dk) = $6 - 1 = 5$. The x-table value obtained as seen in the table of chi-square values is 11.070.

Based on the normality test of normally distributed data, to test the hypothesis using the z test, the hypothesis tested is:

H_0 = The learning outcomes of fourth grade students at SD Negeri 21 Lubuklinggau after implementing the Numbered Head Together learning model are less than 70 ($\mu_1 < 70$).

H_a = The learning outcomes of fourth grade students at SD Negeri 21 Lubuklinggau after implementing the Numbered Head Together learning model were more than or equal to 70 ($\mu_1 > 70$).

Based on the statistical calculation provisions contained in Appendix E page 173 regarding the z-test with a confidence level of $\alpha = 5\%$, if $Z_{\text{count}} > Z_{\text{table}}$, this means that H_a is accepted and H_0 is rejected. The results of the z-test of the post-test data can be seen in table 6..

Table 6. Hypothesis Test Results

Data	Zhitung	Ztable	Information
Post-test	4.8625	1.64	H_a accepted, H_0 rejected

Based on table 6. shows the results of the post-test z-test with a calculated Z value ($4.8625 > Z_{\text{table}}$), this means that H_a is accepted and H_0 is rejected, meaning that the learning outcomes of fourth-grade students of SD Negeri 21 Lubuklinggau after implementing the Numbered Head Together learning model are more than 70 ($\mu_1 > 70$). Based on this description, a clearer picture of the data can be seen, the average value of the initial test and final test as well as student learning completeness can be seen in Figure 1.

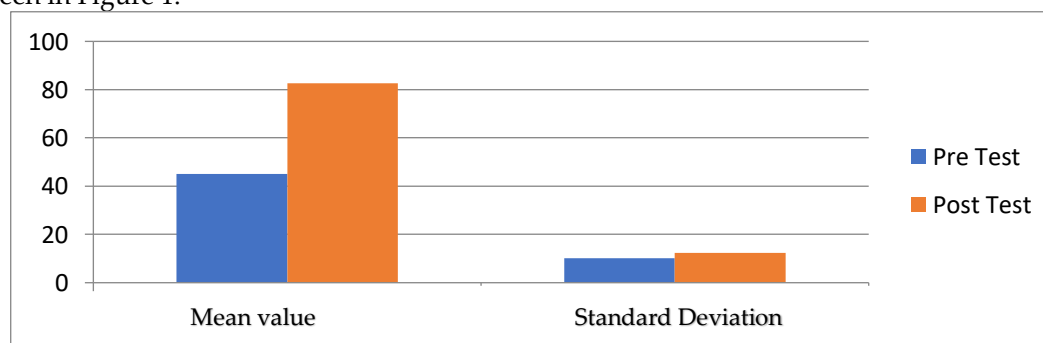


Figure 1. Mean and Standard Deviation Graph

Based on the graph above, it can be stated that the average value for the pre-test value obtained is 44.98 and the average value for the post-test value obtained is 82.74, meaning that there is an average increase of 37.76 in the pre-test data, there is 1 student who has completed the KKTP while in the post-test data there is an increase of 20 students who have completed and 2 have increased from the total number of fourth-grade students of SD Negeri 21 Lubuklinggau, which is 22 people. Thus, it can be concluded that the learning outcomes of students who use the Numbered Head Together learning model in mathematics learning for fourth-grade students of SD Negeri 21 Lubuklinggau are significantly completed.

Based on the research that has been conducted for one month, the use of the Number Head Together learning model can be used as an alternative in the teaching and learning process in the research conducted. In this study, the researcher used grade IV of SD Negeri 21 Lubuklinggau. From the results of the research conducted on a sample of 22 students, the distribution was normal. This research was conducted in four meetings. The data analysis technique was an essay-based test. The instrument used had previously been tested for validity and reliability with a total of 15 questions. After being tested, only 10 questions were suitable for use as a research instrument. The instrument trial was conducted on April 21, 2025, in grade VI of SD Negeri 21 Lubuklinggau.

The implementation of this research was carried out in four meetings with the details of the first meeting, namely the provision of an initial ability test (pre-test), to determine the initial abilities of students in learning Mathematics. The second and third meetings were treatment, students were given treatment in the form of learning using the numbered head together model. Then the fourth meeting was the provision of a final ability test (post-test), to determine the extent of students' Mathematics learning outcomes after the application of the numbered head together learning model. before the research process was carried out, an instrument trial was first conducted. The instrument trial was carried out in class V of SD Negeri 21 Lubuklinggau which was held in one meeting, namely on April 21, 2025, this trial was carried out to determine whether a question was valid or not and determine questions that were categorized as suitable for use in research in class IV of SD Negerin 21 Lubuklinggau.

At the first meeting, students were given an initial ability test (pretest) which was carried out on May 6, 2025. Based on the results of the pretest data calculation from 22 students, only 1 student got a score above the learning objective achievement criteria (KKTP) which was 70. While the other 21 students got a score below the learning objective achievement criteria. So, it can be concluded that the initial ability level of students before being given learning by implementing the numbered head together model has not reached completeness.

The second meeting, namely the author conducted treatment activities using the numbered head together learning model. The second meeting was held on May 15, 2025 in Mathematics learning material understanding the characteristics, types, and properties of polygonal plane shapes. The change in the teacher's teaching method was perceived by students as something new and required adjustments to the learning model used for students. One of the obstacles experienced by students was that students felt less confident in answering questions asked by the teacher related to the material that had been studied. This was seen when the teacher asked one of the students to solve a problem. At that time, students were divided into four groups and each group received a different number and was given a task to be completed together. This was not in accordance with the wishes that the author had previously expected. Thus, the author provided direction and guidance as well as motivation to students in the material taught so that students were more confident and brave in expressing their opinions and answering questions given by the researcher. The learning process at the third meeting which was held on May 16, 2025 with the material calculating the area and perimeter of polygonal plane shapes. The learning process this time was the same as the previous meeting, the difference was that this time the students were more focused and already understood the numbered head together model. In the Numbered Heads Together learning model, the teacher assigns each group a task to work

on together. The teacher asks each group to discuss the answer they consider most appropriate and ensures that each group member knows the answer and understands how to solve it. Then, the teacher calls on a student's number, and the student whose number is called presents the results of their group discussion. Next, the teacher provides feedback on the answers presented by the students. After that, the teacher guides students to summarize the material that has been taught.

In the third meeting, the author did not find any students who had difficulty in following the ongoing learning process because the students already understood the steps for implementing the numbered heads together model that had been carried out in the previous lesson, namely the material on understanding the characteristics, types, and properties of polygonal plane shapes, and each student had achieved quite satisfactory results in accordance with the previously planned learning objectives.

The fourth meeting, after the learning process by applying the Numbered Head Together learning model in Mathematics learning has been carried out, the researcher held a final ability test (post-test) on May 17, 2025. Based on the results of the post-test calculation with 22 students, it is known that the lowest score obtained by students is 36 and the highest score obtained by students is 96, with an average score of 82.74 and a standard deviation of 12.30. In the final ability test (post-test), students who got a score above the KKTP were 20 students, while 2 students got a score below the learning objective achievement criteria (KKTP) of 70, this was caused by students who still lacked confidence and were less able to work together in groups. So it can be concluded that the level of students' final ability (post-test) after being given learning by applying the NHT learning model has increased. It can be seen from the average post-test score (82.74) which is greater than the average pre-test score (44.98).

The results of this study indicate that the Mathematics learning outcomes of fourth-grade students of SD Negeri 21 Lubuklinggau after the implementation of the numbered head together learning model were significantly completed. After comparing the results of the initial test and the final test, it can be seen that there was an increase in learning outcomes. The increase that occurred was 38% when compared to the initial test data, after the implementation of the numbered head together learning model, the percentage of student completion reached 84%. Then, based on the hypothesis testing, it was obtained that $Z_{hitung} > Z_{tabel}$ or $Z_{hitung} (4.8625) > Z_{tabel} (1.64)$, thus the proposed hypothesis can be accepted as true, meaning that the mathematics learning outcomes of fourth-grade students of SD Negeri 21 Lubuklinggau after the implementation of the numbered head together learning model were significantly completed.

Furthermore, the results of the study are also in line with the results of research by Nuryanti Hutabalian, et al (2024) with the title "The Effect of Numbered Heads Together Type Learning Model on Student Learning Outcomes in Theme 7 Subtheme 1 Class V UPTD SD Negeri 121142 Pematangsiantar". The results of the study show that the number head together learning model has an effect on mathematics learning outcomes, obtained Pre-test and Post-test data, namely an average value of 42.41 and an average Post-test value. After data analysis using the t test, the data obtained $t_{count} > t_{table}$, $t_{count} = 17.913 > t_{table} = 2.093$. Therefore, it can be concluded that H_0 is rejected and H_a is accepted, which means H_a , in this study is accepted. So this indicates that there is an influence of the Numbered Heads Together learning model in UPTD SD Negeri 121142 Pematangsiantar. Based on the results of this study, it shows that the cooperative learning model of the Numbered Heads Together type has a very big influence on mathematics learning in elementary schools.

The results of this study are supported by the findings of researchers in the field during the teaching and learning process using the Numbered Heads Together model, students appear more active, students tend to be ready to participate in learning activities by first studying the material to be studied in class. With this numbered head together learning model, teachers explain the material with the lecture method can be reduced, so that students can better channel their own knowledge while the teacher functions more as a facilitator and director, in Mathematics learning using the numbered head together learning model allows students to work together in studying the material being studied. In this learning, students are trained to express opinions to their group friends and discuss to determine

the answer that is considered the most appropriate. Through this activity, students can obtain information and knowledge as well as understanding from friends and teachers.

Based on the results of previous research and the results of research conducted on the results of research that has been carried out in this thesis, the application of the numbered head together model can be used as an effective learning model in the teaching and learning process because it can make students active and enthusiastic in participating in the teaching and learning process and can also improve their learning outcomes.

4. CONCLUSION

Based on the results of the research that has been done, it can be seen that the average value in the pre-test (initial test) is 44.98 and the standard deviation is 10.19. While the average value of the post-test (final test) is 82.74 with a standard deviation of 12.30. Based on the hypothesis testing obtained $Z_{hitung} =$ and after consulting with Z_{tabel} on the Z distribution list with a significance level of 5% at degrees of freedom (dk) = 21, the data shows that Z_{hitung} (4.8625) > Z_{tabel} (1.64), then H_a is accepted and H_o is rejected. So, the hypothesis proposed in this study can be accepted as true, meaning that the Mathematics learning outcomes of fourth grade students of SD Negeri 21 Lubuklinggau after the Numbered Head Together learning model was implemented significantly completed.

Based on the research results and conclusions above, the author considers it necessary to provide suggestions, especially to further researchers. The results of this study can be used as a reference for conducting deeper research and increasing insight into the Numbered Head Together learning model.

REFERENCES

- Alberth, S. M., Halim, A., & Rosyid, A. (2020). Pengaruh kemampuan berpikir kreatif untuk meningkatkan hasil belajar matematika di sekolah dasar. *Jurnal Basicedu*, 4(4), 1291–1301.
- Amalia, L., Astuti, D. A., Istiqomah, N. H., Hapsari, B., & Daniar, A. S. (2023). *Model Pembelajaran Kooperatif*. Cahya Ghani Recovery.
- Andri, A., Olenggius, J. D., & Anastasia Helina, L. (2020). *Analisis faktor penyebab kesulitan belajar matematika pada siswa SDN 01 Nanga Kantuk*. *Analisis Faktor Penyebab Kesulitan Belajar Matematika Pada Siswa Sdn 01 Nanga Kantuk*.
- Arafat, Y., & Tanzimah, T. (2023). Analisis Faktor Kesulitan Belajar Matematika pada Materi Bangun Ruang di Kelas V SD Negeri 17 Air Salek. *Indonesian Research Journal on Education*, 3(1), 415–422.
- Arikunto, S. (2010). *Prosedur penelitian: Suatu pendekatan praktik*. Jakarta: Rineka cipta
- Artama, S., Djollong, A. F., Ismail, Lubis, L. H., Kalbi, R., Yulianti, R., Mukarramah, M., Mardin, H., Ibrahim, M. B., Fatih, T. A., Holifah, L., & Diana, P. Z. (2023). *Evaluasi hasil belajar*. PT. Mifandi Mandiri Digital.
- Astini, N. W., & Purwati, N. K. R. (2020). *Strategi Pembelajaran Matematika Berdasarkan Karakteristik Siswa Sekolah Dasar*. *Emasains*, 9(1), 1–8. Bandung: Alfabeta.
- Briliandika, D., Putra, D. A., & Afiani, K. D. A. (2021). Analisis Model Pembelajaran NHT Dalam Meningkatkan Kemampuan Berpikir Kritis. *INVENTA: Jurnal Pendidikan Guru Sekolah Dasar*, 5(1), 16–29.
- Dakhi, A. S. (2020). Peningkatan hasil belajar siswa. *Jurnal Education and Development*, 8(2), 468–470. Institut Pendidikan Tapanuli Selatan.
- Darman, R. A. (2020). *Belajar dan pembelajaran*. Guepedia.
- Egok, A. S., Andeli, A. P., & Sofiarini, A. (2021). Penerapan model pembelajaran outdoor learning pada pembelajaran tematik siswa kelas V SD Negeri Tanjung Beringin. In *Seminar Nasional Hasil Riset dan Pengabdian* (Vol. 3, pp. 200–205).
- Endayani, T. B., Rina, C., & Agustina, M. (2020). *Metode demonstrasi untuk meningkatkan hasil belajar siswa*. *azkiya*, 5(2), 150–158.