



Concept Understanding Ability and Students Belief through Think Talk Write Learning Model Using Cube Origami Media

Indah Suryawati¹, Khairul Asri², Nur Ainun³, Rahmani⁴, Rifaatul Mahmuzah⁵

^{1,4} Elementary School Teacher Education, Serambi Mekkah University Banda Aceh, Indonesia

^{2,3,5} Mathematics Education, Serambi Mekkah University Banda Aceh, Indonesia

Correspondence: ✉ Indah.Suryawati@SerambiMekkah.ac.id

Article Info	Abstract
Article History Received: 24-09-2021 Revised: 29-11-2021 Accepted: 30-11-2021	Elementary school is the main foundation in developing an understanding of mathematical concepts. If the basic understanding of students' concepts is not good or weak, students cannot solve math problems. Therefore, understanding the concept is essential to help students in learning mathematics. The teacher does not optimize the methods, strategies, or learning models in the learning process. So far, the learning process is only guided by explanations or examples of questions. As a result, when students are faced with different questions, students have difficulty solving problems. It happens because of the lack of students' conceptual understanding skills. The purpose of this study was to determine the increase in the ability to understand the concept by using origami media through the Think Talk Write (TTW) learning model. This study uses a quantitative approach, while the design used in this study is the Pre-Experiment One group pre-test and post-test design. The population in the study were all fifth-grade students at SD Negeri 42 Banda Aceh, totaling 50 students, consisting of students in class VA-1 as the Experiment class, while in class VA-2 as the Control class. Based on the analysis of research data, it is stated that the significant value (2-tailed) N-Gain score is 0.000 less than 0.05, so H_0 is rejected, and H_a is accepted. Thus, it can be concluded that there is an increase in the concept understanding ability and belief taught with origami media and through the TTW model with using conventional learning.
Keywords: Belief; Concept Understanding Ability; Cube Origami Media; Mathematics Learning; Think Talk Write (TTW).	

INTRODUCTION

The branch of science that uses logic and is universal can play a role in developing modern technology known as mathematics. Learning mathematics includes several things, namely: the ownership of values and attitudes, understanding concepts, and the ability to apply them in everyday life [1]–[3] [4]. Mathematics has been applied at all education levels to solve a problem logically, analytically, critically, and creatively [6]–[9]. One of the mathematical abilities needed in learning mathematics based on the goal is understanding the concept [2]. Many students do not understand the concepts of learning mathematics [2], [3], [10]. Students often make mistakes due to miscalculations, or students' thinking ability in responding to mathematical language is still lacking. Some teacher learning processes have not optimized the use of learning media, so students in learning so far only memorize concepts, not understand. As a teacher, it is better to provide several learning media that make students more active and learn more meaningfully, especially in the mathematics learning process [3]. Especially in the cube and block material, it is better to use learning media to improve students' understanding of concepts in learning mathematics. In this case, origami paper media can motivate students. Because using origami paper, students can feel and participate directly in making cube units. Giving assignments to

students through origami media can improve children's fine motor skills [4]. Origami media can improve understanding concepts through the TPS model [5].

Origami can develop students' learning motivation. Learning becomes fun and interesting. So that learning using origami media is a student-centered learning activity [11], [12]. At the same time, the teacher is only a guide. Thus, what they learn becomes knowledge based on learning experiences [13]–[15]. In addition to using learning media, it will be better in using a learning model. The relevant model for understanding concepts through origami paper media is the T²W learning model because, in this model, students are required to think. In thinking activities, students are faced with problems in printed books and apply how to use origami paper media to make cubes and blocks units in applying the area and volume concept. After the thinking stage, students then communicate (Talk). Students must be skilled in speaking (verbal communication), speaking skills with friends, and interacting with fellow groups using the language they understand can foster students' belief in learning mathematics [16]. Expressing opinions when making cube units and applying them in solving problems regarding the area and volume students do not hesitate to express opinions even though the opinions expressed are not suitable, the courage to express opinions with colleagues can foster student belief which in the end can express opinions in front of the class and teacher. Moreover, finally in the writing stage (Write), at this stage, students write down the results of the discussion/dialogue on the worksheet provided. Student activities during this stage are (1) writing solutions to problems/questions given, including when making cube units, (2) solving mathematical problems related to cubes and blocks, calculating area, and calculating volume with origami paper media rocks in cube units, carefully written step-by-step. (3) Correcting all work so that you are sure that no work or calculation is left behind, (4) believing that the best work is complete, easy to read, and guaranteed authenticity [4].

T²W learning model also involves students to dialogue independently after reading, discussing, and sharing ideas with other students, then writing down the discussion results. The method in this T²W model can be applied effectively in heterogeneous groups consisting of 3-5 students [8]. Through the T²W learning process model based on pictures, the teacher explains in outline the material to be studied through the T²W learning model. Then students are distributed the width of the student work where on the student worksheet, students will solve a problem related to the mathematical material described. by the teacher. Then students start learning meaningfully with the T²W learning model. Students begin to understand the concept of learning and take notes on the results of their understanding individually, to be brought to a discussion forum, then students interact and collaborate with friends to discuss alternative answers. The teacher acts as a mediator of the learning environment. In the last step, students construct their knowledge due to collaboration. After everything is finished, the teacher asks students individually to explain ahead [9].

METHOD RESEARCH

This study used a quantitative approach, while the design used a Quasi Experiment Pre-test and Post-test Control Group Design. The data needed in this study will be collected by providing math problems related to understanding concepts in expressing mathematical ideas using origami media through the T²W learning model. At the same time, the test instrument is used to measure the ability to understand the concepts in this study in the form of math problems. Before being

given treatment, the researcher first gave a preliminary test to students by giving math test questions related to understanding the concept. And then, the researchers gave treatment by providing knowledge about the concept understanding ability related to cubes and blocks with origami media and techniques using the TTW learning model in solving mathematical problems.

The population in the study were all students at SD Negeri 42 Banda Aceh, totaling 226 students, consisting of students from grades I to grade VI. The sample selection in this study used a purposive sampling technique because mathematics has been applied explicitly in high grades, namely grades IV, V, and VI. The researcher chose fifth-grade students from the three classes as the sample in this study, considered capable of standard compared to grades IV and VI. The sample in this study were students in class VA-1 as the Experiment class, while in-class VA-2 as the Control class.

The data analysis in this study aims to see an increase in the concept understanding ability using the N-Gain formula by determining in advance (1) the Normality Test is used to determine whether the data is standard using the *Kolmogorov-Smirnov* statistical test, (2) Homogeneity test to determine whether the experimental and control class have the same variance. The test used is *Levene's Test*, and (3) The average difference test; if the two groups are typically distributed and homogeneous, the statistical test used is the t-test using SPSS for windows.

RESULT AND DISCUSSION

Concept Understanding Ability in TTW Learning Using Cube Origami Media

1. Pre-test Data Analysis of Concept Understanding Ability

To conduct a pre-test, namely to find out the similarity of students' initial abilities to the ability to understand concepts in building material, the data from the pre-test were tested to see the similarity of the two averages. The following is a descriptive statistical analysis of the experimental and control class pre-test data.

Table 1. Descriptive Statistics Pre-Test Data Understand Concepts Ability

Class	N	Min	Max	Mean	Variance	Std. Deviation
Experimental	15	42.00	64.00	53.73	32.210	5.68
Control	14	45,00	60.00	52.36	18.401	4.29

The experimental and control class's average pre-test scores are 53.73 and 52.36, with a standard deviation of 5.68 for the experimental class and 4.29 for the control class. These results indicate a difference between the students' average pre-test in the experimental and control classes. However, to determine whether the difference is significant or not, a statistical analysis test is carried out, including normality test, homogeneity test, and average difference test.

a. Normality Test Pre-test Concept Understanding Ability

The normality analysis results of the Kolmogorov-Smirnov test for the pre-test data for the experimental and control class are presented in table 2 below.

Table 2. Normality Test Results of Pre-test Data Concept Understanding Ability

Class	Kolmogorov-Smirnov _a			Hypothesis
	Statistic	df	Sig.	
Experimental	0.167	15	0.200	H ₀ accepted
Control	0.160	14	0.200	H ₀ accepted

The pre-test score of the experimental class's conceptual understanding ability has a significant value. more than $= 0.05$ that is 0.200, and the control class has a signification value more than $= 0.05$ that is 0.200. shows that the pre-test data of the experimental and control classes are normally distributed and will be continued with the homogeneity test.

b. Homogeneity Test Pre-test Concept Understanding Ability

Table 3. Results of Homogeneity of Pre-test Data on Concept Understanding Ability

Class	Levene	Sig.	Hypothesis
Experimental	0.406	0.529	H_0 accepted Homogent
Control			

The pre-test score of the concept understanding ability of the experimental and control class has a significant value of more than $= 0.05$, i.e., 0.529. it shows that the experimental and control classes' pre-test data are homogeneous. Furthermore, it will be continued with the test of the difference in the average N-gain ability to understand concepts in the experimental class and control class which is carried out to answer the hypothesis.

c. Test of mean difference Pre-test of concept understanding ability

Table 4. Results of the Difference in Average Pre-test of Concept Understanding Ability

Class	t-count	Sig. (2-tailed)	Hypothesis
Experimental	0.732	0.470	H_0 rejected
Control			

A significance level of $= 0.05$, the Sig value is obtained. (2-tailed) is 0.470 so that H_0 is accepted, and H_a is rejected. Thus, it can be concluded that there is no difference in the average pre-test between the experimental and control class taught using the TTW learning model. It means that the initial ability to understand the concepts of the experimental and control class students is the same.

d. Post-test Data Analysis Concept Understanding Ability

After learning, a post-test was conducted by applying the TTW model for the experimental class and learning with conventional learning in the control class. Post-test is carried out when learning has ended or at the last meeting. The following is a descriptive analysis of post-test data for the experimental and control classes.

Table 5. Descriptive Statistical Results of Post-test Data Ability to Understand Concepts

Class	N	Min	Max	Mean	Variance	Std. Deviation
Experiment	15	76,00	97,00	90,33	40,95	6,39
Control	14	68,00	82,00	75,71	17,45	4,18

The average post-test ability of the experimental class is 90.33 and 75.71 in the control class. The average post-test of the two classes has increased compared to the average pre-test of the ability to understand concepts before.

2. Analysis of Concept Understanding Ability Improvement

Furthermore, to determine whether the increase in the ability to understand the experimental and control class concept is significantly different, it is necessary to test the average difference on the N-gain data from the two classes. By the purpose of the N-gain calculation, namely, to determine the increase in the ability to understand concepts after learning by applying the TTTW model for the experimental class and learning with the application of conventional learning in the control class, the N-gain data was tested to find out a better improvement between the two classes that were sampled in this study. Descriptive statistics on the N-gain value of the experimental and control class can be seen in the table 6.

Table 6. Descriptive Statistics of N-gain Data Concept Understanding Ability

Class	N	Mean	Variance	Std. Deviation
Experimental	15	0.796	0.014	0.118
Control	14	0.476	0.015	0.124

It can be seen that the average N-gain in the control class and the experimental class is 0.79 and 0.47. The data shows that the average increase in the ability to understand concepts of experimental class students is better than the control class. However, further statistical tests are needed to determine that the improvement in the experimental class is better than the control class, namely using a two-mean difference test or t-test.

a. N-Gain Normality Test Ability Concept Understanding Ability

Table 7. Results of the N-Gain Data Normality Test for Concept Understanding Ability

Class	Kolmogorov-Smirnov _a			Hypothesis
	Statistic	df	Sig.	
Experiment	0.200	15	0.133	H ₀ accepted
Control	0.290	14	0.002	H ₀ rejected

The N-Gain score for the concept understanding ability of the experimental class has a Sig value of more than 0.05, that is 0.133, while the control class is less than the value of 0.002. it shows that the experimental class N-Gain data is normally distributed and the control class N-Gain data is not normally distributed. The test of two independent samples must first be tested regarding the normality and homogeneity of the two variances, with the criteria that if the two groups are normally distributed. It will be continued on the homogeneity test of the two variances. If it produces a homogeneous variance, proceed with the t-test and if it produces an inhomogeneous variance, proceed with the t-test. If the two groups or one of the sample groups are not normally distributed, then proceed with the Non-parametric statistical test, in this case, the Mann-Whitney Test. Based on the data processing results in Table 4.7, one of the sample groups is not normally distributed, then the test of the average difference between the two pre-test data is carried out with a non-parametric test, namely the Mann Whitney Test.

b. N-Gain Average Difference Test Concept Understanding Ability

Table 8. Test Results for Differences in Average N-Gain Concept Understanding Ability

Mann-Whitney	Sig (2-tailed)	Hypothesis
1.000	0.000	H_0 rejected

Table 8 above shows that the N-Gain score's significant value (2-tailed) is 0.000 less than 0.05. Thus, it can be concluded that there is an increase in the N-Gain ability to understand concepts taught by the T²TW model with an average N-Gain ability to understand concepts taught by conventional learning. If viewed from the average value of N-Gain in the experimental and control class, the experimental class N-Gain value is higher than the control class, so it can be concluded that the increase in the ability to understand concepts of the experimental students is better than the control class.

The results of hypothesis testing indicate a significant increase in the ability to understand concepts between students who get the T²TW model and students who get a conventional approach. It indicates a significant increase in the concept understanding ability between students who get the T²TW learning model and students who get a conventional approach. These findings strengthen that the cooperative learning model is better than conventional learning [17], [18], and Setiyaningrum concluded that understanding mathematical concepts among students taught with a realistic mathematics approach was better than conventional learning [19]. Likewise, it will increase with testing the belief hypothesis after being taught using the T²TW learning model.



Figures 1 and 2. The understanding concept activity of a cube using Origami Paper in the Writing Stage of the T²TW Model

Based on the pre and post-test results, a normalized gain (N-Gain) was obtained with the formula in the Sundayana [20] that the average normalized gain for the concept understanding ability was obtained by a significant (2-tailed) N-Gain score 0.000 less than 0.05. Thus, it can be concluded that there is a difference between the average N-Gain of the concept understanding ability taught by the T²TW and the average N-Gain of the concept understanding ability taught by conventional learning. If viewed from the average value of N-Gain in the experimental and the control class, the experimental class N-Gain value is higher than the control class, so it can be concluded that the increase in the concept understanding ability of the experimental class students is better than the control class.



Figures 3 and 4. The understanding Concept Activity of a Cube Using Origami Paper in the Talk Stage of the T²W Model

The results obtained from the study were significantly more able to improve students' conceptual understanding skills with cooperative learning than conventional, although the results obtained were not satisfactory. The results of this study strengthen the findings made by Suci that students' understanding using the T²W model is better than understanding concepts using conventional learning. In other words, the T²W learning model affects understanding the concept [21].

Students' Belief in T²W Learning Using Cube Origami Media

1. Results of Research Implementation of Belief Pretest Data Analysis

Belief data was obtained from filling beliefs in the experimental and control classes. The data obtained is in the form of ordinal data so that before being processed using statistical tests, the data must first be converted into interval data using the *Method of Successive Interval* (MSI). The following is a descriptive statistical analysis of the belief pre-test data for the experimental and control classes.

Table. 9 Descriptive Statistics of Student Pretest Belief Data

Class	N	Minimum	Maximum	mean	Variance	Std. Deviation
Experiment	15	50.92	68,60	59,00	23,169	4,813
Control	14	52.45	62.43	56,344	7,686	2,772

The average pre-test scores of the experimental and control class are 59.00 and 56.34, with a standard deviation of 4.813 for the experimental class and 2.772 for the control class. These results indicate that the average pre-test of students in the experimental and control classes is the same. However, statistical analysis tests were carried out to determine whether the two pre-test averages were significantly the same, including normality, homogeneity, and average difference tests.

a. Belief Normality Pretest

The pre-test normality was conducted to see if the data came from a normally distributed population. The normality analysis of the *Kolmogorov-Smirnov* test for pre-test data for the experimental and the control class are presented in Table 10 below.

Table 10. Normality Test Results of Pretest Belief Data

Class	Kolmogorov-Smirnov ^a			Conclusion
	Statistics	df	Sig.	
Experiment	0.110	15	0.200	H ₀ accepted
Control	0.175	14	0.200	H ₀ accepted

The experimental and control class's belief pre-test scores have a sig value. greater than $\alpha = 0.05$ is 0.200 and 0.200 experimental class control class. It means that H₀ is received, or the pre-test experimental class and the control class are derived from a normally distributed population.

b. Belief Pretest Homogeneity Test

Testing the homogeneity of variance N-gain was carried out using *Levene Statistical Test*

Table 11. Homogeneity of Belief Pretest Data Results

Class	Levene	Sig.	Conclusion	Description
Experiment	3.642	0.067	accept	Homogeneous
Control				

The belief pre-test scores of the experimental and control classes have a significant value of 0.067, more excellent than $= 0.05$. it means that the pre-test of both classes has a homogeneous variant.

c. Difference mean pre-test belief in the experimental and the control class

Table 12. The Difference in Average Pretest Belief Results

Class	t-count	Sig. (2-tailed)	Conclusion
Experiment	1.633	0.114	Reject H ₀
Control			

It can be concluded that there is no difference in pre-test between the experimental and control class, which is taught using the *think talk write* learning model. It means that the initial ability of students' belief in the experimental and control class is the same.

2. Belief Post-Test Data Analysis

Post-test was carried out after learning by applying the *think talk write* model to the experimental class and learning conventional learning to the control class. Post-test is carried out when learning has ended or at the last meeting. The following is a descriptive analysis of the experimental and control class post-test data.

Table 13. Descriptive statistics Belief Data Post-Test

Class	N	Minimum	Maximum	mean	Std. Deviation
Experiment	15	65.58	87.23	76.52	6,444
Control	14	59.26	77.65	69.76	4,633

Table 5. shows that the average post-test belief in the experimental class is 76.52 and in the control class 69.76. The average post-test of the two classes has increased compared to the previous average belief pre-test.

a. Analysis of Increased Belief

Furthermore, to determine whether the increase in the belief of the experimental and control class is significantly different, it is necessary to test the average difference on the N-gain data from the two classes. For the N-gain calculation, namely, to determine the increase in belief after learning by applying the think talk write model for the experimental class and learning with the application of conventional learning in the control class, the N-gain data was tested to find out a more significant improvement between the two classes that were sampled in this study. The following table shows the descriptive statistics of the experimental and control class's N-gain value.

Table 14. Descriptive Statistics of N-gain Belief

Class	N	mean	Variance	Std. Deviation
Experiment	15	0.5569	0.026	0.1614
Control	14	0.3837	0.015	0.1209

Based on Table 6. above, it can be seen that the average N-gain of the control class and the experimental class is 0.55 and 0.38. These data indicate that experimental class students' average increase in belief (belief) is better than the control class. However, further statistical tests are needed to determine that the improvement in the experimental class is better than the control class, namely using a two-mean difference test or t-test.

b. Belief N-Gain Normality Test

They are testing the N-gain normality of students' beliefs using the *Kolmogorov-Smirnov test* through SPSS 16.0 at a significance level of $\alpha = 0.05$. The complete calculation can be seen in the following normality test.

Table 15. Normality Test Results of Student belief N-gain Data

Class	Kolmogorov-Smirnov ^a			Conclusion
	Statistics	df	Sig.	
Experiment	0.174	14	0.200	H ₀ accepted
Control	0.127	14	0.200	H ₀ accepted

Based on Table 7. it can be seen that the significant value of N-gain for both classes is more than 0.05. The experimental class N-gain data and control class N-gain data are typically distributed. Because the two data are typically distributed, it will be continued on the homogeneity test of the two variances.

c. Belief N-Gain Homogeneity Test

Based on the normality test results, it is known that the belief N-Gain data for the two classes are typically distributed. The next step is to test the homogeneity of the two data. The results of the analysis of the homogeneity of variance of *Levene Statistical Test* for the experimental and control class pre-test data are presented in Table 16.

Table 16. Results of Homogeneity Test of Students' Belief N-gain Data

Aspect	Class	Levene Statistics	Sig.
Belief	Experiment	2.200	0.150
	Control		

The table shows the N-Gain score of students' belief in the experimental class, and the control class has a significant value of 0.150, more incredible than $= 0.05$. It means that H_0 is accepted, or in other words, the N-Gain of the two classes has a homogeneous variance. Because the two sample groups have homogeneous variants, it will be continued with the t-test.

d. N-Gain Average Difference Test Student Belief

The test of the difference in the mean N-gain of students' beliefs in the two classes aims to prove the first hypothesis. Calculations using SPSS, a significance level of $= 0.05$. The calculation can be seen in table 17.

Table 17. Test Results of Differences in the Average N-Gain of Students' Belief

T _{count}	sig (2-tailed)	Description
3.250	0.003	H_0 rejected

Table 17 shows that the N-gain belief students have a sig value. (2-tailed) $= 0.033$. Because of the value of sig. (2-tailed) $<$ Significance level ($\alpha = 0.05$), so it is rejected, and H_a is accepted. Thus it can be concluded that there is a difference between the average N-Gain of beliefs taught by the think talk write (TTW) learning model and the average N-Gain of beliefs taught by conventional learning. If viewed from the average N-Gain value of the experimental class and control class, the experimental class N-Gain value is higher than the control class, so it can be concluded that the increase in students' belief in the experimental class is better than the control class.

Learning mathematics through Think Talk Write (TTW) learning has increased the students' belief in learning at SD Negeri 42 Banda Aceh in class V on the material of building space. This effort to increase learning belief can occur because students are accustomed to making small notes or expressing their ideas and are accustomed to communicating mathematical ideas to friends and teachers in front of the class, then this can have a positive impact on students' belief in learning, without hesitation students can easily express ideas. Students learn through thinking, discussing, and presenting the results of their learning in front of the class.

Students who take conventional learning are treated the same as students in the experimental class, only in the control class. Not all students want to play an active role in learning because students in conventional classes only apply ordinary learning and do not require students to think individually and write individually. Students are only expected to solve problems with group members. It turned out that what happened in the field was only a few active students in groups. The task of group members was still expected for intelligent students, while others were busy with activities outside of learning. Therefore, almost the average students in conventional classes are not sure of their abilities in learning mathematics. With some of these explanations, it can be said that the learning belief of students who are taught with the TTW learning model is better than students who are taught conventionally.

Students' learning beliefs are influenced by themselves and the environment, but the learning model affects the formation of students' learning beliefs [22]. TTW is a new learning model for students, so students who have not adapted feel less confident in solving the problems given. In addition, increasing student learning belief also takes a relatively long time. Students' learning belief in mathematics is formed through a long process because it first passes through the stages of emotion and attitude, then there is the formation of beliefs, and finally, the formation of values [23].

Based on the research results described previously, it is known that the learning belief of the students of SD Negeri 42 Banda Aceh in class V has increased after the implementation of TTW on circle material. Based on student learning belief questionnaires given during pre-action and at the second RRP meeting. Based on the analysis of the results of the pre and post-test students' belief questionnaires, a normalized gain (N-Gain) was obtained using the formula developed by Sundayana [20] that the N-gain of students' beliefs had a Sig value. (2-tailed) = 0.033. Because of the significant value (2-tailed) < Significance level ($\alpha = 0.05$), so it is rejected, and H_a is accepted. Thus, it can be concluded that there is a difference between the average N-Gain of beliefs taught with the TTW model and the average N-Gain of beliefs taught by conventional learning. If viewed from the average N-Gain value of the experimental class and control class, the experimental class N-Gain value is higher than the control class, so it can be concluded that the increase in the belief of the experimental class students is better than the control class.



Figures 5 and 6. Belief after Learning with the TTW Model with origami Paper Media

The achievement cannot be separated from the researcher's role during the learning process. The researcher has prepared the suitability between the actions taken by the researcher and the action plans in the lesson plans and the fifth-grade students of MTs Negeri 42 Banda Aceh who work together during the learning process.

CONCLUSIONS AND SUGGESTIONS

Based on the pre and post-test results, the normalized gain (N-Gain) shows that the average normalized gain for understanding concepts is significant (2-tailed). The N-Gain score of 0.000 is less than 0.05. It can be concluded that there is an increase in the students' concept understanding ability taught by the TTW learning model Using Cube Origami Media.

REFERENCES

- [1] K. Adbo and C. V. Carulla, "Learning About Science in Preschool: Play-Based Activities to Support Children's Understanding of Chemistry Concepts," *IJEC*, vol. 52, no. 1, Art. no. 1, Apr. 2020, doi: <https://doi.org/10.1007/s13158-020-00259-3>.
- [2] Eriana, Kartono, and Sugianto, "Understanding Ability of Mathematical Concepts and Students' Self-reliance towards Learning by Implementing Manipulative Props (APM) on Jigsaw Technique," *Journal of Primary Education*, vol. 8, no. 2, Art. no. 2, 2019.
- [3] M. Hariyono and N. Ulia, "Development Teaching Materials of Mathematics Basic Concepts Based on Internalization of Islamic Value to Increasing Concept Understanding Ability," *Jurnal Pendidikan Dasar : Jurnal Tunas Nusantara*, vol. 2, no. 1, 2020.
- [4] E. Suyanto, "Pembelajaran Matematika Dengan Strategi TTW Berbasis Learning Journal untuk Meningkatkan Kemampuan Menulis Matematis," *Kreano, Jurnal Matematika Kreatif-Inovatif*, vol. 7, no. 1, pp. 58–65, 2016, doi: <https://doi.org/10.15294/kreano.v7i1.5001>.
- [5] D. Aswita, S. Putu, and S. Suyanto, "Local Wisdom of Sabang Island Society (Aceh, Indonesia) in Building Ecological Intelligence to Support Sustainable Tourism," *GeoJournal of Tourism and Geosites*, vol. 22, p. 393, Jan. 2018, doi: <https://doi.org/10.30892/gtg.22210-297>.
- [6] Kardoyo, Ahmad Nurkhin, Muhsin, and Hengky Pramusinto, "Problem-Based Learning Strategy: Its Impact on Students' Critical and Creative Thinking Skills," *European Journal of Educational Research*, vol. 9, no. 3, Art. no. 3, Jul. 2020.
- [7] E. Bektishi, "The 'Fours Cs - Collaboration, Communication, Critical Thinking And Creativity At The Faculty Of Arts (FLUP), University Of Porto, Porto, Portugal," *Journal of International Social Research*, vol. 10, pp. 56–62, Jun. 2017, doi: <https://doi.org/10.17719/jisr.2017.1638>.
- [8] S. Rejeki, R. Riyadi, and S. Siswanto, "Problem Based Learning and Guided Inquiry Learning Model on Critical Thinking Ability," *International Journal on Emerging Mathematics Education*, vol. 5, no. 1, Art. no. 1, Mar. 2021, doi: <https://doi.org/10.12928/ijeme.v5i1.19939>.
- [9] Choirudin, M. S. Anwar, I. N. Azizah, Wawan, and A. Wahyudi, "Pengembangan LKPD Matematika Berbasis Kaligrafi dengan Pendekatan Guided Discovery Learning," *Jurnal Pendidikan Matematika (JPM)*, vol. 7, no. 1, Art. no. 1, Jan. 2021, doi: <https://doi.org/10.33474/jpm.v7i1.6738>.
- [10] S. Abramovich, A. Z. Grinshpan, and D. L. Milligan, "Teaching Mathematics through Concept Motivation and Action Learning," *Education Research International*, vol. 2019, p. e3745406, Apr. 2019, doi: <https://doi.org/10.1155/2019/3745406>.
- [11] M. Bafadal, "The Use of Origami in Teaching Writing Procedure text of the Second Grade at SMA Muhammadiyah Mataram," *Linguistics and Elt Journal*, vol. 9, p. 31, Mar. 2019, doi: <https://doi.org/10.31764/leltj.v9i1.734>.
- [12] M. Toyib and N. Ishartono, "An Analysis of the Possibility of Origami Implementation in Mathematics Learning Process in Indonesia," *Advances in Social Science, Education and Humanities Research*, vol. 212, no. 2, Dec. 2018, doi: <https://doi.org/10.2991/icei-18.2018.32>.
- [13] D. Kö, "Use of Origami in Mathematics Teaching: An Exemplary Activity," *Asian Journal of Education and Training*, vol. 6, no. 2, p. 13, 2020, doi: [10.20448/journal.522.2020.62.284.296](https://doi.org/10.20448/journal.522.2020.62.284.296).
- [14] L. Darling-Hammond, L. Flook, C. Cook-Harvey, B. Barron, and D. Osher, "Implications for educational practice of the science of learning and development," *Applied Developmental*

- Science*, vol. 24, no. 2, Art. no. 2, Apr. 2020, doi: <https://doi.org/10.1080/10888691.2018.1537791>.
- [15] L. S. Keiler, "Teachers' roles and identities in student-centered classrooms," *International Journal of STEM Education*, vol. 5, no. 1, p. 34, Sep. 2018, doi: 10.1186/s40594-018-0131-6.
- [16] M. M. L. Siahaan and E. E. Napitupulu, "The Difference of Students' Mathematical Communication Ability Taught by Cooperative Learning Model Think Talk Write Type and Numbered Head Together Type," *1*, vol. 8, no. 3, Art. no. 3, Sep. 2018, doi: <https://doi.org/10.24246/j.js.2018.v8.i3.p231-242>.
- [17] N. Ainin, "Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Matriks dan Kaitannya dengan Motivasi Belajar Matematika Pada Kelas XI," *Euclid*, vol. 7, no. 2, Art. no. 2, Jul. 2020, doi: <https://doi.org/10.33603/e.v7i2.3122>.
- [18] Q. Ainin, M. Mulyono, and E. Syahputra, "Development of Cooperative Learning Think-Talk-Write (TTW) Models Based on Batak Culture to Improve Students' Mathematical Critical Thinking Ability," *Al-Jabar: Jurnal Pendidikan Matematika*, vol. 11, pp. 287–298, Dec. 2020, doi: <https://doi.org/10.24042/ajpm.v11i2.7289>.
- [19] E. Setyaningrum and I. Istiqomah, "Efektivitas Penerapan Model Pembelajaran Think - Talk - Write Terhadap Prestasi Belajar Matematika Siswa Kelas VII SMP Negeri 3 Magelang," *UNION: Jurnal Ilmiah Pendidikan Matematika*, vol. 3, no. 1, Art. no. 1, Mar. 2015, doi: <https://doi.org/10.30738/.v3i1.270>.
- [20] R. Sundayana, *Statistika Penelitian Pendidikan*. Bandung: Alfabeta, 2019.
- [21] S. Indrayani, "Model Pembelajaran Kooperatif Tipe Think Talk Write dan Pengaruhnya Terhadap Pemahaman Konsep Matematika Peserta Didik," *Jurnal Edukasi dan Penelitian Matematika*, vol. 7, no. 2, Art. no. 2, Jun. 2018.
- [22] A. Sabrina, S. Suyono, and W. Rahayu, "The Influence Of Thinking Styles and Mathematical Beliefs On The Elementary Mathematics Teacher's Communication Ability," *Jurnal Cendekia: Jurnal Pendidikan Matematika*, vol. 3, no. 2, pp. 238–248, Aug. 2019, doi: <https://doi.org/10.31004/cendekia.v3i2.101>.
- [23] M. Y. Mazana, C. S. Montero, and R. O. Casmir, "Investigating Students' Attitude towards Learning Mathematics," *Int Elect J Math Ed*, vol. 14, no. 1, Dec. 2018, doi: <https://doi.org/10.29333/iejme/3997>.