The Influence of Cooperative Learning Model Type Think Talk Write (TTW) on Students Mathematical Communication Skills

Siti Jaizah Faridah[1*], Nurul Hikmah[1], Syahrul Azmi[1]

[1] Siti Jaizah Faridah, Matemathics Eduation, University of Mataram, Mataram, Indonesia.

Abstract: This research was conducted to determine the effect of cooperative learning model type think talk write (TTW) on mathematical communication skills in students of SMPN 13 Mataram class VIII on statistics material. Quantitative approach with quasi experimental method was used in this research. The population in this study was all VIII grade students of SMPN 13 Mataram consisting of five classes, with a sample consisting of two classes, namely class VIII E as an experimental class using the cooperative learning model of think talk write (TTW) type and class VIII A as a control class using direct learning model. Data collection techniques used observation sheets, documentation, and tests. The results of data analysis showed that there was an average difference between the experimental and control classes. The t-test results obtained a t-count value of 2,939, and the t-table value obtained a value of 1,669, indicating that the t-count value was greater than the t-table. Thus, the Think Talk Write (TTW) cooperative learning model has a positive effect on students' mathematical communication skills. This research suggests the application of TTW model as an effective learning strategy to improve students' mathematical communication skills at junior high school level.

Keyword: Cooperative Learning Model; Mathematical Communication Ability; Think Talk Write (TTW).

INTRODUCTION

Mathematics is considered as one of the important subjects and is always present in all levels of education. Mathematics learning is carried out with a specific purpose, namely to train students' ability to convey and communicate their thoughts through symbols, tables, diagrams, or other learning media to explain existing problems (Suhenda & Munandar, 2023). Good mathematical communication skills can make students understand mathematics better and become more proficient in mathematical reasoning (Monariska, Jusniani, & Sapitri, 2021)

Mathematical communication skills are important for students to have in order to communicate ideas and results obtained, so that they can improve concept understanding (Azmi, Hayati, Hapipi & Triutami, 2021). According to Arina & Nuraeni (2022) indicators of mathematical communication ability are a) explaining mathematical ideas and models (pictures, tables, graphs, and algebra), b) being able to use mathematical terms, symbols, and structures, to present ideas describe

relationships and situations, express real objects situations and daily events into the form of mathematical models (pictures, tables, diagrams, graphs, and algebra).

Based on the results of interviews and observations at SMPN 13 Mataram in class VIII, the teacher revealed that many students do not have good mathematical communication, this can be seen from the end-of-semester assessment, where the scores of students who get scores below the KKM are 70 more dominating. The mathematics learning situation in the classroom also takes place not as expected where students do not focus on learning and digesting the material even when the teacher has explained the subject matter in front of the class, so there is not much interaction between students and teachers in the learning process, students will start to be active when given practice problems by their teachers so they work together to solve existing problems in order to get good learning results.

In this situation it can be said that the communication skills of students are still low because according to Rennita (2017) says high mathematical communication skills can provide positive and significant results with mathematics learning outcomes because students are able to represent in translating symbols, diagrams, graphs or other mathematical models into words (oral) or good sentences in writing. In line with Rennita, Hidayati & Wati (2021)revealed that one of the factors for low student learning outcomes is caused by low mathematical communication skills so that to improve mathematics learning outcomes, students' mathematical communication skills are first improved.

Students have poor mathematical communication skills due to the learning process which often gets a learning model that is not in accordance with the class situation, resulting in limited interaction between students and teachers in the classroom so that students' abilities do not develop (Ziana & Ristontowi, 2020). The learning model is a conceptual framework used in designing the learning process to achieve learning objectives (Rokhimawan et al., 2022). Based on the researcher's observations, cooperative learning models need to be used in the mathematics learning process in order to increase interaction between students and teachers. The advantages of cooperative learning models according to Kurniati, Patmi & Turmuzi (2016) are that they can trigger learning activeness because students are required to cooperate with their friends so that they can exchange ideas and knowledge so that they will be more enthusiastic in participating in learning.

One of the cooperative learning models is think talk write (TTW). The think talk write (TTW) cooperative learning model is a learning model that has good planning and careful action, where think is a thinking activity, think can be done after reading material or tasks in the learning process, after thinking, talk can be done, namely speaking or communicating, at this stage students can be more skilled in communicating and also this stage can be a means of reflecting on their thoughts. Furthermore, there is write, namely writing after expressing thoughts, learners can write them down with the aim that they can look back on what they have expressed (Rizal, 2018).

The think talk write (TTW) learning model is one of the models that can provide many opportunities for learners to be able to fulfill the need to work together in self-development is the think talk write (TTW) learning model. The three main elements in the think talk write (TTW) learning methodology are writing, speaking and thinking. The think talk write (TTW) cooperative learning approach follows a learning cycle that starts with students thinking with themselves then reading (think), followed by talking and sharing ideas with their group members (talk), and finally writing (write) Habibah & Armanto (2023).

The advantages of the think talk write (TTW) cooperative learning model according to Halik & Yulia (2022) are that students can develop relevant problem-solving skills to understand the subject matter independently, improve critical and creative thinking skills through interaction and discussion during the learning process, and students begin to get used to thinking and communicating with themselves, friends, and teachers.

Based on this explanation in accordance with the learning conditions of students, the cooperative learning model of think talk write (TTW) type is the right choice to improve students' mathematical communication skills at SMPN 13 Mataram.

METHOD

The type of research used in this study is a quantitative approach with a quasi experimental method. The design of this research is posttest only control design which uses two classes, namely experimental class and control class. The experimental class was treated using the Think Talk Write (TTW) cooperative learning model and the control class was treated using the direct learning model. The material presented in both classes is statistics.

Data collection techniques in this study were: observation, documentation, and tests. The instruments in this study are: observation sheet and written test. The instruments prepared will be validated by expert lecturers and teachers and then calculated using the Aiken V formula.

Data analysis was carried out by several tests with the stages of normality test and homogeneity test as a prerequisite test, hypothesis testing, namely Indepentdent Sample T Test, the hypothesis tested was that there was a difference in the average of the two sample classes, which was indicated by if t-count value was greater than t-table value then there was a significant difference in the average value between the experimental class and the control class, and the effect size test to determine the effect of the TTW type cooperative learning model on the mathematical communication skills of class VIII students of SMPN 13 Mataram.

RESULT AND DISCUSSION

The research located at SMPN 13 Mataram was carried out from May 27, 2024 to June 5, 2024 in grade VIII. Class VIII E as an experimental class and class VIII A as a control class. The number of students in each class is 33 students. The research consisted of 3 meetings. The first and second meetings were held for the learning process, and the third meeting was held to conduct a posttest. Before the implementation of the research, the instrument validation was carried out by expert lecturers and mathematics teachers first, the results of the instrument validation were at an average of 0.9 with a very valid category, so the instrument was suitable for use.

The results of posttest data in the experimental class and control class were then analyzed with several tests. The normality test was carried out first to find out whether the two classes were normally distributed or not, the results of the analysis of the Kolmogorov-Smirnov normality test were as follows.

Table 1. Normality Test Results

Kolmogorov-Smirnov		Class
	Experiment	Control
Sig	0.85	0.80

The results of the analysis of the Kolmogorov-Smirnov normality test at a significant level of α=0.05 showed that the experimental class and the control class were normally distributed due to the significant value in both classes >0.05. After the normality test, a homogeneity test was carried out using posttest data. The homogeneity test was carried out using the F test.

Table 2. Homogeneity Test Results

Mathematical Communication	F	Sig
Equal Variance Assumed	0.195	0.661

The results of the homogeneity test analysis at the level of $\alpha = 0,05$ showed that the experimental class and the control class were homogeneous due to a significant value of > 0,05. After the prerequisite test is carried out, then a hypothesis test is carried out The hypothesis test uses the *Indepentdent Sample T-Test* with H_0 dan H_a hypotheses which state:

H_0 : There is no average difference between the experimental class and the control class.

H_a : There is an average difference between the experimental class and the control class.

The criteria for testing the hypothesis are if the $t_{count\ value}$ > $t_{table\ value}$, then H_a is accepted, and vice versa. The results of the hypothesis test analysis are presented in the following table.

Tablel 3. Hypothesis Test Results

t	df	Sig. (2-tailed)	Mean Difference
2.939	64	0.005	10.818

The results of the hypothesis calculation based on Table 3 show that the value of t_{count} = 2,939, and the the value of t_{table} consulted on $\alpha = 0,05$, with df = 64 indicates that the value of t_{table} is at a value of 1,669, so that a value of t_{count} > t_{table} that is 2,939 > 1,669. Based on the results of the analysis, H_0 was rejected and H_a was accepted with the conclusion that there was a difference in the average score between the experimental class and the control class. Furthermore, the effect size test was conducted to see how much the TTW type cooperative learning model affected students' mathematical communication skills. The results of the effect size test analysis showed a value of d=0.59. In accordance with the decision collection, the value of d=0.59 indicates that the effect size test is in the large category. So it can be concluded that the TTW type cooperative learning model has a large effect on the mathematical communication skills of students in class VIII E SMPN 13 Mataram on statistics material.

The application of different treatments can have an impact on students' mathematical communication skills. This is in line with the opinion of Murwatiningsih, Wahyudi, & Setiawan (2019) which reveals that the think talk write (TTW) learning model affects the success of students to improve their mathematical communication skills, where in this learning model provides students with the opportunity to communicate and convey the concept of ideas or their understanding of the material presented, so that students easily express their ideas after thinking or understanding concepts in the material.

The first and second meetings in the experimental class and control class have the same learning process with the stages of introduction, core, and closing activities. the difference between the two classes occurs in the core activities where the core activities of the experimental class use the cooperative learning model of the think talk write (TTW) type, while the control core activities use the direct learning model.

In the first and second meeting of the experimental class, students were given groups and focused on solving problems on the LKPD. Students are given time to think (think) about the answers or solutions that will be answered to each problem contained in the LKPD, then after each individual thinks then all group members have time to discuss (talk) at this stage each group member has the responsibility to explain what they have thought before about the answers to the problems in the LKPD to other group members, after discussing then each group member writes (write) the answers that have been agreed upon during the previous discussion. After the TTW stage was carried out, then a presentation from one of the groups was made in order to get feedback from other groups and from the teacher.

In the experimental class, students were more active and interacted more with both other students and the teacher, this was reinforced by the opinion of Indriyani, Prasetyowati & Supandi (2021) who revealed that the think talk write (TTW) type cooperative learning model can trigger students to be active in the learning process, this happens because the learning model directs students to build their understanding, then communicate what they have understood to others. Isrok'atun and Rosmala also revealed that the cooperative learning model of think talk write (TTW) type is a communication activity between oneself, between students, and teachers, so that students can think, speak, and convey opinions to their friends and then write down the results of their discussion. In the first and second meetings of the control class, the teacher played a more active role in the learning process. In the core activities, the teacher explains the material according to the GPA

that has been designed then students observe, listen, and answer questions posed by the teacher. According to Hunaepi & Samsuri (2019), the direct learning model is one of the learning models that is oriented towards the active role of the teacher, either as a mediator, motivator, or facilitator. The third meeting, the experimental class and control class were given a posttest to measure students' understanding of statistics material. The questions given to the two classes were no different, so the questions each student worked on had the same level of difficulty.

Based on the explanation above, it can be concluded that the different treatments given can produce differences in the average scores of the experimental and control classes. The cooperative learning model of think talk write (TTW) helps students to hone their ability in mathematical communication and makes them more focused in learning activities. Each student is given the opportunity to think about the solution that will be used in solving the problem, the opportunity to talk with group friends who have different abilities so that students can exchange knowledge, and the opportunity to write to hone their skills in writing formulas, making mathematical models such as pictures or diagrams. With the hypothesis that has been proven, the mathematics learning process using the cooperative learning model type think talk write (TTW) on statistics material can affect the mathematical communication skills of class VIII students in the 2023/2024 school year at SMPN 13 Mataram.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the mathematical communication skills of students who use the think talk write (TTW) learning model are better than the mathematical communication skills of students who use the direct learning model, so there is an effect of the cooperative learning model type think talk write (TTW) on the mathematical communication skills of class VIII students of SMPN 13 Mataram in the 2023/2024 school year on Statistics material.

Author Contributions
All authors have real contributions in completing this manuscript.

Conflicts of Interest
The authors declare no conflict of interest.

REFERENCES

Arina, J., & Nuraeni, R. (2022). Kemampuan Komunikasi Matematis Siswa Kelas X SMK di Ponpes Nurul Huda. *Plusminus: Jurnal Pendidikan Matematika*, *2*(2), 315–324. https://doi.org/10.31980/plusminus.v2i2.1877

Azmi, S., Hayati, L., Hapipi, H., & Triutami, T. W. (2021). Pengembangan Instrumen Tes untuk Meningkatkan Kemampuan Komunikasi Matematis Mahasiswa. *Jurnal Pijar Mipa*, *16*(2), 163–169. https://doi.org/10.29303/jpm.v16i2.2249

Habibah HK, U., & Armanto, D. (2023). Application Of Think Talk Write (TTW) Model Assisted By Geogebra To Improve Student's Ability of Mathematical Concept Understanding In Class X of MAS PAB 2 Helvetia. *Asian Journal of Applied Education (AJAE)*, *2*(1), 119–142. https://doi.org/10.55927/ajae.v2i1.2540

Hidayati, P. S., & Wati, T. L. (2021). The Relationship of Mathematical Communication Ability to Learning Outcomes of Grade IV Students in Elementary School. *Academia Open*, *4*, 1–9. https://doi.org/10.21070/acopen.4.2021.1534

Hunaepi, Samsuri,T., & Afrilyana, M. (2014). *Model Pembelajaran Langsung*: Teori dan Praktik. Mataram: Duta Pustaka Ilmu.

Indriyani, N. N., Prasetyowati, D., & Supandi, S. (2021). Efektivitas Model Pembelajaran Kooperatif Tipe Think Talk Write (TTW) dan Think Pair Share (TPS) Terhadap Kemampuan Berpikir Kreatif Siswa Berbantu Question Card. *Imajiner: Jurnal Matematika Dan Pendidikan Matematika*, *3*(2), 130–138. https://doi.org/10.26877/imajiner.v3i2.7476

Isrok'atun dan Rosmala, A. (2018). *Model-Model Pembelajaran Matematika*. Jakarta: Bumi Aksara

Kurniati, N., Patmi, S., & Turmuzi, M. (2016). *Penerapan Strategi Pembelajaran Kooperatif Tipe Cooperative Script pada Perkuliahan Program Linier untuk Meningkatkan Aktivitas dan Prestas Belajar Mahasiswa Semester IV Program Studi Pendidikan Matematika FKIP Universitas Mataram*. *XI*(August), 100–104.

Monariska, E., Jusniani, N., & Sapitri, N. H. (2021). Kemampuan Komunikasi Matematis Siswa SMP melalui Model Pembelajaran Kooperatif Tipe Match Mine. *Prisma*, *10*(1), 130. https://doi.org/10.35194/jp.v10i1.1228

Murwatiningsih, E., Wahyudi, W., & Setiawan, Y. (2019). Efektivitas Model Think Talk Write Dan Think Pair Share Terhadap Peningkatan Kemampuan Komunikasi Matematis Siswa Kelas 4 Sd. *Satya Widya*, *35*(1), 42–53. https://doi.org/10.24246/j.sw.2019.v35.i1.p42-53

Rennita, O. D. (2017). Hubungan Antara Kemampuan Komunikasi Matematika Dengan Hasil Belajar Matematika Siswa SMP Swasta Budi Mulia Medan. *Seminar Nasional Matematika Dan Pendidikan Matematika*, 1–5.

Rizal, M. S. (2018). Pengaruh Model Pembelajaran Kooperatif Tipe Think Talk Write (Ttw) Terhadap Keaktifan Belajar Siswa Dalam Pembelajaran Matematika Kelas Iv Sdm 020 Kuok. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *2*(1), 105–117. https://doi.org/10.31004/cendekia.v2i1.37

Rokhimawan, M. A., Badawi, J. A., & Aisyah, S. (2022). Model-Model Pembelajaran Kurikulum 2013 pada Tingkat SD/MI. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(2), 2077–2086. https://doi.org/10.31004/edukatif.v4i2.2221

Suhenda, L. L. A., & Munandar, D. R. (2023). Kemampuan Komunikasi Matematis Siswa Dalam Pembelajaran Matematika. *Jurnal Educatio FKIP UNMA*, *9*(2), 1100–1107. https://doi.org/10.31949/educatio.v9i2.5049

Ziana, A., & Ristontowi, R. (2020). Kemampuan Komunikasi Matematika Siswa Pada Model Pembelajaran Everyday Mathematics dan Connected Mathematics Project. *Jurnal Pendidikan Matematika Raflesia*, *05*(03), 44–52. https://ejournal.unib.ac.id/index.php/jpmr/article/view/11505