

## **EFFORTS TO IMPROVE MATHEMATICAL COMMUNICATION SKILLS BY USING A COOPERATIVE LEARNING MODEL TYPE THINK TALK WRITE STUDENTS GRADE VIII**

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### **ABSTRACT**

This research is focused on mathematical communication in writing because, according to the facts in the field, students still find it difficult to write symbols or symbols of mathematics, describe problems given in the form of drawings/charts/tables, and turn real problems into the language of mathematics, have not written the conclusions obtained at the end of the problem-solving. The purpose of this study is to improve students' written mathematical communication skills in flat-sided space building materials with a Cooperative Learning Model of Think Talk Write (TTW). The study results using a cooperative learning model type TTW obtained improved mathematical communication skills written on each indicator, i.e., students' ability to express and illustrate problem solutions in the form of images from cycle I amounted to 58,854 % rise to 86,719 % cycle II. The percentage of students' ability to formulate the concept of solving mathematics from problems given by cycle I amount to amount% rise to 73,177 % in cycle II. The percentage of students' ability to express and illustrate problems in mathematical equations in cycle I amount to 48,958 %, rise to 70,052 % in cycle II. The percentage of students' ability to use the language of mathematics and symbols precisely to solve given from cycle I amount to 57,227 % rise to 90,848 % cycle II. The percentage of students' ability to explain the solving measures in writing and provide conclusions of the problems obtained from the cyclical I amounted to 45,573 % rise to 69,271 % cycle II.

**Keywords:** Mathematical communication, written mathematical communication, Think Talk Write (TTW)

### **INTRODUCTION**

According to Ki Hajar Dewantara (2004:75), education is the process of guiding all the natural forces that exist in students' children so that they are human beings and as members of society can achieve the highest salvation happiness. Education in Indonesia aims to convey knowledge to students and improve students' quality to be creative, skilled, and professional human beings (Trianto, 2010:1).

Mathematics is the basic science, both from its applied aspects and the reasoning aspect has a vital role in the mastery of science and technology. As the opinion (Erman Suherman et al., 2001:28) that mathematics serves to serve science means in addition to growing and developing for itself as a science, mathematics also serves the science in its development and operations. According to Prayitno et al. (2013), mathematical communication is a way for students to express and interpret mathematical ideas orally or in writing, whether in drawings, tables, diagrams, formulas, or demonstrations.

During an observation on October 2, 2019, at SMP Negeri 1 Pleret grade VIII E, the researcher was there when the teacher asked questions about the difference of arithmetic lines with rows of geometry students could not reveal in full and true. Also, sometimes students in conveying ideas are less structured and cannot choose the right way, so it is difficult for teachers and other students to understand. In response to teachers' questions, some students prefer to be silent for fear of being wrong in conveying their ideas or opinions. When having difficulty answering teachers' questions, some students prefer to wait for their friend's answer rather than ask other teachers or students questions.

The mathematical communication skills in writing junior high school students 1 Pleret Semester Even School Year 2019/2020 grade VIII E are also low. This is evidenced when students cannot answer questions orally, then the teacher asks the student to write the idea or answer on the board, but the student

still cannot answer. When making observations of students' math assignment answers, few students are wrong to write a mathematical symbol or emblem. As in the image below, the student error occurs in writing a calculated operation that should be less sign / negative but written plus / positive sign. The compact student's entire work does not state the writing results, such as the finished or the conclusion at the end of the work. Before writing down the answers, students also forget to write known and asked, it shows that students are still lacking in providing ideas and descriptions in the form of writing.

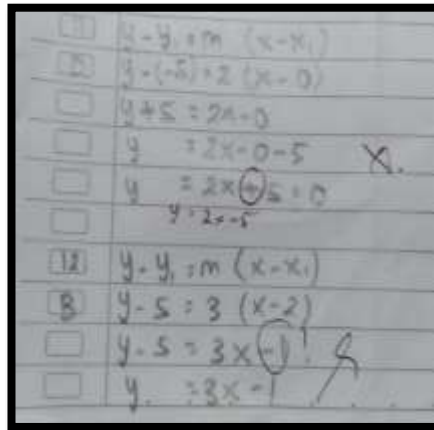


Figure 1. Student Math Assignment Answer Sheet

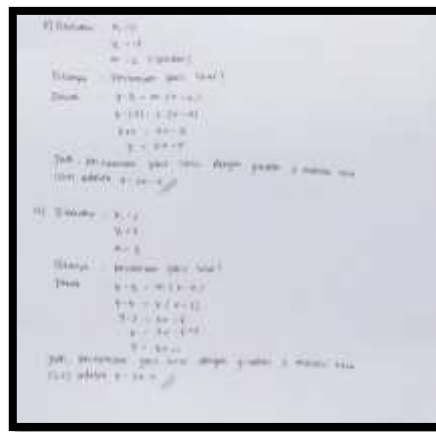


Figure 2. Answer Key sheet

Some students are not used to expressing line equations into the image's shape, as shown below. Some students also have not been thorough in stating the concept of mathematics and its solutions.

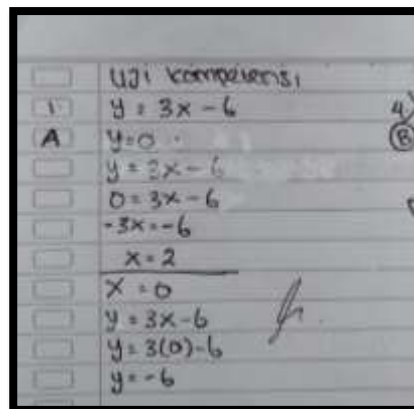
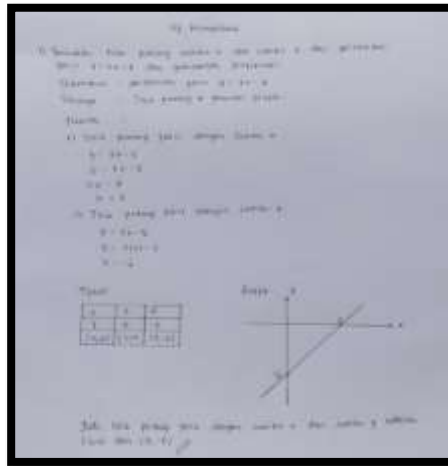


Figure 3. Student Math Assignments Answer Sheet



**Figure 1** Answer Key sheets

At the time of learning, the student has not fully noticed the teacher when delivering the material because it still dominates the learning. Hence, it impresses the teacher give, and the student accepts. This makes students bored and results in students doing other activities that attract more attention, such as chatting with friends, drawing, or other activities.

Mrs. Kisiyanti, S. Pd as one of the math teachers in SMP Negeri 1 Pleret Semester Even School Year 2019/2020 also stated, most students are still confused in writing symbols or mathematical notation correctly, cannot turn a math problem into a picture, table or diagram. From the interviews with math teachers and observation answers from mathematics assignments, grade VIII students E SMP Negeri 1 Pleret Semester Even School Year 2019/2020 stated that writing students' mathematical ability is low.

Anshari (2015: 16) studied the communication capabilities of two aspects Is oral communication (talking) and communication writing (writing). Oral communication is revealed through the intensity of students' involvement in small groups during the learning process. Simultaneously, writing is vocabulary, notation, and mathematical structure to express relationships and ideas and understand them in solving problems.

The indicators of mathematical communication ability in writing put forward by Ross in Nurlaelah (2009: 25) in this study are: 1) Describes the problem situation and states the solution to the problem using images, charts, tables, or presentations algebraically. 2) The results in the form of writing. 3) Use a thorough representation to state mathematical concepts and solutions. 4) Create mathematical situations by providing ideas and descriptions in the form of writing. 5) And use mathematical languages and symbols appropriately.

Cooperative Learning includes a small group of students who work as a team to solve a problem, complete a task, or do something to achieve their common goal (Suherman et al. 2003: 260). According to Huda (2013:218), it is revealed that the TTW-type cooperative learning model is learning that facilitates oral exercises and writing the language correctly.

## **METHODS**

This research activity was conducted at SMP Negeri 1 Pleret Kabupaten Bantul Year 2019/2020. Researchers took the grade VIII E study setting with the number of students 32 using a cooperative learning model type TTW to improve students' mathematical communication skills. The type of research conducted is Class Action Research (PTK). PTK is one form of research conducted in the classroom. PTK is generally done by the teacher in collaboration with the researcher or himself as a double role teacher doing research, individuals in the classroom, in the school, and where he teaches for 'refinement' or 'improvement' of the learning process.

According to Arikunto, Suharsimi (2008:23) explained that action research could be done in at least two cycles of action in class. The information from the first cycle determines the shape of the second

cycle and the next cycle. Therefore, the second cycle, the third cycle, and the next cycle cannot be designed before the first cycle, is implemented. Reflection results are used as input materials for planning the second cycle and the next cycle. The four stages that can be done in the study are the elements that can form a cycle that is one round of consecutive activities, which then goes back to the original step. The four stages are planning, implementation, and reflection. In this study, the data collection techniques used observations of implementing a Cooperative Learning Model Type TTW, interviews of communal mathematical capabilities, and written tests. The observation sheet used data collection instruments to implement the TTW type cooperative learning model, the mathematical communal capability interview guidelines, and the written test sheet.

The formula for obtaining written mathematical communication capability data is as follows:

$$p = \frac{S_k}{S_m} \times 100\%$$

Description:

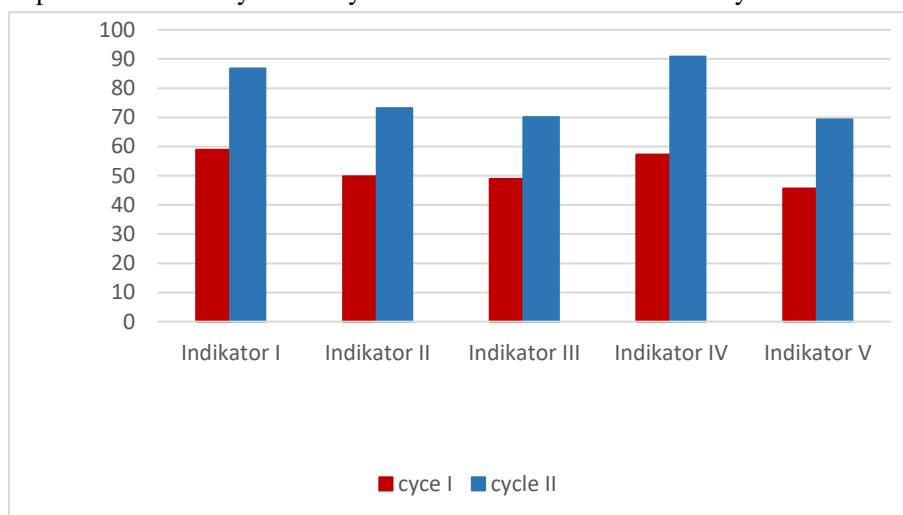
$p$  is the mathematical communication capability in writing of grade VIII students E (%)

$S_k$  is the number of scores earned by grade VIII students E

$S_m$  the maximum score

### RESULTS AND DISCUSSIONS

The student's writing mathematical communication skills test conducted at the end of each cycle shows an improvement from cycle I to cycle II. Here is a bar chart of ability test results



**Figure 5.** Result of Comparison Diagram Mathematical Communication Write Cycles I and II

Figure 5 shows an increase in each indicator of the mathematical communication of writing in the bar chart above. Thus, the mathematical communication skills of grade VIII students in SMP Negeri 1 Pleret improved during the use of a cooperative learning model of TTW.

There are several actions taken by teachers to improve students' mathematical communication skills. In the 1st indicator, the action taken by the teacher to make the ability of students to express and illustrate problem solutions in the form of images becomes increasing is to get used to all students to illustrate the illustration of building space with the correct steps will make it easier to find a solution to the given problem.

In the 2nd indicator, teachers' action to formulate the concept of mathematical completion from the given problem becomes improved is to provide a more in-depth explanation of formulating the concept of mathematical completion from the given problem.

In the 3rd indicator, the action taken by teachers to make students' ability to express and illustrate the idea of problems in the form of mathematical equations to be increased is to provide more question

practice that requires students to express and illustrate the idea of the problem in the form of mathematical equations.

In the 4th indicator, the action taken by teachers to make students use the language of mathematics and symbols precisely in the step of solving the given problem becomes improved is to get students used to be more thorough in doing calculations, write down the solution of the problem using the language of mathematics and symbols appropriately, and review a little algebraic concept by giving one example of an algebraic question.

In the 5th indicator, the actions taken by teachers in order to explain the students' ability to explain the settlement steps in the form of writing and give conclusions of the problems obtained to be improved is to provide a deeper understanding of writing the explanation of the solutions of the problems and providing conclusions.

Observation of the implementation of a cooperative learning model of TTW is conducted as many as two meetings that are observational by three observers. The result of the observation of the implementation of the Cooperative Learning Model of TTW type is that the teacher has carried out the existing stages by the syntax of the Cooperative Learning Model Type TTW.

In this study, researchers also took interview data. The purpose of the interview was to confirm the analysis of mathematical communication capabilities written during the study. Interviews were conducted twice, namely in cycle I and cycle II. On Wednesday, March 18, 2020, a cycle I interview was conducted and then obtained information that students still do not understand and solve the problems provided with group discussions. Students are still adapting to the teachers and learning models used. However, students are happy to learn by discussing using a cooperative learning model type TTW because it is more exciting and boring. At the time of the group discussion, some students felt the group's division was unfair, so that there was an imbalance of strength between groups.

At the stage of stating and illustrating problem solutions in the form of drawings, students are still experiencing confusion because they do not understand the steps of drawing a space building illustration correctly. The student has never met such a question. In solving the problem, students have not been able to formulate the concept of math completion because they are still fixated on memorizing formulas and do not understand the concept of finishing the math so that when the student forgets the formula, then the student prefers to wait for an answer from his friend.

Stating and illustrating problems in mathematical equations such as writing is known and asked, students are still confused because they are not used to writing the problem by writing known and asked first. Using the language of mathematics and symbols precisely to solve the problem is the next stage. Students stated they still feel difficulty in using the language of mathematics and symbols because of being less thorough in doing calculations using algebra, the lack of information obtained by students about mathematical symbols or math language. Result of interview at the stage explaining the steps of solving in the form of writing and giving conclusions of the problems obtained by students stated that not writing an explanation of the steps of solving the problem because feels confusing, unfamiliar, and lacking time so that some students prefer to write the conclusions only.

On Monday, March 13, 2020, an online cycle II interview was conducted through WhatsApp Video Call and then obtained information that students have become accustomed to learning using group discussions even though it is done online. However, students can understand and solve the problem of the given question. Students are pleased and excited to use the TTW type cooperative learning model because teachers' newly created group division somewhat creates a balance of power between groups. When stating and illustrating problem solutions in the form of images, students do not have difficulty because they have become accustomed to the given question's practice. Students can already formulate math completion concepts in solving problems because they understand the teacher's explanation in more detail through a learning video sent via WhatsApp. At the stage of stating and illustrating problems in mathematical equations, students feel writing is known and asked in advance is very easy in solving the given problem, and students are accustomed to writing known and asked before answering the question given.

Furthermore, to use the language of mathematics and symbols precisely in the step of solving the problem given by the student stated that it had not experienced difficulty because it has obtained additional information about the language of mathematics and symbols of each sample of the problem described in the learning video sent by the teacher. The results of the interview at the stage explain the settlement steps in the form of writing and give conclusions of the problems obtained by students stated not to experience confusion because students have become accustomed to every meeting given a question practice on LKS that asks students to explain the steps of problem-solving and provide conclusions. When the teacher gives an example of the problem in the learning video, the teacher also writes the explanation with his sentence on each of the resolution steps of the problem given. At the end of the teacher's completion, gives the solution of the answer.

## CONCLUSION

The use of a TTW type cooperative learning model can improve the mathematical communication skills written on each indicator, namely students' ability to express and illustrate problem solutions in the form of images from cycle I amounting to 58,854 % rise 86,719 % in cycle II. The percentage of students' ability to formulate the concept of solving mathematics from problems given by cycle I amount to 49,740 %, rise to 73,177 % in cycle II. The percentage of students' ability to express and illustrate problems in mathematical equations in cycle I amount to 48,958 %, rise to 70,052 % in cycle II. The paramount of students' ability to use the language of mathematics and symbols precisely to solve the problem given from cycle I amount to 57,227 % rise to 90,848 % cycle II. The percentage of students' ability to explain the solving measures in writing and provide conclusions of the problems obtained from the cyclical I amounted to 45,573 % rise to 69,271 % cycle II.

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