

**IMPROVING STUDENTS' MATHEMATICAL COMMUNICATION
THROUGH SCIENTIFIC APPROACH AND TTW (THINK TALK WRITE)**



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IMPROVING STUDENTS' MATHEMATICAL COMMUNICATION THROUGH SCIENTIFIC APPROACH WITH TTW (THINK TALK WRITE) STRATEGY

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ABSTRACT

The aim of this research is to improve students' mathematical communication grade X TKJ 1 of vocational high school 1 of Banyudono by applying scientific approach (scientific) with TTW (Think Talk Write) strategy in mathematics learning. This research is a classroom action research. Subjects recipient of action is class X TKJ 1 of vocational high school 1 of Banyudono which amounts to 35 students. Methods of data collection are by observation, field notes, documentation and test. The technique of data analysis is done by three stages, namely data reduction, exposure data, and inference. Validity of the data is done by triangulation investigators and methods. Research data, showed an increase in mathematical communication that can be observed from the increase in the percentage of indicators, namely the ability of the student (1) express mathematical ideas by speaking from 14,29% to 74,29% (2) express mathematical ideas by writing from 17,14% to 74,29% (3) demonstrate and depict mathematical ideas visually from 14,29% to 71,43% (4) use mathematical notation to represent ideas, describe relationships and model situation from 20% to 82,86%. The conclusion of this research is the application of scientific approaches (scientific) with the TTW (Think Talk Write) strategy can improve mathematical communication.

Keywords: Communication, Scientific, Think Talk Write

INTRODUCTION

Communication is the process of delivering and receiving information between one or more persons with the aim to know and understand something. Communication as a tool for one can interact with others. UNESCO set of skills for life in the 21st century, namely creativity and innovation, critical thinking skills, and problem solving, communication and collaboration, social and cross-cultural skills, and mastery of information (Ridwan Abdullah Sani, 2014: 8).

Relation to the world of education, communication has an important role. Karl W Kosko dan Jesse L. M. Wilkins (2010) states that “Communication is an essential part of mathematics and mathematics education”. In the process of mathematics learning is indispensable for the communication that occurs between teachers and students as well as students with other students. Mathematical communication skills students need special attention. This is in accordance with the opinion of Umar Wahid (2012) students require communication skills in order to communicate his ideas in an effort to answer the contextual issues that the teacher, participate actively in discussions, are responsible for their answers to open questions and tasks set by the teacher. So the students are not only required to be able to work on the problems properly but they must also be able to know the process of getting an answer and then be able to communicate ideas, ideas and thoughts to other students.

Based on the communication between teachers and students, the teacher can find some information related to the learning process that takes place. Such information include: the teacher can know the extent of students' understanding of the material being taught, to know what the difficulties experienced by the students, and teachers can find out what learning means in the classroom makes the students active. In addition, communication is built by a teacher will affect the learning process and learning objectives to be achieved. This is in line with the opinion of Nana Sudjana (2000: 31) that in order to achieve the teaching and learning interactions is need for clear communication between teachers and students, so that its integrated two activities, namely teaching with powerful learning activities and achieve learning objectives. In addition, Martinis Yamin and Bansu I. Ansari (2010: 87) argues that the communication or dialogue between students and the teacher can increase understanding.

Results of preliminary observations mathematical communication skills class X TKJ 1 of vocational high school 1 of Banyudono which amount 35 students, which consisted of 6 male students and 29 female students, there are problems in the learning of mathematics in the classroom, among others: 1) express mathematical ideas by speaking 14.29% 2) express mathematical ideas by writing 17.14% 3)

demonstrate and depict mathematical ideas visually 14.29% 4) use mathematical notation to represent ideas, describe relationships and model situation 20%. Based on these data students' mathematics communication skills class X TKJ 1 X TKJ 1 of vocational high school 1 of Banyudono is quite low.

Problems that occur above, caused by several factors including: 1) the implementation of learning in the classroom is still a teacher-centered (teachers more actively explain the learning materials so that more teachers communicate therefore learning in the classroom is still dominated by the teacher); 2) students tend to be passive and still reluctant when asked to ask the teacher if there are things that are not yet understood or understandable; 3) Students are difficult to communicate their ideas or opinions in response to the problems of both the teachers and the other students. When in fact of the opportunity to communicate the students will be able to broaden their knowledge more widely.

Based on the problems that have been described, the root causes of the low mathematical communication class X TKJ 1 is the use of approaches and strategies learning implemented by teachers who are less precise. Approaches and strategies learning used by teachers can affect the activity of students in the classroom followed, one of which is an activity that occurs between teachers and students in learning mathematics.

The existence of these problems, teachers should be able to find a solution so that these problems are not sustainable. The problems that occurred in class X TKJ 1 need to be addressed immediately because it can affect the learning objectives in the classroom. This is commensurate with the opinions Syaiful and Aswan (2010: 2) that the effect of failure of teachers to manage the classroom, the teaching goal was difficult to achieve. To overcome these problems, teachers need to design appropriate learning to stimulate students to improve communication skills of mathematics. The application of scientific approach (scientific) with TTW (Think Talk Write) strategy is expected to improve students' mathematics communication in the learning of mathematics of X TKJ 1 of vocational high school 1 of Banyudono.

Scientific approach becomes the approach which is implemented on 2013 curriculum. Atsnan M.F dan Rahmita Yuliana Gazali (2013) The scientific approach

is believed to be the golden footbridge development and the development of attitudes, skills and knowledge of students in the approach or work process that meets the scientific criteria.

TTW (Think Talk Write) strategy is a learning strategy that can develop mathematical understanding and communication abilities of students. Groove progress TTW strategy starts from the involvement of students in thinking or talking to himself after the reading, then speak and share ideas (sharing) with friends. TTW (Think Talk Write) strategy can help students to communicate and discuss his thoughts with his friend so that students in the learning process can help each other and exchange ideas. In addition, students can also communicate his ideas in writing.

RESEARCH METHOD

This research is a classroom action research. Tjipto Subadi (2013: 179) defines action research is a study conducted by the real problems that arise in the classroom, then based on the issue of teachers looking for alternative ways to overcome and follow up with concrete actions planned and measurable success rate. Action research is characterized by continuous improvement to achieve the objectives of the research.

This Research was conducted for 9 months from October 2014 to June in vocational haigh school 1 of Banyudono. Subjects recipient of action are students grade X TKJ 1 which amounts 35 students. Subject giver of action is mathematics teacher of grade X TKJ 1 namely Ibu Endang Dwiyani, S.Pd .

The technique of data collection used include: observation to determine the activities of students during the learning process in the classroom, especially with regard to students' mathematical communication; field notes to record important events that arise during the process of mathematical learning takes place not in the guidelines for observation; documentation for to archive important data in the study, such as documents relating to the school name, student name, student identification number that can be seen in the documents that exist in schools as well as photographs or images obtained during the study; tests to determine the level of students' mathematical communication skills in understanding the material.

Data analysis techniques in this research conducted in three stages, namely data reduction, exposure data, and inference. This research used investigators and methods triangulation

RESULTS AND DISCUSSION

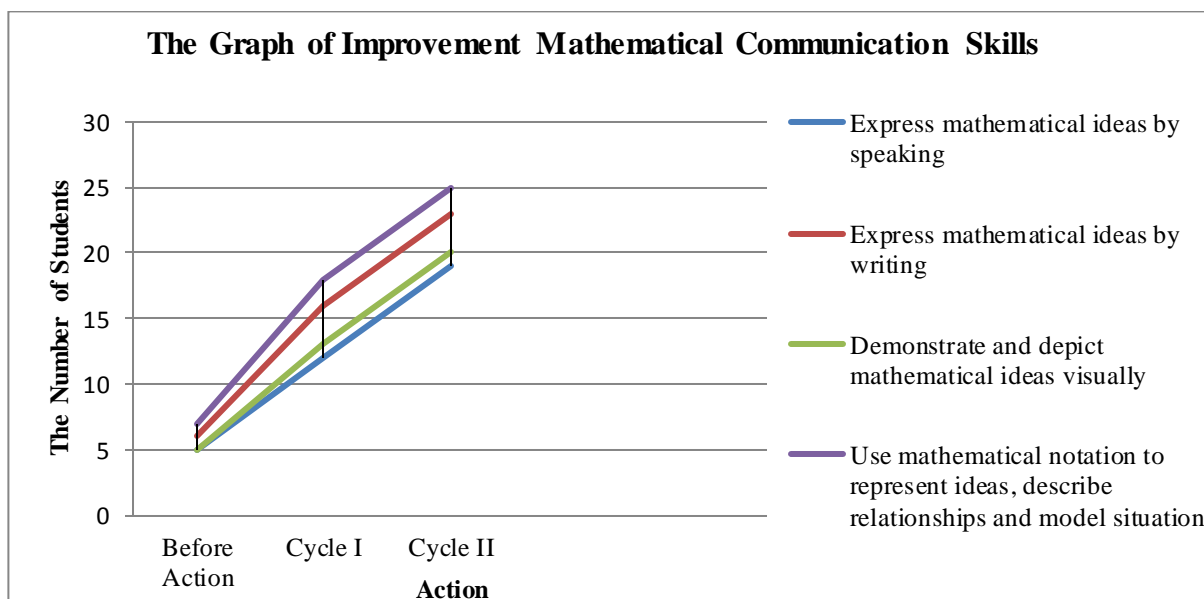
Based on implementation of callasroom action is the application of scientific approach (scientific) with TTW (Think Talk Write) strategy taht have been implemented in the learning process that starts from cycle I and finishes on cycle II, students' mathematical communication skills of grade X TKJ1 of vocational high school 1 of Banyudono experienced change for the better. Results of research on classroom action cycle 2 was agreed that lerning action have been implemented successfully improve students' mathematical communication skills in lerning process.

The data obtained by researchers about mathematical communication skills of students grade X TKJ 1 in mathematics learning from before action until cycle II can be illustrated at table1 below

Table 1 The Data of Improvement Students' Mathematical Communication

| No | Indicators of mathematical communication skills | Before Action | Classroom Action | |
|----|--|------------------------|-------------------------|-------------------------|
| | | | Cycle I | Cycle II |
| 1 | Express mathematical ideas by speaking | 5 students (14,29%) | 12 students (34,29%) | 19 students (54,86%) |
| 2 | Express mathematical ideas by writing | 6 students (17,14%) | 16 students (45,71%) | 23 students (67,71%) |
| 3 | Demonstrate and depict mathematical ideas visually | 5 students (14,29%) | 13 students (37,14%) | 20 students (57,14%) |
| 4 | Use mathematical notation to repserent ideas, describe relationships and model situation | 7 students (20%) | 18 students (51,43%) | 25 students (71,43%) |

The graph about mathematics communication skills of students grade X TKJ 1 in mathematics learning from before action until cycle II can be illustrated at picture 1 below.



Picture 1 The Graph of Improvement Mathematical Communication Skills

Students are able to express mathematical ideas by speaking increased. At the initial condition as much as 5 students (14.29%), after the action on cycle I were 12 students (34.29%), and the cycle II as much as 19 students (54.86%). According to Yamin Martinis and Bansu I. Ansari (2010) argued the participation of the main ways of communication in mathematics is through talk

Students are able to express mathematical ideas by writing increased. At the initial condition as much as 6 students (17,14%), after the action on cycle I were 18 students (51,43%), and the cycle II as much as 23 students (67,71%). As stated by Martinis Yamin and Bansu I. Anasari (2010) activities write means constructing idea, because after discussion or dialogue between friends and then express it through writing. Not only that, writing in mathematics petrified realize one of the goals of laerning, that is the students' understanding of the material being taught.

Students are able to demonstrate and depict mathematical ideas visually increased. At the initial condition as much as 5 students (14,29%), after the action on cycle I were 15 students (42,86%), and the cycle II as much as 20 students (57,14%). Prposed by Martinis Yamin and Bansu I. Ansari (2010) student activity during the writing is to organize all the work step by step, whether ithe solution is the use of charts, graphs, ot tables to be aesily readable and.

Students are able to use mathematical notation to represent ideas, describe relationships and model situation increased. At the initial condition as much as 7 students (20%), after the action on cycle I were 19 students (54,86%), and the cycle II as much as 25 students (71,43%).

From the result of research conducted in cycle I to cycle II showed that increased mathematical communication skills.. According to Martinis Yamin and Bansu I. Ansari (2010) argued that Think Talk Write strategy is a learning strategy that is expected to develop the ability of students' mathematical understanding and communication. It means that by applying scientific approach (scientific) with TTW (Think Talk Write) strategy can improve students' mathematical communication skills.

Result of the research reinforced by previous research, namely research has been done by Nunun Elida (2012) concluded that students' mathematical communication skills acquire cooperative learning with Think Talk Write better than students who acquire learning in the conventional way. The same thing also expressed by Imama Wahidah and Ipung Yuwono (2012) concluded that by applying Think Talk Write strategy in learning can improve students' learning outcomes in Junior high school of Brawijaya Smart School (BSS). In addition, Rofinda Taubah (2014) argued that an increase in students' mathematical communication skills through scientific approach with Problem Based Learning model.

CONCLUSION

Mathematical communication skills of students is indispensable in the learning process of mathematics in order to increase the success in learning. After learning of mathematics using scientific approach (scientific) with the TTW (Think Talk Write) strategy in the class of X TKJ 1 can improve students' mathematical communication skills. Results of classroom action research conducted collaboratively between researcher and teacher of mathematics grade X TKJ 1 get some conclusions as follows:

1. Implementation of the study of mathematics by using scientific approach (scientific) with TTW (Think Talk Write) strategy can be used as one of the learning innovations that can improve students' mathematical

communication skills. Furthermore, through this sresearch students become more active in the classroom.

2. After the classroom action in the learning of mathematics using scientific approach (scientific) with TTW (Think Talk Write) strategy on the material trigonometry there is an increase students' mathematical communication skills. It can be seen from each of the indicators observed in this research, namely:
 - a. Students are able to express mathematical ideas by speaking before the action of 5 students (14,29%), after the action at the cycle I of 12 students (34,29%), and after the action at cycle II of 19 students (54,86%).
 - b. Students are able to express mathematical ideas by writing before the action of 6 students (17,14%), after the action at the cycle I of 18 students (51,43%), and after the action at cycle II of 23 students (67,71%).
 - c. Students are able to demonstrate and depict mathematical ideas visually before the action of 5 students (14,29%), after the action at the cycle I of 15 students (42.86%), and after the action at cycle II of 20 students (57,14%).
 - d. Students are able to use mathematical notation to repserent ideas, describe relationships and model situation before the action of 7 students (20%), after the action at cycle I of 19 students (54.28%), and after the action at cycle of 25 students (71.43%).

From the explanation above can be concluded that the application of the scientific approach (scientific) with TTW (Think Talk Write) strategy can improve mathematical communication skills grade X TKJ 1 of vocational high school 1 of Banyudono.

REFERENCES

- Atsnan, M.F dan Rahmita Yuliana Gazali. 2013. Penerapan Pendekatan *Scientific* dalam Pembelajaran Matematika SMP Kelas VII Materi Bilangan (Pecahan). *Makalah dalam Seminar Nasional Matematika dan Pendidikan Matematika* . 9 November 2013.

- Elida, Nunun. 2012. "Meningkatkan Kemampuan Komunikasi Matematika Siswa Sekolah Menengah Pertama melalui Pembelajaran Think Talk Write (TTW)" Jurnal Ilmiah Program Studi Matematika STKIP Siliwangi Bandung, Vol 1, No.2, September 2012.
- Kongthip, Yanin, dkk. 2012. Mathematical Communication by 5th Grade Students' Gestures in Lesson Study and Open Approach Context. *Scientific Research*. 3(8) : 632-637.
- Kosko, Karl W and Jesse L.M. Walkins. 2010. Mathematical Communication and Its Relation to the Frequency of Manipulative Use. *International Electronic Journal of Mathematics Education (IEJME)*,5(2): 79-90.
- Taubah, Rofinda. 2014. Implementasi Pendekatan Saintifik dengan Model Problem Based Learning untuk Meningkatkan Komunikasi Matematika. Surakarta: Skripsi FKIP UMS (Tidak dipublikasikan).
- Subadi, Tjipto. 2013. *Lesson Study sebagai Inovasi Pendidikan*. Solo: Kafilah Publishing.
- Umar, Wahid. 2012. *Membangun Kemampuan Komunikasi Matematis dalam Pembelajaran Matematika*". Jurnal Ilmiah Program Studi Matematika STKIP Siliwangi Bandung, Vol 1, No.1, Februari 2012.
- Wahidah, Imama dan Ipung Yuwono. 2012. "Penerapan Strategi Think Talk Write (TTW) untuk Meningkatkan Hasil Belajar Matematika Siswa Kelas VII SMP Brawjaya Smart School (BSS)".
- Yamin, Martinis dan Bansu I. Ansari. 2009. *Taktik Mengembangkan Kemampuan Individual Siswa*. Jakarta: Gaung Persada Press.