



## THE IMPROVEMENT OF MATHEMATICS COMMUNICATION FOR JUNIOR HIGH SCHOOL STUDENTS THROUGH CONTEXTUAL MATHEMATICS LEARNING

### AUTHORS INFO

Herlina  
Universitas Sembilanbelas November Kolaka  
Herlina8072@gmail.com  
+6282344891534

### ARTICLE INFO

ISSN: 2528-2468  
Vol. 1, No. 2, July 2016  
URL: <http://usnsj.com/index.php/JME>

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### Abstract

This study aims to (1) obtain a mathematical description of the communication skills of students with mathematics learning contextual learning and student learning by conventional teaching; (2) To determine the improvement of communication skills students learn mathematics with math contextual learning and student learning by conventional teaching; (3) In order to obtain comparative increase in mathematical communication skills students learn mathematics contextual learning and student learning by conventional teaching; (4) In order to obtain a description of the activity of students in mathematics learning contextual; (5) In order to obtain a description of what students about math learning contextual. This research was conducted by using a quasi-experimental design with the model of the Non-equivalent Pretest and Posttest Control Group. The population in this study was all students of class VIII SMP Negeri 1 Kolaka with samples of two classes as experimental class and control class. The instrument used in this study consisted of communication test instruments and mathematical abilities nontes instruments, such as observation sheets, and opened questionnaire sheet. The analysis used is descriptive analysis, significant test one sample, and the average difference in of two. The results showed that in general the contextual learning mathematics can improve communication skills of mathematics. Learning math can be used as an alternative contextual learning for teachers, especially for math students improve communication skills.

Keywords: contextual mathematics learning, conventional learning, mathematical communication skills.

### A. Introduction

Mathematical communication is very important in the learning process of mathematics, because through communication mathematics students reflect, clarify, and expand ideas and understanding of mathematical relationships and can be expressed this argument, it is in accordance with the Ontario Ministry of Education (2005). Communication can be defined mathematically as a dialogue or a related event that occurred in a classroom environment where there is a transfer message. Messages are routed contains material students are learning math, for example in the form of concepts, formulas, and problem-solving strategies. Parties involved in the communication event in a classroom environment for teachers and students. How to redirect the message may include oral and written (Rahayu, 2006). Ministry of Education (2006: 8) states that the mathematical language to communicate ideas with even more practical, systematic and efficient. When students are challenged to communicate the results of his thoughts to other students, both orally and in writing, then they learn to clarify, persuade, and right in using the language of mathematics (NCTM, 2000). The activities included in the mathematical communication according to Sumarmo (2006) are: (1) stating a situation,

drawing, diagram, or a real object into the language, symbols, ideas, or mathematical models; (2) explaining ideas, situations, and relationships math orally or in writing; (3) listen, discuss, and write about mathematics. (4) reading with understanding a written mathematical representations; (5) making a conjecture, making the argument, a definition, a generalization; (6) revisits a mathematical description or paragraph in their own tongues.

But the reality on the ground shows that the communication skills of mathematics students is still low, such as: students are less able to explain the idea in the form of text and images, it is difficult stating a diagram into a symbolic language, students are less able to express an idea with their own words and disadvantaged students expressed his opinion in learning. Results of preliminary research conducted by Herlina, et al (2012) in three schools in Kolaka that SMPN 1 Kolaka, SMPN SATAP 1 Mowewe, and SMAN 1 Tanggetada by providing communication test of mathematics that has been validated by the subject teachers of mathematics shows that students are not able to (1) state about the story in the form of an image; (2) create a mathematical model of word problems; and (3) complete the mathematical model.

Students' mathematical communication skills can be improved by training students to communicate problems or ideas, either orally or in writing. A problem or idea would be easily communicated by the student if the problem is nothing to do with the activity or activities of students daily. We can say problems or ideas should be in conformity with the context of students' everyday lives. This is in line with the contextual meaning to learning Contextual Teaching and Learning (CTL).

Based on issues outlined above, the author tries to apply contextual learning mathematics under the title of "The Improvement of Mathematical Communications Ability through Contextual Math Learning."

## **B. Literature Review**

Contextual Teaching and Learning departs from a belief that someone is interested in learning when he saw the meaning of what he learned. People will see the meaning of what he learned if he can connect the information received with the knowledge and previous experience. This is in accordance with the expression Johnson (2002) that the CTL system is based on the assumption that the meaning arises from the relationship between content and context. Context gives meaning to the content. If students can connect more lessons at school with this context, it is so much more meaning to be derived from these lessons. Finding meaning in the knowledge and skills to bring on the mastery of knowledge and skills is a must. It can be said when the students find the meaning of school, then they will understand and remember what they have learned. Heuvel-Panhuizen in Ward (2004) states that in mathematics learning is contextual, process development of concepts and mathematical ideas originated from the real world. The real world does not just mean physically concrete, but also includes things that can be imagined by the NII in accordance with the mind of Students' experience. This means that the problems posed at the beginning of contextual learning *mateamtika* are actual problems for students (sincerely exist in reality of student life) or problems that can be imagined as a real problem by the students.

CTL is the foundation philosophy of constructivism. According to the constructivist (Suparno, 2012: 61) students' learning is an active process of constructing meaning, both from the text, dialogue, physical experience, and Lail more. According to the Ministry of Education (2002: 26), CTL-based learning involves seven major components of productive learning, namely: (1) constructivism, which is emphasizing the understanding of the students themselves are active, creative, and productive based on knowledge and meaningful learning experiences; (2) asking (questioning) is a way for someone to gain knowledge; find (inquiry) is an activity that starts from the observation of the phenomenon continued with meaningful activities to produce the findings obtained by the students; community learning (learning community) that learning should be consistently implemented in study groups; modeling (modeling) is a form of learning certain skills and knowledge using a model that can be replicated students; reflection (reflection) *yatu kembali* reflection of what is newly learned; actual votes (authentic assessment) is the process of collecting a variety of data that can bring an idea or information about the development of students' learning experiences. This study focused in mathematics so that the application of CTL in learning math hereinafter referred to as contextual learning.

One of the alternatives that can be used by teachers to improve students' communication skills math is math learning contextual. The logic is that if the students were asked about their daily activities, then they will easily communicate, so with contextual mathematics instruction makes learning math as daily activities so that students are expected to also be able to

communicate mathematics as well as to communicate their daily activities. Contextual mathematics learning involves students actively, make learning more fun. The link between learning material and real life students give awareness about the usefulness of mathematics.

Contextual learning mathematics is intended for learning mathematics in school is not seen as the delivery or transfer of knowledge per se, but the learning of mathematics is seen as a mathematical activity. Mathematization is the process of translating the mathematical problems into mathematical form contextual formal or informal. In order for the process of translating the mathematical form of contextual into formal mathematical forms became easier, use informal mathematical form or by drawing sketches. For example, contextual mathematical forms: a child has seven marbles, given to her as much as four points. Then the rest of the child's marbles are three grains. So they can easily solve the problems of this contextual converted into informal mathematics as follows.

Furthermore it can be converted into formal form becoming  $7 - 4 = 3$ .

In the conventional learning teachers explain the learning materials, and then gave several examples of problems and how to solve them and after that the students do practice questions individually. Teaching is similar to classical learning, where teachers taught a number of students in the room that has the ability to minimum requirements for that level. Interest, interests, skills, and students in learning speed assumed to be equal. Teachers generally dominating the class, students are passive and just accept (Ruseffendi, 1991)

### C. Methodology

A sample of 47 students of class VIII SMP, divided into one experimental class (21) and one control class (26), which is elected directly by the researcher. Experimental class taught mathematics contextual learning, whereas the control class was taught by conventional learning. The instrument used to collect data, namely: (1) test communication of capabilities of mathematical description is tested as many as 6 numbers. Before these tests are used, first do some validation, namely: appearance (surface) and the contents by the supervisor, lecturer, mathematics education experts and school teachers. Validation views (surface) include: clarity in terms of language, clarity in terms of numbers or symbols, clarity in terms of image/representation. Validation of contents, include: compliance with the material, conformity with indicators of learning achievement, conformity with the characteristics of mathematical communication skills, compliance with the level of difficulty of Class VIII students of SMP. Additionally, conducted limited trials to test the legibility tested to four students; (2) Observation Sheet for Contextual Mathematics Learning Process; (3) Observation Sheet for Conventional Learning Process; (4) open questionnaire to collect data about students' opinions and comments about contextual learning mathematics. To determine the increase of each class is calculated using the formula N-Gain. The average value of the N-Gain will be consulted by category Hake (1999: 1), namely the high g if  $g > 0.7$ ; g was if  $0.3 < g \leq 0.7$ ; Low g, if  $g \leq 0.3$ . The average value of N-t Gain tested the samples to determine its significance. Differences average increase of two N-Gain tested with two different t-test average.

### D. Finding and Discussion

#### 1. Findings

Descriptively, the students' pretest of experimental class obtained the lowest score of 5.88, the highest score of 72.06; an average of 36.48 with a standard deviation of 19.25. In the control group obtained the lowest score of 0; the highest score of 29.41; an average of 6.33; and a standard deviation of 7.89. To score the experimental class postes obtained the lowest score 25; the highest score of 100; an average of 61.41 and a standard deviation of 21.35. While in the control group obtained the lowest score of 0; the highest score of 62.5; an average of 15.39; and a standard deviation of 13.06. Based on the calculation of N-Gain, it was gained an average of N-Gain experimental class 0.41 (medium) and the control class 0.07 (low). The test results showed that the average increase in mathematical communication skills students learn by teaching mathematics contextually higher than students learning with conventional learning.

## **2. Discussion**

The average test results showed that the increase of students' mathematical communication skills who learn with teaching of mathematics contextually was higher than students who learning with conventional learning. This is in accordance with the expression Johnson (2002) that the CTL system is based on the assumption that the meaning arises from the relationship between content and context. Context gives meaning to the content. If students can connect more lessons at school with this context, it is so much more meaning to be derived from these lessons. Finding meaning in the knowledge and skills aim to bring at the mastery of knowledge and skills. It can be said that when the students find the meaning of school, then they will understand and remember what they have learned.

At the first meeting illustrated that all the students were very enthusiastic but students confused by the unusual LKS they get but at the next meeting the students were able to perform their activities better than previous meetings. The object selected was contextual traffic signs, bicycle chains, and a pulley that had to do with the material being studied is tangent to the circle. Students were very enthusiastic response to their presentation. To propose the idea, still a few students dared to propose the idea. In general, activity in the classical interaction was increased. Contextual learning mathematics has made the students more active in participating in learning activities and more important is learning becomes more meaningful.

In the control group, it appears that most students just pay attention to the teacher explains the material on the board, then copy it in a notebook and memorize the formula. This indicates that the formulas apart from the experience of previous students, so that what they earn is not meaningful. Students then complete the questions on the worksheet. LKS usual, which does not allow students to construct their own knowledge, can easily be done a small proportion of students. Students are quite imitating the teacher using the formula in solving problems. But if the teacher asked the students got more or unusual problems, the students solve the confusion. There are students who say "because not the same as the example" and some are saying "no formula". Students only happy to resolve the problems outstanding and bored if it finds problems are not uncommon. So, most students just passively waiting for the teacher report missing correct answer.

Atmosphere of control class was fairly quiet because there was no group discussion. It was one or two students who occasionally had questions. This was due to the application of conventional learning. In general, conventional learning cannot improve the students' communication skills, especially math.

In general, students who get contextual learning mathematics give a positive opinion on that learning. This is supported by the results of the acquisition of the opinions and comments of 21 students as much as 68.18% of students found positive for contextual learning mathematics. Quite a high percentage of positive opinions of students indicated that students feel happy and feel more helped in understanding the concepts of mathematics with math learning contextual. Students who think positive have the possibility to support interactive learning atmosphere between students and students, students and teachers, and students in the environment. This provides a positive impact to the development of mathematical communication skills of students, which is visible from the increase in the ability of the experimental class that gets mathematics contextual learning was higher than the control class who received conventional learning.

## **E. Conclusion**

Mathematical communication skills of students before treated as very low both students who obtain contextual learning of mathematics and students who received conventional learning. After receiving treatment, mathematical communication skills of students who obtain contextual learning of mathematics quite enough, while the mathematical communication skills of students who received conventional learning is still very low.

There is an increasing mathematical communication skill, both students who obtain contextual learning of mathematics and students who received conventional learning. Improved communication skills students acquire mathematical contextual learning mathematics is higher than the increase of mathematical communication skills of students who received conventional mathematical learning. In the aspect of students' activity in contextual learning process, student activities in completing a task individually and discuss in groups quite good compared to the activity of students in the learning process conventional. Although at the beginning of the meeting there are still constraints. This occurs because the new learning known students so that

students are not familiar with this way of learning. At the following meeting, the constraints became on the wane. In general, students have positive opinions towards learning mathematics context.

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