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ANALYSIS SCIENTIFIC APPROACH EFFECT ON MATHEMATICAL COMMUNICATION ABILITY OF JUNIOR HIGH SCHOOL STUDENTS

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ABSTRACT

This research is classroom action research. This research aims to analyze the effect of the scientific approach on students' mathematical communication. The method used is descriptive qualitative. The subjects of this study were 34 students of class VII SMP Pasundan 3 Cimahi, consisting of 22 male students and 12 female students. The test instrument used in this study was in the form of a test in the form of a description of 5 questions using indicators of students' mathematical communication skills on comparative material and a non-test used in the form of a questionnaire on the learning activity attitude scale as many as 20 positive and negative questions. This research was carried out in 2 cycles consisting of 2 meetings in each cycle. The data analysis technique used in this study was carried out in three stages, 1) data reduction, 2) data presentation, and 3) conclusion stage. The results of students' answers are shown by the N-Gain data in the Average category with a score of 0,4381. The results of data analysis show that there is an influence of a scientific approach on students' mathematical communication skills after being given action of 70%. Therefore, it can be concluded that there is an effect of using a scientific approach on mathematical communication skills.

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INTRODUCTION

Mathematics is a universal science that has a very important role in developing thinking power, in various disciplines, and underlies the development of modern technology. According to (Sepriani, 2021) Mathematics is often called the "queen of knowledge". Because there are many other sciences whose discovery and development depend on mathematics. In line with that, mathematics also plays an important role in our lives and is most often found in various aspects, one of which is the learning process in schools where other subjects besides mathematics also use concepts from mathematics.

One of the skills that must be possessed by students is mathematical communication in a material. Mathematical communication is very important to support mathematics learning in understanding a process. Through communication, students can also develop mathematical ideas in a language that students can understand (Maharani & Ramlah, 2021). Which will be very useful for the students themselves and will make it easier to answer certain questions. Therefore, according to Fathurrohman, students need an effective learning approach and involve students. The learning approach is the method used by teachers in implementing learning so that the concepts presented can adapt to students (Yanti, Laswadi, Ningsih, Putra, & Ulandari, 2019). Then there will be good communication between teachers and students in the learning process.

Based on the results of our observation before, it shows that learning tends to be still teacher-centered because of the lack of communication between teachers and students in learning. But in reality, students' mathematical communication skills are still low. This is shown by the results of Osterholm's research (Nuraeni & Luritawaty, 2016) which states that students seem to have difficulty articulating reasons in understanding a reading. When asked to provide logical reasons for their understanding, students sometimes only focus on a small part of the text and state that this part (the problem containing symbols) does not understand, but does not give reasons for the statement (Putri, 2021). Whether or not students are correct in interpreting depends on students' understanding after reading the questions and formulating the answers according to the concepts understood by students. In addition, mathematical communication skills are closely related to mathematical literacy skills (Pertiwi & Novtiar, 2022). Kadir (2008) explains that revealing students' abilities in various aspects of communication, it can be done by looking at students' abilities in discussing problems and making mathematical expressions in writing, both pictures, mathematical models, as well as symbols or their language (Hodiyanto, 2017). Analysis of mathematical communication skills is useful for teacher evaluation, thesis research purposes, and knowing the average ability of students from the results of the description questions.

What happens in the field is that teachers are more accustomed to the lecture method compared to other methods that are better to use so that students have less mathematical communication. In a good learning process, one of them is by using the right approach so that it will make students more active in the learning process and more interesting. The book Connected Mathematics by Bistari (2010: 4) also reveals the importance of communication in mathematics learning, 'the overarching goal of connected mathematics is all students should be able to reason and communicate proficiently in mathematics (Fadhilaturrahmi, 2017).

In line with the description above, a solution is needed for this problem. To realize a fun learning process, it is necessary to have an appropriate approach for students. One of them is using a scientific approach which contains elements of observing, formulating problems, proposing or formulating hypotheses, collecting data, and drawing conclusions.

The scientific approach is intended to provide understanding to students in recognizing, and understanding various materials using a scientific approach, that information can come from anywhere, anytime, not depending on unidirectional information from the teacher (Wijayanti, 2014). In line with (Machin.A, 2014) the advantages of the scientific approach include: (1) It can improve intellectual abilities, especially critical thinking skills, (2) Can create a learning condition where students feel that learning is important and a necessity, (3) Can shape students' abilities in completing a task. problems systematically, (4) Train students in

communicating ideas, (5) Can develop student character, (6) obtain high learning outcomes (Syaadah & Ristiana, 2022).

So it is very emphasized that students can play more roles in the learning process compared to teachers because if students are more active, good communication will be created. Students will also definitely hone themselves to be more active by looking for material before learning takes place so that when the learning process is carried out students can answer questions posed by the teacher, which will create a fun learning process. The characteristic of the scientific approach is that it focuses on the learner, At the stages of the scientific approach, it can help students to find out mathematical concepts in learning, and can make learning more effective and students can get maximum results in learning mathematics, especially in comparative material. From this phenomenon, the authors are interested in conducting research because through this classroom action research, it can be seen that the problems of learning mathematics in the classroom by applying a scientific approach in learning comparative material.

METHOD

For this research, the method used is classroom action research because it prioritizes the nature of logical phenomena that prioritizes appreciation. In the classroom action research method, the researcher tries to understand and interpret the meaning of an event in the interaction of human behavior under certain conditions according to the prospect of the researcher himself. This study aims to understand the object under study comprehensively. The test instrument used in this study was a test in the form of a description of 5 questions using indicators of students' mathematical communication skills on comparative material and non-test used in the form of an attitude questionnaire. learning activity scale as many as 20 positive and negative questionnaires.

This research was carried out in two cycles consisting of two meetings in each cycle. The data analysis technique used in this study was carried out in three stages, 1) data reduction, the researcher analyzed the student's answer data assisted by filling out questionnaires to determine the stages of students in answering questions, 2) data presentation, the results of the analysis carried out by researchers were presented in text form. narratives, diagrams and tables of analysis results, and conclusions. 3) The conclusion stage, is the conclusion of the data that has been obtained from the process of data reduction and presentation. In contrast to (Nugrawati, 2018) the stages in the research, namely: 1) Preparing mathematical ability questions, 2) Conducting test trials, 3) Analyzing the data obtained, 4) Describing the results of data analysis and providing conclusions.

To determine the effect of student learning before and after being given a scientific approach, the N-Gain test is used, while the N-Gain test formula (Fadhilaturrahmi, Ananda, & Yolanda, 2021), is as follows.

$$N - gain(g) = \frac{Skor\ postest - Skor\ pretest}{Skor\ Maksimal - Skor\ pretest}$$

Description :

N-gain: The amount of the gain factor

Pretest score : The value of the initial test results

Posttest score : Final test score

Maximum score : Maximum test score

Table 1. Presentase kriteria factor gain

Interval	Criteria
g >0,7	Tall
0,3 ≤ g ≤ 0,7	Currently
g < 0,3	Low

Accordingly, the research was carried out in two cycles according to the steps according to Kemmis & Mc.Targgart (Cahyani, Hadiyanti, & Saptoro, 2021). This research was tested on class VII students of SMP Pasundan 3 Cimahi, totaling 34 children with the implementation time in the first semester of the 2021/2022 academic year. Research is very focused on comparative material. Data collection techniques used in this study are interviews, observations, and tests. Interviews were conducted with the classroom teacher to collect data on the students' initial conditions regarding student activity. Observations are used to collect disciplinary data in each cycle. Tests were conducted to collect data on mathematical communication skills at the end of each cycle.

RESULTS AND DISCUSSION

This research was conducted on one of the seventh graders at SMP Pasundan 3 Cimahi. The research questions have been stated previously, to answer these research questions, discussion and analysis of answers are carried out to reveal students' mathematical communication skills from each answer to the test questions that are used as research samples. Describe students' mathematical communication in solving problems on comparative material in each question. The research sample amounted to 34 students. The data from this research are in the form of scoring results of students' mathematical communication skills whose data collection uses instruments in the form of essay test questions as many as 5 questions and 20 non-test questions positive and negative. The results of the N-gain below, it is obtained:

Table 2. Results N-gain

Average Score Results		Max Score	Average N-gain
Pretest	Postest		
196	453	16	0,4381

The table above shows that the average score for the pretest and posttest shows a clear difference between the results before being given learning using a scientific approach and after using a scientific approach. The maximum score also shows a number that is quite large when compared to the correct answers to all of the 5 questions attached. The average N-gain produced is also classified as moderate because of the large number of students who answered correctly. Therefore, it can be said that the scientific approach affects the learning process to create more effective and active learning.

The results of the questionnaire as many as 20 positive and negative can also be obtained below:

Table 3. Student Activity Questionnaire results

Questionnaire Score	Criteria
1	Very Strong
16	Strong
3	Enough

The results of student answers shown by the data above indicate that the category is strong. The results of data analysis show that there is an influence of the scientific approach on students' mathematical communication skills after being given action. Therefore, it can be concluded that there is an effect of using a scientific approach on mathematical communication skills.

Pre-cycle activities are used to determine the initial state of the research object in this case. Pre-cycle activities are carried out by conducting interviews with classroom teachers, making observations during online learning, and giving test questions to determine students' abilities. In this activity, the researchers found that the activeness and mathematical communication skills of students, especially analyzing and evaluating were still relatively low. Furthermore, the researchers prepared to learn tools in the form of lesson plans, LKPD, teaching materials, teaching media, and evaluation questions for activities in cycle I and cycle II.

In the first stage, students are required to be able to work on the questions that have been provided as many as 5 questions, from there we can see how students can work on these questions before being given learning material with a specified time of 60 minutes. Then the students collect the results of working on the questions through the WhatApp application because at this stage students have not been able to meet face-to-face with the teacher. Therefore, students who have finished working on the questions are expected to immediately submit them to the WhatApp Group. And for students who have not worked on it, the researcher will be billed directly by the researcher to collect assignments.

At the next stage, students are forced to be more able to communicate what things must be poured into the same question so that the results can be better than before. Because students are first given material and explanations that they feel are sufficient to be able to fill in the previous questions to be better than before. And previously, students were also asked whether the learning delivered could be understood by students so that the same mistakes would not happen again on the same questions.

After students can solve the questions asked, the next students are required to be able to fill in the late questionnaire provided as many as 20 positive and negative questionnaires. The collection process is by filling out the google form that was previously shared in the WhatsApp group. The results obtained are calculated using Microsoft Excel so that the results can be seen. Learning outcomes are changes in the level of ability obtained by students after carrying out the learning process both in writing and orally. The level of this ability is seen from three domains, namely cognitive, attitude, and psychomotor (Siagian, 2021).

They suggest reducing the number of questions with the same question criteria even though they are in different sentences (Yusup, Febrianawati., Studi, Program., Biologi, Tadris., Islam, Universitas., Antasari, Negeri, 2018). This is because by increasing the attractiveness of students to mathematics lessons, students will focus more on the material presented by the

teacher. Researchers also see that teachers can freely use learning media combined with a scientific approach (Wijaya, Tommy Tanu., Purnama, Aditya., Tanuwijaya, Hendry, 2020).

The series of stages in the scientific approach are able to help students construct and explore concepts during the learning process, and make online learning more effective and students can achieve maximum mastery in learning mathematics. Based on the phenomena that have been stated, the authors are interested in conducting a classroom action research (Pebriyanti et al., 2021). Students with low mathematical communication skills also still make mistakes in pronouncing the necessary calculation steps and are hesitant in explaining problem solving. Based on this, students with low mathematical communication skills do not yet have effective speaking skills this corresponds to (A. W. Yanti & Novitasari, 2021). In contrast to that according to (Nasution & Ahmad, 2019) the ability to express mathematical ideas in the form of pictures is formed through the scaffolding given by the teacher and discussion among fellow students. The scaffolding process carried out by the teacher on students can make students understand the existing ideas and can illustrate them in the form of pictures. Furthermore, the ability to express mathematical ideas into their own statements is formed when students compare and discuss answers.

CONCLUSION

Based on the discussion in this chapter, the researcher presents conclusions and suggestions based on all research activities regarding the effect of the scientific learning model on student learning outcomes in comparative learning with strong category results. and has a positive impact on the learning process which is marked by an increase in classical completeness and the average score of students in each cycle carried out.

Based on the results and discussion of the study, it was concluded that students' mathematical communication skills using a scientific approach in observing, formulating problems, proposing or formulating hypotheses, collecting data, and drawing conclusions obtained results were classified as strong level. This is because students can communicate with teachers so that they become more active than before using the scientific approach.

Then put forward some suggestions that hopefully can be input in carrying out the learning process. The suggestions from this research are: Mathematical communication skills help students to be more active in learning and teachers do not fully teach with the lecture method. Therefore, learning like this can be alternative learning that can be applied by teachers because it will arouse the enthusiasm and activeness of students. Students should be taught with learning that stimulates active student activity so that students can be more creative and can find their own concepts, principles and meanings of the material studied with the teacher only acting as a facilitator.

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