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# Mathematics Communication Ability In Mathematics Learning

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**Abstract** : *The problem that is the focus of this research is the decline in students' mathematical communication skills in learning mathematics at MI PUI Ciawigebang. The aims of this study were to: 1) determine the mathematical communication skills of students; 2) Knowing the mathematics learning of students; 3) Knowing students' mathematical communication skills in learning mathematics. The type of research used is descriptive qualitative research. The source of data used in this study is a primary source, namely the results of interviews with 6 research subjects taken based on 3 abilities, namely 2 students with high abilities, 2 students with moderate abilities, and 2 students with low abilities. and secondary sources in the form of journals and books. The research instrument used in this study was a mathematical communication ability test, documentation, and interviews. The research subjects were fifth grade students at MI PUI Ciawigebang Kab. Brass. Based on the results of research and discussions that have been carried out, some conclusions can be drawn as follows. 1) Mathematical communication skills in class V MI PUI Ciawigebang are based on written mathematical communication skills and Oral mathematical communication skills, each of which consists of 3 aspects of mathematical communication skills. mathematical communication skills in class V MI PUI Ciawigebang only reached Aspect 2; .2) Mathematics learning for class V MI PUI Ciawigebang based on the grouping of High, medium, and low categories is still not optimal, this is due to the lack of confidence in students in presenting mathematical ideas in writing and orally on the given problems; 3) students' mathematical communication skills in learning mathematics. Subjects in the high category capable in all 3 aspects can demonstrate the use of mathematical language and forms of mathematical representation. Subjects in the moderate category in aspects 1 and 2 can write down information that is known and asked in full, while low category subjects are only able in aspect 1 to be able to express ideas through writing and demonstrate and visually describe*

***Keywords*** ***: mathematical communication skills, learning mathematics***

**Introduction**

Education is an important need for humans. Education is a conscious effort that is planned and structured so as to form a learning atmosphere in order to acquire new knowledge. Education cannot be separated from other scientific fields. Education is a field that focuses its activities on the teaching and learning process (knowledge transfer). In human education will experience the process of self-development as best as possible through learning activities. (Imam Gunawan, 2012). Mathematics is a subject that is most feared by most students because it is considered a very difficult subject. Mathematics has a higher level of difficulty and abstraction of concepts compared to other subjects (Halawati, 2018)

Mathematics subjects need to be given to all students starting from elementary school, to equip students with the ability to think logically, analytically, systematically, critically, innovative and creative, and the ability to work together. To achieve these goals, in mathematics learning it is very important to develop various aspects of skills, one of which is higher order thinking skills (Halawati, 2019). The general purpose of education is to educate and develop the potential in students to be able to face the future. With the development of intelligence and self-potential, every child is expected to be able to have knowledge, creativity, a good personality, be independent, and be responsible. One of the efforts to achieve this goal is through learning mathematics. One of the abilities that students need to have in mathematics is mathematical communication skills. According to the NCTM (National Council of Teachers of Mathematics, 2000: 60). Indicators are measures of achievement of basic competencies which are characterized by measurable changes in behavior, including attitudes, knowledge, and skills. (Halawati, 2021)

Mathematical communication is a way for students to share mathematical ideas that have been studied and clarified in understanding. Through communication, ideas become objects of reflection, can be improved, discussed, and changed. When students are challenged to communicate the results of their thoughts to others orally or in writing, they learn to explain, convince, and use mathematical language appropriately. Mathematics is a science that studies abstract structures and patterns of relationships that exist in them. This means that learning mathematics is essentially learning concepts, concept structures and looking for relationships between concepts and their structures (Halawati, 2018).

In order to compare the Mathematics and Science achievements of 4th and 8th graders in several countries, a study was conducted, namely the Trend In International Mathematics And Science Study (TIMSS). In general, TIMSS aims to monitor the results of the education system related to student achievement in Mathematics and Science. TIMSS is carried out regularly every 4 years, namely 1995, 1999, 2003, 2007, 2011 and 2015. Indonesia is one of the countries that became the object of TIMSS in the last four periods. Talking about mathematics achievement, Indonesia's position is still below the international level, as reported by TIMSS. The results of the 2003 TIMSS study, Indonesia is ranked 35

out of 46 participating countries with an average score of 411, while the international average score is 467. The results of the 2007 TIMSS study, Indonesia is ranked 36 out of 49 participating countries with an average score of 397, the results of the 2011 TIMSS study, Indonesia is ranked 38 out of 42 participating countries with an average score of 386, while the international average score is 500 (P4TK, 2011). And the latest results, namely TIMSS 2015 Indonesia is ranked 44th out of 49 countries (Nizam, 2016).

**Table 1**
**TIMSS Indonesia results**

| Tahun | Peringkat | Rata-rata Skor Indonesia | Rata-rata Skor Internasional | Negara yang berpartisipasi |
|---|---|---|---|---|
| 2003 | 35 | 411 | 467 | 46 |
| 2007 | 36 | 397 | 500 | 49 |
| 2011 | 38 | 386 | 500 | 42 |
| 2015 | 44 | 397 | 500 | 49 |

Source : www.kemendikbud.com

With the TIMSS criteria, the achievement of survey participants is divided into four levels: low (low 400), medium (intermediate 475), high (high 550) and advanced (advanced 625) from the data above so that Indonesia's position is at a low level According to Aminah's research results in Cendikia (2018) which states that mathematical communication skills are low because students seem to have difficulty articulating reasons in understanding a mathematical reading. There are still many students who do not write down the solution, which makes intrapersonal (message-symbol processing) and interpersonal (message-delivery) communication important in interpreting terms to solve mathematical problems

**Method**

The type of research used is descriptive qualitative research. The data sources used in this study are primary sources, namely the results of interviews with 6 research subjects taken based on 3 abilities, namely 2 students with high abilities, 2 students with moderate abilities, and 2 students with low abilities. and secondary sources in the form of journals and books.

Data collection technique In this study, the data collection methods used are:

a. Documentation

Documentation is used to make it easier for researchers to repeat data from interviews between researchers and students and can be evidence if needed in the future, tools such as cellphones and notebooks are needed.

b. Interview

Interview is a data collection technique used to obtain information directly from the source. Interviews are used when researchers want to conduct a preliminary study to find problems that must be investigated and also if researchers want to know things from respondents more deeply. Researchers

used interview techniques to collect data about students' mathematical communication skills. Information in the form of data/information will then be processed using triangulation techniques to draw conclusions.

c. Mathematical Communication Ability Test

The mathematical communication ability test used is a question obtained from the Master Bank Math Problem Class V questions compiled by the Grasindo Team. The test in question is a written test consisting of 10 questions about the volume of cubes and blocks.

## Result And Disucssion

The following will discuss the results of the analysis previously described about mathematical communication skills in terms of ability grouping. First, it will be discussed about mathematical communication ability in terms of high ability grouping, second mathematical communication ability in terms of medium ability grouping, and the last is about mathematical communication ability in terms of low ability grouping. Further discussion is presented as follows.

1. **Mathematical Communication Ability In Terms Of High Ability Grouping**

   In this study, the subjects for mathematical communication skills with high grouping were T-1 and T-2. The results of the analysis that has been carried out from the results of the mathematical communication ability test and the interview results from the subjects T-1 and T-2 are generally able to meet the 3 aspects of mathematical communication skills. However, from the three aspects of mathematical communication skills, the subject with the high ability grouping still does not meet the 3rd aspect.

   In aspect 1 of mathematical communication skills, subjects with high ability grouping can write down information that is known and asked completely, so that subjects with high ability grouping are able to express mathematical ideas.

   In aspect 2 of mathematical communication skills, subjects with high ability grouping can use symbols, notations and mathematical structures in solving problems, then use them when writing down what is known and asked.

   In aspect 3, students' mathematical communication skills with high ability groupings can describe shapes that match the illustration questions accompanied by their sizes. This can be seen from subjects T-1 and T-2 who can describe the shapes of cubes and blocks to describe shapes that match the volume of cubes and blocks. Both subjects can describe the cube and block shapes requested from the questions accompanied by size descriptions, so that

students with high ability grouping are able to explain ideas, mathematical relations in writing or with pictures.

From the discussion above, students' mathematical communication skills with high ability grouping can be categorized as capable. This is because students with high ability groupings are sufficient in demonstrating the use of mathematical language and forms of mathematical representation. This can be seen from students with high ability groupings who are able to write down information that is known and asked completely and can describe the appropriate form of the question. Learners with high ability grouping can provide a clear line of thought. This is because students with high ability grouping can write down the appropriate steps. In addition, students with high ability grouping also use a form of mathematical representation with some success. It can be seen that students can do calculations even though they write conclusions that are still not perfect. This is in line with previous research. The results of research conducted by Iasha Nur Afifah Khadijah1, Rippi Maya2, Wahyu Setiawan3 (2018) with the title "analysis of the mathematical communication skills of junior high school students on statistics material" states that mathematical communication skills in statistical material are included in good criteria. Because students can write down mathematical ideas, aspects of mathematics, and can explain mathematical models, or steps to solve problems clearly and precisely. From this explanation, the teacher should always encourage students in carrying out learning to be more careful in writing what is known and asked. In addition, the teacher must also remind students to get used to using mathematical symbols in presenting mathematical ideas and solving problems in mathematics.

2. **Mathematical Communication Ability In Terms Of Ability Grouping Medium**

In this study, the interview subjects for mathematical communication skills were S-1 and S-2. The results of the analysis that have been carried out from the results of the mathematical communication ability test and the results of interviews from the S-1 and S-2 subjects have been able to fulfill aspects 1 and aspect 2, but the subject of ability grouping is less capable in aspect 3.

In aspect 1 of mathematical communication skills, the subject of medium ability grouping (S-1, S-2) can write down information that is known and asked completely. During learning, the teacher always emphasizes by reminding repeatedly so that students pay attention to the information that is known and asked, because this is very important in solving problems.

In aspect 2 of the mathematical communication skills of subjects with moderate ability grouping (S-1, S-2) can use mathematical symbols in solving

problems. On the subject of medium grouping can also use mathematical symbols in solving problems.

In aspect 3, students' mathematical communication skills with medium ability grouping can describe shapes that match the problem illustrations but are not accompanied by size descriptions. This can be seen from the subject of S-1 who can describe cubes and blocks according to the illustration of the problem but does not write down size information on the picture. Likewise for the subject of S-2 can describe the shape of a cube and a block to describe a shape that is in accordance with the volume of the cube and block but is not accompanied by a description of the size/symbol.

From the discussion above, students' mathematical communication skills with medium ability grouping can be categorized as capable. This is because students with high ability groupings are sufficient in demonstrating the use of mathematical language and forms of mathematical representation. This can be seen from students with moderate ability groupings who are able to write down information that is known and asked completely and can describe the appropriate form of the question. Learners with high ability grouping can provide a clear line of thought. This is because students with moderate ability grouping can write down the appropriate steps. In addition, students with moderate ability grouping also use the form of mathematical representation with some success. It can be seen that students can do calculations even though they write conclusions that are still not perfect. This is in line with previous research conducted by Dona Dinda Pratiwi (2015) entitled "Analysis of Mathematical Communication Skills in Solving Mathematical Problems according to Cognitive Style and Gender". Stating that the mathematical communication skills of students with cognitive dependence style are said to be good, because they can communicate ideas in writing, express ideas well both orally and in writing and can rearrange information in such a way that the problem solving ideas presented can use actual problem solutions. . From this explanation, the teacher should always encourage students to be more careful in writing what is known and asked. In addition, the teacher must also remind students to get used to using mathematical symbols in presenting mathematical ideas and solving problems in mathematics, and the teacher must also remind students to always write down size descriptions on pictures.

3. **Mathematical Communication Skills In Terms Of Low Ability Grouping**

In this study, the interview subjects for mathematical communication skills were R-1 and R-2. The results of the analysis that have been carried out from the results of the mathematical communication ability test and the

results of interviews with subjects R-1 and R-2 are only able to fulfill aspect 1, namely the ability to express mathematical ideas and demonstrate and visually describe. As for aspects 2 , and 3 subjects with low ability grouping were not able to fulfill it.

In aspect 1 of mathematical communication skills, subjects with low ability groupings (R-1, R-2) were able to write down information that was known and asked completely. Based on this, it can be concluded that subjects with low ability grouping are able to present mathematical ideas in writing.

In aspect 2 of mathematical communication skills, the subject of low ability grouping (R-1, R-2) cannot use mathematical symbols in solving mathematical problems and cannot use mathematical symbols on what is known and asked. Based on this, it can be concluded that subjects with low ability grouping are not able to present mathematical ideas in writing.

In aspect 3, the subject's mathematical communication ability with the subject of low ability grouping (R-1, R-2) cannot describe the shape that is in accordance with the problem and does not make the size of the image according to the problem. Based on this, it can be concluded that subjects with low ability groupings are not able to explain ideas, everyday situations and mathematical relationships in writing with pictures.

From the discussion above, the mathematical communication skills of students with low ability grouping can be categorized as incapable. This is because students with low ability groupings are not sufficient in demonstrating the use of mathematical language and forms of mathematical representation. This can be seen from students with low ability groupings who are not able to write down information that is known and asked completely and can describe the appropriate form of the question. Students with low ability grouping cannot provide a clear line of thought. This is because students with low ability grouping cannot write down the appropriate steps. In addition, students with low ability grouping also do not use the form of mathematical representation with some success. It can be seen that students cannot do calculations but write conclusions that are still wrong. This is in line with previous research from the Research Results of Novie Suci Rahmawati, Martin Bernard & Padillah Akbar (2019) entitled "Analysis of Mathematical Communication Skills of Vocational High School Students on Two Variable Linear Equation System Materials" which states that students are still of the low type because students still have difficulty in answering questions and unable to express mathematical ideas when solving mathematical problems. Based on this, the teacher should put more emphasis on learning to use mathematical symbols. The teacher must also urge

students to be careful in solving mathematical problems and urge them to make pictures that are accompanied by the correct size. In addition, the teacher must also guide students to always make the correct conclusions at the end of solving mathematical problems by always reminding students during learning and if the conclusions made by students are still inaccurate, the teacher provides corrections and together with students make correct conclusion.

## Conclussion

Based on the results of research and discussion, conclusions can be drawn to answer the researcher's questions, namely: Mathematical communication skills in class V mi pui ciawigebang are based on written mathematical communication skills and oral mathematical communication skills, each of which consists of 3 aspects of mathematical communication skills. Mathematical communication skills in class v mi pui ciawigebang only reached aspect

Mathematics learning for class v mi pui ciawigebang based on the high, medium, and low categories is still not optimal, this is due to the lack of students' confidence in presenting mathematical ideas in writing and orally on the problems given.

The mathematical communication ability of students in learning mathematics in class v mi pui ciawigebang, high category subjects are capable in all 3 aspects, moderate category subjects are capable in aspects 1 and 2, while low category subjects are only able in aspect 1. High category subjects can show the use of mathematical language and forms of mathematical representation. This can be seen from students with high ability groupings who are able to write down information that is known and asked in full and can describe shapes that match the problem. Learners with high ability grouping can provide a clear line of thought. This is because students with high ability grouping can write down the appropriate steps. In addition, students with high ability grouping also use a form of mathematical representation with some success. The subject of the medium category has been able to fulfill aspect 1 and aspect 2 but the subject of the medium ability grouping is less capable in aspect 3. It can be seen that the subject of the medium ability grouping can write down the information that is known and asked completely. During learning, the teacher always emphasizes by reminding repeatedly so that students pay attention to the information that is known and asked, because this is very important in solving problems. In mathematical communication skills, subjects with moderate ability grouping can use mathematical symbols in solving problems. On the subject of medium

grouping can also use mathematical symbols in solving problems. Low category subjects have not been able to demonstrate the use of mathematical language and forms of mathematical representation. This is because students with low ability groupings are not sufficient in showing the use of mathematical language and forms of mathematical representation. This can be seen from students with low ability groupings who are not able to write down information that is known and asked completely and can describe the appropriate form of the question. Students with low ability grouping cannot provide a clear line of thought. This is because students with low ability grouping cannot write down the appropriate steps. In addition, students with low ability grouping also do not use the form of mathematical representation with some success.

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