**International Journal of Economy, Education and Entrepreneuship**
p-ISSN: 2798-0138 | e-ISSN: 2798-012X
Vol. 2, No. 3, December 2022
*https://doi.org/10.53067/ije3.v2i3*

# DESCRIPTION OF STUDENT'S MATHEMATIC COMMUNICATION ABILITY REVIEWING FROM PERCEPTION OF MATHEMATICS

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***Abstract***
*This study aims to describe the mathematical communication skills of class VII students in terms of students' perceptions of mathematics in class VII statistics material. The data sources of this research were students of class VII C of SMP Negeri 1 Sumbang. Respondents in this study were taken by purposive sampling method. Students are categorized into three categories, namely high, medium, and low perceptions of mathematics. The method used for data collection in this study was a questionnaire on students' perceptions of mathematics, mathematical communication skills tests, and interviews. Based on the results of research that has been done, it can be concluded that students who have a good perception of mathematics are able to meet the three indicators of mathematical communication skills, students who have an ordinary perception of mathematics are quite capable of meeting the three indicators of mathematical communication skills and students who have poor perceptions towards mathematics tend not to be able to meet the indicators of mathematical communication skills.*
**Keywords:** *Mathematical Communication Ability, Students' Perception of Mathematics*

## INTRODUCTION

Communication has an understanding as a process of sending emotions, ideas, information, abilities, etc., through symbols such as numbers, pictures, words, and so on. Mathematical communication ability is a person's competence to state mathematical statements in writing, write explanations or reasons for each mathematical argument that he chooses and applies in solving mathematical problems, using formulas, notations, diagrams, tables, or mathematical terms appropriately, and studying, and evaluating how others do mathematical thinking (Sari et al., 2017).

Mathematical communication skills are needed in mathematics because they have several roles, including measuring tools for ability, reflecting students' mathematical understanding, and helping sharpen students' thinking (Triana & Zubainur, 2019). *Mathematical communication* is a fundamental mathematical ability that is necessary and essential for every student to have, which can be used as a provision for students in solving and constructing mathematical problems and as a means for students to exchange ideas and opinions (Hikmawati et al., 2019). This is reinforced by the research of Astuti & Leonard (2015), which found that mathematical communication had an effect of 88.17% on student achievement. Armed with these abilities, it will make it easier for students to come up with mathematical ideas so that the mathematical difficulties faced by students are easily understood by the students themselves and others.

Mathematical communication skills can be viewed from many things including perception. Perception is essential for humans responding to everything or the symptoms around them (Najichun & Winarso, 2016). In the research of Putri & Widodo (2018), it is stated that students' perceptions

influence mathematics learning achievement because, in their research, they found the conclusion that if students have good perceptions of the mathematics learning process, they get to have good mathematics learning achievements as well. The same thing was conveyed by Gani (2015) that there were differences in interest in learning that were found from each student who had different perceptions of mathematics. It is strengthened by Nur's research (2016) that students' perceptions of mathematics have a positive and significant effect on students' learning motivation with an effect of 13.5%, and students' perceptions of mathematics have an influence on students' mathematics learning outcomes by 20.40% (Vani et al., 2019).

Based on the results of interviews conducted with one of the mathematics teachers, some information was obtained, including that students there when learning mathematics took place, especially during a pandemic like this, it was not very optimal because it was done online. As is known, schools in the Banyumas district are now accepting new students using a zoning system so that students who attend SMP Negeri 1 Sumbang are diverse. This research is essential to do in this school for several reasons, namely (1) students' mathematical communication skills are essential in students' mathematics learning; (2) the heterogeneity of students at SMP Negeri 1 Sumbang, which is expected to show diverse perceptions of mathematics; and (3) the difference in students' perceptions of mathematics which is expected to show differences in their mathematical communication skills.

## METHOD

This study aimed to describe the mathematical communication skills of class VII students of SMP Negeri 1 Donor in terms of students' perceptions of mathematics. This study took nine students by purposive sampling to be respondents, each of which consisted of 3 respondents with good perceptions of mathematics, three with ordinary perceptions of mathematics, and three with poor perceptions of mathematics. The steps in this research are as follows: (1) Establishing a school as a research location, namely SMP Negeri 1 Sumbang. (2) Determining the research sample using a purposive sampling technique with the teacher's consideration, namely 33 students in class VII C consisting of 13 male and 20 female students (Sukestiyarno, 2020). (3) Develop research instruments in the form of grids and test questions on mathematical communication skills along with answer keys, grids, questionnaires, and scoring guidelines from questionnaires on student perceptions of mathematics and semi-structured interview guidelines. (4) Distributing questionnaires on students' perceptions of mathematics and mathematical communication ability test questions to class VII C students of SMP Negeri 1 Sumbang. (5) Collect and correct the results of questionnaires and tests based on the answer keys and scoring guidelines that have been made. (6) Selecting nine students using purposive sampling as respondents consisting of students with good, average, and poor perceptions of 3 students in each category. (7) Conducting interviews with nine selected respondents. (8) Documenting in the form of writing or transcripts of the results of questionnaires on students' perceptions of mathematics, tests of students' mathematical communication skills, and interviews and photos of activities. (9) Analyzing the

data obtained from the research by describing the results of the questionnaire on students' perceptions of mathematics, tests of mathematical communication skills, and the results of interviews from each selected subject. (10) Carry out a data validity test using triangulation techniques, (11) Conclude.

The instruments used in this study were a questionnaire on students' perceptions of mathematics, mathematical communication skills tests, interview guidelines, and documentation. The subjects of this study were students of class VII C of SMP Negeri 1 Sumbang in the even semester of the 2020/2021 academic year. Data analysis techniques used in this research are data reduction, data presentation, and conclusion drawing.

## RESULTS AND DISCUSSION

**Table 1. The results of the questionnaire on students' perceptions of mathematics**

| No. | Perception Category | Amount |
|---|---|---|
| 1. | Good | 4 |
| 2. | Ordinary | 25 |
| 3. | Not Good | 4 |
| Amount | | 33 |

Thirty-three students take the mathematical communication ability test, and students are categorized into 3: students who have good perceptions of mathematics, ordinary perceptions of mathematics, and poor perceptions of mathematics. Based on table 1, it can be seen that from 33 students, four students have a good perception of mathematics, or 12.12% of the number of students in the class, and four students have a poor perception of mathematics, or 12.12% of the number of students in the class. The remaining 25 students, or 75.75% of the total students in the class, had a standard perception of mathematics.

In this study, three respondents were taken from each category to be interviewed further about the mathematical communication ability test. The information is presented in table 2.

**Table 2. Respondent category data**

| No. | Group | Initial | Score | Research Subject Code |
|---|---|---|---|---|
| 1. | Good | NHA | 132 | **PB 1** |
| 2. | | FPA | 142 | **PB 2** |
| 3. | | SNAZ | 146 | **PB 3** |
| 4. | Ordinary | WE | 109 | **PBS 1** |
| 5. | | NZA | 120 | **PBS 2** |
| 6. | | EPM | 113 | **PBS 3** |

| | | | | |
|---|---|---|---|---|
| 7. | Not Good | NNA | 99 | **PKB 1** |
| 8. | | FAP | 90 | **PKB 2** |
| 9. | | RS | 100 | **PKB 3** |

The following is the data on students' mathematical communication ability test scores in statistical material based on data collection using instruments in the form of description test questions.

**Table 3. The results of the score and the percentage of students' mathematical communication ability tests**

| Response Code | Indicator 1 | | | Indicator 2 | | | | Indicator 3 | | Amount | Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1c | 2c | 3c | 1b | 2a | 2b | 3b | 1a | 3a | | |
| PB 1 | 8 | 8 | 8 | 6 | 6 | 6 | 8 | 16 | 8 | 74 | 86.05 |
| PB 2 | 8 | 8 | 8 | 6 | 6 | 6 | 8 | 16 | 8 | 74 | 86.05 |
| PB 3 | 8 | 8 | 8 | 6 | 8 | 8 | 8 | 20 | 10 | 84 | 97.67 |
| PBS 1 | 6 | 7 | 4 | 6 | 6 | 6 | 2 | 10 | 10 | 57 | 66.28 |
| PBS 2 | 6 | 8 | 7 | 2 | 8 | 8 | 2 | 16 | 8 | 65 | 75.58 |
| PBS 3 | 6 | 8 | 6 | 2 | 8 | 8 | 3 | 16 | 8 | 65 | 75.58 |
| PKB 1 | 6.5 | 6.5 | 6 | 7 | 6 | 8 | 3 | 16 | 4 | 63 | 73.26 |
| PKB 2 | 8 | 2 | 6 | 4 | 3 | 4 | 2 | 10 | 4 | 43 | 50 |
| PKB 3 | 4 | 4 | 4 | 1 | 5 | 1 | 1 | 2 | 2 | 24 | 27.91 |

Table 3 above shows the score and percentage of mathematical communication skills of each respondent. PB 3 has the highest percentage of 97.67%, while the lowest percentage is owned by PKB 3, which is 27.91%. Based on the answers to the mathematical communication ability test and interviews with nine respondents who were included in the group of students with good perception, average perception, and poor perception of mathematics, the following description was obtained:

**Description of Students with Good Perception of Mathematics**

Respondents with a good perception of mathematics subjects have good mathematical communication skills. The percentage of written mathematical communication skills possessed by PB 1, PB 2, and PB 3 are 86.05%, 86.05%, and 97.67%, respectively. Respondents with a good perception of mathematics tend to answer all the questions with correct and easy-to-understand answers. Respondents also tend to be able to meet the indicators of mathematical communication skills, namely using language, notation, symbols, and mathematical structures to present ideas and model the given mathematical problems; understand and interpret mathematical ideas from everyday problems presented in written form; and express mathematical ideas in writing, then describe in visual form in

the form of tables and diagrams. Respondents can arrange three pieces of information based on the description of each question using their language that the reader quickly understands. This shows that respondents can generate information from the questions with their communication skills in the form of informative sentences they compose. Respondents have also been able to make simple frequency distribution tables, bar charts, and double line charts properly according to the commands desired by the questions. Some respondents have completed the tables and diagrams with the information to be easily understood. Then the respondent can solve the daily problems by describing questions, tables, and diagrams. Some respondents wrote their answers in full with the steps, but some could write down the answers directly. They can also explain the steps for the solution orally. In line with the research of Rusdi et al. (2020), someone with an excellent cognitive style can answer questions clearly and write down the completion process in a structured manner.

**Description of Students with Ordinary Perceptions of Mathematics**

Respondents with a standard perception of mathematics tend to fulfill some indicators. The percentage of written mathematical communication skills achieved by the three respondents in this category was 66.28%, 75.58%, and 75.58%. This figure is not high but not too low but still below the number of respondents with a good perception of mathematics. Respondents with an ordinary perception of mathematics can use language, notation, symbols, and mathematical structures to present ideas and model information from a given mathematical problem and understand, interpret and assess mathematical ideas from everyday problems presented in the form of writing and visuals. Some respondents wrote the information in slightly ambiguous sentences, but the reader could still capture the information they meant. The tables and diagrams made by the respondents are also by the questions asked, although there are still a few errors due to the lack of accuracy from the respondents. There is one indicator in which respondents still cannot understand, interpret and assess mathematical ideas from everyday problems presented in written or visual form. The questions given to measure this indicator are questions that ask the respondent to count the number of students with certain conditions, count the number of students from the pie chart given, then look for the difference between two specific data and calculate the percentage of the number of sure students requested by the question. Some respondents use the steps to solve the problem, while others write the answers directly. The error made by respondents with a standard perception of mathematics is in the questions that ask respondents to calculate the percentage of students. They admitted they were still confused and did not understand how to calculate the percentage. Students with a mediocre perception of mathematics can be seen as having the potential to improve their mathematical communication skills. This is known from several errors made by the respondent due to the lack of thoroughness and understanding he obtained from the question.

**Description of Students with Not Good Perception of Mathematics**

Respondents with a poor perception of mathematics subjects tend not to meet the indicators of mathematical communication skills. The percentage of written mathematical communication skills of the three respondents in this category are 73.26%, 50%, and 27.91%, respectively. Respondents have not been able to describe the situation from the description of the problem in visual forms such as tables, bar charts, and double-line charts. The diagrams made are still not to the wishes of the questions and are difficult to understand. Some information is compiled based on the description of the data on the questions correctly and precisely, but not a little information that is less precise and uses ambiguous sentences. For indicators of understanding, interpreting, and assessing mathematical ideas from everyday problems presented in written or visual form, several numbers are answered correctly. However, many numbers are still answered incorrectly, and they are still unable to explain the steps. The solution. The questions from this indicator are still related to the previous questions, so because the respondent is still wrong in doing the questions in the previous number, the questions he does next will be wrong too. This also applies to questions that ask respondents to compile information based on the description of the question. Much information is compiled based on the answers to questions they previously worked on, which answers are still inaccurate. Respondents with a poor perception of mathematics still make many mistakes in solving the given problems due to their low interest in mathematics.

From the description above, it can be seen that the mathematical communication skills of students in each category have various descriptions. Fitroh and Sari (2018) state that students' perceptions of mathematics influence student learning outcomes. It can be seen from the differences in students' mathematical communication ability test answers from each category. Gani (2015) also said that perception is a critical factor in learning mathematics because perception can be a strength and an impetus for students to learn, as well as foster a sense of love and pleasure to learn. Research by Huang & Normandy (2009) also explains the importance of understanding concepts to communicate mathematics. Understanding concepts also grows because of good perception of mathematics. This can be seen from respondents who have a good perception of mathematics being more able to meet the indicators of mathematical communication skills than respondents who have an ordinary or poor perception of mathematics.

## CONCLUSION

Based on the results of the analysis and discussion, conclusions can be drawn regarding the mathematical communication skills of class VII students in terms of students' perceptions of mathematics, namely:

1. Students with a good perception of mathematics can fulfill all indicators of mathematical communication skills, including presenting and modeling information from mathematical problems given using self-constructed language, understanding, interpreting, and assessing mathematical ideas through questions from everyday problems. The day is presented in written

or written form. It expresses mathematical ideas by demonstrating and illustrating in the form of simple frequency distribution tables, bar charts, and double-line charts.

2. Respondents with an ordinary perception of mathematics, in general, are sufficient to meet the indicators of mathematical communication skills. There are quite a lot of errors caused by the lack of accuracy of the respondents. The difficulty experienced by respondents in this category is mainly calculating the percentage of a certain number of students desired by the question. The information compiled is correct and contained in the description of the problem, although some sentences are written in unclear sentences. Respondents can also express mathematical ideas by demonstrating and illustrating in the form of simple frequency distribution tables, bar charts, and double-line charts.
3. Respondents with a poor perception of mathematics tend to be less able to meet the indicators of mathematical communication skills. Lack of ability to present and modeling information from given mathematical problems using self-constructed language. Respondents are also less able to understand, interpret and assess mathematical ideas through questions from everyday problems presented in written or written form. Respondents have not been able to express mathematical ideas by demonstrating and describing them in simple frequency distribution tables, bar charts, and double line charts.

## REFERENCES

Astuti, A. dan Leonard. (2015). Peran Kemampuan Komunikasi Matematika Terhadap Prestasi Belajar Matematika Siswa. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 2, (2). 102-110. https://doi.org/10.30998/formatif.v2i2.91

Fitroh, M. I., & Sari, A. F. (2018). Pengaruh persepsi matematika siswa terhadap hasil belajar siswa di smkn 1 surabaya tahun ajaran 2017/2018. *Jurnal Pembelajaran Matematika, 5*(2), 148-156.

Gani, A. (2015). Pengaruh model pembelajaran dan persepsi tentang matematika terhadap minat dan hasil belajar matematika siswa smp negeri di kecamatan salomekko kabupaten bone. *Jurnal Daya Matematis*, *3*(3), 337-343. https://doi.org/10.26858/jds.v3i3.1700

Hikmawati, N. N., Nurcahyono, N. A., & Balkist, P. S. (2019). Kemampuan Komunikasi Matematis Siswa dalam Menyelesaikan Soal Geometri Kubus dan Balok. *Prisma*, *8*(1), 68-79. https://doi.org/10.35194/jp.v8i1.648

Huang, J., & Normandia, B. (2009). Students' Perceptions on Communicating Mathematically: A Case Study of a Secondary Mathematics Classroom. *International Journal of Learning*, *16*(5), 1-21. https://doi.org/10.18848/1447-9494/CGP/v16i05/46273

Najichun, M., & Winarso, W. (2017). Hubungan persepsi siswa tentang guru matematika dengan hasil belajar matematika siswa. https://doi.org/10.14710/jpu.15.2.143-150

Nur, M. A. (2016). Pengaruh Perhatian Orang Tua, Konsep Diri, Persepsi Tentang Matematika Terhadap Hasil Belajar Matematika Melalui Motivasi Belajar Siswa Kelas VIII SMP Negeri Di Kecamatan Ujung Loe Kabupaten Bulukumba. *Matematika Dan Pembelajaran*, *4*(2), 64-79. https://doi.org/10.24014/sjme.v2i2.2067

Putri, I. D. C. K., & Widodo, S. A. (2018, February). Hubungan antara minat belajar matematika, keaktifan belajar siswa, dan persepsi siswa terhadap prestasi belajar matematika siswa. In *Prosiding Seminar Nasional Pendidikan Matematika Etnomatnesia*.

Rusdi, M., Fitaloka, O., Basuki, F. R., & Anwar, K. (2020). Mathematical Communication Skills Based on Cognitive Styles and Gender. *International Journal of Evaluation and Research in Education*, *9*(4), 847-856. https://doi.org/10.11591/ijere.v9i4.20497

Sari, D. S., Kusnandi, K., & Suhendra, S. (2017, September). A cognitive analysis of students' mathematical communication ability on geometry. In *Journal of Physics: Conference Series* (Vol. 895, No. 1, p. 012083). IOP Publishing. https://doi.org/10.1088/1742-6596/895/1/012083

Sukestiyarno, Y. L. (2020). Metode penelitian pendidikan [Educational research methods]. UNNES Press.

Triana, M., & Zubainur, C. M. (2019). Students' Mathematical Communication Ability through the Brain-Based Learning Approach Using Autograph. *Journal of Research and Advances in Mathematics Education*, *4*(1), 1-10. https://doi.org/10.23917/jramathedu.v4i1.6972

Vani, I. K., Paloloang, B., & Idris, M. (2019). Pengaruh Persepsi dan Minat Belajar Terhadap Hasil Belajar Matematika Siswa Kelas X SMK Negeri 6 Palu. *Jurnal Elektronik Pendidikan Matematika Tadulako*, *6*(4), 455-468.