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Analysis of Students Mathematical Communication Ability Models on Set Materials

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Abstract: This study aims to see and analysis: The ability of mathematical communication to connect actual items, photos and diagrams into mathematical thinking. The ability of mathematical communication to provide explanations for thoughts, conditions, writing with gadgets, pictures, graphs, and actual algebra. The ability to speak mathematically expresses ordinary events in language or mathematical symbols. The ability of mathematical conversation to create state versions through writing, concrete gadgets, pictures, graphs, and algebraic methods. Mathematical verbal exchange ability to provide explanations and make questions about mathematics that has been found. The method in this study uses a qualitative method. The results showed that the mathematical communication ability to connect real objects, pictures and diagrams became low mathematical inspiration. Mathematical communication skills mentioning ideas, situations, writing using real objects, pictures, graphs and algebra are classified as moderate. Mathematical communication ability models states that everyday occurrences in mathematical language or symbols are low. The ability of mathematical communication to produce examples of a situation through writing, real objects, pictures, graphs, and algebraic methods is low. The ability of mathematical communication to express and make questions about the mathematics that has been learned is low.

Keywords: Mathematical Communication Ability; Set Models; Cognitive Development Stage

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INTRODUCTION

Mathematical communication is very important in teaching in schools so that students are able to read, know what is ordered and talk about in an issue, mathematical communication is a basic thing that students must understand. mathematics is also a means of interaction between students and communication between teachers and students. Unfortunately, mathematical communication skills rarely receive attention in schools. The importance of possessing mathematical communication skills was stated by Baroody [1] using rational a) mathematics is an essential language that is not only a sense of thinking, finding formulas to solve problems, or just concluding, but mathematics also has unlimited value to express various ideas clearly, thoroughly and perfectly; b) mathematics and learning mathematics means that the heart of human social activities, for example in learning mathematics, the relationship between teachers and students, between students and students, between mathematics learning materials and students are important factors in advancing the potential of students.

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According to the Ministry of National Education (No. 20 of 2006), one of the objectives of learning mathematics is to communicate ideas in the form of symbols, tables, graphs, or other media to clarify a situation or problem. This means that in addition to other abilities (such as reasoning abilities, mathematical representation abilities, and problem solving abilities), students have a strong desire, awareness, dedication and tendency to think and act mathematically in a positive way and based on faith, piety, and morals. noble as a mathematical disposition. that mathematical communication skills are also important to be developed in every mathematics learning process [1].

In addition to using cognitive abilities, it should be accompanied by affective abilities in student learning, so that students have a positive view of mathematics. The importance of someone who has a high mathematical disposition will produce an active, diligent, enthusiastic person in learning. According to Sumarmo in (Rustyani, 2018), mathematical disposition becomes hope, awareness, devotion and a strong similarity in students to think and act mathematically in a positive way and based on faith, piety, and noble character. Disposition is reflected in students' interest and religion in mathematics. with the disposition of students will feel responsible in making decisions [2] according to the description above it can be concluded that mathematical disposition can make a person more disciplined and enthusiastic in learning because in him self-confidence is embedded [3].

Mathematics is a language. Mathematics as a language is of course very necessary to be communicated both orally and in writing so that the information conveyed can be known and understood by others. As Cockroft said [4], ‘We believe that all these percepcions of the usefulness of mathematics arise from the fact that mathematics provides a means of communication which is powerful, concise, and unambiguous.’ This statement shows the need for students to learn mathematics on the grounds that mathematics is a very powerful communication tool, thorough, and not confusing.

Communication skills must be possessed by students in learning mathematics to interact with their environment. Through communication activities, students can exchange mathematical ideas and then communicate the results of their thoughts. Mathematics learning activities should emphasize activities that can improve mathematical communication so that students have the ability to interact well in solving dilemmas to achieve other mathematical abilities such as reasoning, understanding, connection and problem solving. The learning process in the classroom in understanding mathematical communication according to Baroody [5] it means capital in solving, exploring and investigating mathematics and is a forum for social activities using friends to develop thoughts and discoveries, brainstorming, assessing and sharpening inspiration to convince people. Sumarmo [6]. states that mathematical communication skills include students' abilities: connecting real objects, pictures, and diagrams into mathematical ideas, mentioning ideas, situations and mathematical partners orally or in writing with real objects, pictures, graphs and algebra, expressing everyday events in language or mathematical symbols, listening, discussing and writing mathematical discourse, reading using the understanding of a written mathematical presentation, compiling mathematical questions relevant to problem situations, making conjectures, compiling arguments, formulating definitions and generalizations.

On the other hand, Greenes and Schulman [7] which states that mathematical communication is: 1) the central power for students in formulating mathematical concepts and strategies, 2) success capital for students towards approaches and solutions in mathematical exploration and examination, 3) a forum for students to communicate using friends to gain information, share ideas and innovations, brainstorm, evaluate and sharpen ideas to convince others.

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Thus, mathematical communication skills become one of the social activities (talking) as well as thinking aids (writing) that are recommended by experts to continue to be developed among students. The indicators of mathematical communication skills according to Sumarmo [8]. namely: 1) Connecting concrete objects, pictures, and diagrams into mathematical ideas. two) expressing ideas, and mathematical partners orally or in writing with real objects, pictures, graphs and algebra, 3) stating everyday incidents in mathematical language or symbols, 4) listening, discussing, and writing about mathematics, 5) reading with understanding or presentation of written mathematics, 6) making conjectures, compiling arguments, formulating definitions, and generalizations, 7) explaining and forming questions about the mathematics that has been learned.

Contains previous research or related to the research conducted. Examples in previous studies [1][2][3] used background subtraction to detect inactive objects, while [4][5] according to tracking techniques using multiple cameras. but the tracking technique is less than optimal due to the large number of occlusions in the scene, on the contrary using background subtraction has a good recall, even though this method also produces a lot of false alarms caused by changes in illumination and crowds.

In previous studies using descriptive methods on set material. Narrative research can be divided into several types, namely: survey method, continuous narrative method, problem study research, job analysis research and activities, action research, and documentary [9]. research that uses the problem study method, using this method researchers want to see firsthand what mistakes they are able to make when working on a problem. The test given is in the form of a written test in the form of essay questions, where the mathematical communication data comes from the results of students' work on solving set problems, which is seen as coming from cognitive style. Researchers took 10 students as objects to explore students mathematical communication skills, using test, interview, and documentation techniques.

However, this technique is less than optimal in set learning because descriptive research can be heuristic or deductive. This type or category of research refers to research that uses existing data or as non-experimental research with hypotheses that have been formed previously, therefore the resulting data is not necessarily valid or appropriate to use research activities.

METHODS

For this research, the method used is a qualitative method. This method is called qualitative because it is more appropriate to the nature of the logical phenomenon that prioritizes appreciation (verstehen). In qualitative methods, researchers try to understand and interpret the meaning of an event of human behavior interaction in certain situations from the perspective of the researcher himself. Research that uses qualitative research aims to understand the object being studied in depth.

The data collection technique in this study was carried out using tests in the form of essays and in-depth interviews were carried out on the research subjects. The data analysis technique used in this research is descriptive analysis, namely analyzing data using a way of describing or describing the data that has been collected. there are 3 stages carried out, 1) data reduction, in this case the researcher analyzes the data by analyzing student answers assisted by conducting interviews to select the stages of students in answering questions, 2) data presentation, the results of the analysis carried out by researchers are presented in the form of narrative text, diagrams and tables of analysis results, and conclusions, 3) the

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conclusion stage, is the conclusion of data obtained from the process of data reduction and presentation.

By Sugiono [10] In qualitative research, because the problems brought up by researchers are still ad interim, the theory used in preparing qualitative research proposals is also temporary, so the theory used in preparing qualitative research proposals is still ad interim, and will develop after researchers enter field or social context. In qualitative research, the researcher enters an exclusive social situation, makes observations and interviews with people who are reviewed and understand about the social situation.

RESULT AND DISCUSSION

For writing the formula is written as follows :

$$Id(k,k+1) = | Ik+1 – Ik| \quad (1)$$

$$\text{Edge gradien} = \sqrt{G_x^2 + G_y^2} \quad (2)$$

$$\text{Sudut}(\theta) = \tan^{-1}\frac{G_x}{G_y} \quad (3)$$

This research was conducted in one of the eighth graders at SMP Negeri 3 Ngamprah. Mathematical communication ability test was given to 6 students regarding the set material. The data from the results of this study are in the form of student learning outcomes whose data collection uses an instrument in the form of a description test of 5 questions.

Table 1:Mathematical Communication Ability Percentage

Kode Siswa	Skor Soal No 1	Skor Soal No 2	Skor Soal No 3	Skor Soal No 4	Skor Soal No 5
ST1	3	3	3	3	3
ST2	2	3	3	1	2
SS1	1	2	1	1	0
SS2	1	2	1	1	0
SR1	1	1	1	1	0
SR2	2	1	1	1	0
Jumlah	**10**	**12**	**10**	**8**	**5**
Presentase	**41.7%**	**50%**	**41.7%**	**33.3%**	**20.8%**

Question 1

Know the following Venn diagram! Find the members of the set K, L and S and what is the relationship between the sets K and L?

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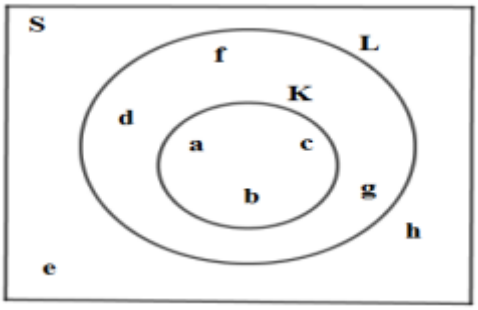

Figure 1: Test Example

Analysis of mathematical communication skills of moderately capable subjects in question number 1 is presented as Figure 1 and Figure 2.

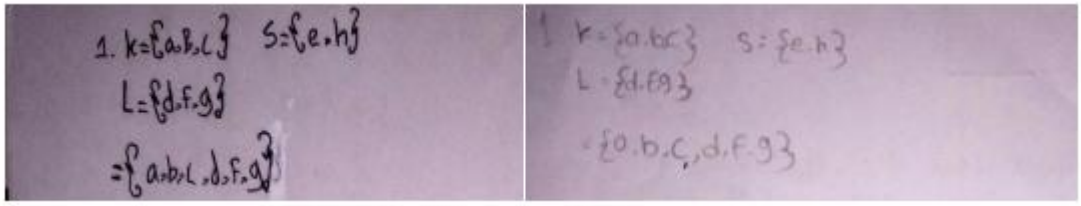

Figure 2: Analysis

Analysis of the mathematical communication skills of SS1 students in Figure 2. SS1 and SS2 are shown in Figure 2, SS has understood what the problem wants, namely registering its members and determining the relationship that occurs in the set, so that the solution is not resolved correctly. To obtain more information about mathematical communication skills, conversations were conducted with students with moderate abilities, the researchers conducted interviews with SS1 and SS2 as in the following transcript:

P1 : From question 1 what did you ask?

SS1 and SS2 : Determine the members of the set K, L and S.

P1 : Are you sure about the members of the set that you have filled in?

SS1 and SS2 : I don't know sis, I think so.

P1 : After the members of the set have been obtained, what are the next steps?

SS1 and SS2 : Determine the relationship between K and L

P1 : How to determine the relationship of the set?

SS1 and SS2 : I don't know sis

P1 : After that, is there still more to be done?

ST1 and ST2 :Nothing.

Question No 2

It is known that S= {whole number}, P= {prime number}, and Q={odd number}. Write it down by listing its members, then state the set in a Venn diagram!

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Analysis of mathematical communication skills number 2 for subjects with high, medium and low abilities, almost all of them can understand the problem asked by the question, so that the subject can know the steps to be able to illustrate the set into a Venn diagram and determine the intersection. But there are also low-ability subjects who cannot understand the problem, it can be seen from Figure 3

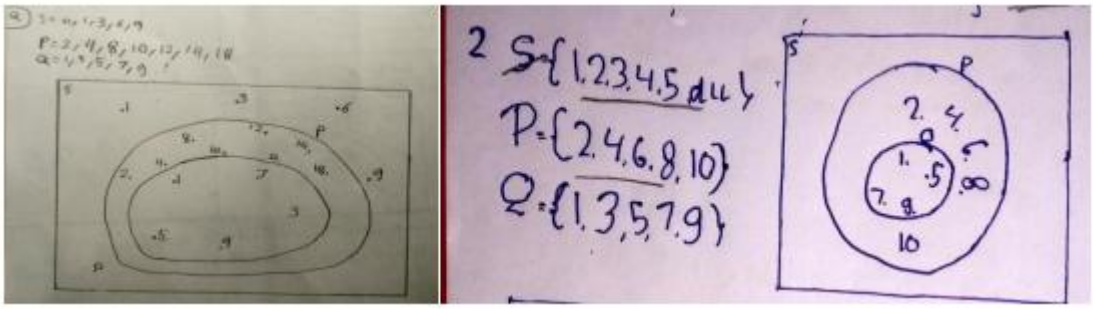

Figure 3: Student Answer

Analysis of the mathematical communication skills of SR1 students cannot understand the problems in the problem to register its members correctly, their ignorance of the members of whole numbers, prime numbers and odd numbers makes the completion process not as expected, so there are many errors to describe it in the diagram venn. To obtain more information about SR's mathematical communication skills in number 2, the researchers conducted interviews with SR as the transcript.

P1 : what to do with question number 2?

SR1 and SR2 : determine the members of the set.

P1 : do you know the numbers of whole numbers, prime numbers and odd numbers?

SR1 and SR2 : No

P1 : then what to do?

SR1 : state it in the venn diagram, bro, but I can't make the venn diagram.

P1 : are you sure it's correct the venn diagram you made?

SR : I'm not sure bro, but as far as I know, that's the Venn diagram.

Based on the researcher's interview with SR, it was obtained data that SR did not understand and knew the numbers including whole numbers, prisms and odd numbers. and do not know how to form a venn diagram. so the answer is not correct. Analysis of the errors in numbers 3, 4 and 5 for subjects with high, medium and low abilities, almost all of them cannot understand the problem asked by the question, so that the subject cannot know the steps to be able to illustrate the set into a Venn diagram and determine the appropriate intersection. It can be seen from the percentage of subjects obtained in question no. 3 only 41.7%, question no. 4 only 33.3%, and question no. 5 only 20.8%

CONCLUSION

Based on the results of research and discussion of research, it was concluded that mathematical communication skills connecting real objects, pictures and diagrams into mathematical ideas were classified as low. Mathematical communication skills to explain

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ideas, situations, writing using real objects, pictures, graphs and algebra are classified as moderate. Mathematical communication ability states that everyday events in mathematical language or symbols are low. Mathematical communication ability to make a model of a situation through writing, real objects, pictures, graphs, and algebraic methods is low. The ability of mathematical communication to explain and make questions about the mathematics that has been studied is low. These results are the basis for researchers to conduct further research on the mathematical communication skills of junior high school students in Cimahi City. according to the results of the research obtained, the researchers provide the following suggestions: (1) junior high school students should be specially trained on mathematical communication skills; (2) further research is needed on the achievement and improvement of mathematical communication skills.

REFERENCES

[1] N. Nurrizbaeni and L. S. Zanthy, "Analisis Kemampuan Komunikasi Matematik dan Disposisi Matematik Siswa Mts Nurul Hatta Kelas VII Pada Materi Himpunan," *J. Educ.*, vol. 01, no. 03, pp. 29–36, 2018.

[2] S. Aminah, T. T. Wijaya, and D. Yuspriyati, "Analisis Kemampuan Komunikasi Matematis Siswa Kelas Viii Pada Materi Himpunan," *J. Cendekia J. Pendidik. Mat.*, vol. 2, no. 1, pp. 15–22, 2018, doi: 10.31004/cendekia.v2i1.29.

[3] Y. Jamiah and A. Y. T, "Ditinjau Dari Motivasi Belajar Pada Materi Himpunan," pp. 1–8.

[4] Y. Yuzalia and H. Nufus, "Analisis Newman ' s Error Penyelesaian Soal-Soal Pada Materi Himpunan Berbasis Kemampuan Komunikasi Matematis berdasarkan Gaya Kognitif dan Habits of Mind," vol. 4, no. 2, pp. 113–122, 2021.

[5] A. Artikel and V. I. I. S. M. P. Instrumen, "Judika (jurnal pendidikan unsika)," vol. 7, pp. 10–19, 2019.

[6] R. Deviyani, Anggrianti, and L. S. Zanthy, "Analisis Kemampuan Pemecahan Masalah dan Komunikasi Matematik Pada Materi Himpunan," *J. Educ.*, vol. 01, no. 03, pp. 217–222, 2019.

[7] L. Safitri, P. Darmawan, and N. Prayekti, "Kemampuan komunikasi matematis merupakan hal yang penting dalam proses pembelajaran" . pp. 160–170, 2019.

[8] W. Dianti, Zubaidah, and Hamdani, "Kemampuan Komunikasi Matematis Siswa Dalam Materi Himpunan Di Kelas VII SMP Negeri 7 Kubu Raya," *J. Pendidik. dan Pembelajaran Khatulistiwa*, vol. 7, no. 7, pp. 1–8, 2018.

[9] S. F. Andini and R. Marlina, "Analisis Kemampuan Komunikasi Matematis Siswa SMP dalam Menyelesaikan Soal Pada Materi Himpunan," *J. Pembelajaran Mat. Inov.*, vol. 4, no. 2, pp. 343–354, 2021, doi: 10.22460/jpmi.v4i2.343-354.

[10] Wiyanti dan Marlina, "Analisis Kemampuan Komunikasi Matematis Siswa Kelas VIII A SMP Karawang Barat Dalam Menyelesaikan Soal Himpunan," *Pros. Semin. Nas. Mat. dan Pendidik. Mat. Sesiomadika*, pp. 818–819, 2019.

https://doi.org/10.63876/ijtm.v1i1.4