WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Analysis of Students' Mathematical Communication Ability in Solving Problems Viewed from the Mathematical Disposition

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ABSTRACT:

This study aims to describe students mathematical abilities in problem solving in terms of mathematical dispositions. Research subjects are 5 student's class VIII-A SMP Negeri 2 Kutorejo which is taken based of the mathematical disposition test given trought the google form. The method use a mix method with a quantitative approach for taking subjects and qualitative approach for data description and data analysis. The results of tests conducted on several problem solving questions showed that in expressing ideas, very high mathematical disposition are able to write in complete according to indicators. While the other four subjects did'nt write one aspect of the indicator. In understanding the problem only subjects with a very high mathematical disposition and the subject of high mathematical disposition who wrote down the calculation process. In presenting mathematical ideas, all subject does not use symbols and mathematical notation according to the test. If can be concluded that the mathematical communication skills of the students with very high mathematical dispositions are better than students with high, medium, low and very low disposition..

Keywords*: Mathematical Communication; Problem Solving; Mathematical Disposition*

Introduction

Mathematical communication skills are one of the social activities (speaking) and also a tool for thinking (writing) that experts consider being developed among students (Umar, 2012). With mathematical communication, students learn to convey their understanding of ideas orally or in writing into mathematical symbols and language. This mathematical communication ability can help other mathematical abilities, such as problem-solving.

Basically, the ability to solve mathematical problems is an essential mathematical ability and needs to be mastered by students who study mathematics. The rationale that underlies the truth of this statement includes: (a) Curriculum (2013); NCTM (2000) argues that solving mathematical problems is an ability listed in the curriculum and learning objectives of mathematics. Problem-solving ability is a person's ability to solve problems related to mathematics (Lestari & Yudhanegara, 2015).

In addition to abilities related to cognitive aspects, such as mathematical communication skills, it is also necessary to develop four attitudes to appreciate mathematics's usefulness in life. Interest in learning mathematics, curiosity, attention, tenacity, and confidence in solving problems are attitudes that must be developed. The development of the affective domain, which is the aim of mathematics education, is to grow and develop mathematical dispositions. According to Sukamto (2013), a mathematical disposition is a tendency to think and act positively. Mathematical disposition is said to be good if students like challenging problems and involve themselves directly in solving them (Permana in Sepalianti, 2014). Based on Sumarmo (2010) defines a mathematical disposition as one's cohesion and analysis of mathematics. In a broad sense, mathematical dispositions relate to how students view and solve problems, confidence, persistence, interest, and flexible thinking to pursue various problem-solving strategies.

Based on this background, this research aims to describe the mathematical communication abilities of students with very high, high, medium, low, and very low mathematical dispositions in solving mathematical problems.

Method

This research is a combination research (mixed method), combining qualitative and quantitative data. In this study, the qualitative approach is the primary method that aims to collect, triangulate, analyze, and describe data. At the same time, the quantitative approach is a secondary method that aims to take the subject.

The research subjects were taken from class VIII - A students of Kutorejo 2 Public Middle School for the 2020/2021 academic year. The steps taken in selecting research subjects were 1) giving a mathematical disposition questionnaire to class VIII A students of Kutorejo 2 Public Junior High School, 2) the results of the mathematical disposition questionnaire scored and grouped, 3) based on the results of the questionnaire, students were categorized into five categories students' mathematical dispositions, namely very high, high, medium, low and very low, 4) research subjects were taken from each student

who received the highest score in the category of mathematical dispositions that appeared, 5) subjects could communicate something in writing well based on consideration math teacher in class. The instruments in this study were a mathematical disposition questionnaire and problem-solving questions.

Researchers adopted a mathematical disposition questionnaire from Mahmudi, Ali (2010) in this study. The statement consists of 33 statements which are divided into 20 positive statements and 13 negative statements. Furthermore, from the results of the mathematical disposition test, students were grouped into five categories, namely very high, high, medium, low, and very low categories, based on the average percentage.

Problem-solving questions given to students aim to determine student communication in problem-solving. The questions are related to the material that students have studied. To obtain valid data, researchers conducted time triangulation.

Results and Discussion

Five subjects were selected based on the mathematical disposition questionnaire results. The following is a list of research subjects.

Table 1. List of Research Subjects

Subject Code	Percentage Mathematical Disposition	Remarks
LA	97,7%	Very High Mathematical Disposition
BD	84,8%	High Mathematical Disposition
ID	79,5%	Moderate Mathematical Disposition
GP	69,7%	Low Mathematical Disposition
EN	58,3%	Very Low Mathematical Disposition

The answers from the LA subject to the questions on the test given are presented as follows:

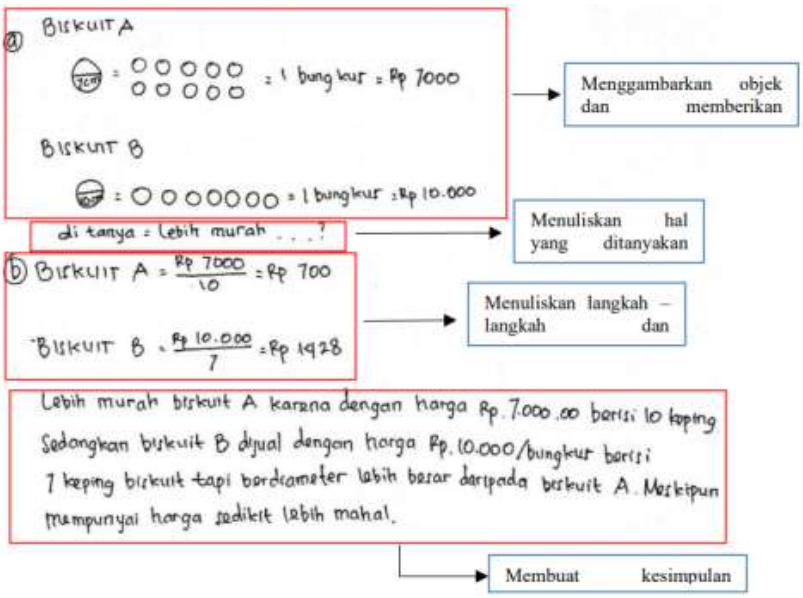

Figure 1. Problem Solving Test Results for LA Subjects

In expressing their mathematical ideas, Subject LA writes down what is known in the problem, even though it is incomplete. Subject LA wrote down what was asked of the problem, namely determining which biscuit was cheaper. Subject LA conveys his ideas in the form of pictures according to the information in the problem. The information is the diameter of the biscuits and the price of each packet of biscuits. It is in accordance with the information contained in the questions given. In understanding the intent of the problem, the LA subject used the division algebraic operation correctly but had not been able to solve the problem according to the intent of the problem. In solving the problem, the LA subject immediately compared prices by paying attention to the number of biscuits in one pack. What became a mistake was that the LA subjects ignored the diameters of the two biscuits, while the diameter of the biscuits affected the price in one pack. In presenting his mathematical ideas, LA subjects only wrote down their calculation operations. They did not use symbols, notations, and mathematical terms related to the concepts needed to solve this problem. Subject LA can write conclusions in everyday language when describing relationships with models.

The answers from the BD subject to the questions on the test given are presented as follows:

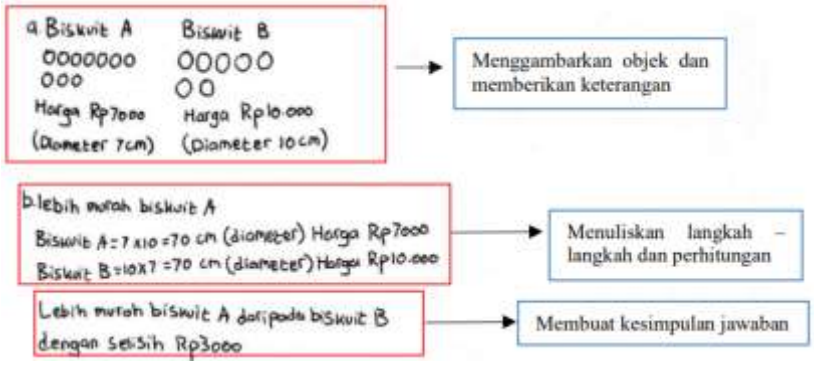

Figure 2. Subject BD's Problem-Solving Test Results

In expressing their mathematical ideas, Subject BD wrote down the information known from the questions provided, even though it was not complete. However, Subject BD needed to write down the questions asked in the given problem. Subject BD in conveying his ideas in the form of images in accordance with the information contained in the problem. The information written by Subject BD is the diameter of the biscuits and the price of each packet of biscuits. This is in line with the information contained in the questions given. In understanding the intent of the problem, Subject BD was wrong in writing the formula used to solve the problem and in describing the relationships with the situation model. Subject BD wrote conclusions in line with the results obtained. It is just that the steps used in solving the questions given are wrong. So the conclusions obtained by Subject BD are also wrong. Subject BD only wrote down their calculation operations when presenting their mathematical ideas. However, he did not use symbols, notations, and mathematical terms related to the concepts needed to solve this problem.

Subject BD's answers to the test questions given are presented as follows:

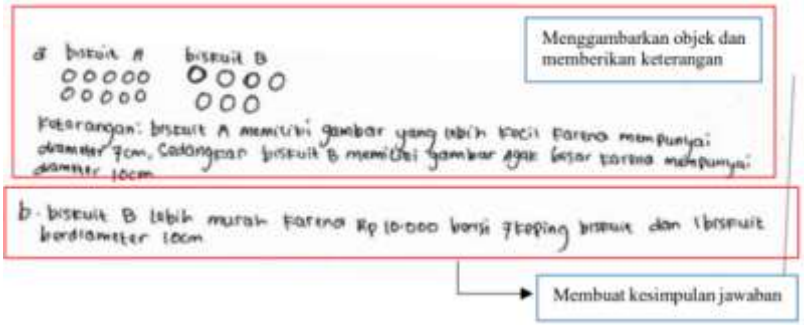

Figure 3. Subject ID's Problem-Solving Test Results

In presenting their mathematical ideas, the ID subject wrote down information about what was known from the questions provided, even though it was incomplete. However, the ID subject does not write down the things asked in the given problem. Subject ID visually describes mathematical ideas according to the information in the problem. The information written by Subject ID corresponds to the information contained in the problem, namely the diameter of the two biscuits. However, Subject ID did not write down all of the information in the problem because Subject ID did not write down the price of each packet of biscuits. In understanding the intent of the questions, Subject ID did not solve the problem according to the intent. Subject ID also did not write down the steps for processing or algebraic operations in solving the questions provided. Subject ID does not perform calculations to solve the problem. Subject ID only presents conclusions without writing an explanation for solving the problem. In presenting his mathematical ideas, Subject ID did not use symbols, notations, and mathematical terms related to the concepts needed because Subject ID also did not write down the process for solving the questions provided.

Subject GP's answers to the questions given in the test are presented as follows:

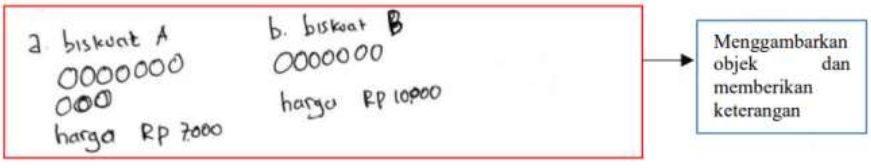

Figure 4. Problem Solving Test Results for Subject GP

In expressing his mathematical ideas, Subject GP wrote down the information that could be obtained from the questions, even though they were incomplete. However, Subject GP did not write down the things asked from the problems given. Subject GP expressed his mathematical ideas in the form of pictures, and Subject GP draws according to the intent of the problem. The information written by Subject GP corresponds to the information contained in the problem, namely the price of biscuits per pack, but Subject GP ignores information such as the diameter of the biscuits. In understanding the intent

of the questions, Subject GP did not understand the problem given, so the Subject did not solve the problem according to the intent of the problem. Subject GP also did not write down the steps for processing or algebraic operations and did not perform calculations to solve the problem. In presenting his mathematical ideas, GP subjects do not use symbols, notations, and mathematical terms related to the concepts needed to solve this problem. In describing the relationship with the situation model, the GP subject also did not write down the conclusions that could be obtained because the GP subject did not solve the problems that had been given.

The answers from Subject EN to the questions given in the test are presented as follows:

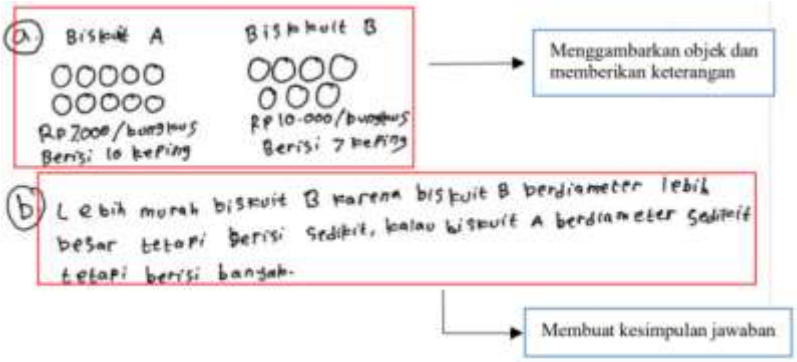

Figure 5. Subject EN's Problem-Solving Test Results

In expressing their mathematical ideas, Subject EN write down information related to things that are known from the questions provided, even though they are incomplete. However, the EN subject did not write down the questions asked in the given problem. Subject EN expressed his ideas in pictures, and subject EN illustrated them according to the information in the problem. The information written by subject EN corresponds to the information in the problem, namely the number of biscuits and the price of each packet. Still, subject EN does not write down all the information in the problem. Subject EN ignored the information, namely the diameter of the biscuit. In understanding the intent of the question, Subject EN did not solve the problem following the intent of the problem. The EN subject also did not write down the steps for processing or algebraic operations in solving the problems provided. Subject EN does not perform calculations to solve the problem. The EN subject only presents conclusions without writing an explanation for solving the problem. In presenting mathematical ideas, subject EN does not use symbols, notation, or mathematical terms related to the concepts needed to solve this problem because subject EN does not write down the steps to solve the questions provided. In describing the relationship with the situation model, subject EN can only write the conclusion that biscuit B is cheaper because it has a larger diameter. However, in conclusion, the EN subject does not describe the steps or processes for solving the problems provided, so the written conclusions are also wrong.

Of the five subjects, they could not solve the given problem and solve the problem using logic without relating it to the appropriate mathematical concept to solve the problem. Inability to solve the given problem was due to the subject's unfamiliarity with non v-routine questions. This is reinforced by information from the mathematics teacher in class VIII A that subjects in mathematics learning are only used to solving routine problems using the appropriate formula in the mathematics book.

Conclusion

Based on the results of research and discussion, it can be concluded that:

1. In expressing mathematical ideas through writing, the five research subjects could write down their ideas correctly and clearly. Subjects with very high mathematical dispositions (LA) wrote down what they knew. While the other four subjects only wrote down what was known from the questions. In describing ideas in visual form, the five subjects described objects according to the intent of the questions.
2. In understanding the intent of the questions, the five research subjects did not interpret or evaluate their mathematical ideas properly. Subjects with very high mathematical dispositions (LA) and subjects with high mathematical dispositions (BD) wrote down the steps for the process and calculations. Meanwhile, the other three research subjects (ID, GP, and EN) did not write down the steps of the process
3. In presenting mathematical ideas, the five research subjects do not use notations or symbols following the intent of the questions. In describing the relationships with the situation model, the subject had a low mathematical disposition and did not write conclusions about the answers to the questions. The other four research subjects reported conclusions on the answers to the questions following the understanding of each subject.

References

Kemendikbud. (2013). *Permendikbud No.64 tentang Standar Isi Pendidikan Dasar dan Menengah*. Jakarta: Kementrian Pendidikan dan Kebudayaan

Lestari, K. E., & Yudhanegara, M. R. (2015). *Penelitian Pendidikan Matematika*. Bandung: PT Refika Aditama.

Mahmudi, Ali. (2010). *Tinjauan Asosiasi antara Kemampuan Pemecahan Masalah dan Disposisi Matematis*. Makalah disajikan pada Konferensi Nasional Matematika XV UNIMA

NCTM. (2000). *Principles and Standards for School Mathematics*. NCTM: Reston VA.

Sefalianti, Berta. (2014). *Penerapan Pendekatan Inkuiri Terbimbing terhadap KemampuanKomunikasi dan Disposisi Matematis Siswa*. Jurnal Pendidikan dan Keguruan. Vol 1, No 2.

Sukamto. (2013). *Strategi quantum learning dengan pendekatan konstruktivisme untuk meningkatkan disposisi dan penalaran matematis siswa*. Jurnal: UNNES Journal of Primary Educational, II (2), hlm. 91-98.

Sumarmo, U. (2010). *Berfikir dan Disposisi Matematik: Apa, Mengapa dan Bagaimana Dikembangkan pada Peserta Didik*. Bandung:FPMIPA UPI.

Umar, W. (2012). *Membangun Kemampuan Komunikasi Matematis dalam. Pembelajaran Matematika*. Jurnal Ilmiah Program Studi Matematika. STKIP Siliwangi