Mathematical Communication Ability from The Perspective of Math Anxiety in 10th Grade Student

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Article Info	Abstract
	This study aims to describe mathematical communication ability based on math anxiety in 10th grade student. This research method is descriptive qualitative. The research subjects were 36 students of class X MIPA 5 at SMA Negeri 1 Lasem in the academic year 2020/2021. The research data were collected through questionnaires, tests, interviews, and observations. The data analysis technique in this study was done through a process of reduction, categorization, and data validity. Based on the results of the study, there were students who had high, moderate, and low math anxiety. Mathematical communication ability of students with moderate and high math anxiety, there is the fact that there are those who master writing problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion; some only mastered writing mathematical problems into mathematical modeling but did not master solving mathematical problems and making a settlement conclusion; there were also those who mastered writing mathematical problems into mathematical modeling and solving mathematical problems but did not master making a conclusion. Meanwhile, students' mathematical communication ability with low math anxiety mastered writing mathematical problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion.

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INTRODUCTION

Mathemathics learning has many benefits in real life. Maftukhin et al. (2014) argued that in order to master and create technology in the future, strong mastery of mathematical material is required from an early age. Fadli & Irwanto (2020) also stated that in order to respond to career and educational challenges in college, it is necessary to have a good problem solving, cooperation and communication ability. Communication ability is an element of general abilities that is important to have and master in both academic and non-academic fields. (Khachatryan & Karst, 2017 and Mercer-Mapstone & Matthews, 2015).

Cartwright (2020) argued that the ability to take notes and find strategies correctly called written communication ability in mathematics is an important skill in the curriculum. Triana et al. (2019) stated Mathematical communication ability is the ability that becomes the main concern in thinking ability and conveying ideas. Lomibao et al. (2016) explained that Mathematical communication ability is the ablity to express idea, describe, and discuss mathematical concepts coherently and clearly. Sufi (2016) stated that Mathematical communication ability is important in the learning process of mathematics. Mathematical communication ability is an important ability since it is used in teaching mathematical concept. (Kaselin et al. 2013 and Sudia et al., 2020). Duran as quoted by Dewi et al. (2017) also argued that with mathematical communication ability, it is possible to get new information or ideas that helps to understand the problems wisely. Syaiful et al. (2019) also argued that Mathematical communication ability is the ability that is able to help students get better understanding in mathematics as a whole and make mathematics more meaningful. Based on some existing definitions, it can be concluded that Mathematical communication ability is one of the important abilities used in mathematics to describe a problem that helps students to understand their mathematics problems.

Mathematical communication ability requires special steps to transform mathematical problems into mathematical symbols or models called mathematical modeling. According to Kharisudin & Cahyati (2020) Mathematical modeling is the art of applying mathematics to real-world problems in order to understand problems, whereas according to Nursyarifahet al. as quoted by Kharisudin & Cahyati (2020), Mathematical modeling is a process of thinking and the process of describing a mathematical relationship with real-world problems that are considered difficult become easier and clearer by expressing them in the form of models or pictures. Based on several researchers' opinion, it can be concluded that mathematical modeling is a strategy related to describing mathematical problems into mathematical symbols or models for easier understanding.

Mathematical modeling has an important role in mathematical communication ability but students still have difficulty doing mathematical modeling in reality. This is shown by researcher conducted by Sutrisno & Kharisudin (2020) that stated many students still could not answer the questions correctly which only changed the constants from the previous question and they are only able to answer the questions if the questions are the same as those taught by the teacher. In fact, students still have difficulty doing mathematical modeling which cause low mathematical communication ability. Kharisudin & Cahyati (2020) stated that there are four mathematical modeling steps that are able to make it easier for students to interpret mathematical problems into mathematical symbols or models that are identifying problems, compiling mathematical models, solving problems using controlling laws, and interpreting model solutions into problem solutions.

Based on the results of the observations, many students still get difficulties in doing mathematical modeling so that most of the students still have difficulty changing problems in the form of story problems into symbols or mathematicl models which cause mathematical communication ability to be low. This is in line with several results of the reasearch which show that students' mathematical communication ability is still low. Ashim et al. (2020); Duskri et al.(2017); Hodiyanto(2017) and Muhammad & Akhsani (2016) show that students' mathematical communication ability is still low. Based on the recent findings, it shows that mathematical communication ability in mathematics curiculum is rarely trained by teachers, so that students' mathematical communication ability tends to be unsatisfactory

(Stoffelsma & Spooren, 2019 and Yaniawati et al., 2019).

Many factors influence the students' low mathematical communication ability. One of them is feeling uncomfortable or strained when learning mathematics. According to Richardson & Suinn as quoted by Anita (2014) stated that a feeling of strained and anxiety that interferes solving math problems in both real and academic life is known as math anxiety. Chang & Beilock, (2016) and Eden et al. (2013) revealed that math anxiety is one of the factors that causes low math performance. There is a relation between math anxiety and math ability (Rozgonjuk et al. 2020). Henschel & Roick (2017) said that a higher level of math anxiety leads to lower numeracy ability and reduces performance in math problems.

Maloney et al. (2014) stated that math anxiety is the feeling of fear, full of fear, the unpleasant feeling of horrified that many people experience when they are faced math problem solving. Anita (2014) stated that math anxiety can not be seen as a simple thing, because of the students' inability to adapt to the lessons that cause students difficulties and as the result it leads to low learning outcomes and student achievement in mathematics.

Ardiyanti et al. (2019) stated that there is an effect of math anxiety on mathematical communication ability. Aunurrofiq & Junaedi (2017) and Kodirun (2017) stated that high math anxiety cause low math ability. Tabrizi et al. (2011) stated that prolonged anxiety is very dangerous when it is untreated and caused psychological and psychological disorders such as depression, indigestion, and schizophrenia. Besides, anxiety can create psychological and social stress.

Based on the description above, theoretically there is a relationship between mathematical communication ability and math anxiety. There is an important role in controlling math anxiety and the use of mathematical modeling in achieving mathematics learning goals especially in mathematical comunication ability. This becomes the basic reason for researchers to conduct research related to mathematical communication ability based on students' math anxiety levels. In this study, it is studied how mathematical communication ability in terms of math anxiety grade X.

METHODS

The research method used in this research is descriptive qualitative research. Descriptive research is a research that produces descriptive data in the form of witten or spoken words from people or observable behavior (Moleong 2014).

The research was conducted at SMA Negeri 1 Lasem in the odd semester of 2020/2021. The subjects of the data were the students of X MIPA 5 based on certain consideration. The subjects selection process is carried out by determining the subjects selection criteria. They are (1) students have received SPLTV material; (2) Students have taken a mathematical communication ability test; (3) students meet the criteria for math anxiety classification; (4) the subjects are chosen with the consideration of well communication so that become well disclosure. The subjects selected in this study were six students in each math anxiety category. The subjects selected in this study were 2 subjects from the low math anxiety category, 3 subjects from the moderate math anxiety category, and 3 subjects from the high math anxiety category.

The researcher used math anxiety questionnaires, a mathematical communication test, and interview to obtain data from same source. The data collection and analysis of qualitative data are used to describe the mathematical communication ability of students in each category of math anxiety, namely high, moderate, and low.

RESULTS AND DISCUSSIONS

The tests that are given to obtain patterns of mathematical communication ability are arranged according to the following indicators of mathematical communication ability (1) the ability to write mathematical situations and problems in writing with mathematical symbols, pictures, graphics, or mathematical models, (2) the ability to write down mathematical problem solving (mathematical models) in a structured and systematic manner, (3) the ability to make a settlement conclusion of mathematical problems (NCTM, 2000).

The questionnaire used to classify math anxiety is adjusted to indicators of math anxiety which include (1) somatic (changes in the state of an individual's

body); (2) cognitive (changes in a person's cognitive when dealing with mathematics); (3) attitude (changes in attitude that arise); (4) Mathematical knowledge/ understanding (the thought that he does not know enough about mathematics) (Cooke et al., 2011).

The study was conducted in class X MIPA 5 by providing a math anxiety questionnaire to group students based on math anxiety. The following are the results of the math anxiety questionnaire from students which are presented in Table 1.

Table 1 Math Anxiety Classification Results

Math Anxiety	Many Student
Low	4
Moderate	26
High	6

Based on Table 1, it was found that students were grouped into high, moderate, and low math anxiety groups. The grouping of math anxiety is associated with the test results of mathematical communication ability which can be seen in Table 2 below.

Table 2 Results of the Mathematical Communication Ability Test in terms of Math Anxiety

Math Anxiety	Mathematical Communication Ability		
	High	Moderate	Low
High	1	1	4
Moderate	6	17	3
Low	4	0	0

Based on Table 2, it is obtained a description of the pattern of mathematical communication ability in terms of math anxiety as follows.

Students with High Math Anxiety

Based on Table 2, there are 6 students with high math anxiety with three categories of mathematical communication ability, namely high, moderate, and low. A student with high math anxiety who has high mathematical communication ability can master writing problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion. A student with moderate mathematical communication ability can master writing problems into mathematical modeling and solve mathematical problems but is unable to master in making a settlement conclusion. For students with low mathematical communication ability, three students are able to master writing problems into mathematical modeling but cannot master mathematical solving problems and making a settlement conclusion; besides that, there is one student with low communication ability who cannot master writing problems into mathematical modeling and solving mathematical problems but can master in making a settlement conclusion.

Students with Moderate Math Anxiety

Based on Table 2, there are 26 students with moderate math anxiety with three categories of mathematical communication ability, namely high, moderate, and low. There are six students with moderate math anxiety who have high mathematical communication ability who can master writing problems into mathematical modeling, solve mathematical problems, and make a settlement conclusion. There are fourteen students with moderate communication ability who can master writing problems into mathematical modeling and solve mathematical problems but unable to master making a settlement conclusion, besides that there are three students who can master writing mathematical problems into mathematical modeling & making a settlement conclusion but unable to master in solving mathematical problems. Meanwhile, three students with low communication ability were able to master writing problems into mathematical modeling and were unable to master mathematical solving problems and making a settlement conclusion.

Students with Low Math Anxiety

Based on Table 2, there are 4 students with low math anxiety with one category of high mathematical communication ability. All students with low math anxiety can master writing problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion.

Based on 36 students as research subjects, it was found that students' mathematical communication ability in terms of moderate and high math anxiety had many variations. Even students with moderate and high math anxiety with the same mathematical communication ability have different patterns.

Meanwhile, students with low mathematical communication ability in low math anxiety can master writing problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion

CONCLUSION

Based on the analysis and discussion results, the pattern of mathematical communication ability of class X SMA Negeri 1 Lasem in terms of math anxiety has many variations.

There are students with high math anxiety with high mathematical communication ability who master in writing problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion. There are also students with high math anxiety with mathematical communication ability who are mastering writing problems into mathematical modeling and solving mathematical problems but lacking mastery in making a settlement conclusion. In addition, it was found that students with high math anxiety with low mathematical communication ability were sufficiently good at writing problems into mathematical modeling but lacked mastery in solving mathematical problems and making a settlement conclusion.

The results also showed that there were students with moderate math anxiety with high mathematical communication ability who mastered writing problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion. In addition, there are students with moderate math anxiety with mathematical communication ability who are mastering writing problems into mathematical modeling, sufficiently good at solving mathematical problems and lacking mastery in making a settlement conclusion. It was also found that students with moderate math anxiety with low mathematical communication ability mastered writing problems into mathematical modeling but lacked mastery in solving mathematical problems and making a settlement conclusion.

Based on the results of the study, it was also found that all students with low math anxiety had high mathematical communication ability capable of mastering writing problems into mathematical modeling, solving mathematical problems, and making a settlement conclusion.

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