

ANALYSIS OF STUDENTS' REASONING ABILITY AND COMMUNICATION ABILITY IN SOLVING ALGEBRA CALCULATING OPERATIONS

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ABSTRACT

This study discusses students' reasoning abilities and communication skills in solving algebraic arithmetic operations questions for class VII MTs Negeri 2 Jeneponto. This study aims to determine students' reasoning abilities and communication skills in solving algebraic arithmetic operations questions for class VII.F MTs Negeri 2 Jeneponto, to determine students' reasoning abilities in solving algebraic arithmetic operations questions and students' communication abilities in solving algebraic arithmetic operations questions class VII.F MTs Negeri 2 Jeneponto. This type of research is descriptive with a qualitative approach. The results of the data analysis show that most of [1] the students' reasoning abilities, in this case, are already classified as good with the ability to think logically in solving problems, students are good at understanding the form of the questions given, able to draw logical conclusions. Then from [2] the communication skills of students are classified as good in solving problems. Students already understand the form of the questions given, students can already determine the answers, and students are still not active enough to ask questions in class.

Keywords: Reasoning skills; communication skills; algebraic computing operations

1. INTRODUCTION

Education in general has the meaning of a life process in developing each individual to be able to live and carry out his life. So being an educated person is very important because humans are educated to become useful people for the country, homeland, and nation (Alpian et al., 2019; Muhammad & Yosefin, 2021). The role of education is very

large in preparing and developing human resources (HR) who are reliable and able to compete healthily but also have an increased sense of togetherness with fellow human beings. One of the disciplines studied by students at school is mathematics.

Mathematics can be interpreted as knowledge that is obtained by thinking (reasoning). Mathematics places more emphasis on rational (reasoning) activities, not emphasizing experimental results or observations. Mathematics is formed because of human thoughts related to ideas or processes and reasoning (Siagian, 2016).

Reasoning and communication are very important in the problem-solving process. According to NCTM (2000), students must develop mathematical reasoning abilities and communication skills as a result of learning mathematics. Learners must have competence as a result of learning mathematics. NCTM (National Council of Teachers of Mathematics) has identified the following competencies that students must possess as a result of learning mathematics, namely problem-solving, argumentation and proof, communication, connection, and representation. Mathematical reasoning abilities influence the process of learning mathematics (Tukaryanto et al., 2018), because every mathematical problem must be solved by a reasoning process (Putri et al., 2019). In addition, mathematical communication skills make it easier for students to solve problems (Laia & Harefa, 2021) so it becomes an important ability for students to have (Hendriana & Kadarisma, 2019).

Based on the results of the interviews that the researchers conducted with one of the mathematics teachers at MTSN 2 Jeneponto named Mrs. Susanti S.Pd. MTs Negeri 2 Jeneponto is a public school located in Kelara District, Jeneponto Regency. At school, the teacher uses the expository method in giving lessons to students on the subject of algebraic arithmetic operations which aims to increase the activity of students in class. With the KKM 73 standard given by the mathematics teacher, it turns out that the average student learning outcomes are above the KKM score. Based on the results of observations made at the school, the researcher believes that the mathematical abilities of students in this school are quite good. Mathematical abilities include understanding mathematical concepts, and mathematical reasoning, students' mathematical communication is considered difficult to do for reasons of limited researchers and time, therefore analyzing one or two mathematical abilities is expected to provide an overview of students' mathematical abilities at the school. The ability referred to is the reasoning ability and communication ability of students. Mrs. Susanti S.Pd stated that students' reasoning abilities and communication skills were still very low. This is caused by a lack of students' understanding of the concept of the material being taught, especially in algebraic arithmetic operations. Mathematical ability itself includes understanding mathematical concepts, mathematical reasoning, mathematical communication, and problem-solving.

The purpose of this study was to determine students' mathematical reasoning abilities in solving class VII algebraic arithmetic operations questions at MTs Negeri 2 Jeneponto and to find out students' mathematical communication abilities in solving algebraic arithmetic operations questions for class VII MTs Negeri 2 Jeneponto.

2. METHODS

The research approach used is a qualitative approach. The qualitative approach is one of the inquiry strategies that emphasize more on the search for meaning, understanding, concepts, characteristics, symptoms, symbols, and descriptions of a phenomenon, focused and multi-method, natural and holistic, prioritizing quality, using several methods and presented narratively (Yusuf, 2014). The type of research that will be used by researchers in this research plan is a qualitative descriptive method that aims to find out and analyze the reasoning abilities and communication skills of students in solving algebraic arithmetic operations questions. qualitative descriptive method is a method based on the philosophy of positivism that is used to research natural object conditions (as opposed to experiments) where the researcher is the key instrument, data collection techniques are carried out by triangulation (combined) data analysis is inductive and the results of qualitative research are more emphasizing meaning rather than generalization (Sugiyono, 2015).

This research was conducted at Madrasah Tsanawiyah Negeri 2 Jeneponto. Precisely in Tolo Village, Kelara District, Jeneponto Regency. The subjects of this study were class VII.F students consisting of 21 students. As for the interviews, the researcher chose 6 students including 2 students with high scores, 2 students with moderate scores, and 2 students with low scores. This interview was conducted to determine students' reasoning abilities and communication skills in solving mathematical problems on algebraic arithmetic operations.

The data collection techniques used in this study were observations, diagnostic tests, and in-depth interviews, while the research instruments used were test instruments, interviews, and documentation. In data validity techniques using data credibility testing techniques or trust in data from qualitative research results, for example, by expanding observations, increasing persistence in research, triangulation, discussions with colleagues, negative case analysis, and member checks, is one way to test the validity data (Sugiyono, 2013). Researchers used triangulation to measure trust in this study. Triangulation is defined as examining data from many sources in various ways and at various periods to find out the truth (Sugiyono, 2013). The interview data analysis technique was carried out interactively and continued until completion to produce saturated data. Data analysis includes actions such as data reduction, data presentation,

and conclusion (Sugiyono, 2011). Data on students' written test results were analyzed to assess their reasoning abilities and communication skills.

3. RESULTS AND DISCUSSION

Based on the description of reasoning abilities and communication skills above, several abilities are carried out by students in answering the questions on the algebraic arithmetic operations material given. In the following, a description of the reasoning ability test and communication skills of class VII.F MTs Negeri 2 Jeneponto Jeneponto Regency will be presented.

Reasoning Ability Test Results

Based on the results of tests and interviews on reasoning abilities conducted on class VII.F students of MTs Negeri 2 Jeneponto, it can be seen that the abilities experienced by students in solving questions on algebraic arithmetic operations material. The test results obtained by students in solving 3 questions show the ability to draw logical conclusions, provide explanations using models, facts, properties, and relationships, the ability to estimate answers and process solutions, and the ability to use patterns and relationships to analyze mathematical situations in solving questions. The reasoning ability of students is already quite good in solving problems even though some students cannot. This problem is caused because students do not understand the form of the questions given, are unable to draw logical conclusions, students still cannot determine the answer, and vice versa. This is in line with research conducted by Rismen et al. (2020) which states that the dominant students' reasoning and communication abilities are in the poor criteria, and based on indicators of mathematical reasoning and communication skills students have maximum achievement on indicators of making conjectures through selecting formulas or definitions and indicators of doing mathematical manipulation through calculations. According to Shodiq, reasoning is a special thinking activity, where a conclusion is drawn, where a statement is concluded from several premises (Shadiq, 2005). According to interviews with students:

.....students still do not understand the material being taught, especially material for algebraic arithmetic operations, then in a learning atmosphere in class students usually do not pay attention to what is explained by the teacher in the sense of being noisy in class, disturbing each other, students also rarely repeat material given by the teacher when at home, students fail to understand during math lessons in class.....

Based on the results of the interviews in terms of material for algebraic arithmetic operations, students are classified as good and some students cannot understand the questions given with their reasoning abilities. This is in line with research which shows

that the causes of student errors in solving questions are confusion in determining formulas and not understanding questions (Yusdiana & Hidayat, 2018). In addition, there are weaknesses caused by wrong learning habits and attitudes, and students do not yet have the basic skills and knowledge needed to solve problems. Other causes that are likely to cause low student abilities are parental support, independent learning, learning facilities, and student learning ethic (Umar & Widodo, 2022). Therefore, teachers need to apply appropriate learning models to create conducive situations and conditions (Nabillah & Abadi, 2019).

Communication Ability Test Results

Based on the results of tests and interviews on communication skills conducted on class VII.F students of MTs Negeri 2 Jeneponto, it can be seen that the ability experienced by students in solving questions on algebraic arithmetic operations material. Test results obtained by students in solving 3 questions show that the ability to connect real objects, pictures, and diagrams into mathematical ideas, the ability to explain ideas, situations, and mathematical relations orally and in writing with real objects, pictures, graphs, and algebra, and the ability to express everyday events in language or mathematical symbols in solving questions. Students' communication abilities are quite good in solving problems and some students are still unable to understand algebraic material. This problem is caused because students do not understand the form of the questions given, students still cannot determine the answer, and vice versa. Other causes that cause students to experience errors in solving algebra problems are errors in calculations, understanding of positive and negative operations, lack of understanding of problems, and wrong processes (Nugraha et al., 2019). In the research by Aminah et al. (2018), students' communication skills in explaining ideas, and situations, writing with real objects, pictures, graphics, and algebra are classified as moderate. This is in contrast to research conducted by Adnan (2017) which states that students' communication abilities are still low. Students do not understand the form of the questions given, still cannot determine the answers to questions, and are less active in asking questions in class (Adnan, 2017). Based on the mathematics curriculum, one of the functions of mathematics is as a vehicle for developing the ability to communicate using numbers and symbols (Jihad, 2008). Following interviews with students:

.....students still do not understand the material being taught, especially algebraic arithmetic operations, then in a learning atmosphere in class students usually do not pay attention to what is explained by the teacher in the sense of being noisy in class, disturbing each other, students rarely repeat material that has been taught at home, students fail to understand during math lessons in class, students also lack questions when there is material taught by the teacher...

Based on the interview results, in this case, the material for algebraic arithmetic operations, students are classified as good with their communication skills. In addition, there are weaknesses caused by wrong learning habits and attitudes, and students do not yet have the basic skills and knowledge needed to solve problems.

The reasoning ability of class VII.F students of MTs Negeri 2 Jeneponto in solving algebraic arithmetic operations questions is quite good with the ability to think logically in solving problems, students can already understand the form of the questions given and can draw logical conclusions, and class students' communication skills VII.F MTs Negeri 2 Jeneponto in solving algebraic arithmetic operations questions are classified as good in solving problems. Students already understand the form of the questions given, and students can already determine the correct answer.

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