Analysis of Students' Creative Thinking in Proposing SPLDV Problems Viewed from Cognitive Abilities

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Abstrak: This research aims to describe the analysis of students' creative thinking in posing SPLDV problems in terms of students with high abilities and low abilities. This research is a qualitative descriptive study. The material used is Systems of Linear Equations in Two Variables (SPLDV). SPLDV are two linear equations that have solutions in the form of ordered pairs which can be represented by x, y. The results of the research are that students with high abilities in asking SPLDV problems can be included in the good category. Students with medium low ability in asking SPLDV problems are still in the sufficient category. Low ability students HY are only able to meet the indicators of creative thinking fluency. In planning and implementing SPLDV problem submissions, it is seen from cognitive ability, namely high ability and low ability are still categorized as lacking.

Kata kunci: *Problem Solving; Story Problems; Math Skills.*

PENDAHULUAN

Mathematics is known as a basic science that deals with ideas for solving problems related to numbers or abstract concepts where the truth of concepts and statements is consistent. Mathematics is also a basic science that plays a very important role in our daily lives. Therefore, mathematics is taught seriously even in kindergarten, starting from Elementary School (SD), Middle School (SMP), and High School (SMA). Meanwhile, deepening mathematics learning can be done at college/university.

Studying mathematics will train students' creative and systematic thinking skills. However, the role of mathematics is not limited to that, like other fields, namely economics and physics, it cannot be separated from the role of mathematics. However, researchers want to focus more on students' creative thinking abilities. So, students will have the ability to solve certain problems creatively.

Creativity is an ability where someone is able to give birth to something new in the form of a real work idea that has never existed before. According to Mursalin, et al (2018) in their research, every individual has the innate ability to think creatively, this ability must be developed so that passive potential does not occur. The ability to think creatively can also be called divergent thinking, which means thinking flows without sticking to a certain pattern. Creative thinking can also be interpreted as a combination of logical thinking and divergent thinking based on conscious intuition. Creative thinking is authentic and reflective and produces complex products. Thinking skills involve synthesizing ideas, constructing new ideas and determining their effectiveness. The thought process is characterized by strong and stable motivation and can be observed with high intensity over time. This kind of creative thinking ability is very important in learning mathematics.

The ability to think creatively is very important in learning mathematics, one of which is needed in searching for ideas in a problem, which can be obtained from applying problem posing learning. Problem posing in mathematics is a problem where students are asked to create a new problem (question) based on the information that will be provided. Balka (In Silver 1997) in his research, asked students to pose mathematical problems that could be solved based on information provided from a collection of stories about real world situations. Several components of creative thinking are also present in the problem posing process. For example, fluency in problem posing refers to the number of problems posed, flexibility refers to the number of different categories of problems created, and originality refers to the unusualness (different from the norm) of a problem that has been posed.

Siswono, et al (2018) said that mathematical problem submissions can be analyzed based on their quality and complexity. Based on quality, it will be analyzed into mathematics questions and non-math questions; questions that make sense (plausible) and questions that don't make sense (implausible); questions with adequate information and questions with inadequate information. Meanwhile, based on complexity, problem submissions are analyzed based on the complexity of the questions and the complexity of the answers. The level of difficulty or complexity of questions can be divided into questions with one question or questions with more than one question. Meanwhile, the level of difficulty or complexity of answers can be divided into answers with various completion steps, one completion step, or no completion steps according to the indicators.

Indicators of creative thinking vary. As a reinforcement of opinion, Silver 1997 (in Siswono 2011) shows indicators for identifying students' creative thinking (fluency, flexibility and novelty) using problem solving and problem posing. of these three components assess different parts and are independent of each other. Therefore, students have different levels of creative thinking. A student may also achieve three components, two components, or just one component. The development of a set of levels for students to think creatively has actually been carried out, but only in terms of posing problems in mathematics (Siswono, 2004).

In reality, learning by posing problems does not receive good attention from teachers. This was revealed from the results of researchers' interviews with several secondary school teachers who did not understand the term problem posing. This condition shows that this type of learning is still rarely carried out in the classroom. In classroom learning, students' success in receiving information or material has different levels according to their cognitive abilities.

Cognitive abilities themselves are brain-based skills needed to perform any task from the simple to the most complex. A person's cognitive abilities can explain differences in individual

success in learning. These cognitive abilities can be accommodated in learning, so that it can result in improved learning attitudes and improve students' creative thinking skills.

Creative thinking skills are closely related to students' cognitive abilities. Where the creative thinking process is a form of cognitive aspect. This process refers to individuals producing creative solutions or products. Such thinking is usually triggered by challenging tasks. By thinking creatively, students are expected to be able to view the world from various points of view so that new solutions emerge to overcome life's problems.

METODE

The approach used in this study is a qualitative approach. Qualitative research is research where the aim is to analyze and describe phenomena, attitudes and thoughts of people individually or in groups.

The type of research carried out in this research is descriptive research. Descriptive research is the most basic form of research which is intended to describe or describe existing natural phenomena, both natural phenomena and human engineering. Descriptive research does not provide treatment, manipulation or changes to the independent variables, but describes an actual phenomenon that is happening now.

This research is used to provide an overview of a problem. Data obtained from tests and interviews. This research was conducted in depth on the creative thinking abilities of class VIII students at SMP Sabilur Rosyad Palengaan Pamekasan.

The types of data used in this research are primary and secondary data. Primary data is data obtained directly from research subjects using measurement tools or data collection tools directly from the subjects as a source of information. Primary data is obtained from observing activities and actions which include all the steps and work methods that have been attempted and carried out by researchers in carrying out their research.

Secondary data is known as supporting or complementary data to primary data. Secondary data can be obtained by taking photos of research activities and everything related to the research process.

HASIL DAN PEMBAHASAN

Based on the analysis of test results and interviews, researchers obtained information related to indicators of creative thinking. This has become a benchmark for researchers to analyze students with high abilities and students with low abilities in posing problems with systems of linear equations in two variables. The creative thinking indicators that researchers use are fluency, flexibility, originality and elaboration which are extracted from each subject. In accordance with Munandar's opinion in chapter II which provides indicators to determine creative thinking abilities (fluency, flexibility, originality and elaboration).

The subjects for this research were taken from class VIII students of SMP

Sabilur Rosyad Palengaan Pamekasan. The discussion in this research only applies to students at Sabilur Rosyad Middle School. The results of the analysis carried out by the researcher will be presented through indicators that the research subject can fulfill or not.

AS Subjects' Creative Thinking Ability in Posing SPLDV Problems Judging from High Ability

Based on the results of the analysis, it can be seen that AS subjects can meet the fluency indicators. Fluency itself refers to planning and building ideas in posing problems. In this study, AS was able to create his own questions and solve them smoothly (see fig. 1). In posing problems, AS was able to meet one of the indicators of creative thinking, namely fluency. Students can state what is known to be asked and answered from the questions asked and convert it into a mathematical model. AS was able to convert the questions into mathematical models and solve the questions asked smoothly until he got the final result.

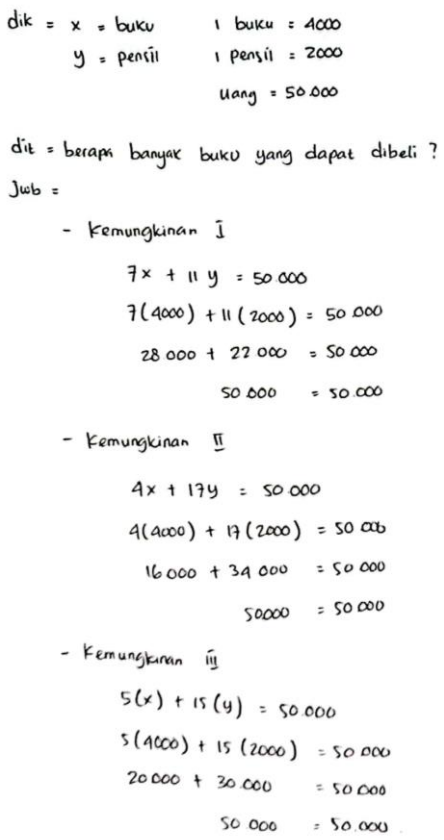

Figure 1. Analysis of creative thinking based on AS Subject answers

Flexibility refers to solving problems using several different methods. The results of the research show that AS has an instrumental understanding when asking questions on systems of linear equations with two variables. AS creates his own questions and provides alternative answers using several possibilities that AS can.

Original refers to the steps used in working on the questions and finding your own strategy. The results of the research show that AS is able to meet the original indicators. It can be seen from the problem submission test sheet that AS shows the creation of questions in the form of story questions and the completion steps when submitting and answering questions that he has created himself.

Elaboration refers to finding solutions other than the method already used, and writing alternative answers in detail. It can be seen that AS is able to explain each step in the alternative answers that have been made in detail and is able to write down the alternative answers clearly and in detail, but AS is unable to provide another method other than the method that has been used due to time constraints.

Based on the description above, it can be concluded that students who have high abilities at Sabilur Rosyad Middle School are able to fulfill the four indicators of creative thinking, namely fluency indicators, flexibility indicators, original indicators, and elaboration indicators using two-variable linear equation systems. This can be completed by highly skilled students at Sabilur Rosyad Middle School because students often work on practice questions, especially on the material that has been assigned, namely systems of linear equations in two variables.

Creative Thinking Ability of UH Subjects in Posing SPLDV Problems Judging from Low Ability 1

Based on the results of the analysis, it can be seen that UH subjects can only fulfill one indicator of creative thinking, namely fluency. Where fluency refers to UH being able to answer what the researcher assigned, namely creating his own questions with alternative answers using the material Systems of Linear Equations in Two Variables (see fig. 2). Here UH is able to create his own questions and is able to provide alternative answers with explanations known to be asked and answered but is only able to provide one alternative answer, so the UH subject is still included in the indicators of creative thinking fluency. The subject is included in creative thinking because UH is able to create his own questions and answer them himself.

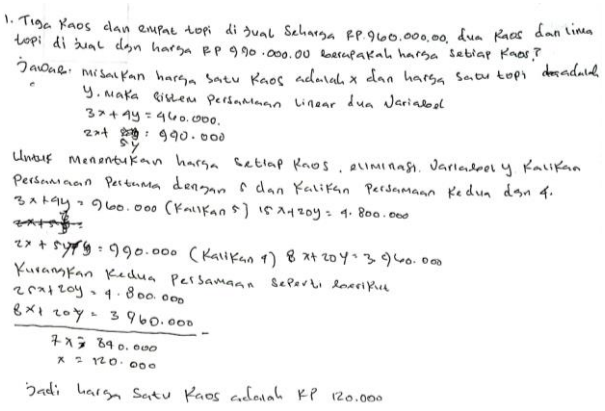
1. Tiga Kaos dan empat topi di jual seharga RP.960.000,00, dua Kaos dan lima topi di jual dgn harga RP 990.000.00 berapakah harga sebiah Kaos?
Jawab: misalkan harga satu Kaos adalah x dan harga satu topi adalah y. Maka Bikkan Persamaan linear dua Variabel
3x+4y = 960.000.
2x+5y = 990.000
Untuk menentukan harga setiap Kaos, eliminasi Variabel y Kalikan Persamaan Pertama dengan 5 dan Kalikan Persamaan Kedua dgn 4.
3x+4y = 960.000 (Kalikan 5) 15x+20y = 4.800.000
2x+5y = 990.000 (Kalikan 4) 8x+20y = 3960.000
Kurangkan Kedua Persamaan seperti berikut
15x+20y = 4.800.000
8x+20y = 3960.000
7x = 840.000
x = 120.000
Jadi harga satu Kaos adalah RP 120.000

Figure 2. Submission and alternative answers to UH subject questions

Flexibility refers to methods other than the methods that have been used and refers to the obstacles or difficulties experienced by UH subjects. In the problem posing test sheet, the subject cannot meet this indicator because the subject cannot provide alternative answers other than the method that has been used, the UH subject is only able to provide one alternative answer, due to the obstacles or difficulties experienced by the UH subject, namely because the subject lacks practice in working on the questions. -math questions.

Next is the original indicator, this indicator refers to the steps carried out by the subject, the UH subject was able to provide the steps or how to do it well and clearly, but during the interview the UH subject was unable to provide an

explanation of the steps that had been completed at the time. problem posing assignments. The UH subject also said that he was not satisfied with what was answered because UH was only able to provide one alternative answer.

The creative thinking elaboration indicator refers to other methods that the subject can find other than the method that has been used, and refers to the detailed answer steps. UH subjects could not meet the elaboration indicators. This is because the subject was unable to provide a method other than the method used by UH, but the UH subject was able to write alternative answers in detail as explained in chapter vi or can be seen in the researcher's attached list.

Based on the description of the discussion above, it can be concluded that students with low abilities at Sabilur Rosyad Middle School are not able to meet four indicators, but are only able to meet one indicator, namely the creative thinking indicator, fluency with the material on two-variable linear equation systems. This is influenced by the lack of students practicing creating and answering mathematics questions. This cause can be overcome by teachers, namely by giving students questions that can make students enthusiastic about working on mathematics problems.

HY Subject's Creative Thinking Ability in Posing SPLDV Problems Judging from Low Ability 2

Based on the results of the analysis of the assignment of subject HY, who is a student with low ability, to the material on a two-variable linear equation system that he himself had created with alternative answers. Subject HY was only able to fulfill two of the four indicators, namely fluency and flexibility indicators. The fluency indicator itself refers to the way students pose problems with alternative answers. In the student assignment results sheet given by the researcher, subject HY was able to ask questions about a system of linear equations with two variables in the form of story questions and provided alternative answers that were clear and easy to understand.

The flexibility indicator refers to the use of students' methods in providing alternative answers. It can be seen later whether students are able to provide alternative answers other than the method that has been used. Subject HY here was able to give two alternative answers in different ways, namely in the first way subject HY gave alternative answers by subtraction where x-y = 8 minus x+ y = 72 then substituted. In the second method, the subject uses a different method, namely directly substituting equation 1 and equation 2. This can be seen from the results of the assignment given by the subject.

Furthermore, the original indicator refers to the way students provide the steps used when students provide alternative answers. Subject HY was unable to meet this indicator, this can be seen from the results of HY's assignment that the subject was able to provide the steps used but during the interview the subject was unable to explain the results of the problem posed by himself.

The last indicator is elaborative creative thinking, this indicator refers to students finding new ideas/methods other than the ideas/methods that have been written down, meaning that students are able to develop from posing problems that they have created themselves. Subject HY here cannot develop what the subject has written.

Based on the description above, it can be concluded that students with low two abilities at Sabilur Rosyad Middle School are only able to fulfill two of the four indicators, namely the fluency indicator and the flexibility indicator.

From all the discussion above, it can be concluded that there is a clear difference between high ability students and low ability students at Sabilur Rosyad Middle School, namely that it can be seen from the fulfillment of the indicators for each student in the sample, high ability students are able to fulfill the four indicators and low ability students Not sure, some are able to fulfill one indicator, some have two indicators of creative thinking.

PENUTUP

Based on the results of data analysis and discussion presented in the previous chapter, three conclusions can be drawn in this research, namely: The indicator of creative thinking that often appears is the indicator of fluency, this is because students are able to explain alternative answers fluently and there are students who are able to provide many ways to pose problems; Indicators that sometimes appear and sometimes do not are indicators of flexibility, this is proven in this research, students are able to provide several methods and some are not able to provide these methods; Indicators that do not appear enough are originality and elaboration, this is due to students' inability to explain the steps in alternative answers, not being able to develop ideas and not being able to provide alternative answers in detail; High level creative thinking abilities are still minimal among SMP/MTs, students are still classified as having low level abilities.

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