Description of Mathematical Creative Thinking Ability on the Material of the Smallest Common Multiples and the Biggest Common Factors

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Abstract. This study aims to describe students' mathematical creative thinking abilities in one of the state elementary schools in Bandun Regency, SDN Cilame on the material for KPK FPB using a descriptive method. The subjects of this study were 4th grade students at SD Negeri Cilame in the odd semester of the 2022/2023 school year with a total of 27 students. The instruments used in this study were essay tests to obtain data on mathematical creative thinking skills and interviews to complement and strengthen information derived from administering tests on triangular material that has been validated empirically. To see students' mathematical creative thinking skills, 4 indicators are used, namely 1) Fluency; 2) Flexibility; 3) Originality; 4) Detail (elaboration). The data analysis technique used in this study is percentage analysis. Based on the analysis of the data obtained for the indicators of fluency (fluency) of 50.93%, flexibility (flexibility) of 46.14%, originality (originality) of 33.33%, and detail (elaboration)

Keywords: Creative Thinking, KPK and FPB, Mathematics, Flexibility, Detail

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INTRODUCTION

Mathematics is one of the subjects that is taught at all levels of education, be it elementary school, junior high school, or senior high school. This is because mathematics plays an important role, including counting and measuring. This makes mathematics a basic science that has an important role, both in everyday life and in the development of science and technology.

Learning mathematics at school is not only related to mastering as much material as possible, but also training students to think critically, creatively and structuredly. Ministerial regulation number 21 of 2016 concerning content standards for primary and secondary schools states that the 2013 curriculum-based education process is aimed at developing various attitudes, knowledge and skills competencies. Specifically in terms of skills, the ability to think and act creatively, productively, critically, independently, collaboratively, and communicatively is set as a graduate competency standard (Permendikbud, 2016). Therefore, in learning mathematics, learning must be directed to acquire higher thinking skills, including the ability to think creatively mathematically.

Maulana (2017) explains that thinking is a human mental activity that leads to goal-oriented discoveries. Creative thinking is a mental activity that is used by someone to formulate ideas and develop new ideas fluently and flexibly. Creative thinking is original and reflective. The result of this thinking ability is very complex. The activities carried out include combining ideas, generating new ideas, and determining their effectiveness. Creative thinking generally includes the ability to draw conclusions that lead to results that have novelty values (Wahid, 2018).i

The importance of the ability to think creatively for students who are starting to be grown from the elementary school level should be of concern to all of us as educators. Having students who are creative mathematically will make it easier for students to be creative in various ways. Including being creative in other subjects, to being creative in solving problems and being able to face global competition. Mathematical creative thinking is the ability to generate new ideas and ideas by creating new ways of solving problems as alternative solutions (Lestari, 2015).

According to Nurlaela and Ismayati (2015) creative thinking is thinking consistently and continuously so as to create something creative or original depending on needs. Creative thinking is also an important skill for everyone. Skills that refer to a person's ability to handle thoughts that generate new ideas. Therefore, these abilities must be developed by all students.

In general, there are four indicators used to measure students' creative thinking abilities, namely fluency, flexibility, originality, and elaboration. For more details, as revealed by Munandar (2009) that indicators of the ability to think creatively mathematically are as follows:

a) The ability to think fluently (Fluency) is the ability to produce many answers, solve problems, ideas, questions, make many ways or suggestions for doing something, and find more answers.
b) The ability to think flexibly (Flexibility) is the ability to generate varied questions and answers, identify problems from different perspectives, look for various alternatives or varied methods, and be able to change approaches or ways of thinking.
c) Originality is the ability to ask diverse and unique questions, think of unusual ways of expressing oneself, and be able to combine unusual parts or elements.
d) The ability to detail (Elaboration) is the ability to develop and improve ideas or ideas by adding or detailing the subject, idea, or situation in detail to make it more interesting.

The problem that is often experienced by students today is the lack of creativity in thinking, which can affect their learning outcomes. Low mathematics learning outcomes are of course much influenced by several factors, both from the students themselves, the teacher as a facilitator or the surrounding environment. Many teachers in both primary and secondary education are not optimal in observing students' creative thinking abilities. In the process of learning mathematics, the teacher places too much emphasis on students on the behavioral aspect (doing), but does not emphasize the thinking aspect (thinking). Learning focuses on how to do something, but less on why this happens and with what impact. In other words, the learning process is only carried out in the form of memorization, not problem solving, reasoning, critical thinking, or creative thinking. This is in accordance with what was conveyed by Yuli and Siswono (2018) that most mathematics learning in class still emphasizes understanding but does not develop critical and creative thinking skills. Students are not facilitated to solve problems in a way that is different from what the teacher exemplifies. In addition, students also focus more on the formula used than other alternative problem solving options.

Based on the results of field observations conducted at the research site, related to learning mathematics, it was found that students were not used to solving open-ended math questions (questions that had various answers or problem-solving solutions). Students solve more math problems using existing solutions and memorize problem solving from routine questions that have been taught by the teacher. When students are asked questions that require many answers or solutions to a problem, students have difficulty answering these questions. As a result, the ability of students to develop creative thinking varies. Students' ability in solving problems varies. Students tend to give the same answers as those given by the teacher and even just follow the examples in the guidebook.

Mathematics learning should emphasize student activity as the center of learning. Students are trained in critical, analytical and creative thinking so that they can be mentally and physically active, able to develop their own knowledge through guidance provided by the teacher, so that they can solve problems in mathematics. With the implementation of the 2013 curriculum, students are expected to independently find concepts to develop creative thinking skills through the delivery of learning experiences. One of the cognitive aspects needed and very important to support learning based on the 2013 curriculum is the ability to think mathematically and creatively. In line with the opinion of Yuli and Siswono (2018) that one of the goals of the 2013 curriculum is to balance creativity between the development of spiritual (mental) and social attitudes, curiosity, creativity, and collaboration with intellectual and psychomotor abilities.

The role of KPK and FPB has always been an interesting topic in mathematics learning, because KPK and FPB are directly related to everyday life. In KPK and FPB material, students are introduced to multiples, factors, common multiples, common factors, prime factorization, FPB and KPK. All of that, requires a creative thinking process for each problem solving. Students not only

have to be able to solve problems according to the direction of the teacher, but more importantly in solving triangle problems students can find many solutions and answers that are relevant to solving problems, can find many alternatives or different ways of solving problems, can provide answer yourself with a method or strategy that is different from other students, accompanied by detailed steps. Several studies on mathematical creative thinking skills have actually been carried out before with various aspects such as critical thinking skills in number pattern material (Usman et al., 2021), flat shapes (Safaria, S., A., & Sangila, M., 2018) , or building space (Andiyana et al., 2018), efforts to improve critical thinking skills through the application of learning models (Faturohman & Afriansyah, 2020), including efforts to improve mathematical creative thinking skills through the development of a counting board game (Widiyanto & Yunianta, 2021). In this research, an attempt was made to look at students' mathematical creative thinking skills on KPK and FPB material in one of the public elementary schools in Bandung Regency.

METHOD

The research was conducted at one of the public elementary schools in Bandung Regency, in grade IV students in the odd semester of the 2022/2023 academic year. The method used in this research is descriptive research method. This method is used to describe the observed data in the form of statements that describe the mathematical creative thinking abilities of Cilame Elementary School students in solving mathematical problems using KPK and FPB material. The subjects in this study were 27 grade IV students at SDN 1 Cilame, consisting of 17 female students and 10 male students. The interview subjects were selected by 6 people representing the high, medium and low categories. The number of subjects was taken using the Cluster Random Sampling technique, which is a sampling technique from the population that is randomly selected based on groups. The characteristics of the sample in each group are considered heterogeneous (Kurniawan, 2018).

To determine each student's creative thinking ability on each indicator of creative thinking ability adjusted to the assessment criteria in the research school:

Table 1. Criteria for Students' Mathematical Creative Thinking Ability

Criteria	Mark
Tall	mark ≥ $\bar{x}$ + SD
Currently	$\bar{x}$ – SD ≤ mark < $\bar{x}$ + SD
Low	mark < $\bar{x}$ – SD

RESULTS

From the data obtained, the highest score was 69, and the lowest score was 20 with a score range of 0 to 96. Overall, students' mathematical creative thinking abilities were in the medium category, namely 45.52%. The results of the mathematical creative thinking ability test are based on four indicators of mathematical creative thinking ability, namely fluency, flexibility, originality, and elaboration. Table 2 below contains a description of the achievements of students' mathematical creative thinking abilities for each item of questions reviewed based on student indicator groups on mathematical creative thinking abilities with an overall indicator score of 648.

Table 2. Description of Mathematical Creative Thinking Ability for Each Indicator

Question Items	Indikator				Total score
	Fluency	*Flexibility*	Originality	Elaboration	
1	57	50	44	61	212
2	63	52	40	62	217
3	57	49	29	41	176
4	54	57	42	62	215
5	48	44	28	48	168
6	51	47	33	53	184
	330	299	216	327	1172
	50,93	46,14	33,33	50,46	

An overview of the distribution of students' mathematical creative thinking abilities based on indicators is illustrated with a pie chart in Figure 1.

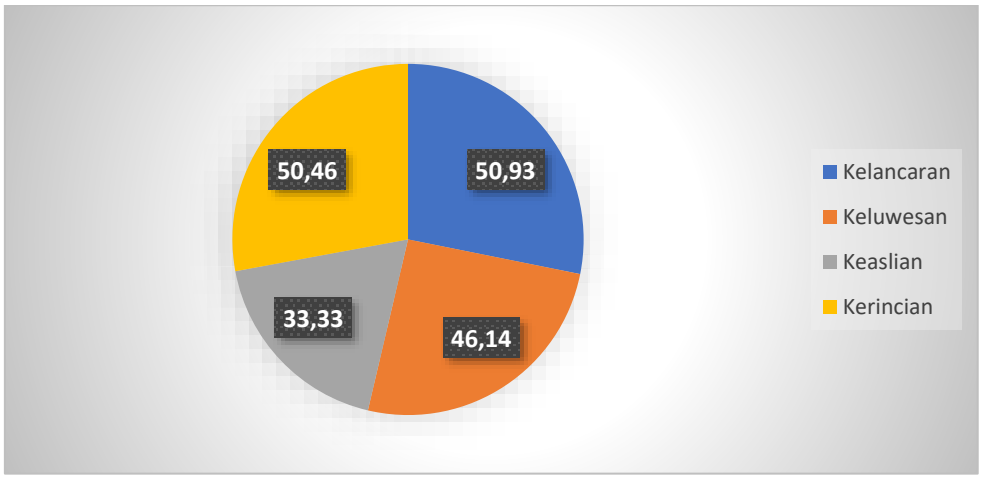


Figure 1. Diagram of Students' Creative Thinking Ability

From Figure 1 it can be seen that the indicator most often used by students for each question is the fluency indicator, which is 50.93%, followed by the elaboration indicator, which is 50.46%. Table 3 below is a description of the achievements of students' mathematical creative thinking abilities based on student category groups on mathematical creative thinking abilities.

Table 3. Mathematical Creative Thinking Ability Based on Category Groups

Category	Mark	subject	Percentage
Tall	mark $\geq \bar{x}$ + SD	4	14,81 %
Currently	$\bar{x}$ – SD $\leq$ mark < $\bar{x}$ + SD	16	59,26%
Low	mark < $\bar{x}$ – SD	7	25,93%
Amount		27	

Figure 2 below is a pie chart to show the distribution of data on students' mathematical creative thinking abilities by category. Figure 2 shows that there are 4 students or 14.81% who have high mathematical creative thinking ability, 16 students 59.26% who have moderate mathematical creative thinking ability, and for 7 students or 25.93% who have low mathematical creative thinking ability .

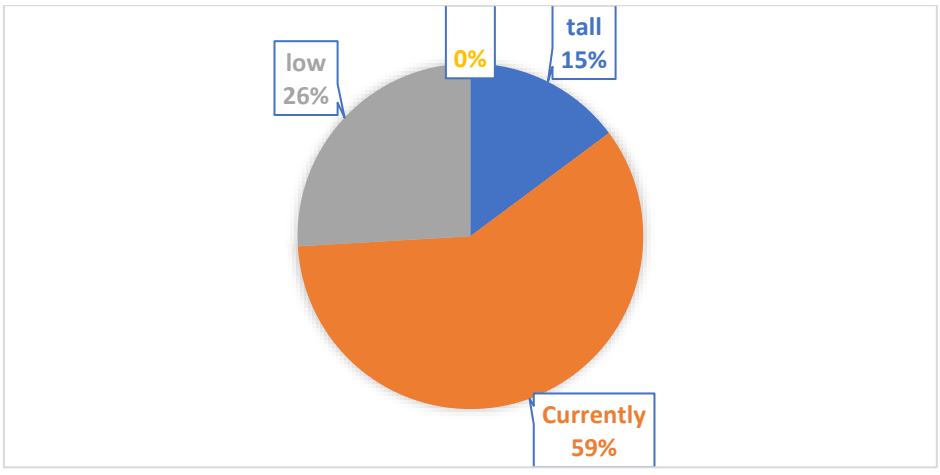


Figure 2. Diagram of Students' Mathematical Creative Thinking Ability Based on Category

The following Table 4 is a description of the achievements of students' mathematical creative thinking abilities in each item reviewed based on student categories.

Table 4. Mathematical Creative Thinking Ability by Category

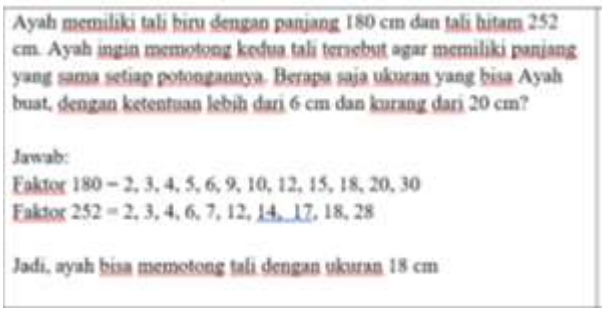
Category	Subjek	Total Score	Total Score for Each Category	Indicator			
				Smoothness	Flexibility	Authenticity	Details
Tall	4	260	384	72	75	51	62
Currently	16	744	1536	211	191	132	210
Low	7	168	672	47	33	33	55
Amount	27	1172	2592	330	299	216	327

Table 4 above shows that the score obtained from the four indicators of students' mathematical creative thinking abilities for the high category is the flexibility indicator of 75, the medium is the fluency indicator of 211 and the low is the detail indicator of 55.

DISCUSSION

1) Fluency

For the first indicator, fluency, students are able to provide the right range of answers accompanied by clear problem solving. Based on the findings, students' mathematical creative thinking ability in this first indicator reached 50.93%. Some students were able to provide several good answers with clear problem solving, while others had only one relevant answer and unclear problem solving. This is shown from one of the results of student work in Figure 3.


Ayah memiliki tali biru dengan panjang 180 cm dan tali hitam 252 cm. Ayah ingin memotong kedua tali tersebut agar memiliki panjang yang sama setiap potongannya. Berapa saja ukuran yang bisa Ayah buat, dengan ketentuan lebih dari 6 cm dan kurang dari 20 cm?

Jawab:
Faktor 180 = 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 30
Faktor 252 = 2, 3, 4, 6, 7, 12, 14, 17, 18, 28

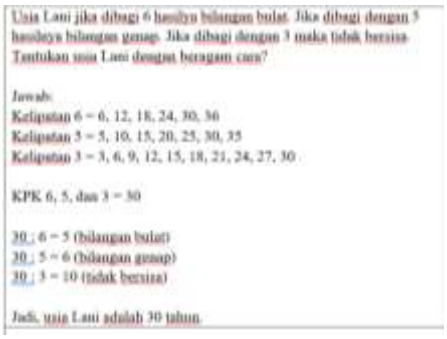
Jadi, ayah bisa memotong tali dengan ukuran 18 cm

Figure 3. Student Answers

From the students' answers above, it can be seen that the students have been able to solve the problem. However, the solution to the problem is unclear, and there are deficiencies in the student's work. This means that most students are used to answering questions that have one answer, so students are hesitant to determine more than one answer.

2) Flexibility

In the second indicator, namely flexibility, students are able to provide answers to more than one way of solving (various) differently. Based on the results of research on students' mathematical creative thinking abilities on this indicator reached 46.14%. Some students are able to answer in a variety of different ways (answers are more than one way of solving), but some students have not been able to work on the questions by giving various answers, with the calculation process and the correct results. This is indicated by one of the results of student work which has not been able to provide answers in various or varied ways, but the calculations and results are correct as follows.


Usia Lani jika dibagi 6 hasilya bilangan bulat. Jika dibagi dengan 5 hasilnya bilangan genap. Jika dibagi dengan 3 maka tidak bersisa. Tentukan usia Lani dengan beragam cara?

Jawab:
Kelipatan 6 = 6, 12, 18, 24, 30, 36
Kelipatan 5 = 5, 10, 15, 20, 25, 30, 35
Kelipatan 3 = 3, 6, 9, 12, 15, 18, 21, 24, 27, 30

KPK 6, 5, dan 3 = 30

30 : 6 = 5 (bilangan bulat)
30 : 5 = 6 (bilangan genap)
30 : 3 = 10 (tidak bersisa)

Jadi, usia Lani adalah 30 tahun.

Figure 4. Student Answers

This means that students still find it difficult to work on creative thinking questions by giving various correct and appropriate answers. Students use more existing solutions, or memorize problem solving from routine questions or examples that have been given by the teacher, causing students to tend to work on problems only focusing on one way of solving.

3) Originality

On the third indicator, namely authenticity, students have not been able to provide answers in a unique way or a way that is different from those given by other students, the calculation process and the results are correct. Based on the results of research on students' mathematical creative thinking abilities on this indicator, it reached 33.33%. Student test results showed that almost all students had not been able to provide answers in a unique way or in a way that was different from those given by other students, but students were able to provide answers with the correct calculation process and results. This is because students are not used to solving open-ended math problems causing students to be confused and find it difficult when working on the questions given because they do not know the method or alternative that will be used to solve the problem. Even though there are actually many open questions that don't only have one way of solving them, there are many ways that can be made to solve them.Keterincian (*Elaboration*)

On the fourth indicator, namely detail, students are able to provide correct answers to one or more ways of solving problems, accompanied by detailed steps. Based on the results of research on students' mathematical creative thinking abilities on this indicator, it reached 50.46%. The results of student tests showed that some students were able to provide detailed and sequential answers, but there were still students who lacked detail in writing down their answers. This is due to a lack of understanding of students in learning mathematics, and there is no willingness to ask the teacher so that students will experience difficulties when working on the questions given by the teacher.

Based on the research results and the results of data analysis, the ability to think creatively is categorized as high, medium and low. The description of the characteristics of each category in terms of indicators of the ability to think creatively mathematically is as follows:

1) High Category

Based on data analysis from the results of the study, that overall out of 27 students there were only 4 students who were in the high category. Students who are in the high category are students who have fulfilled the 4 indicators of the ability to think creatively mathematically as previously mentioned, but the scores obtained for each indicator are different. This is indicated by the ability of students to solve problems, students are not only fixated on one alternative answer, but are also able to provide ideas, solutions, and other alternatives that are different from other students in solving problems. The answers of some students use more than one solution with the same result. Students are also able to provide detailed answers in solving problems. However, for students who meet the authenticity indicator, students are only able to provide answers with the correct completion process but have not been able to provide unique answers or different ways given by other students in solving questions.

2) Moderate Category

Students who are in the medium category are 16 people out of 27 people. It can be said that more than 50% of students have been able to provide ideas or solutions in solving problems using one solution method and the results are correct. Some students have also been able to provide order and detail of answers in solving some questions, but there are still students who do not write down their answers in order and detail. Thus, students are able to fulfill 2 indicators of creative thinking, namely fluency and elaboration.

3) Low Category

There were 7 students who were included in the low category out of a total of 27 students. This is because in this category students are able to solve the questions given, but they solve these questions using methods with wrong results and some do not provide answers to some questions. Students who are in the low category only meet 1 indicator of creative thinking, namely fluency

From the explanation above, it can be concluded that the students are quite capable of indicators of fluency and detail, but the indicators of flexibility and originality are still moderate. There are several factors that influence each indicator of students' creative thinking abilities, including the following. First, students are not used to solving open-ended math questions (questions that have various answers or problem solving solutions), causing students to be confused and find it difficult to work on the questions given because they do not know what method or alternative to use to solve them. this matter. Second, students solve more math problems using existing solutions and memorize problem solving from routine questions that have been taught by the teacher, causing students to tend to work on problems only focusing on one way of solving problems. The creativity of students' thinking varies, causing curiosity and thoroughness of students in solving problems, some are already optimal and some are not optimal. Third, the ability to solve various problems causes students to get used to solving problems based on examples given by the teacher or following the steps for solving existing ones in guidebooks or on the internet. So that students tend to be lazy to think or try to work on the problem using different methods or alternatives or make new discoveries that can solve the problem and make students not confident in their own answers so they expect more answers from other students.

From the results of the discussion that the authors have described above, the ability to think creatively mathematically in one of the state elementary schools in Bandung regency in completing tests on triangle material, the dominant is in the medium category with a percentage score of 59.26%. Most students have not been able to fulfill the four indicators of mathematical creative thinking ability. Research that supports the author's statement is by Samsiawaty K. Daud (2018) which concludes that students' creative thinking abilities in a school in Bone Bolango Regency are at the moderate category level with a percentage score of 68.59%. In this research, because in solving problems, most students have not been able to fulfill all the indicators of creative thinking ability in number pattern material.

CONCLUSION

The results of the study showed that the ability to think creatively mathematically on the material for KPK and FPB in one of the public elementary schools in Bandung district was classified as moderate or not optimal. This can be seen from the overall achievement of students' mathematical creative thinking ability which is only 59.26%, meaning that most students are able to work on mathematical creative thinking questions even though the results are not optimal. Of the 27 students, 4 students were in the high category, 16 students were in the medium category, and 7 students were in the low category.

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