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Unlocking Students' Creative Thinking in Mathematics: A Study on Three-Dimensional Shapes

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ABSTRAK

Kemampuan berpikir kreatif perlu dimiliki oleh siswa dalam pembelajaran matematika. Penelitian ini bertujuan untuk menganalisis kemampuab berpikir kreatif siswa SMP pada materi Bangun Ruang Sisi Datar Kubus dan Balok. Metode penelitian ini adalah deskriptif kualitatif. Penentuan subjek penelitian dilakukan secara *Purposive Sampling* dengan memilih 3 orang siswa kelas VIII. Data diperoleh dengan cara melakukan tes tertulis, wawancara, dan observasi. Setiap data atau informasi yang diperoleh dianalisis dalam bentuk deskriptif. Kemampuan berpikir kreatif yang dimiliki siswa dianalisis berdasarkan indikator-indikator kemampuan berpikir kreatif. Hasil penelitian ini adalah keempat indikator kemampuan berpikir kreatif siswa perlu ditingkatkan karena belum optimal. Faktor-faktor yang mempengaruhi kemampuan berpikir kreatif yaitu proses pembelajaran, pemahaman siswa, serta pemberian latihan soal.

Kata Kunci: Kemampuan Berpikir Kreatif; SMP; Bangun Ruang Sisi Datar.

ABSTRACT

Creative thinking skills are essential for students in learning mathematics. This study aims to analyze the creative thinking abilities of junior high school students in the topic of Three-Dimensional Shapes, specifically cubes and rectangular prisms. The research method used is qualitative descriptive. The selection of research subjects was conducted using purposive sampling, involving three eighth-grade students. Data were collected through written tests, interviews, and observations. All obtained data or information were analyzed descriptively. Students' creative thinking skills were analyzed based on specific indicators of creative thinking ability. The results of this study show that all four indicators of students' creative thinking skills need improvement, as they are not yet optimal. Factors influencing creative thinking skills include the learning process, students' comprehension, and the provision of practice problems.

Keywords: Creative Thinking Skills; Junior High School; Three-Dimensional Shapes.

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1. INTRODUCTION

The way that people think and reason is greatly influenced by mathematics. Students must naturally cultivate their creativity in order to complete these processes (Faiziyah, Hanan, & Azizah, 2022). Consequently, mathematics is taught at all levels of education. The Regulation of the Minister of Education, Culture, Research, and Technology No. 7 of 2022 stipulates that mathematics is a mandatory subject in the basic and secondary education curricula. Furthermore, the Ministerial Regulation No. 21 of 2016 outlines that the study of mathematics is expected to cultivate logical, critical, analytical, creative, precise, and meticulous attitudes in students, along with responsibility, responsiveness, and persistence in solving problems (Febrianingsih, 2022).

According to Mukaromah (2023), Marlina and Jayanti stress that students must become proficient in the four Cs: (1) communication, (2) creativity and innovation, (3) teamwork, and (2) critical thinking and problem-solving. The ability to conceive, discover, or construct new (original) ideas for solving mathematical problems—which include fluency, flexibility, originality, and elaboration to reach exact and accurate results—is what Mukaromah (2023) defines as mathematical creative thinking skills.

According to Wahyuni (2022), mathematical creative thinking is a goal-oriented cognitive process that aims to produce or uncover unique, unorthodox, and creative ideas while offering precise and correct solutions. Every learner has this innate ability, which allows them to approach mathematics issues imaginatively and generate original ideas using a range of methods (Nadhifah, 2022). Four components make up mathematical creative thinking: (1) fluency, which shows that students can come up with a lot of ideas or solutions; (2) flexibility, which shows that students can solve problems in different ways; (3) originality, which shows that students can solve problems in their own ways; and (4) elaboration, which means that problems are solved in a methodical and detailed manner (Suripah & Sthephani, 2017; Afriansyah, 2021).

Students that possess mathematical creative thinking abilities are expected to understand, grasp, and resolve challenges (Faturohman & Afriansyah, 2020). Students who learn mathematics creatively are more confident when they use their own methods to solve issues. Furthermore, pupils need to be able to think creatively in order to adjust to the quick changes in science, technology, and the increasingly cutthroat global environment. For both the present and the future, mathematical creativity is essential, particularly while managing the modern world's constant development and improvement (Muthaharan, 2018; Setyaningsih & Kustiana, 2023).

However, this contrasts with real-world classroom scenarios, where students rarely attempt to solve problems and seldom practice tasks requiring creative thinking (Nadhifah, 2022; Ernita, Isnarto, & Suyitno, 2024). From the teacher’ s perspective, there is a lack of effort to train students to solve problems using their own reasoning. Consequently, students are hesitant to

express their new ideas. Teachers often rely on questions provided in textbooks, which typically have closed-ended answers (Nufus, 2021; Sumartini, 2022; Kosasih, Gita, & Nurjanah, 2024).

It is clear from the discussion above that pupils need to be able to think creatively in mathematics. In order to examine students' mathematical creativity in relation to three-dimensional shapes—specifically cubes and rectangular prisms—the researcher was inspired. In light of these subjects, the aim of this study is to evaluate students' capacity for mathematical creativity.

2. METHOD

This study used a descriptive research design with a qualitative methodology. Based on the post-positivist philosophy, qualitative research uses the researcher as the main tool to examine phenomena in their natural settings. Triangulation techniques were used to collect the data, and the results are intended to identify traits, interpret meaning, explain occurrences, and identify hypotheses (Sugiono, 2019). Conversely, descriptive research aims to provide a thorough and detailed description of the phenomenon being studied in order to bolster the data presentation (Nugrahani, 2014). The purpose of this study is to describe how well students use mathematical creativity to solve problems involving three-dimensional shapes with flat surfaces.

The study was carried out in a private junior high school in the Garut Regency's Tarogong Kaler District. Based on observations that students' creative thinking abilities were not yet at their best, this location was selected in order to address issues connected to the significance of mathematical creativity. The study was conducted between May and July of 2024, during the academic year 2023 – 2024.

This study focused on Grade VIII students' mathematical creativity in relation to three-dimensional shapes, particularly cubes and rectangular prisms. Students in Grade VIII at a private junior high school in Tarogong Kaler District, Garut Regency, served as the subjects. In order to ensure that the subjects could provide the thorough information needed for the study, the subjects were chosen based on their conversational skills and cognitive test scores (high, medium, and low levels). An observer joined the researcher during the interviews in order to evaluate the students' answers.

In this study, tests, interviews, and observations were used as data gathering methods. Primary and supporting instruments were among the instruments used. The researcher, who was actively involved from the start of the study to its conclusion, served as the main tool. Test papers, interview guidelines, and observation sheets were examples of supporting materials. Three steps made up the data analysis process: data reduction, data display, and conclusion drafting.

The researcher simplified the findings of written assessments, interviews, and observations into clear, well-structured language during the data reduction phase. By choosing pertinent material that matched the study objectives and written test outcomes, interview data was reduced. Data presentation entailed compiling the results into observation logs, interview transcripts, and written test results. After that, these data were examined to produce conclusions that addressed the main topic of the study.

During the conclusion-drawing phase, students' work was carefully and precisely compared with the findings of the interviews and observations. Through this procedure, the researcher was able to assess how well students were able to use mathematical creativity to solve real-world mathematical issues.

3. RESULT AND DISCUSSION

a. Research Result

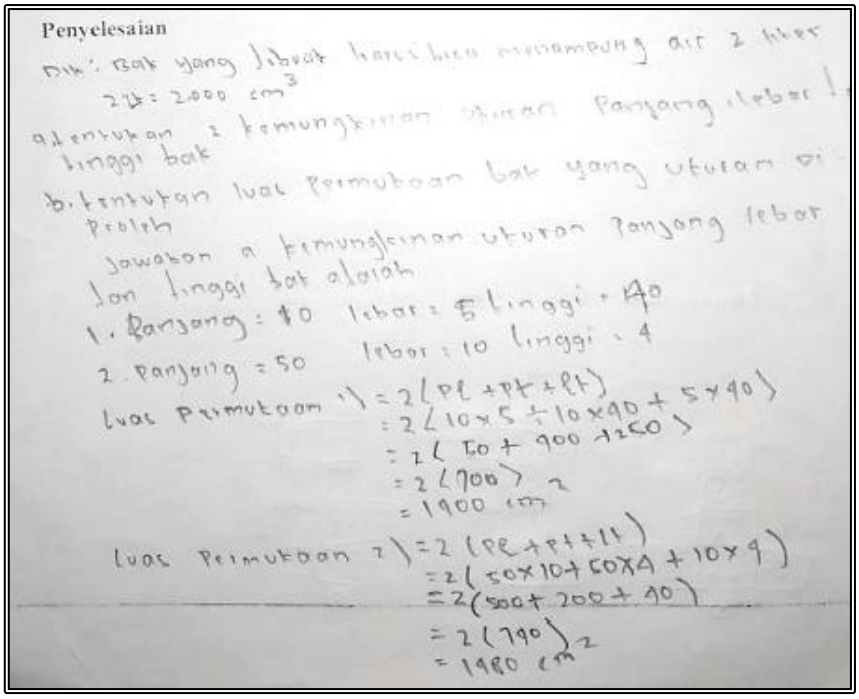


Figure 1. Student-1 Response Results for Fluency Indicator

Based on Figure 1, the responses of Student 1 on the fluency indicator show that they are capable of generating numerous ideas, multiple answers, various problem-solving methods, and a wide range of questions with ease. Additionally, the student can provide multiple approaches or suggestions for accomplishing different tasks and consistently considers more than one solution. This finding is supported by the results of an interview conducted by the researcher with Student 1. The following is an excerpt from the interview regarding the fluency indicator in mathematical creative thinking skills:

P: "Do you think the given question is easy to understand? Explain!"

S: "Yes, Ma'am, I understand the meaning of the given question."
P: "Can you mention the given information in the question? What is the problem presented in the question?"
S: "In question number 4, it is stated that there is an open-top rectangular water tank that can hold 2 liters of water. 2 liters is equal to 1,000 cm^3. We are asked to determine the possible dimensions of length, width, and height for a volume of 2 liters. Then, based on those dimensions, we need to calculate the surface area."
P: "Did you use all the available information to solve the problem? Was there any information that you did not use? Explain!"
S: "Yes, Ma' am, I used all the information provided in the question to solve it."
P: "Are you sure you have carefully written down all the given and required information? Explain!"
S: "Yes, Ma' am, I have written down all the given and required information."

The interview excerpt above indicates that the students have understood the given problem, are able to identify the provided information and the problem within the question, can utilize all the given information effectively, and are capable of presenting multiple solutions fluently. In addition to assessing creative thinking skills through test questions and interviews, the researcher also involved an observer to examine students' responses during the interviews. Below is the observation sheet for Student 1 related to the fluency indicator of creative thinking skills.

No.	Pernyataan	Respon		Keterangan
		Ya	Tidak	
1.	Siswa memahami soal yang diberikan	✓		
2.	Siswa dapat menyebutkan informasi dalam soal	✓		Siswa dapat menyebutkan informasi dalam soal tetapi harus menggunakan pertanyaan pemandu untuk mendapatkan informasi.
3.	Siswa dapat menyebutkan informasi dalam soal yang digunakan dan tidak digunakan untuk menyelesaikan masalah	✓		
4.	Siswa menuliskan apa yang diketahui dan ditanyakan dalam soal dengan teliti	✓		

Figure 2. Student Observation Sheet 1 – Fluency Indicator

Based on the observation sheet, it was found that the student's responses during the interview indicated their ability to understand the given problem, recall information from the problem statement (albeit with the aid of guiding questions), and utilize the provided information to solve the problem. Therefore, based on Figure 1, the interview excerpt, and Figure 2, it can be concluded that Student 1 possesses creative thinking skills in terms of fluency.

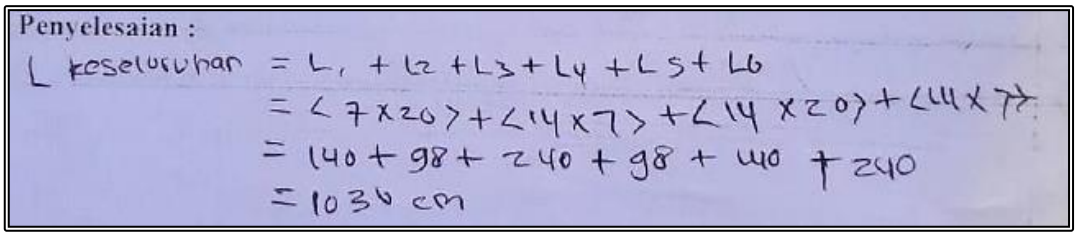


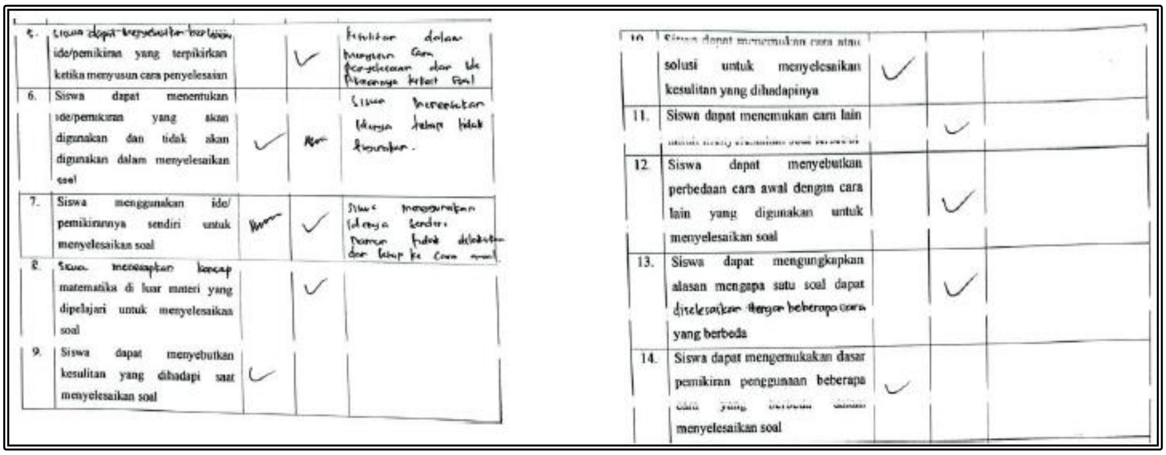
Figure 3. Student-2 Respons Results on Flexibility Indicators

Based on Figure 3, the students' responses to the flexibility indicator show that Student 2 is able to generate ideas, answers, or statements, but these are not yet varied. Additionally, the student is able to view a problem from a different perspective. However, in the responses, the student has not yet been able to explore multiple alternatives or different approaches and has not shown the ability to change their approach or thinking style. This is evident from the student providing only one solution method. The researcher also conducted an interview with Student 2. Below is an excerpt from the interview with Student 2 regarding the flexibility indicator in mathematical creative thinking ability:

P: "What ideas or thoughts came to your mind when you were working on the solution?"
S: "When solving this problem, the idea that came to mind was to calculate the surface area of the cake box by adding up the areas of all the faces of the rectangular prism."
P: "Were there any ideas that you thought of but decided not to use? Explain!"
S: "No, ma'am."
P: "Was this idea your own? Explain!"
S: "Yes, ma'am, I came up with the idea myself to solve the problem."
P: "Did you apply any concepts from outside the material that was studied? Explain!"
S: "No, ma'am, I only used concepts from solid geometry."
P: "Did you encounter any difficulties in solving this problem? Explain!"
S: "Yes, ma'am, I had difficulty when calculating the surface area of the cake box."
P: "If so, where did you find a way to overcome that difficulty?"
S: "I checked the calculations I had already done."
P: "Did you find another way to solve this problem? Explain!"
S: "No, ma'am."
P: "What is the difference between the original method you used and any other method?"
S: "I didn't find another method."
P: "Why can this problem be solved in a different way?"
S: "I don't know, ma'am."
P: "Where did you think of this?"
S: "I didn't find another method."
P: "Did you get the same result using both methods?"
S: "I think the result would be the same."

The interview excerpt above shows that the student is able to mention various ideas/thoughts when developing a solution to the problem. Furthermore, the excerpt demonstrates that the student is able to use their own ideas/thoughts to solve the problem and can find a way or solution to overcome the difficulties they face. However, the student has not

yet been able to find alternative methods to solve the given problem. In addition to using the creative thinking ability test through questions and interviews, the researcher also used an observation sheet to observe the students' responses during the interview. Below is the observation sheet for Student 2 regarding the creative thinking ability, specifically the flexibility indicator.



5.	Siswa dapat menyebutkan berbagai ide/pemikiran yang terpikirkan ketika menyusun cara penyelesaian		✓	[illegible]
6.	Siswa dapat menentukan ide/pemikiran yang akan digunakan dan tidak akan digunakan dalam menyelesaikan soal	✓	[illegible]	[illegible]
7.	Siswa menggunakan ide/pemikirannya sendiri untuk menyelesaikan soal	[illegible]	✓	[illegible]
8.	Siswa menerapkan konsep matematika di luar materi yang dipelajari untuk menyelesaikan soal		✓	
9.	Siswa dapat menyebutkan kesulitan yang dihadapi saat menyelesaikan soal	✓		
10.	Siswa dapat menemukan cara atau solusi untuk menyelesaikan kesulitan yang dihadapinya	✓		
11.	Siswa dapat menemukan cara lain [illegible]		✓	
12.	Siswa dapat menyebutkan perbedaan cara awal dengan cara lain yang digunakan untuk menyelesaikan soal		✓	
13.	Siswa dapat mengungkapkan alasan mengapa satu soal dapat diselesaikan dengan beberapa cara yang berbeda		✓	
14.	Siswa dapat mengemukakan dasar pemikiran penggunaan beberapa [illegible] menyelesaikan soal	✓		

Figure 4. Student Observation Sheet 2 — Flexibility Indicator

Based on the observation sheet, it is evident from the student's responses during the interview that the student has not yet been able to articulate the ideas or thoughts that came to mind when formulating a solution method, has not been able to find alternative methods other than the ones written to solve the given problem, and has not been able to explain the reasons for using a different method on the same problem. Therefore, based on Figure 3, the interview excerpts, and Figure 4, it can be concluded that Student 2 has not yet developed creative thinking skills for the flexibility indicator.

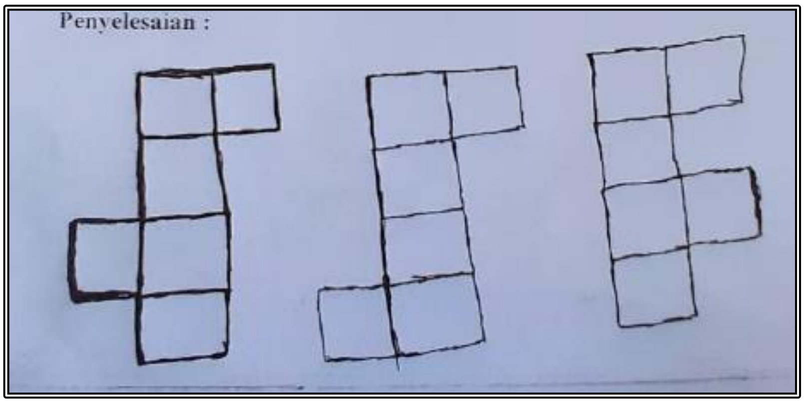


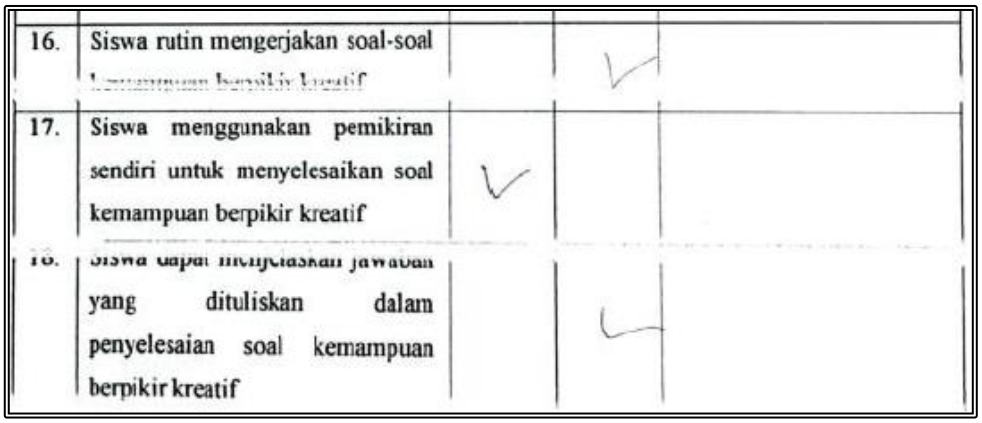
Figure 5. Student-3 Response Results for Originality Indicator

Based on Figure 5, the student responses to the originality indicator show that Student 3 is able to create new and unique expressions, but has not yet demonstrated the ability to make unconventional combinations of parts or elements. This can be seen in the student's responses.

Student 3 depicted three different nets, but one of the images does not represent a cube net. Additionally, Student 3 did not include the dots, as shown on a die, for each net created, as instructed in the problem. The researcher also conducted an interview with Student 3. Below is an excerpt from the interview with Student 3 regarding the originality indicator in mathematical creative thinking ability:

P: "Have you ever solved a question like this before? Or something similar?"
S: "No, I haven't, Ma'am."
P: "Did you use your own reasoning? Are you sure you didn't cheat?"
S: "Yes, Ma'am, I thought of the solution to this problem myself."
P: "Explain your unique answer!"
S: "I just drew the net of the cube."

The interview excerpt above shows that the student has worked on similar problems and used their own thinking to solve them. However, based on the excerpt, it is evident that the student is not yet able to explain the steps they took to solve the problem. In addition to assessing creative thinking ability through tests and interviews, the researcher also used an observation sheet to observe the students' responses during the interview. Below is the observation sheet for Student 3 regarding the originality indicator of creative thinking ability.



16.	Siswa rutin mengerjakan soal-soal kemampuan berpikir kreatif		✓
17.	Siswa menggunakan pemikiran sendiri untuk menyelesaikan soal kemampuan berpikir kreatif	✓	
18.	Siswa dapat menjelaskan jawaban yang dituliskan dalam penyelesaian soal kemampuan berpikir kreatif		✓

Figure 6. Student Observation Sheet 3 – Originality Indicator

Based on the observation sheet, it was found that the student's answers during the interview indicated that they had never worked on creative thinking tasks. However, the student made an effort to use their own thinking in solving the creative thinking tasks. Additionally, the student was unable to explain the answers written in the solution to the creative thinking problems. Therefore, based on Figure 5, the interview excerpt, and Figure 6, it shows that Student 3 does not yet possess creative thinking skills for the originality indicator.

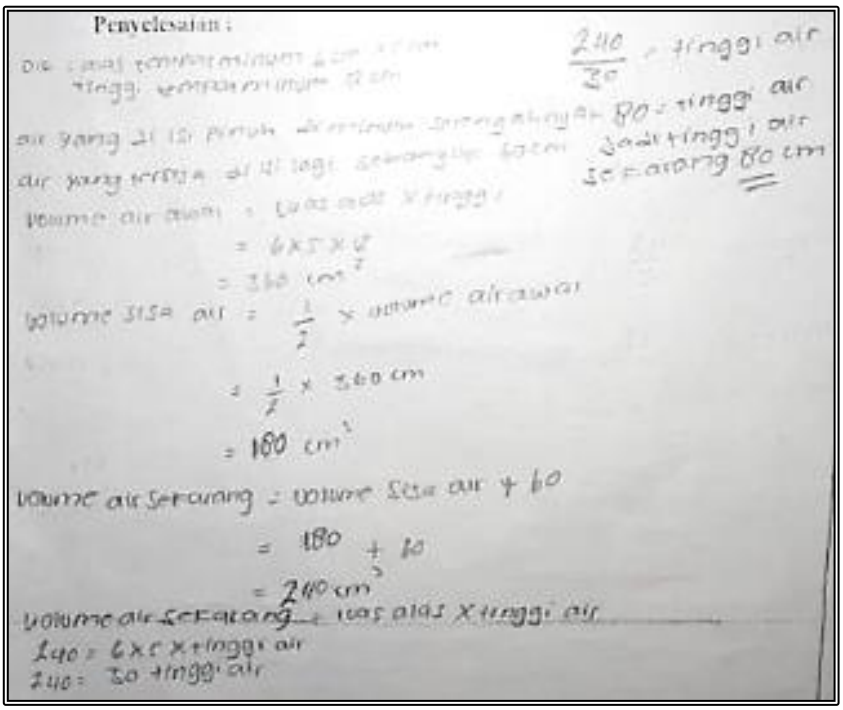


Figure 7. Student-1 Response Results for Elaboration Indicator

Based on Figure 7, the response from Student 1 shows that Student 1 is able to enrich and develop an idea or product, as well as add or elaborate on the details of an object, idea, or situation, making it more engaging. The researcher also conducted an interview with Student 1. Below is an excerpt from the interview between the researcher and Student 1 regarding the elaboration indicator in mathematical creative thinking ability:

P: "What is the thought process to solve the problem in the question? Please explain!"

S: "To solve this problem, I first identify the known elements and what is being asked. Then, I calculate the area of the base of the drinking container, followed by determining the volume of water after half of it has been consumed, and finally, I calculate the height of the remaining water after adding 60 cm^3."

P: "Are you confident with the solution you've provided? If not, why? Please explain!"

S: "Yes, I am confident."

P: "In solving the problem, did you use logic, or did you just answer randomly? Please explain!"

S: "Of course, I used my logic to think it through."

P: "Is there a cause-and-effect relationship in solving this problem? Please explain."

S: "Yes, Ma'am. From the known volume, we can determine the height of the water."

P: "Does the conclusion you made relate to the previous steps? Please explain!"

S: "Yes, Ma'am. My final conclusion is very much connected to the steps I took earlier in the solution process."

The interview excerpt above shows that the student is able to explain their thought process in solving the given problem. In addition, the student demonstrates confidence in the problem-solving process. The student is also able to show cause-and-effect relationships in solving the problem and draw conclusions based on the steps taken to solve the problem. Besides using creative thinking ability tests through questions and interviews, the researcher also

used an observation sheet to observe the students' responses during the interview. Below is the observation sheet for Student 1 related to the creative thinking ability indicator of elaboration.

19.	Siswa dapat menjelaskan alur atau langkah-langkah penyelesaian soal kemampuan berpikir kreatif	✓		
	dalam menyelesaikan soal kemampuan berpikir kreatif		✓	
21.	Siswa menggunakan pemikiran menyelesaikan soal kemampuan berpikir kreatif	✓		
22.	Siswa mampu menunjukkan hubungan sebab akibat dari soal yang diberikan	✓		
23.	Siswa dapat menyusun kesimpulan penyelesaian soal kemampuan berpikir kreatif	✓		

Figure 8. Student Observation Sheet 3 – Elaboration Indicator

Based on the observation sheet, it was found that the student's responses during the interview indicated that they could explain the steps or process in solving the creative thinking task. However, they were not yet able to demonstrate confidence in their answers. The student has been able to use their thought process, demonstrate the cause-and-effect relationships in the given task, and draw conclusions based on the steps taken to solve the problem. Therefore, based on Figure 7, the interview excerpt, and Figure 8, it shows that Student 1 has developed creative thinking skills for the elaboration indicator.

Based on the data reduction that has been carried out, the conclusion regarding students' creative thinking abilities is shown in the following table:

Table 1. Percentage of Mathematical Creativie Thinking Indicators Attained

No	Indicator	S-1	S-2	S-3	Percentages
1	Fluency	V	X	X	33%
2	Flexibility	X	X	X	0%
3	Originality	V	V	X	66%
4	Elaboration	V	X	X	33%
Percentage per student		75%	25%	0%	

Based on Table 1, it is evident that Student 1 has met three out of the four indicators of creative thinking ability. In other words, Student 1 has 75% of the mathematical creative thinking skills. As for Student 2, only one indicator of mathematical creative thinking ability is present, meaning that Student 2 has 25% of the mathematical creative thinking skills. Meanwhile, Student

3, overall, does not possess mathematical creative thinking skills. It is also known that the fluency indicator is only possessed by one out of three students who were used as research samples. In other words, only 33.3% of students possess the fluency indicator of mathematical creative thinking skills. As for the flexibility indicator, none of the three students in the sample demonstrated creative thinking skills in this aspect. Furthermore, two out of three students, or 66.7%, already possess the originality indicator. Meanwhile, for the elaboration indicator, 33.3% is possessed by one student.

The researcher presents the data on students' mathematical creative thinking abilities in the form of a diagram to make it easier to observe the achievement of students' mathematical creative thinking skills. Below is the bar chart illustrating the data on students' mathematical creative thinking abilities.

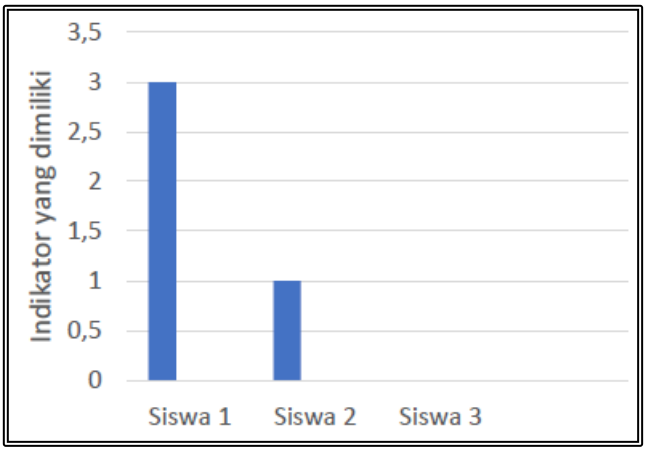


Figure 9. The Mathematical Creative Thinking Ability of Students Based on the Students

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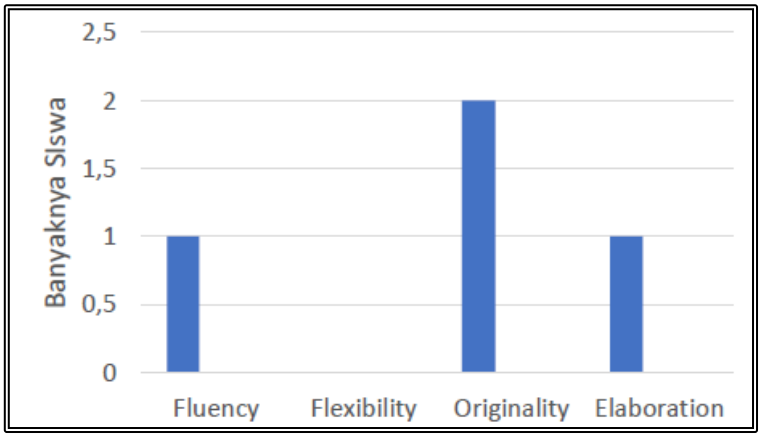

Figure 9. The Mathematical Creative Thinking Ability of Students Based on the Indicators

Student 1 has met 75% of the indicators for mathematical creative thinking abilities. This is demonstrated by the fact that 3 out of 4 indicators of mathematical creative thinking abilities have been achieved by Student 1. The first indicator that has been met by Student 1 is fluency. The criteria for achieving this first indicator, as shown by Student 1, include being able to generate many ideas, answers, and solutions to problems. Additionally, Student 1 has understood the given problems and is able to use all the information provided in the problems to find solutions. The second indicator that has been met by Student 1 is originality. The criteria for achieving this second indicator, as shown by Student 1, include being able to generate new and unique expressions and create unusual combinations of parts or elements, as well as using their own thinking to solve problems and explaining the steps taken in the problem-solving process. The third indicator that has been met by Student 1 is the ability to develop, enrich, or elaborate on an idea. The criteria for achieving this third indicator, as shown by Student 1, include being able to enrich and develop an idea or product, as well as being able to add or elaborate on details of an object, idea, or situation to make it more engaging. Student 1 has shown confidence in the problem-solving process, is able to demonstrate cause-and-effect relationships in solving problems, and can draw conclusions based on the steps taken to solve the problems. The indicator for flexibility, however, has not yet been achieved by Student 1.

Student 2 has met 25% of the indicators for mathematical creative thinking ability. Student 2 has met one of the indicators for mathematical creative thinking ability. The indicator is originality in thinking. This indicator is demonstrated by Student 2's ability to produce new and unique expressions, as well as create unconventional combinations of parts or elements, using their own thinking to solve problems, and being able to explain the steps taken to solve the problems. Meanwhile, the other three indicators—fluency, flexibility, and the ability to develop, enrich, or detail an idea—have not yet been met by Student 2.

Student 3 has not yet developed mathematical creative thinking skills. This is evidenced by the failure to meet all the indicators of mathematical creative thinking abilities. Student 3 understands the information in the given problems but is unable to provide correct and complete answers.

b. Discussion

Fostering students' mathematical creative thinking processes is one of the primary learning goals, and this study focuses on evaluating students' mathematical creative thinking abilities. The capacity to come up with unique ideas or thoughts to precisely and successfully solve mathematical problems is known as mathematical creative thinking. Fluency, adaptability, creativity, and elaboration are all included. The indications of mathematical creative thinking employed in this study include (1) fluency; (2) flexibility; (3) originality in thinking; and (4) the

capacity to grow, enhance, or expand on a concept, according to Munandar, as mentioned in Widianti et al. (2020).

The results of the study showed that only one out of three students met the fluency indicator, two out of three students met the originality indicator, one out of three students met the elaboration indicator, and no student met the flexibility indicator. These results are in contrast to earlier studies that found that the originality indicator had the lowest average percentage score at 51.61% and the fluency indicator had the greatest at 74.19% (Khairunnisa, 2021).

The study's conclusions include the following: (1) differences in the way that students think; (2) the ability of some students to solve problems in a fluent manner, producing a variety of answers and ideas; (3) the ability of students to solve problems using a variety of approaches, although these approaches tended to be homogeneous (similar or not significantly different); and (4) the difficulty of some students in analyzing the problems that were presented. It is possible to draw the conclusion that students' mathematical creative thinking abilities fall into the low range based on the research findings and data analysis.

The fact that none of the three sample students fully met any of the creative thinking characteristics indicates a poor level of mathematical creativity. This shortcoming is ascribed to challenges in comprehending issues and offering solutions (Khairunnisa, 2021). These challenges are caused by a number of factors, such as teachers' failure to adapt their teaching strategies to the learning preferences of their students, students' poor comprehension of the subject matter, challenges with knowledge transfer, and a lack of desire to study at home (Wahyuni, 2022).

The researcher was especially eager to investigate the flexibility and originality indicators further in light of these findings. According to the study's findings, students' least proficient creative thinking ability was the flexibility indicator. This finding aligns with previous research conducted by Zakiatun Nufus (2021) in her study titled "Analysis of Mathematical Creative Thinking Skills of MTsN Students". Nufus' s research identified flexibility as the weakest creative thinking indicator, based on tests and interviews. Flexibility is the second most important indicator after originality, as it reflects the productivity of ideas used to solve problems (Siswono, as cited in Nufus, 2021).

The flexibility indicator revealed that none of the three students could change their problem-solving techniques or recognize many distinct approaches or directions when faced with mathematics creative thinking issues. According to interviews, students' limited time to complete the projects was one of the reasons they did not consider several different options. This implies that students were not used to using their creative thinking skills to solve mathematics difficulties. Problems requiring creative thinking are rarely, if ever, practiced by many pupils (Nadhifah, 2022). But according to Johnson (as described in Nufus, 2021), creative thinking is a

mental habit that is developed by taking into account intuition, igniting imagination, investigating novel possibilities, revealing astounding viewpoints, and producing surprising thoughts.

Furthermore, students' incapacity to generate several different answers can result from their ignorance of the ideas underlying the difficulties at hand. According to the students, the following factors make it difficult for them to achieve the highest possible scores for the creative thinking indicators: (1) they are not used to answering questions that require problem-solving skills; (2) they are not taught to answer questions in different ways; (3) they have a tendency to memorize or imitate what the teacher does, which limits their capacity for flexible thought; (4) teachers do not use teaching strategies that promote a variety of approaches to problem-solving; and (5) they are not encouraged to ask questions when faced with challenges, which leads to a lack of understanding that endures over time (Nufus, 2021).

In contrast, the most frequently attained indication among students was creativity. Two out of three pupils showed the capacity to combine components or elements in novel ways when it came to problems evaluating originality. Their ability to build three distinct cube networks and apply numerical principles to dice demonstrated this. According to interviews, pupils were more confident and better prepared to complete the tasks because they had before dealt with similar issues. The researcher came to the conclusion that when pupils have experience with similar difficulties, they are more competent and self-assured while handling them. Mathematical creative thinking skills are more likely to be displayed by students who are self-assured, act autonomously when making decisions, and are not afraid to voice their thoughts (Dalilan & Sofyan, 2022).

4. CONCLUSION

Out of the three pupils in the study sample, only one of them met the fluency indication, according to the analysis. In other words, only 33.3% of the pupils showed the fluency indicator-related mathematics creative thinking abilities. None of the three students in the sample shown any capacity for creative thought in relation to the flexibility indicator. Meanwhile, the originality indicator was displayed by two of the three pupils, or 66.7%. One student, or 33.3% of the students, met the elaboration indicator competency. It is anticipated that this study will improve the flexibility indicator by offering insights that teachers, students, and future researchers can use to investigate solutions or motivate students to regularly solve mathematical problems using a variety of ways and generate pertinent ideas. The researcher also suggests that future research look into how using instructional media affects students' capacity for mathematical creativity.

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