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Analysis of Grade VI Students' Mathematical Creative Thinking Skills in Solving Problems on the Topic of Circles

Oktorina Ponco Rahayu[1], Ristiana Dyah Purwandari[2]
[1]SD Negeri 1 Mantrianom, Bawang, Banjarnegara
[2]Magister Pendidikan Dasar, Universitas Muhammadiyah Purwokerto

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ABSTRACT

This research aims to describe how the mathematical creative thinking abilities of grade sixth students in solving mathematical problems on circle material at SD Negeri 1 Mantrianom with the indicators of mathematical creative thinking ability used being fluency, flexibility, originality and elaboration. This research was conducted on 23 class VI students using a qualitative descriptive method. The instrument used was 4 descriptive questions which covered students' mathematical creative thinking abilities on circle material. The results of the research show that students' mathematical creative thinking abilities have a percentage of 62.5% which is included in the category of creative.

Corresponding Author:
Oktorina Ponco Rahayu
SD Negeri 1 Mantrianom, Bawang, Banjarnegara
Karanganyar, Mantrianom, Kec. Bawang, Kab. Banjarnegara, Jawa Tengah 53471
Email: oktorinapr@gmail.com

1. INTRODUCTION

One of the thinking skills that need to be developed in mathematics learning is creative thinking ability. Creative thinking refers to the ability to analyze information based on acquired data and create new, improved concepts. An individual goes through stages of synthesizing ideas and formulating more refined concepts while planning and applying ideas, ultimately producing something innovative (Siregar R. , 2020).

Mathematical thinking is also defined as a way of thinking related to mathematical processes (*doing math*) or a way of thinking in solving mathematical tasks (*mathematical tasks*), whether simple or complex (Panglipur & Mahendra, 2022).

Through creative thinking skills, students can observe and analyze mathematical problems from various perspectives, then relate them to their existing knowledge. This enables students to express new ideas or concepts in solving mathematical problems. Pratiwi (2021) stated that enhancing mathematical creative thinking skills provides a broader space for students to develop their potential, such as fostering interest, honing talents and abilities, and offering personal satisfaction in achieving success.

A study conducted by (Nurjamilah & Marlina, 2019) examined students' creative thinking skills in solving mathematical problems. The findings indicated that students' mathematical creative thinking ability was categorized as relatively low. Consistent with previous findings, preliminary observations conducted by the researcher also revealed that students' mathematical creative thinking skills tended to be low. This was evident from the lack of enthusiasm among students when working on mathematical problems, as they perceived them

as difficult to solve. During the process of solving mathematical problems, students were generally reluctant to complete tasks independently and show little willingness to explore different methods and solutions beyond what has been taught by the teacher. Additionally, they are accustomed to being provided with example problems, causing them to rely heavily on the solutions given by the teacher. As a result, their creative thinking skills remain low and do not develop.

According to Suripah and Sthephani (2017), mathematical creative thinking skills consist of four aspects: fluency, flexibility, originality, and elaboration.

2. METHOD OF THE RESEARCH

This study is a qualitative descriptive research with the objective to describe students' mathematical creative thinking skills in solving mathematics problems on the topic of circles. The research was conducted at SD Negeri 1 Mantrianom in a Grade VI consisting of 23 students. The selection of research subjects was based on students' performance in solving circle-related problems. Based on these considerations, three students were chosen as research subjects. The instrument used for data collection was a creative thinking skills test.

To assess students' mathematical thinking skills, the researcher analyzed the results of the written test completed by students through the following stages of mathematical thinking:

Table 1. Scoring Guidelines for the Creative Thinking Skills Test

Aspect	Student Response to a Problem or Question	Score
Fluency	Does not respond or provides an irrelevant idea for problem-solving.	0
	Provides a relevant idea for problem-solving but expresses it unclearly.	1
	Provides a relevant idea for problem-solving and expresses it clearly and completely.	2
	Provides more than one relevant idea for problem-solving but expresses them unclearly.	3
	Provides more than one relevant idea for problem-solving and expresses them clearly.	4
Flexibility	Does not respond or provides one or more answers, but all are incorrect.	0
	Provides one answer but makes errors in the calculation process, leading to an incorrect result.	1
	Provides one answer with correct calculations and results.	2
	Provides more than one answer, but some are incorrect due to calculation errors.	3
	Provides more than one answer with correct calculations and results.	4
Originality	Does not respond or provides an incorrect answer.	0
	Provides an answer using their own method, but it is difficult to understand.	1
	Provides an answer using their own method, with a structured calculation process but an incorrect solution.	2
	Provides an answer using their own method, but there are errors in the calculation process, leading to an incorrect result.	3
	Provides an answer using their own method, with correct calculations and results.	4
Elaboration	Does not respond or provides an incorrect answer.	0
	The answer contains errors and lacks details.	1
	The answer contains errors but includes minimal details.	2
	The answer contains errors but includes detailed explanations.	3
	Provides a correct and well-detailed answer.	4

After scoring students' answers for each test item, the obtained scores are processed by calculating the percentage of students' scores for each indicator of creative thinking skills. The interpretation is as follows:

Table 2. Percentage of Creative Thinking Skills

No	Percentage Obtained	Interpretation Category

1	81% - 100%	Highly Creative
2	61% - 80%	Creative
3	41% - 60%	Moderately Creative
4	21% - 40%	Less Creative
5	0% - 20%	Not Creative

3. RESULTS AND DISCUSSION

This study began by selecting three samples from a total of 23 Grade VI students at SD Negeri 1 Mantrianom. The results obtained from the selected students while solving problems on the topic of circles are as follows:

Table 3. Scores Obtained by Sample Students

Student	Score	Category
1	100	High
2	70	Medium
3	30	Low

The test data obtained from the analysis of students' answers is based on the scoring guidelines for creative thinking skills, which describe students' mathematical creative thinking skills in solving problems on the topic of circles.

Tabel 4. Tabel Perolehan Skor tiap Indikator

Student	Fluency Score	Flexibility Score	Originality Score	Elaboration Score
1	4	2	4	4
2	3	1	4	3
3	2	1	1	1
Total Score	9	4	9	8
Percentage per Indicator	75%	33%	75%	67%
Creative Thinking Percentage	62.5%			

The data obtained from the scores of each indicator of mathematical creative thinking skills show that students' creative thinking skills in the fluency indicator (for question number 1) reached 83.3%, which falls into the highly creative category. Next, for the flexibility indicator (for question number 2), the score obtained was 33%, which is categorized as less creative. For the originality indicator (for question number 3), students' mathematical creative thinking skills scored 75%, placing them in the creative category. Lastly, for the elaboration indicator, students achieved a score of 67%, which also falls into the creative category.

From the table of scores obtained for each indicator, it can be observed that three abilities are categorized as creative, while one indicator, flexibility, is categorized as less creative.

Question Number 1 – Fluency Indicator Component

"A picture of a Teflon pan is provided. Observe the image of the Teflon pan below. Bita goes to a supermarket to buy a Teflon pan. The pan has '24 cm' written on it. What does this mean? Can you determine the radius of the pan?"

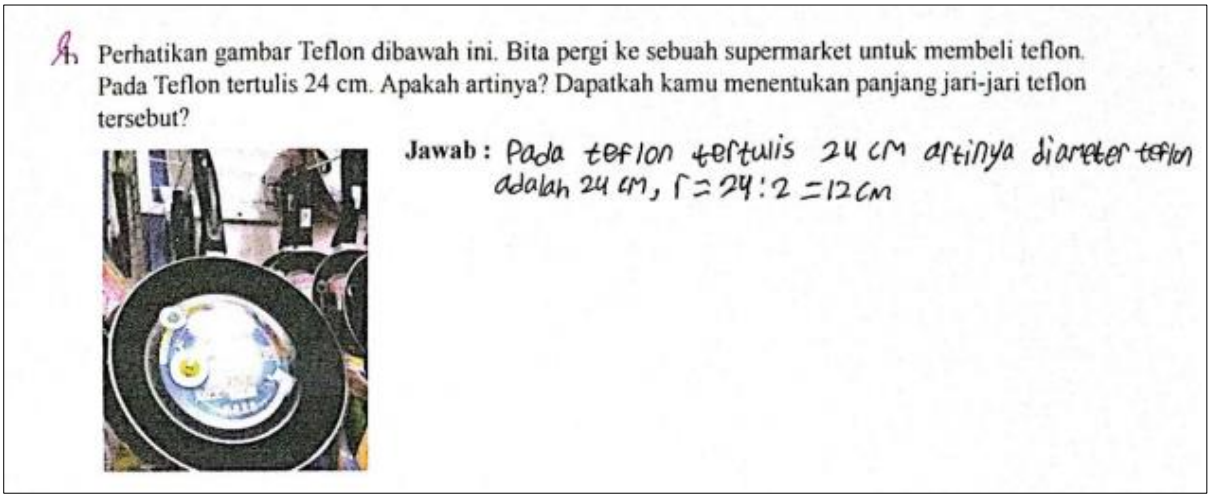

Figure 1. Student's Answer to Question No. 1

Based on the student's answer in Figure 1, the student responded to question number 1 by identifying the information provided in the problem, namely the diameter of the circular Teflon pan. After that, the student was asked to determine the radius of the Teflon pan. In this question, which assesses the fluency indicator, students' mathematical creative thinking skills reached 75%, which falls into the creative category. Furthermore, the researcher conducted an interview session with the student. The student explained that once the diameter is found, determining the radius becomes easy.

Question Number 2 – Flexibility Indicator Component

"During the semester break, Anwar visited an amusement park. There, he saw a large Ferris wheel. Observe the image of the Ferris wheel below. The description of the Ferris wheel states that its radius is 21 meters. Calculate the circumference of the Ferris wheel!"

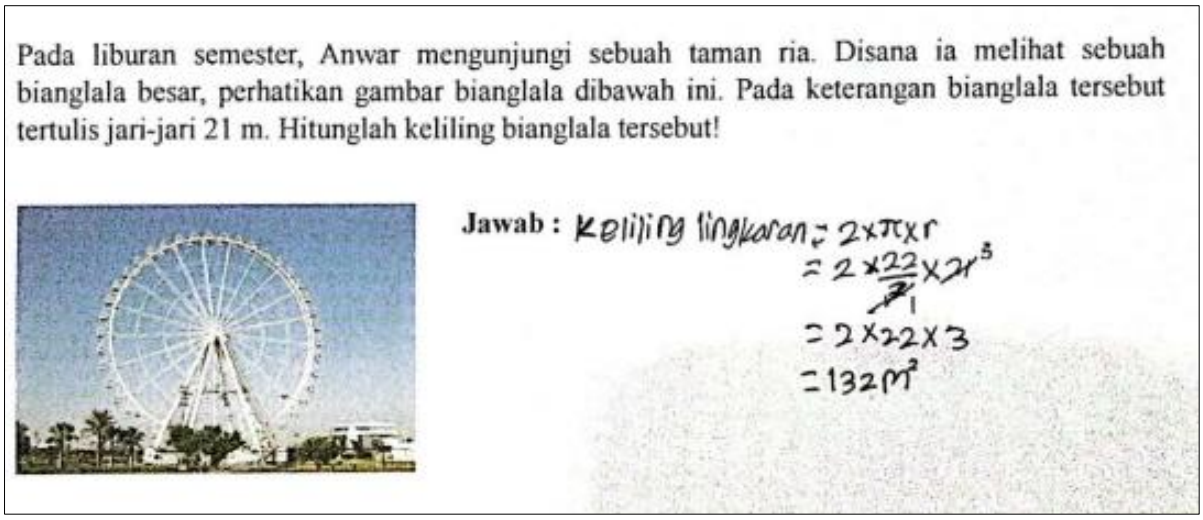

Figure 2. Student's Answer to Question No. 2

In question number 2, which assesses the flexibility indicator, the average percentage of students' scores is 33%. Based on the students' answers in Figure 2, they directly calculated the circumference of the Ferris wheel shown in the image. All students provided only one method for solving the problem, with one student making a calculation error in the process. With a percentage score of 33%, this indicates that students' ability in the flexibility indicator is classified as less creative.

Question Number 3 – Elaboration Indicator Component

"A park is in the shape of a circle. The circle has a diameter of 98 meters. Along the edge of the park, a palm tree is planted at every 11-meter interval. Determine the total number of palm trees needed."

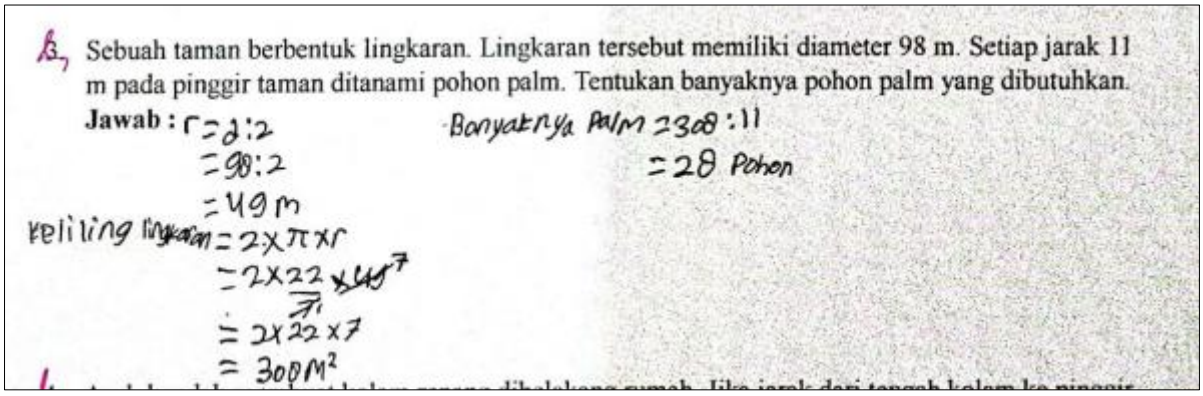

Figure 3. Student's Answer to Question No. 3

In question number 3, which assesses the elaboration indicator, the average percentage of students' scores is 67%. Based on the students' answers in Figure 3, they solved the problem by first determining the radius of the circular park before calculating its circumference. Once the circumference was determined, the students then elaborated on their answers by calculating the total number of palm trees needed to surround the circular park. However, there was still one student who was unable to elaborate properly, resulting in errors when extending the situation and a lack of detailed answers. With a percentage score of 67%, this indicates that students' ability in the elaboration indicator is classified as creative.

Question Number 4 – Originality Indicator Component

"Father plans to build a swimming pool in the backyard. If the distance from the center of the pool to its edge is 18 meters, what is the area of the pool?"

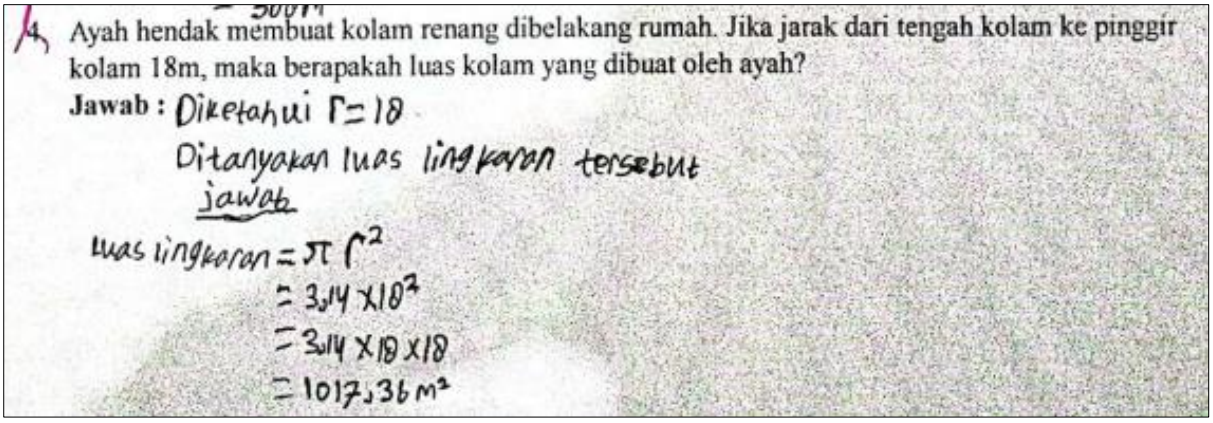

Figure 4. Student's Answer to Question Number 4

Based on the students' answers to question number 4, they immediately solved the problem by determining the radius of the circular swimming pool. The students directly concluded that the distance from the center to the edge of the pool represents the radius (r) of the circle. Among the three sample students, one student was unable to provide an answer using their own method, making it difficult to understand.

4. CONCLUSION

Based on the data analysis results, with an average percentage of 62.5%, it can be concluded that the mathematical creative thinking skills of Grade VI students at SD Negeri 1 Mantrianom in solving circle-related problems fall into the creative category. From the table of scores obtained for each indicator, it is evident that three abilities are categorized as creative, while one indicator, flexibility, falls into the less creative category. In the flexibility question, students were unable to provide appropriate answers that aligned with the expected indicator.

The results of this study are expected to provide insights for teachers and researchers regarding the creative thinking skills of Grade VI students at SD Negeri 1 Mantrianom. By understanding the actual condition

of students' abilities, it is hoped that teachers and researchers can design or develop learning strategies that encourage students to think creatively, particularly in the aspect of flexibility.

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