Creative thinking ability of junior high school students in square and triangle

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Abstract
Creative thinking ability is the ability to think that aims to create ideas, provide answers or find different or uncommon ideas with correct and precise results. This study aims to determine the mathematical creative thinking ability of junior high school students in Girijawa Village, Garut Regency. With the indicators of mathematical creative thinking ability used are the indicators of Fluency (smooth thinking), Flexibility (flexible thinking), and Originality (original thinking). This study was conducted on junior high school students who live in Girijaya Village, Garut Regency. This study uses a descriptive qualitative method with the instrument used in the form of 5 descriptive questions on students' mathematical creative thinking abilities on the material of quadrilaterals and triangles, accompanied by questionnaires and interviews with students. The conclusion of this study is that the mathematical creative thinking ability of junior high school students in Girijaya Village, Garut Regency is still low.
Keywords: mathematical creative thinking ability; descriptive qualitative; junior high school

Abstrak
Kemampuan berpikir kreatif adalah kemampuan berpikir yang bertujuan menciptakan gagasan, memberikan jawaban atau menemukan ide yang berbeda atau tidak umum dengan hasill yang benar dan tepat. Penelitian ini bertujuan untuk mengetahui kemampuan berpikir kreatif matematis siswa SMP di Desa Girijawa Kabupaten Garut. Dengan indikatorkemampuann berpikir kreatif matematisyang digunakan adalah indikator *Fluency* (berpikir lancar), *Flexibility* (berpikir lewes), dan *Originality* (berpikir orisinil).penelitian ini dilakukan pada siswa SMP yang tinggal di Desa Girijaya Kabupaten gGrut. Penelitian ini menggunakan metode kualitatif deskriptif dengan intrumen yang digunakan berupa 5 butir soal uraian kemampuan berpikir kreatif matematis siswa pada materi segiempat dan segitiga, disertai dengan akngket dan wawan cara kepada siswa. Kesimpulan dari penelitian ini adalah kemampuan berpikir kreatif matematis siswa SMP di Desa Girijaya Kabupaten Garut masih rendah.
Kata Kunci: kemampuan berpikir kreatif matematis; deskriptif kualitatif; SMP

Introduction

Education is a process of interaction between educators and students, both formally, non-formally and informally. According to Hamalik (Suparman & Zanthy, 2019; Dalilan & Sofyan, 2022), Education is a process in order to influence students to be able to adapt as well as possible to their environment, thus causing changes in themselves that allow them to function adequately in community life. In addition, education is one aspect of life that plays an important role. A country can achieve progress in its technology if education in the country is of good quality. The high and low quality of education is influenced by many factors. Factors that influence formal education in schools can come from students, teachers, facilities and infrastructure, and can also be due to environmental factors.

Mathematics is an important part of the field of science and is taught at every level of education. Mathematics is always included in the National Examination and mathematics is easy to find in everyday life. Mathematics is the basis for the development of modern technology. Viewed from the perspective of classifying the field of science, mathematics is included in the exact sciences that require more creative thinking skills than memorization (Aripin & Purwasih, 2017; Nurhanifah, 2022). Based on mathematics, it is a necessity and a subject that students must have. By studying mathematics, a person is trained in using his mind (Kurniawati et al., 2020).

Costa (Dewi & Riandi, 2016; Atiyah & Nuraeni, 2022), states that thinking skills are categorized into basic and complex thinking skills. Basic thinking skills include basic processes which are a description of the rational thinking process that contains a set of mental processes from simple to complex. The basic thinking skills model includes causation, transformation, relationships, classification, qualifications. Complex thinking skills are thinking skills that are based on basic thinking processes. Costa (Yuliati, 2013), states that there are at least four complex thinking processes that occur in a person, namely problem solving, decision making, critical thinking, and creative thinking. Mathematics can be used to develop systematic, logical, creative, disciplined, and effective cooperation thinking skills in modern and competitive life Handoko (Siregar et al., 2020).

Mathematics is taught basically with the aim of helping to train students' mindsets to be able to solve problems creatively, critically, logically and precisely. The ability to think creatively is one of the goals in learning mathematics. Siswono (Yulianti, 2017), said that creative thinking which implies perseverance, personal discipline and attention involves mental activities such as asking questions, considering new information or unusual ideas with an open mind, making connections, especially between something similar, freely linking one to another, applying imagination to every situation that generates new and different ideas, and paying attention to intuition.

The ability to think creatively in mathematics leads to the ability to think mathematically creatively. Hamzah (Soeviatulfitri & Kashardi, 2020), explains that the ability to think mathematically creatively is the ability to use the thought process to a problem, based on rational concepts and principles. The ability to think mathematically creatively can be interpreted as the ability to solve mathematical problems with more than one solution (Rahayu et al., 2018; Salsabila & Delyana, 2023). In solving mathematical problems, the ability to think creatively is very important, the ability to think creatively allows students to solve routine and non-routine problems (Sari & Afriansyah, 2022).

Creative thinking skills are skills that students must have in solving mathematical problems, because they are the basis for responding to the responses received in finding solutions to the problems they face. Given that the problems faced cannot necessarily be solved in the way that has existed before, but require new combinations, either in the form of attitudes, ideas or thought products so that the problem can be solved (Fitriarosah, 2016). This means that without adequate creative thinking skills, students will have difficulty solving math problems quickly, accurately, and correctly. This is in line with the results of research by Mualifah, Basuki and Lestari (2020), stating that mathematical creative thinking skills affect problem-solving skills. Mathematical thinking skills must be possessed by students because they can help students solve problems both in learning mathematics and solving problems they face in everyday life.

Creative thinking provides benefits to a person's life such as adding new knowledge and creating solutions to solve problems (Setyaningsih & Kustiana, 2023). Johnson (Marliani, 2015; Faiziyah, Hanan, & Azizah, 2022), argues that the benefits of creative thinking are very broad, unlimited and cannot be limited so that they are able to find new things or updated ideas and concepts. Someone who always thinks creatively will have an impact on the person's personality in planning and deciding on an action and a creative person will be more organized in action. Their innovative plans and original products have been carefully thought out in advance by considering the problems that may arise and their implications, so with creative thinking, a plan can be carried out well and carefully from the planning stage to its implementation. Based on several definitions of creative thinking according to the experts above, it can be concluded that creative thinking is the ability to create something new, something different from others, create solutions to solve problems, and make innovative and original plans that are carried out carefully in their implementation by considering the problems that may arise and how to overcome them.

The ability to think mathematically creatively is very much needed by students because it can help students in solving problems both in mathematics itself and in everyday life. However, in the process, creative thinking skills are still difficult for students to have because many factors can influence it. Research by Andiyana, Maya, and Hidayat (2018), the ability to think mathematically creatively of junior high school students in Ngamprah

Village on spatial geometry material is still very low. Research by Suparman and Zanthy (2019) and Sumartini (2022), shows that students' creative thinking skills are still relatively low because of the many mistakes made by students in solving mathematical creative thinking ability test questions. Research by Rachman and Amelia (2020) shows that the ability to think mathematically creatively of high school students in West Bandung Regency on Trigonometry material is relatively low. Based on previous research, it can be seen that the ability to think mathematically creatively is still relatively low (Sabaruddin et al., 2023).

To measure the level of mathematical creative thinking ability, there are several indicators. According to Munandar (Fitriarosah, 2016; Rahayu, Liddini, & Maarif, 2022), the characteristics of creative thinking ability are as follows: 1. Fluency is the ability to generate many opinions, answers, problem solving, provide many ways or suggestions in doing various things and always think of more than one answer; 2. Flexibility is the ability to produce varied ideas, answers, or questions, can see a problem from different perspectives and be able to change the approach in obtaining a solution to a problem; 3. Originality is the ability to generate new and unique ideas, think of unusual ways to express oneself, and be able to make unusual combinations; and 4. Elaboration the ability to enrich, develop, spice up or issue an idea, idea, or product and add or detail the details of the situation so that it is more interesting.

Based on the description above, the ability to think creatively in mathematics can be interpreted as a mental activity that is used by someone to build new ideas or concepts. This study aims to determine how students' mathematical creative thinking abilities are on the material of quadrilaterals and triangles using the indicators of Fluency, Flexibility, and Originality.

Method

This research is qualitative descriptive research. The subjects in this study were junior high school students who live in Girijaya Village, Garut Regency. This research was conducted in the even semester. The data collection technique in this study used a creative thinking ability test instrument. The selection of subjects by interviewing students about mathematics lessons and the material to be taught based on various considerations, one student was selected as the research subject. The instruments used were in the form of creative thinking ability test essay questions, creative thinking ability questionnaires and interviews.

Result

This research was conducted in Girijaya Village, Garut Regency. The data from the results of this study are in the form of student learning outcomes whose data collection uses test instruments in the form of descriptions and creative thinking ability questionnaires. Test data were obtained from the analysis of student answers based on the reference guidelines for scoring mathematical creative thinking abilities. Describes students' mathematical creative thinking abilities in solving problems on the material of quadrilaterals and triangles in each problem. This study includes Fluency, Flexibility, Originality.

Table 1. Description of the fluency indicator.

	Total Score	**Total Score**
Student	4	2
Percentage (%)	100	50

Based on Table 1, it shows the ability to think fluently on questions 1 & 2 with a percentage of 100% & 50%.

Table 2. Description of the fluency indicator.

	Total Score
Student	3
Percentage (%)	75

Based on Table 2, it shows the ability to think novelly on question number 3 with a percentage of 75%.

Table 3. Description of the flexibility indicator.

	Total Score	**Total Score**
Student	1	1
Percentage (%)	25	25

Based on Table 3, it shows the ability to think novelly in questions 4 & 5 with a percentage of 25% & 25%.

Discussion

Looking at the percentage of all indicators, there are only 2 indicators that exceed 50%, namely the fluency indicator and the novelty indicator at 100% and 75%. It can be said that the average creative thinking ability of students is still low.

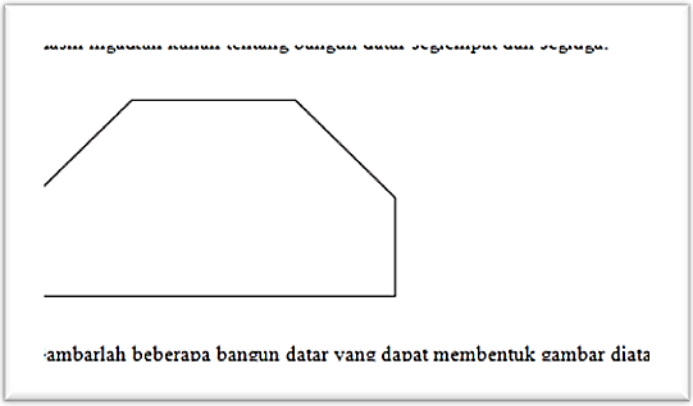


Figure 1. Question Number 1

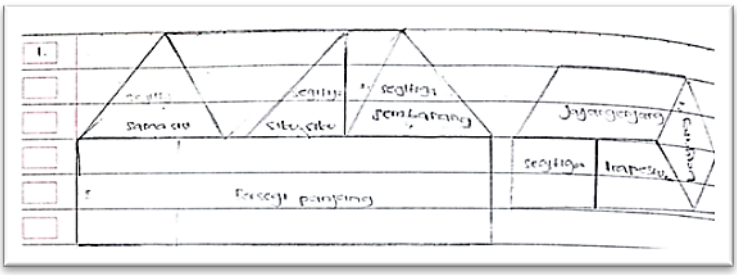


Figure 2. Student's answer to question number 1

The student's answer to number 1 is very good, where the student provides a solution to the problem or more than one answer, according to what is asked in the question (see Figure 1 & 2).

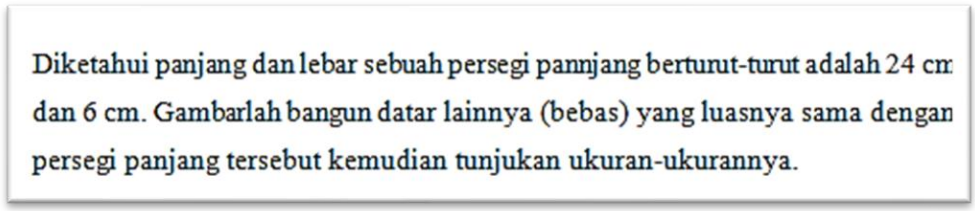


Figure 3. Question Number 2

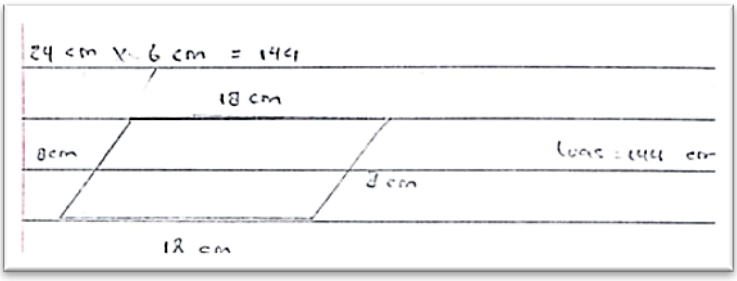


Figure 4. Student's answer to question number 2

In Figure 3 & 4, students only provide 1 answer as requested in the question. Students do not take the initiative to add other answers. Students' answers can be understood. In

the percentage of fluent thinking ability, students get 100% and 50% of the answers. It can be seen that this is due to students being too focused on the question instructions. Based on the results of the student's method, students can mention other answers.

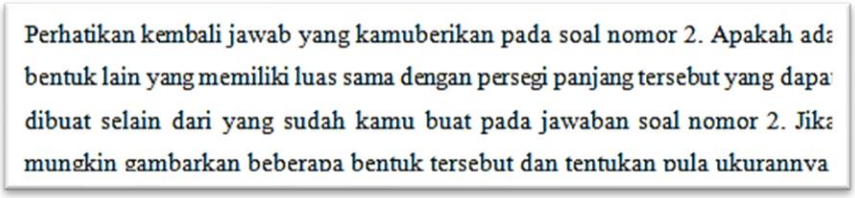

Perhatikan kembali jawab yang kamuberikan pada soal nomor 2. Apakah ada
bentuk lain yang memiliki luas sama dengan persegi panjang tersebut yang dapa
dibuat selain dari yang sudah kamu buat pada jawaban soal nomor 2. Jika
mungkin gambarkan beberapa bentuk tersebut dan tentukan pula ukurannya

Figure 5. Question Number 3

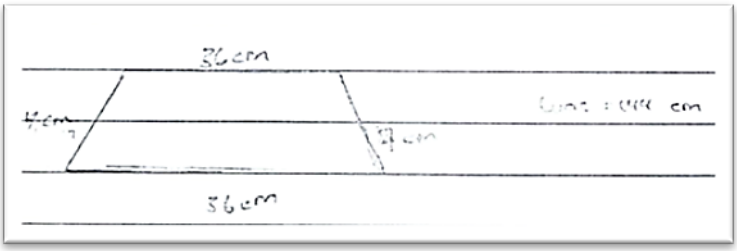


Figure 6. Student's answer to question number 3

In Figure 5 & 6, students do not show novelty in their answers because students still use the general baggundatar form, students do not review their answers and are not careful in answering so that there are mistakes in answering. During the interview, students forget to check their answers again. In number 3, students get a presentation of 75%.

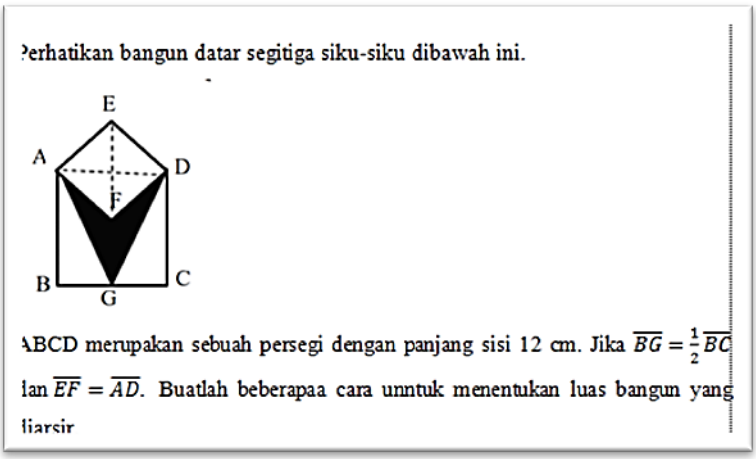


Figure 7. Question Number 4

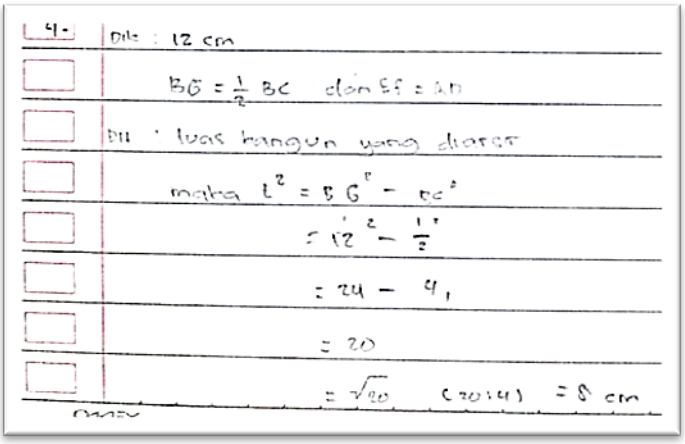
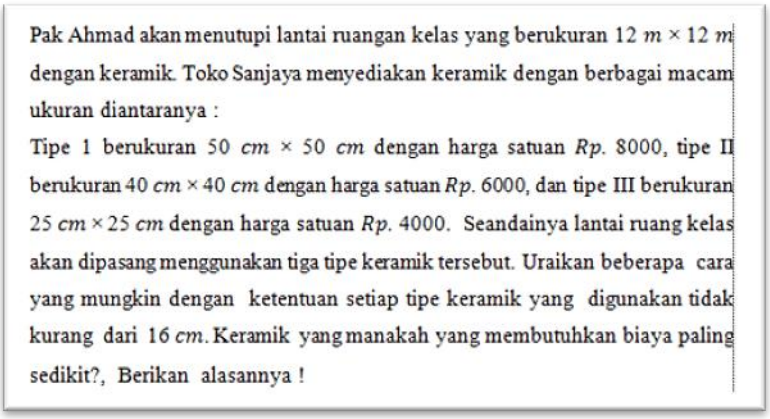


Figure 8. Student's answer to question number 4

In Figures 7 & 8, students are less careful in understanding the question instructions so that the answers are not finished, during the interview students assume the question is finished but when the question is read again the answer is not finished, students have difficulty understanding the question because the image does not include the size. In question number 4 students get a presentation of 25%.



Pak Ahmad akan menutupi lantai ruangan kelas yang berukuran 12 $m \times 12\ m$ dengan keramik. Toko Sanjaya menyediakan keramik dengan berbagai macam ukuran diantaranya :

Tipe 1 berukuran 50 $cm \times 50\ cm$ dengan harga satuan $Rp.$ 8000, tipe II berukuran 40 $cm \times 40\ cm$ dengan harga satuan $Rp.$ 6000, dan tipe III berukuran 25 $cm \times 25\ cm$ dengan harga satuan $Rp.$ 4000. Seandainya lantai ruang kelas akan dipasang menggunakan tiga tipe keramik tersebut. Uraikan beberapa cara yang mungkin dengan ketentuan setiap tipe keramik yang digunakan tidak kurang dari 16 cm. Keramik yang manakah yang membutuhkan biaya paling sedikit?, Berikan alasannya !

Figure 9. Question Number 5

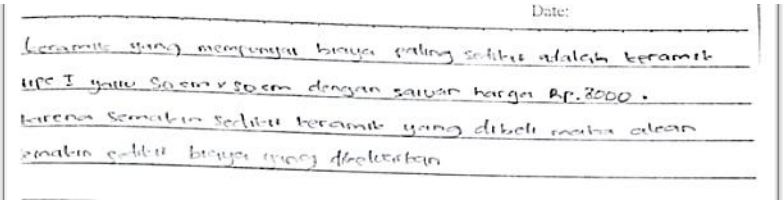


Figure 10. Student's answer to question number 5

Based on Figures 9 & 10, in answer number 5 the student did not include a way to obtain the answer, the student included his personal opinion that larger ceramics would cover the floor faster so that the purchase was in small quantities compared to other ceramics. However, the student's answer is correct. The presentation of this sol is 25%.

Conclusion

Based on the research, the mathematical creative thinking ability of junior high school students in Girijaya Village, Garut Regency on the material of quadrilaterals and triangles is still low. With an average presentation of 55%. The percentage of each indicator is as follows, the indicator of fluent thinking ability is 100% and 50%, the indicator of novelty thinking ability is 75%, the indicator of flexibility thinking ability is 25% and 25%. In this flexibility question, students are not able to provide various solutions, do not understand the question and do not look back at the results that have been written.

Conflict of Interest

The authors declare that no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely by the authors.

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