
ANALYSIS OF STUDENTS' MATHEMATICAL CRITICAL THINKING ABILITY IN MIDDLE SCHOOL ON FLAT-SIDED SOLID GEOMETRY MATERIAL

Fatimatus Solihah¹, Moh.Supratman², Linda Damayanti³¹²³Mathematics Education Study Program, Qamarul Huda Badaruddin UniversityCorrespondence Writer: fsolihah29@gmail.com**Abstract**

Mathematical critical thinking ability is a thinking skill that involves students' prior knowledge which is then abstracted so that cognitive strategies are created as determinants of deciding arguments and conclusions in dealing with mathematical problems. The type of research method used is descriptive qualitative with the aim of obtaining an overview of students' mathematical critical thinking ability. A total of 20 students of class VIII-A at one of the MTs Darussafi'iyah NW Peseng were used as the subjects of this study. The research instrument was a descriptive test question consisting of three items related to the material of flat-sided solid shapes that had been adjusted to the characteristics of critical thinking ability. The descriptive test question instrument has been validated by mathematics subject teachers and expert mathematics lecturers. The indicators of mathematical critical thinking ability used as guidelines in this study are: interpretation, analysis, evaluation and inference. Analysis was carried out on students' answers with results showing that students' critical mathematical thinking abilities were classified as moderate. Based on the average results of the overall students' mathematical critical thinking ability test, a percentage of 25% was in the high category, 50% was in the medium category and 25% was in the low category. So it can be concluded that the level of critical mathematical thinking ability of students at MTs Darussafi'iyah NW Peseng is classified as moderate.

Keywords: *Critical thinking, Mathematical, Geometry***1. PENDAHULUAN**

One of the life skills that need to be developed through the educational process is thinking skills (Novitasari & Puspitawati, 2022). A person's ability to succeed in life is largely determined by their thinking skills, especially in efforts to solve problems (Affandy et al., 2019). The National Council of Teachers argues that the goal of mathematics education is for students to learn about problem solving, learn to reason, learn to communicate mathematically, learn to connect ideas, and learn to represent (Maesaroh, 2021). The primary aim of mathematics education is to support learners in facing the challenges of the 21st century (Solihah, 2023). These challenges are important for learners to become quality human resources (Solihah et al., 2025). Furthermore, Edwar Glaser defines mathematical critical thinking as the skill of thinking and disposition that unites students' prior knowledge with their mathematical reasoning skills, as well as To create a general idea from a problem,

to verify, and to evaluate mathematical situations reflectively as a cognitive strategy (Danaryanti & Lestari, 2018). According to Ennis, the definition of critical thinking is “critical thinking is reasonable, reflective thinking that is focused on deciding what to believe or do” (Rifqiyana et al., 2016). Based on this definition, critical thinking is identical to rational and reflective thinking. Mathematical critical thinking is a fundamental part of the process of thinking to analyze arguments and generate ideas regarding any meaning or significance, and the hope is to develop logical thinking patterns (Shanti et al., 2018). Based on the opinions above, it can be concluded that critical thinking is a high-level thinking ability that is rational and reflective, focusing on decision-making about what to believe or do.

The importance of critical thinking for students can begin at the elementary level, through middle school, and into higher education. In accordance with the content standards of the Minister of Education and Culture Regulation number 21 of 2016, which requires the inclusion of critical thinking skills in mathematics learning competencies, middle school students are emphasized to develop their ability to think critically (Agustiana & Imami, 2021). Critical thinking is important for building the character of the nation; students are required to start thinking critically, including in mathematics learning in the classroom, because mathematics is inherently tied to our daily activities (Lusita, 2023). With the increased critical thinking skills of students today, it is hoped that critical thinking can be instilled in students and strengthen their own character (Manurung et al., 2023).

Harun Puling et al. (2024) argue that the ability to think critically provides more accurate guidance in thinking, working, and assisting in determining the relationships between things. Therefore, critical thinking skills are essential in problem-solving or finding solutions. The analysis of critical thinking skills is an integration of various components such as observation, analysis, reasoning, evaluation, decision-making, and persuasion.

This research aims to analyze the mathematical critical thinking skills of eighth-grade students on the topic of flat-sided three-dimensional shapes. The benefits of this research are expected to serve as a continuous research opportunity related to students' critical thinking skills without considering the correctness of their answers and copying answers from their friends.

2. METODE PENELITIAN

This research method uses a qualitative descriptive approach. The qualitative descriptive method is a method that depicts, describes, and presents the events of the object being studied based on the situations and conditions when the research is conducted (Arifin, 2020). Eighth-grade students of MTs Darussyafi'iah NW Peseng, totaling 20 students, are the subjects of this study. The instruments used in this research include observation, interviews, and tests.

1. Observation

Observation is used when the research concerns human behavior, work processes, natural phenomena, and when the number of respondents being observed is not too large. In this study, the researcher directly observed the research location and examined how the learning process occurs in the classroom. The researcher found indications of low interest among students in learning mathematics.

2. Interview

An interview is a conversation conducted by one person with another for a specific purpose. In this study, the researcher interviewed the Mathematics teacher of class VIII-A as a resource for this research to understand how to learn, how to read the characteristics of their students, and the difficulties faced in the mathematics learning process.

3. Test

Table 1. Critical thinking skills test blueprint

NO	Indicators of Mathematical Critical Thinking	Sub Skill
1	<i>Interpretation</i>	Understanding the problems of flat-sided geometric shapes by accurately writing down both the known and the questions being asked. .
2	<i>Analysis</i>	Creating a mathematical model from the given problem of flat-sided geometric shapes. .
3	<i>Evaluation</i>	Using the right strategy to solve geometric problems. flat side space, complete

		and correctly in performing calculations.
4	<i>Inference</i>	One can draw conclusions logically from what is asked regarding the problem of three-dimensional shapes with flat surfaces. .

This research uses a written test containing contextual questions on the material of flat-sided spatial shapes, which is used to measure and describe students' critical thinking ability (Lusita, 2023).

To obtain data on students' mathematical critical thinking skills, a direct assessment of students' answers was conducted. The scores for students' mathematical critical thinking abilities are categorized into three levels: high, medium, and low. The following table (Table 2) presents the categorization of students' mathematical critical thinking abilities:

Tabel 2 Category of Students' Mathematical Critical Thinking Skills

Score threshold	Category
$x \geq \bar{x} + SD$	High
$\bar{x} - SD < x < \bar{x} + SD$	Medium
$x \leq \bar{x} - SD$	Low

Keterangan :

x = Student Score

$\bar{x}$ = Average Student Score

SD = Standard Deviation (Arifin, 2020).

3. RESULTS AND DISCUSSION

3.1 Results

This study was conducted with 20 eighth-grade students in class VIII-A at MTs Darussyafi'iah NW Pesang on Wednesday, May 14, 2025. From these 20 students, the researcher selected 3 students' responses as samples for analysis.

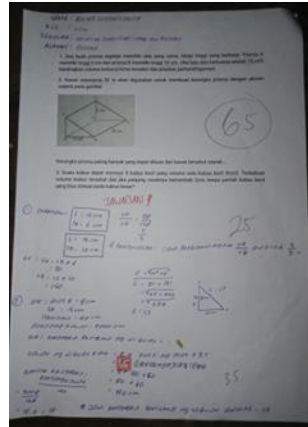


Figure 3.1. Student responses with the highest score

In Figure 3.1, this is the response with the highest score among the 20 students. On answer number 1, the student answered several indicators, namely analysis and evaluation, where it can be seen that the student responded only mathematically and did not describe it. Then, in answer number 2, the student was able to fully address the indicators related to the question, meaning the student could analyze and evaluate the given problem and answer it correctly.

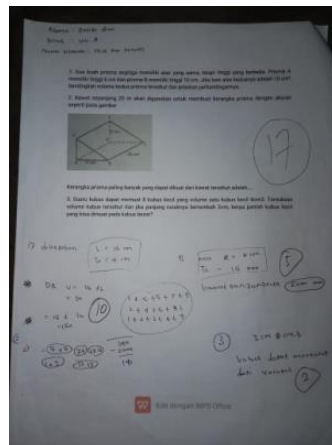


Figure 3.2. A student's low-scoring answer

In Figure 3.2, it can be seen that the student's score is the lowest among the other 20 students. This can be seen from the student's answers, where for item 1 the student only analyzed it but did not describe it, and the answer was very simple, even failing to meet the other indicators. Then the answer to item 2 was the same as the answer to item 1, in which the student did not describe it and did not meet the indicators desired by the researcher. Likewise, the answer to item 3 was very simple, and the answer was even incorrect.

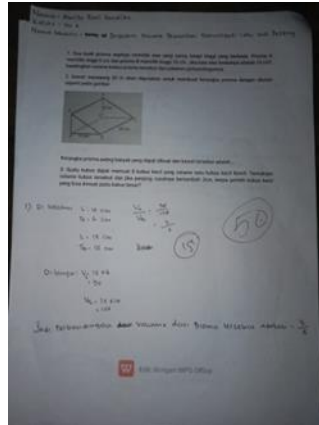


Figure 3.3. Student response with a medium score

Figure 3.3 shows the moderate score of the other 20 students. For question 1, the student only analyzed the problem but did not fully describe the steps used to answer it, and did not meet the indicator the researcher wanted to identify.

From this explanation, it can be concluded that the students' critical thinking ability is in the moderate category. To strengthen the results we obtained, we included the results/scores from the answers to the practice problems that were given.

The results of the students' mathematical critical thinking ability test are presented in the form of descriptive statistics in the following table:

Table 3 Descriptive Statistics of Students' Mathematical Critical Thinking Ability Test Results

	N	Nilai Minimum	Nilai Maksimum	Mean	Standa Deviasi
Students' Mathematical Critical Thinking Skills	20	17	65	47,5	14,417

In Table 3, the students' standard deviation was 14.417 and the mean was 47.5. These two values were used to determine the grouping into high, medium, and low categories in measuring students' mathematical critical thinking ability on the topic of polyhedral solids. According to Arikunto [3], the mean and standard deviation of the research data are the most influential factors in determining the assessment criteria for students' mathematical critical thinking ability.

Table 4 Percentage of Students' Mathematical Critical Thinking Ability Level

Category	Score Range	Number of Students	Percentage
High	$x \geq 61,917$	5	25%
Medium	$33,083 < x < 61,917$	10	50%
Low	$x \leq 33,083$	5	25%
Total		20	100%

Table 4 shows that 5 students are in the high category, with a percentage of 25%, and their test scores are greater than or equal to 61.917. Next, 10 students are in the medium category, with a percentage of 50%, and their test scores are greater than 33.083 and less than 61.917. There are also 5 students in the low category, with a percentage of 25%, and their scores are less than or equal to 33.083. The minimum mastery criterion (KKM) standard at the school is 75. Based on this KKM standard, it shows that out of 20 students in class VIII-A at MTs Darussyafi'iah NW Peseng, not a single student achieved the KKM score, because the highest score obtained was 65, and that score does not meet the requirement for a student to be said to have reached or exceeded the KKM score. Therefore, it can be concluded that the level of students' mathematical critical thinking ability in the topic of solid figures with flat sides in class VIII-A at MTs Darussyafi'iah NW Peseng is categorized as moderate.

3.2 Discussion

Figure 3.1 shows the student's responses with the highest score, which was 65 points. For question 1, the student was able to analyze and evaluate, but answered only mathematically and did not describe the solution. For question 2, the student answered correctly. Figure 3.2 shows the responses of the student with the lowest score, which was 17 points. For question 1, the student only analyzed the problem but did not describe it, and the answer was very brief. The same was true for questions 2 and 3.

Figure 3.3 shows the student's responses with a medium score, which was 50 points. For question 1, the student was able to analyze the problem but did not fully describe the steps in answering it.

From the explanation above, it can be concluded that students with high mathematical ability are able to solve the given problems in accordance with the indicators present in students' mathematical critical thinking ability, although they have not fully met those indicators. Meanwhile, students with moderate mathematical ability are able to answer the questions using one or two of the indicators present in students' mathematical critical thinking ability. And students

with low mathematical ability answer very simply and are not yet able to meet the indicators present in students' mathematical critical thinking ability.

From the test results, it can be seen that the difficulty students faced was converting word problems into mathematical form. This is in line with Badraeni et al. (2020), who stated that the factors affecting students in working on test questions about solid figures with flat faces are students' limited mathematical comprehension, because they do not fully understand the problem or the mathematical concepts. In answering the questions, all subjects were unable to meet all the stages of the critical thinking skills indicators. In general, students have not yet been able to achieve the desired indicators, especially the evaluation indicator and the reasoning used in drawing conclusions (Lusita, 2023).

Based on the interview with the mathematics teacher, the school is still using the 2013 Curriculum (K13). As a result, to improve students' critical thinking skills, the teacher relies more on a contextual learning model and has not yet tried other learning models. The test results also show that the difficulty students face is turning word problems into mathematical form.

Teachers use a contextual learning model that can help improve students' critical thinking skills. However, teachers still face several difficulties in helping students quickly understand the material being taught. This is consistent with research conducted by (Farib et al., 2019; Sukma & Priatna, 2021), which states that junior high school students' critical thinking skills are still low. This is due to the many difficulties students still face in understanding mathematics material, a lack of practice in solving math problems, and the learning strategies applied being less appropriate. Therefore, teachers as instructors should be able to determine appropriate mathematics learning strategies that suit students' needs and situations so that students' critical thinking skills can be developed.

4. CONCLUSION

Students' mathematical critical thinking ability on the topic of flat-faced solid figures at MTs Darussafi'iyah NW Peseng, based on the research results, showed that 5 students were in the high category, with a percentage of 25%, and test scores greater than or equal to 61.917. Next, 10 students were in the medium category, with a percentage of 50%, and test scores greater than 33.083 and less than 61.917. And 5 students were in the low category, with a percentage of 25%, and test scores less than or equal to 33.083. Therefore, it can be concluded that the level of students' mathematical critical thinking ability on the topic of flat-faced solid figures in class VIII-A at MTs Darussafi'iyah NW Peseng is classified as moderate. From the test results, it can be seen that the difficulty students face is converting word problems into mathematical form, where students are still unable to analyze and evaluate the problems, as well as draw the correct conclusions..

5. THANK YOU NOTE

The researchers would like to express their gratitude to the principal of MTs Darussyafi'iah NW Peseng for giving them the opportunity to conduct this study..

6. RECOMMENDATION

For future work, the researcher recommends further studies related to developing or improving students' mathematical critical thinking skills.

7. REFERENCE

- Affandy, H., Aminah, N. S., & Supriyanto, A. (2019). *Analisis Keterampilan Berpikir Kritis Siswa Pada Materi Fluida Dinamis Di SMA Batik 2 Surakarta*. 9.
- Agustiana, E., & Imami, A. I. (2021). Analisis Kemampuan Berpikir Kritis Matematis Siswa Smp Pada Materi Bangun Ruang Sisi Datar. *Jurnal Pembelajaran Matematika Inovatif*, 4(2), 373–382. <https://doi.org/10.22460/jpmi.v4i2.p%25p>
- Arifin, Z. (2020). Metodologi Penelitian Pendidikan. *Jurnal Al-Hikmah STIT Al-Hikmah Way Kanan (Media Pendidikan, Kependidikan dan Sosial Kemasyarakatan)*, 1(1). <https://www.alhikmah.stit-alhikmahwk.ac.id/index.php/awk/article/view/16>
- Badraeni, N., Pamungkas, R. A., Hidayat, W., Rohaeti, E. E., & Wijaya, T. T. (2020). Analisis Kesulitan Siswa Berdasarkan Kemampuan Pemahaman Matematik Dalam Mengerjakan Soal Pada Materi Bangun Ruang Sisi Datar. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(1), 247–253. <https://doi.org/10.31004/cendekia.v4i1.195>
- Danaryanti, A., & Lestari, A. T. (2018). Analisis Kemampuan Berpikir Kritis Dalam Matematika Mengacu Pada Watson-Glaser Critical Thinking Appraisal Pada Siswa Kelas Viii Smp Negeri Di Banjarmasin Tengah Tahun Pelajaran 2016/2017. *EDU-MAT: Jurnal Pendidikan Matematika*, 5(2). <https://doi.org/10.20527/edumat.v5i2.4631>
- Farib, P. M., Ikhsan, M., & Subianto, M. (2019). Proses berpikir kritis matematis siswa sekolah menengah pertama melalui discovery learning. *Jurnal Riset Pendidikan Matematika*, 6(1), 99–117. <https://doi.org/10.21831/jrpm.v6i1.21396>
- Harun Puling, Efiana Manilang, & Mozes Lawalata. (2024). Logika dan Berpikir Kritis: Hubungan dan Dampak Dalam Pengambilan Keputusan. *Sinar Kasih: Jurnal Pendidikan Agama dan Filsafat*, 2(2), 164–173. <https://doi.org/10.55606/sinarkasih.v2i2.319>
- Lusita, S. F. (2023). Pendidikan Matematika: Urgensi Kemampuan Berpikir Kritis Dan Karakter Mandiri. *DIKMAT: Jurnal Pendidikan Matematika*, 04(01). <https://jurnal.habi.ac.id/index.php/Dikmat>

- Maesaroh, S. (2021). Kemampuan Berpikir Kritis Matematis Siswa SMP pada Materi Bangun Ruang Sisi Datar. *Jurnal Riset Intervensi Pendidikan (JRIP)*, 3. <https://journal.rekarta.co.id/index.php/jrip/article/view/164>
- Manurung, A. S., Fahrurrozi, F., Utomo, E., & Gumelar, G. (2023). Implementasi Berpikir Kritis dalam Upaya Mengembangkan Kemampuan Berpikir Kreatif Mahasiswa. *Jurnal Papeda: Jurnal Publikasi Pendidikan Dasar*, 5(2), 120–132. <https://doi.org/10.36232/jurnalpendidikandasar.v5i2.3965>
- Novitasari, F., & Puspitawati, R. P. (2022). Pengembangan E-Lkpd Berbasis Problem Solving Pada Materi Pertumbuhan Dan Perkembangan Untuk Melatih Keterampilan Berpikir Kritis Siswa Kelas XII SMA. *Jurnal Inovasi Pembelajaran Biologi*, 3(1), 31–42. <https://doi.org/10.26740/jipb.v3n1.p31-42>
- Rifqiyana, L., Masrukan, M., & Susilo, B. E. (2016). Analisis Kemampuan Berpikir Kritis Siswa Kelas Viii Dengan Pembelajaran Model 4k Ditinjau Dari Gaya Kognitif Siswa. *Unnes Journal of Mathematics Education*, 5(1). <https://doi.org/10.15294/ujme.v5i1.8608>
- Shanti, W. N., Sholihah, D. A., & Abdullah, A. A. (2018). Meningkatkan Kemampuan Berpikir Kritis Melalui Ctl. *Jurnal Pembelajaran Matematika*, 5(1), 98–110.
- Solihah, F. (2023). Efektivitas Penggunaan Konten e-Learning Berbantuan Moodle Terintegrasi Model Pembelajaran PBL dalam Meningkatkan Kemampuan Komunikasi Matematis. *Empiricism Journal*, 4(1), 181–191. <https://doi.org/10.36312/ej.v4i1.1104>
- Solihah, F., Rahmawati, H., Fadli, S., Akbar, L. A., & Rosalia, A. (2025). Analisis Kemampuan Berpikir Kreatif Matematis Siswa Kelas XI dalam Menyelesaikan Masalah SPLTV. *Empiricism Journal*, 6(2), 669–677.
- Sukma, Y., & Priatna, N. (2021). Pengaruh Self-Efficacy terhadap Kemampuan Berpikir Kritis Siswa Pada Mata Pelajaran Matematika. *Jurnal Ilmiah Soulmath: Jurnal Edukasi Pendidikan Matematika*, 9(1), 75–88. <https://doi.org/10.25139/smj.v9i1.3461>