

Profile of Critical Thinking Skills of Fifth Grade Elementary School Students Reviewed from a Gender Perspective

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Abstract

Critical thinking skills are essential in learning and can be developed from an early age. This study aims to describe the differences in critical thinking skills between male and female students in solving fraction problems in mathematics. The research used a descriptive qualitative method with data reduction, presentation, and conclusion drawing techniques. Data were collected through tests and interviews involving 85 fifth-grade students from four elementary schools in the Diponegoro Cluster using purposive sampling. The critical thinking test consisted of four indicators: interpretation, analysis, evaluation, and inference. The results showed that female students demonstrated higher critical thinking skills than male students, with an average score of 73.10 (moderate category) compared to 59.80 (low category). Female students' superiority appeared across all critical thinking indicators. These differences are influenced by individual interests, accuracy, and cognitive abilities. The findings suggest that learning strategies should consider gender differences to enhance critical thinking development.

Keywords: Critical Thinking, Mathematics, Fractions, Gender

Abstract

Keterampilan berpikir kritis merupakan kemampuan penting dalam pembelajaran dan dapat dikembangkan sejak dini. Penelitian ini bertujuan mendeskripsikan perbedaan keterampilan berpikir kritis antara siswa laki-laki dan perempuan dalam menyelesaikan soal matematika pecahan. Metode penelitian yang digunakan adalah deskriptif kualitatif dengan teknik reduksi data, penyajian data, dan penarikan kesimpulan. Data dikumpulkan melalui tes dan wawancara terhadap 85 siswa kelas V di empat SD Gugus Diponegoro dengan teknik purposive sampling. Tes berpikir kritis mencakup empat indikator: interpretasi, analisis, evaluasi, dan inferensi. Hasil penelitian menunjukkan bahwa siswa perempuan memiliki kemampuan berpikir kritis lebih tinggi dibandingkan siswa laki-laki, dengan skor rata-rata 73,10 (kategori sedang) dibandingkan 59,80 (kategori rendah). Keunggulan siswa perempuan tampak pada semua indikator berpikir kritis. Perbedaan ini dipengaruhi oleh minat, ketelitian, dan kemampuan kognitif masing-masing individu.

Keywords: Berpikir Kritis, Matematika, Pecahan, Gender

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INTRODUCTION

Education in Indonesia has undergone significant curriculum transformation, one of which is the Merdeka curriculum. Law Number 12 of 2024 concerning the Curriculum for Early Childhood Education, Elementary Education, and Secondary Education, Chapter I Article 1, states that "an merdeka curriculum is a curriculum that provides flexibility and focuses on essential material to develop students' competencies as lifelong learners with Pancasila character." Merdeka curriculum defined as a curriculum that provides flexibility in learning curricular With content designed to be more useful, and students have sufficient time to think critically and develop competencies optimally. According to Majidah et al., (2024), learning in an merdeka curriculum is based on the concept of siding with and liberating students. This is based on the essence of the merdeka curriculum, namely strengthening the Pancasila Student Profile, with one of its main characteristics being reasoning and critical thinking (Indriani et al., 2024).

Subjects in the curriculum merdeka, mathematics is a subject that accommodates critical thinking skills. According to Akbarovna (2024), mathematical concepts are useful in improving critical and analytical thinking skills through the use of abstract concepts and logical reasoning, enabling individuals to evaluate situations from multiple perspectives and find solutions to complex problems. Mathematics also plays a role in educating children to become critical, responsible, and cooperative individuals in society (Sachdeva & Eggen, 2021). Therefore, mathematics is not only a subject known for counting, but also emphasizes the process of developing critical thinking skills.

However, the development ability of critical thinking through subjects, especially mathematics, is still less than optimal. This is shown in The results of the Programme for International Student Assessment (PISA) under the Organisation for Economic Cooperation and Development (OECD) show a downward trend in Indonesia's mathematical literacy scores. Since 2003 until now, Indonesia's average mathematical literacy score has remained low, below the international average. (Rusmining & Mahmudah, 2024). The latest data from the Programme for International Student Assessment (PISA) in 2022, Indonesia ranked 68th out of 79 (OECD, 2023) with a score of 366. There are three main domains in measuring mathematical literacy skills: the content domain, the context domain, and the process domain. The process domain has three parts: formulating systematic situations, applying facts, concepts, procedures, and tools to interpret, explain, and predict phenomena (OECD, 2023). This mathematical literacy is useful in making decisions based on constructive mathematical thinking patterns. (Rodhi, 2021) This reflects Indonesia's low mathematical literacy as a benchmark for critical thinking skills. These results indicate a gap between objective curriculum merdeka, which emphasizes the importance of critical thinking, and the implementation and real achievements of students in the field.

Based on interviews and observations with fifth-grade teachers at SDN 4 Gugud Diponegoro on November 18-20, 2024, critical thinking skills varied between male and female students in the class. Many students had difficulty understanding the content of questions, connecting information, and drawing

logical conclusions. The teacher also revealed that most students were not yet accustomed to presenting reasons or opinions in a structured manner when solving problems. Furthermore, students' ability to evaluate arguments and choose problem-solving strategies was still limited. This indicates that students have not fully mastered the critical thinking skills needed in the learning process, especially in fractions.

The low level of mathematical literacy indicates that critical thinking skills play a crucial role in the learning process, enabling students to objectively consider, analyze, and evaluate issues or ideas to reach accurate conclusions (Raj et al., 2022). Individuals with critical thinking skills can be identified using several indicators, including: 1) interpretation; 2) analysis; 3) evaluation; 4) drawing conclusions; 5) providing further explanations; and 6) self-regulation (Facione, 2015). Critical thinking, within the context of an merdeka curriculum, is linked to the critical reasoning dimension of the Pancasila Student Profile, enabling students to objectively process information, both qualitatively and quantitatively, connect various pieces of information, analyze, evaluate, and draw conclusions (Ministry of Education, Culture, Research, and Technology, 2022). Critical thinking skills in mathematics learning will help students understand and solve various mathematical problems or questions that require reasoning, analysis, evaluation, and interpretation (Rahmaini & Chandra, 2024). Therefore, critical thinking skills are considered as important skills that can be developed through mathematics learning and have been integrated into the Merdeka Curriculum through the critical reasoning dimension in the Pancasila Student Profile.

RLow critical thinking skills can be caused by physical condition, intellectual development, motivation, and gender (Rosmaini, 2023). One factor that needs to be considered in developing critical thinking skills in learning is gender. Gender is defined as a complex human psychological and sociocultural concept that can influence sexual characteristics. According to put Davison et al., (2021) Gender differences will affect the exploration of various strategies in solving problems. Problem-solving strategies can be influenced by gender, which also has a significant impact on critical thinking processes. (Saputri et al., 2023) Therefore, it is important to examine the differences in critical thinking abilities between male and female students, because these differences can affect thinking strategies, information processing, and decision-making in solving mathematical problems.

A study previously about critical thinking comparing male and female subjectswoman by Saputri et al. (2023) highlighted the comparison of female critical thinking skills being higher than male because female students have self-confidence and critical thinking skills that on average outperform male students. However, this study only focused on prospective teachers and did not examine elementary school students. Research by Arini et al. (2023) showed that the average score of female students was higher than the average score of male students because female students tended to provide more detailed and comprehensive answers than male students in junior high school. This study still focused on junior high school subjects. There are different research results from several previous studies, which suggest that the critical thinking abilities of male

and female students do not differ significantly (Egmir, & Ocak., 2020; Kuloğlu & Karabekmez, 2022; Marni et al., 2020).

Based on the results of the thinking construction study, previous research has shown inconsistent results. This study focuses on elementary school students' critical thinking skills, specifically from a gender perspective. This contrasts with previous research, which was mostly conducted at the secondary school level.. SThis study presents a new contribution by comprehensively exploring the critical thinking skills of elementary school students through the indicators of Facione's Theory.

The purpose of this study was to describe the profile of critical thinking skills in male and female students. This study showed that elementary school students have the knowledge and interest in applying their critical thinking to analyze problems. Implications this research push for designing learning strategies that are more responsive to gender differences and as a consideration in compiling teaching materials that focus on indicators of critical thinking skills, including interpretation, analysis, evaluation, and inference. Therefore, this study presents the title of the problem that arises, namely "Profile of Critical Thinking Skills of Grade V Students Reviewed from Gender".

RESEARCH METHODS

This study used a qualitative, descriptive approach. This approach aims to describe in-depth and systematically the profile of male and female students' critical thinking skills in solving mathematics problems. Through this descriptive approach, researchers can identify differences in critical thinking skills based on indicators such as interpretation, analysis, evaluation, and inference.

The data sources were written test results and interviews. The sample used was 85 fifth-grade students from four elementary schools in the Diponegoro Cluster. The sample was selected using purposive sampling, based on specific considerations relevant to the research objectives. This technique was chosen to facilitate the researcher's exploration and in-depth understanding of the characteristics of students' critical thinking skills (Sugiyono, 2016).

The data collection technique in this study uses a test technique with an assessment instrument, namely a descriptive type test to measure critical thinking skills in mathematics learning which has been validated by experts in the field of elementary education and has been tested for validity and reliability. Meanwhile, the interview guide instrument aims to conduct interviews with students regarding the results of the work that the subject has done in solving the problems given.

This study involved administering a critical thinking test to all students who were the subjects of the study. Their answers were then analyzed to assess their level of critical thinking regarding fractions and examine the differences in critical thinking skills between man and woman. The categorization of critical thinking skills in this study uses test scores which are then classified into several categories of critical thinking ability levels, namely high, medium, and low as stated by Sari et al. (2022).

Table 1. Level of Students' Critical Thinking Skills Based on Test Results

No	Sign	Ability Level
1	80-100	High

2	60-79	Currently
3	<60	Low

The data analysis for this study followed the qualitative approach adopted by Miles and Huberman (Sutopo, 2006). In the first stage, the researchers reduced the data by analyzing the results of critical thinking tests and interviews. The data presentation stage involved presenting the data in tables or graphs depicting the research findings. The data conclusion stage involved summarizing the research findings related to students' critical thinking from a gender perspective.

RESULTS AND DISCUSSION

The data collected by the researchers began with the first test, a critical thinking ability test, aimed at grouping students based on their critical thinking abilities in mathematics. The subjects selected for this grouping were students with high and low levels of critical thinking abilities. Based on these groups, two subjects were selected: one male and one female student. The researchers then conducted interviews to obtain more detailed information regarding the subjects' critical thinking abilities.

This research was conducted in four elementary schools in the Diponegoro Cluster. The following are the results of students' critical thinking skills at the four elementary schools in the Diponegoro Cluster.

Table 2. Level of Students' Thinking Ability Based on Test Results and Gender

Gender	Average value	Ability Level
Man	59,80	Low
Women	73.10	Currently

Based on the table above, the average critical thinking ability of male students is 59.80, which is considered low, compared to the average critical thinking ability of female students, which is 73.10, which is considered medium. The total number of students is 85, consisting of 53 male students. Twelve students obtained above average scores, while 41 male students obtained below average scores. The average score of female students is 73.10. with 10 female students get grades in down average. On the other hand, 22 students get value above average.

Differences in students' critical thinking abilities are seen from different perspectives, supported by the percentage of abilities from each critical thinking ability indicator, which can be seen in Table 3.

Table 3. Percentage of Students' Critical Thinking Skills Reviewed from a Gender Perspective

Indicator	Man	Women
Interpretation	66%	72%
Analysis	61%	65%
Evaluation	53%	61%
Conclusion	40%	46%
Average amount %	55%	61%

Based on the data above, students' critical thinking skills differ by gender. Overall, male students have lower percentages than female students when looking at the indicators of interpretation, analysis, evaluation, and inference.

1. Students' critical thinking abilities are reviewed from the prospective gender.

Data analysis revealed significant differences between male and female students in each critical thinking skill indicator. These differences were evident in the concepts and strategies used to solve problems. Student questions and answers were analyzed by gender.

Interpretation Indicators

On the interpretation indicator, students can re-explain fraction operation problems presented in their own words. Interpretive skills enable accurate understanding and recognition of the problems presented. This study found that male students only achieved a score of 66%. whereas female students have scored 72%.

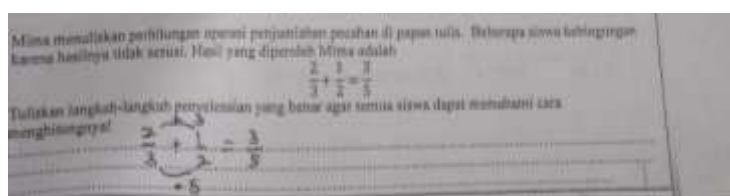


Figure 1. Male Students' Answers to the Interpretation Indicator

Subject HZI, a male student, struggled to accurately understand the problem and made a conceptual error when working with fractions with unlike denominators. The student immediately added the numerators and denominators of the two fractions. This approach indicates that the subject did not yet understand how to add two fractions with unlike denominators. This error is classified as a conceptual error because the subject not only made an error in the solution procedure but also did not demonstrate a correct understanding of the principle of adding fractions. Furthermore, the lack of effort to convert the fractions to the same denominator indicates that the subject has not yet mastered the basic steps in fraction operations. The female student's answer can be seen in Figure 2 below:

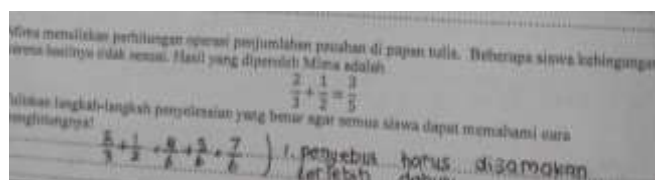


Figure 2. Female Students' Answers to the Interpretation Indicator

The female student was able to accurately understand the substance of the question. This can be seen in Figure 3. The subject first equalized the denominators of the fractions using the LCM of 3 and 2, which is 6. The subject also wrote an explanation that "the denominators must be equalized first," indicating a conceptual understanding of the fraction addition procedure. This

answer reflects the student's ability not only to calculate correctly but also to understand the mathematical thought processes underlying the operation. This demonstrates success in achieving the interpretation indicator accurately and logically.

Analysis indicators

For students who have understood the problem, the next step is to determine the claims and reasons used to support or oppose an opinion in the statement of operations involving ordinary fractions. The analysis indicator for female students was 65%, while for male students it was 61%. This indicates that female students excelled in the analysis indicator compared to male students. The following are the students' answers to the analysis indicator:

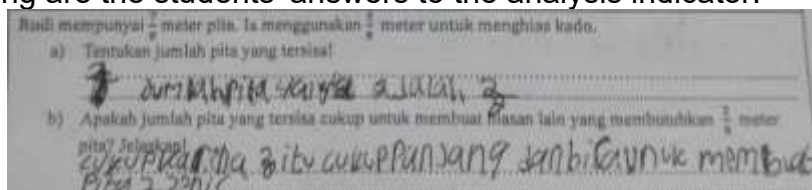


Figure 3. Male Students' Answers to Analysis Indicators

A male student demonstrated a conceptual error in subtracting fractions with like denominators. In part b, the student attempted to make a claim and provide justification. However, because the basis of his calculation was incorrect, the claim was invalid. The female student's answer can be seen in Figure 4.

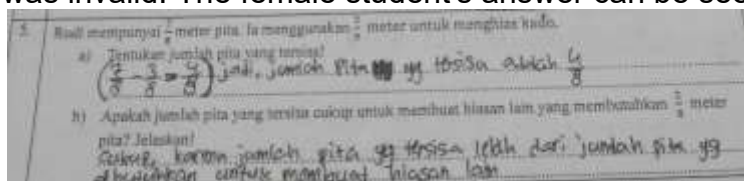


Figure 4. Female Students' Answers to Analysis Indicators

The female student demonstrated a good understanding of solving fraction subtraction problems and analyzing the sufficiency of fraction values. In part b, she was able to analyze the sufficiency of remaining ribbon to make other decorations that required it. This demonstrated her ability to draw conclusions from the results of previous operations and use them to support decisions.

Evaluation Indicators

Evaluation stage: Students assess the logical strength of an argument based on the relationship between premises and conclusions in the concept of fractions. The evaluation indicator scores were 53% for male students and 61% for female students, indicating that female students have superior abilities compared to male students. The following are the male students' answers in Figure 5.

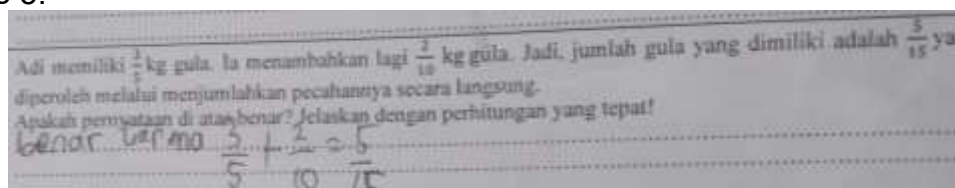


Figure 5. Male Students' Answers to Evaluation Indicators

Figure 5 shows that a male student was unable to correctly evaluate the argument because he accepted the incorrect statement without reviewing the process and logic of adding fractions. This indicates that the student did not yet understand the importance of equating the denominators and was unable to identify errors in the mathematical procedure. However, the female student's response was different, as seen in Figure 6.

Adi memiliki $\frac{3}{5}$ kg gula. Ia menambahkan lagi $\frac{2}{10}$ kg gula. Jadi, jumlah gula yang dimiliki adalah $\frac{5}{10}$ yang diperoleh melalui menjumlahkan pecahannya secara langsung.
Apakah pernyataan di atas benar? Jelaskan dengan perhitungan yang tepat!

$\frac{3}{5} + \frac{2}{10} = \frac{3}{5} + \frac{2}{10} = \frac{6+2}{10} = \frac{8}{10}$ salah, karena ~~pernyataan yg~~ jumlah yg tepat yaitu $\frac{8}{10}$

Figure 6. Female Students' Responses to Evaluation Indicators

The female students demonstrated evaluation skills involving understanding and analyzing the truth of a mathematical statement. They also provided rebuttals to the statement and included appropriate calculation steps. This ability demonstrates that the students have a strong understanding of the concept of fractions and can logically connect the premise (the addition of fractions) to the conclusion.

Inference Indicator

The inference indicator shows that students can develop alternative solutions to the problems presented. The highest indicator score for female students was 46%, while for male students it was 40%, indicating that female students' abilities are better than male students'. The following are the male students' answers to the inference indicator:

Pak Budi memiliki $\frac{1}{2}$ liter minyak goreng. Ia kini memiliki berapa liter alternatif?

Alternatif 1: Mengganti $\frac{1}{2}$ liter minyak untuk memasak.

Alternatif 2: Mengganti $\frac{1}{2}$ liter minyak untuk menggoreng ikan.

a. Jika Pak Budi memilih alternatif pertama, berapa liter minyak yang terjual?

b. Jika Pak Budi memilih alternatif kedua, berapa liter minyak yang terjual?

Masalah pilihan yang lebih menguntungkan jika Pak Budi ingin menggunakan minyak gorengnya?

Jawab alternatif 1: $\frac{1}{2} = \frac{1}{2}$ liter

Jawab alternatif 2: $\frac{1}{2} = \frac{1}{2}$ liter

Figure 7. Male students' answers to the Inference indicator

Male students had a poor understanding of the calculation procedures for fractions with unlike denominators. Furthermore, the alternative answers used to draw conclusions were less valid because the procedural calculations were inaccurate. Female students' answers can be seen in Figure 8.

Pak Budi memiliki $\frac{1}{2}$ liter minyak goreng. Ia kini memiliki berapa liter alternatif?

Alternatif 1: Mengganti $\frac{1}{2}$ liter minyak untuk memasak.

Alternatif 2: Mengganti $\frac{1}{2}$ liter minyak untuk menggoreng ikan.

a. Jika Pak Budi memilih alternatif pertama, berapa liter minyak yang terjual?

b. Jika Pak Budi memilih alternatif kedua, berapa liter minyak yang terjual?

Masalah pilihan yang lebih menguntungkan jika Pak Budi ingin menggunakan minyak gorengnya?

Jawab alternatif 1: $\frac{1}{2} = \frac{1}{2}$ liter

Jawab alternatif 2: $\frac{1}{2} = \frac{1}{2}$ liter

Masalah pilihan yang lebih menguntungkan jika Pak Budi ingin menggunakan minyak gorengnya?

Jawab alternatif 1: $\frac{1}{2} = \frac{1}{2}$ liter

Jawab alternatif 2: $\frac{1}{2} = \frac{1}{2}$ liter

Figure 8. Female Students' Answers to the Inference Indicator

The female student successfully calculated fraction operations with different denominators. When deducing alternative solutions, she chose the first

alternative because it had more oil remaining. This statement aligns with her calculations, demonstrating her ability to draw accurate conclusions based on available numerical data.

Female students scored higher than male students. This was because female students wrote answers in a more organized, detailed, and neat manner (Hikmah, 2022). The results of this study also align with research by Nuryadi et al. (2022), which showed that in the average total score of the critical thinking ability test, there was a significant difference in male students' scores, who scored lower than the average score of female students. This was due to the female learning community being more advanced, while males prioritized physical activity, resulting in lower academic achievement.

The differences in critical thinking skills between boys and girls in solving critical thinking problems on fractions in fifth grade, based on student responses and interviews, are influenced by a lack of interest or fascination with mathematics and different cognitive factors. This is in line with Piaget's theory, which explains that thinking (cognitive) skills are an innate potential that every individual, both boys and girls, has and can develop over time. However, low interest in learning is often the main cause of students making errors in calculations, not understanding problems, or even being unable to complete assignments completely (Anggraeni et al., 2024). Students' cognitive abilities are reflected in their errors in interpreting problems and understanding the mathematical concepts they have learned. This makes it difficult to see the relevance of concepts, both within the context of mathematics itself and in applications outside of mathematics (Rosmayadi et al., 2023). Furthermore, accuracy in solving problems also affects the ability to solve problems that require critical thinking. Women tend to have superior language skills due to greater brain activity in the areas that regulate language function, allowing them to express ideas clearly and structuredly, reflecting higher-order thinking (Sari et al., 2022).

Thus, female students' critical thinking skills are superior to male students', as measured by indicators of interpretation, analysis, evaluation, and inference. This is due to internal factors such as interest, accuracy, and cognitive abilities (conceptual errors, arithmetic operations, and principles) that vary among individuals. Therefore, these critical thinking skills need to be improved through appropriate learning strategies and models.

CONCLUSION

Critical thinking skills differ between male and female students. Female students' critical thinking skills are higher than male students. This is indicated by an average score of 73.10 for female students (medium category), while for males it is only 59.80 (low category). The superiority of female students' critical thinking skills is also indicated by the percentages in each critical thinking indicator, such as interpretation, analysis, evaluation, and inference. Differences in critical thinking skills between male and female students are influenced by internal factors such as learning interest, accuracy, and cognitive ability. Therefore, appropriate learning strategies are crucial to improving the critical thinking skills of all students.

This study has limitations in discussing the analysis of critical thinking skills from a gender perspective. This results in the study's results being unable to

comprehensively describe other factors that influence critical thinking skills, such as learning motivation, cognitive style, and students' learning environment. Therefore, further research is recommended to expand the study variables to obtain a more comprehensive picture of students' critical thinking ability profiles. Practically, the findings of this study provide recommendations for teachers and education in elementary schools to design more varied learning strategies that can accommodate the learning needs of both male and female students. Teachers can integrate problem-based approaches, discussions, and collaborative projects that require students to develop critical thinking skills in the aspects of interpretation, analysis, evaluation, and inference.

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