



Analysis of Junior High School Students' Analytical Thinking in Solving Fraction Problems Based on Gender

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Abstract

The purpose of this study was to analyze junior high school students' analytical thinking in solving fraction problems based on gender. This study used a descriptive qualitative approach. The subjects were two eighth-grade students, one male and one female, selected based on their comparable mathematical and communication skills. The instruments used were Analytical Thinking Test (ATT) and semi-structured interviews. Data validity used time triangulation, while data analysis involved data reduction, data presentation, and conclusion drawing. This study contributes to the existing literature by providing an in-depth description of students' analytical thinking processes in solving fraction problems using indicators of differentiation, organization, and attribution, and examining how these processes manifest across genders. The results showed that both students met all indicators of analytical thinking. However, differences were found in the characteristics of their thinking processes. Male students tended to provide concise and direct solution steps, while female students presented more detailed and structured explanations. The findings from MS and SP indicate that differences in analytical thinking lie in the processing and presentation of information rather than in the analytical thinking itself. However, these findings are limited to the study subjects and cannot be generalized without further investigation involving more participants.

Keywords: Analytical Thinking; Fraction Problems; Gender; Junior High School Students

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INTRODUCTION

Education plays a crucial role in shaping the quality of human resources through the development of students' thinking skills. One area that can hone human thinking in-depth is mathematics education. Mathematics is a discipline that can enhance thinking and argumentation skills, contribute to solving everyday problems and in the workplace, and



support the development of science and technology (Fadhilah and Maf'ulah, 2024). According to Wahyuni, Fajariyah, Lausandi, Nurwiani, and Maf'ulah (2024) mathematics is a universal science that serves as the foundation for development in today's modern world. One of the main goals of mathematics education is to train students to think logically, systematically, and analytically in solving problems, both abstract and contextual.

Problem solving requires several thinking skills, one of which is analytical thinking. Analytical thinking enables students to identify important information, connect relevant elements, and logically evaluate problem-solving strategies. This ability plays a crucial role in the context of mathematical problem-solving, ensuring that students not only obtain final answers but also understand the process and rationale behind each step (Irma et al., 2025). Problem-solving requires students to find solutions to problems that are not easily solved directly, according to each student (Putri, Maf'ulah, and Hartiningrum, 2023; Talia, Afriansyah, and Sumartini, 2024). Fractions are one of the mathematics topics that require analytical thinking skills. Fractions are a prerequisite for understanding subsequent topics, and many topics are intertwined with the concept of fractions (Maf'ulah, Juniati, and Siswono, 2015; Afriansyah and Turmudi, 2022). Fractions involve understanding the relationship between numerators and denominators, comparing values, and applying fraction operations in various contextual situations (Hidayatullah et al., 2024). Various studies have shown that fractions are relatively difficult for junior high school students to understand because they are abstract and require a strong conceptual understanding, not just calculation procedures (Anggraeni, Darto, and Rohimah, 2022; Mujib and Sulistiana, 2023; Indriani, 2024).

Analytical thinking is one of the higher-order thinking skills that enables individuals to examine information systematically, identify relationships among components, and evaluate appropriate strategies for solving problems. This study adopts the analytical thinking framework proposed by (Anderson and Krathwohl, 2001) in the revision of Bloom's Taxonomy. According to this framework, analytical thinking consists of three cognitive processes: differentiating, organizing, and attributing. Differentiating refers to the ability to distinguish relevant information from irrelevant information and identify important elements of a problem. Organizing is the ability to determine relationships among pieces of information and arrange them into a coherent structure for problem solving. Attributing refers to the ability to evaluate, justify, and draw conclusions based on the strategy used in solving a problem. These indicators were used as the analytical framework for examining students' analytical thinking in solving fraction problems.

Previous studies have examined analytical thinking and mathematical problem-solving skills from various perspectives. Students' analytical thinking skills in fractions are categorized as high, medium, and low, with the main weaknesses being the accuracy and completeness of answers (Napui, Resmawan, Takaendengan, and Pauweni, 2024). Amilia and Rahaju (2022) showed that high school students' analytical thinking skills in problem-solving are influenced by the visualizer and verbalizer cognitive styles. Meanwhile, Alghar (2023) examined the analytical thinking processes of mathematics students based on APOS theory, examining

gender and found that both males and females were able to meet the analytical thinking indicators, although there were variations in the mental structures used.

Other studies examining mathematical abilities by gender also showed mixed results. Laili and Qomariyah (2021) found differences in fraction problem-solving abilities between male and female students, particularly in the calculation and accuracy stages. Sugiarti (2023) reported that male students' mathematical critical thinking abilities tended to be superior in several indicators compared to female students. However, most of these studies focus more on the final results or problem-solving phase, and have not yet examined in-depth the analytical thinking processes of junior high school students in fractions, based on gender. Although previous studies have investigated analytical thinking, fraction problem solving, and gender differences separately, limited research has explored how junior high school students demonstrate the analytical thinking processes of differentiating, organizing, and attributing when solving fraction problems. Therefore, this study contributes to the existing literature by providing an in-depth qualitative description of analytical thinking processes in fraction problem solving based on gender.

The problem that emerged in this study is how junior high school students' analytical thinking in solving fraction problems is viewed based on gender. Differences in cognitive characteristics and thinking styles between male and female students are thought to influence how they gather information, process data, and evaluate mathematical problem-solving strategies. Analytical thinking is an important tool in mathematics education, where it involves two main abilities: breaking down mathematical problems and applying in-depth analysis to find solutions (Wang et al., 2025). Analytical thinking ability is the ability to think by identifying or selecting important information from the material, forming a complete unit by linking the parts, and conducting evaluations in order to find a solution to a problem (Subakri, 2020). The process of analytical thinking requires precision, the ability to compare data, recognize patterns, evaluate arguments, and draw valid conclusions. Thus, analytical thinking can be observed through certain signs or aspects that serve as benchmarks for assessing a person's level of mastery, commonly referred to as analytical thinking indicators. The analytical thinking indicators in this study refer to three stages, namely collecting data (differentiating), processing data (organizing), and testing strategies (attributing). In the data collection stage (differentiating), students are able to identify and state known information in the problem and determine what is being asked. Next, in the data processing stage (organizing), students are able to identify the relationship between known information and what is being asked, then use this relationship to solve the problem. The final stage is testing strategies (attributing), namely students re-examine the solutions obtained to ensure their accuracy and draw conclusions that are in accordance with the given problem.

The purpose of this study is to analyze the analytical thinking of male and female junior high school students in solving fraction problems. The results are expected to provide a more comprehensive picture of the differences and similarities in students' analytical thinking

processes based on gender and provide teachers with considerations in designing mathematics lessons that optimally develop students' analytical thinking skills.

METHODS

This study aims to analyze the analytical thinking of junior high school students in solving problems in a specific area based on gender. The method used is descriptive qualitative research, as this study focuses on in-depth coverage of students' thought processes in solving mathematical problems, without providing any treatment or manipulation of variables. According to Sugiyono (2018) in Avita Putri et al., (2024) defines qualitative research as a philosophically grounded research method used to conduct research under scientific conditions (experiments) where the researcher acts as the instrument, and qualitative data collection and analysis techniques emphasize meaning. The subjects of this study were two eighth-grade junior high school students, consisting of one male student (MS) and one female student (FS). The subjects were selected purposively based on the following criteria: having learned fraction material, possessing equivalent mathematical ability based on academic performance and teacher recommendations, demonstrating good communication skills to express their thinking processes both orally and in writing, and being willing to participate in all stages of the research. These criteria were established to ensure comparability between the subjects and to facilitate a more in-depth analysis of analytical thinking processes based on gender.

The research procedure was carried out in several stages. The first stage involved developing the research instruments, namely an Analytical Thinking Test (ATT) consisting of one open-ended question on fraction material designed based on analytical thinking indicators, and a semi-structured interview guide. The second stage was instrument validation by a mathematics education lecturer to assess the suitability of the indicators, the accuracy of the material, and the clarity of the language. At this stage, the validator provided several suggestions for instrument improvement, including clarifying the test title to align with the research objectives, improving the wording of the instructions to make them more understandable to students, and rearranging the question presentation format to make them more systematic and communicative. All validator suggestions were followed up through instrument revisions. After the revisions, the ATT instrument was declared to have met the eligibility criteria and was used as a research instrument, as shown in the figure below. The third stage was the implementation of ATT 1 to the MS and SP, which took place on November 27, 2025, followed by interviews. The fourth stage was the implementation of ATT 2 for MS and SP, which took place on November 29, 2025, followed by interviews. The fifth stage was an analysis of data consistency between sessions. If inconsistencies were identified, additional ATT were conducted until credible. Data collection was conducted at different times for temporal triangulation purposes.

The data obtained were analyzed using the Miles and Huberman model according to Sugiyono (2016), which includes three stages: data reduction, data presentation, and conclusion drawing. Data reduction was carried out by selecting and grouping test and interview data

according to analytical thinking indicators. Data presentation was done in the form of descriptive narratives to illustrate students' analytical thinking processes. Conclusions were drawn through repeated data verification until consistent findings were obtained. Data validity was ensured through temporal triangulation, by comparing ATT results and interviews conducted at different times to ensure consistency in students' analytical thinking skills.

RESULTS AND DISCUSSION

The results of this study aim to analyze the analytical thinking of eighth-grade junior high school students in solving fraction problems based on gender. This analysis was carried out based on analytical thinking indicators according to research guidelines, namely: 1) Collecting data (differentiating), 2) Processing data (organizing), 3) Testing strategies (attributing). The subjects used were two eighth-grade junior high school students selected based on gender, namely one male (MS) and one female (SP). The data of this study were reviewed from the results of the Analytical Thinking Test (ATT) and interviews with MS and SP. The following discussion is presented based on a review of the analytical thinking process of each subject.

Analytical Thinking Test for Male Students (MS)

The indicator of data collection (differentiating) is seen when MS mentions the known information in the problem. The evidence for MS's ATT results stating the known information in the problem is shown in Figure 1.

Diket = pipa A = $\frac{3}{4}$ Jam
Pipa B = $\frac{2}{3}$ Jam

Figure 1. Evidence from the MS ATT results stating the known information in the problem.

Based on Figure 1, MS identified the relevant information provided in the problem by writing that Pipe A can fill the tank in $\frac{3}{4}$ hour and Pipe B in $\frac{2}{3}$ hour. This indicates that MS was able to distinguish important information from the problem statement and focus on the data needed for problem solving. The ability to identify and record the known information demonstrates the fulfillment of the differentiating indicator in analytical thinking.

This evidence is also supported by the interview excerpt:

- P : What is known in the problem?
MS : Pipe A is filled in $\frac{3}{4}$ hours and pipe B in $\frac{2}{3}$ hours.

MS also wrote down the question asked in the problem. The evidence from the MS ATT results determining the question asked in the problem is shown in Figure 2.

Ditanya = Laju...?

Figure 2. Evidence of MS ATT results determining the question asked in the problem.

Figure 2 shows that MS identified the question being asked, namely determining the amount of the tank filled after Pipe A operates alone for 10 minutes. By clearly stating the problem objective, MS demonstrated an understanding of the information that needed to be obtained from the given data. This process reflects the differentiating indicator because MS was able to separate relevant information and recognize the focus of the problem.

This evidence is also supported by the interview excerpt:

- P : What was the question?
 MS : The result of the tank being filled after pipe A was filled in 10 minutes.

Based on Figures 1 & 2, along with the interview excerpt, it can be concluded that MS provided written information that was appropriate to the context of the problem. This process demonstrates the activity of sorting important information from the problem according to the data collection indicator (differentiating).

The data processing (organizing) indicator can be seen from the way MS links known information with the things asked, The evidence of the ATT MS results linking known information with the things asked is stated in Figure 3.

Handwritten work in Figure 3:

$$\begin{aligned} \text{Jawab: Pipe A} &= \frac{3}{4} \text{ Jam} = 45 \text{ menit} \\ \text{Pipe B} &= \frac{2}{3} \text{ Jam} = 40 \text{ menit} \\ \text{Pipe A} &= \frac{1}{45} \text{ menit} \\ \text{Pipe B} &= \frac{1}{40} \text{ menit} \\ \frac{1}{45} + \frac{1}{40} &= \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360} \times 10 = \frac{170}{360} \end{aligned}$$

Figure 3. Evidence of ATT MS results linking known information to the question being asked.

Based on Figure 3, MS connected the known information with the question, namely Pipe A = $\frac{3}{4}$ hours = 45 minutes, Pipe B = $\frac{2}{3}$ hours = 40 minutes, Pipe A = $\frac{1}{45}$ minutes, Pipe B = $\frac{1}{40}$ Minutes and $\frac{1}{45} + \frac{1}{40} = \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360} \times 10 = \frac{170}{360}$. This shows that MS was able to identify the relationship between the available information and the problem objective. Such a process reflects the organizing indicator because the information was structured systematically to support the next stage of problem solving.

This evidence is also supported by the interview excerpt:

- P : How do you relate the known and the question asked in the given question?
 MS : I wrote down the known, then converted it to minutes and then found the speed.

MS also solved the problem. The proof of the ATT MS results in solving the problem is stated in Figure 4.

Handwritten work for Figure 4:

$$\begin{aligned} \text{Jawab: Pipa A} &= \frac{2}{4} \text{ Jam} = 45 \text{ menit} \\ \text{Pipa B} &= \frac{2}{3} \text{ Jam} = 40 \text{ menit} \\ \text{Pipa A} &= \frac{1}{45} \text{ menit} \\ \text{Pipa B} &= \frac{1}{40} \text{ menit} \\ \frac{1}{45} + \frac{1}{40} &= \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360} \times 10 = \frac{170}{360} \\ \text{Pipa A} &= \frac{1}{45} \times 10 = \frac{10}{45} = \frac{2}{9} \\ \text{total} &= \frac{17}{36} + \frac{2}{9} = \frac{17}{36} + \frac{8}{36} = \frac{25}{36} \end{aligned}$$

Figure 4. Evidence of MS ATT results in solving the problem.

Figure 4 illustrates how MS applied the organized information to solve the problem, namely Pipe A = $\frac{3}{4}$ hours = 45 minutes, Pipe B = $\frac{2}{3}$ hours = 40 minutes, Pipe A = $\frac{1}{45}$ minutes, Pipe B = $\frac{1}{40}$ minutes, $\frac{1}{45} + \frac{1}{40} = \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360} \times 10 = \frac{170}{360}$, Pipe A = $\frac{1}{45} \times 10 = \frac{2}{9}$ with a total of $= \frac{17}{36} + \frac{2}{9} = \frac{17}{36} + \frac{8}{36} = \frac{25}{36}$. This evidence indicates that MS was able to organize information effectively and transform it into a logical solution strategy, thereby fulfilling the organizing indicator.

This evidence is also supported by the interview excerpt:

- P : So, what steps did you take to solve the problem from start to finish?
 MS : The time in pipe A and pipe B was converted from hours to minutes, then the time in pipe A and pipe B was added together.

Based on Figures 3 & 4, along with the interview excerpt, it can be concluded that MS was able to determine the solution steps written more concisely, directly to the core and logical calculations. This process reflects the data processing indicator (organizing), namely organizing information and arranging it into a solution strategy.

The strategy testing indicator (attributing) is seen when MS tested and checked the solution to the problem, as shown in the interview excerpt:

- P : Did you double-check your answer?
 MS : Yes.

MS also drew a conclusion in the form of a solution to the problem. The evidence of the ATT MS results draws conclusions in the form of solutions to the problems stated in Figure 5 below.

Handwritten conclusion for Figure 5:

Jadi hasil tangki yang sudah terisi setelah pipa A bekerja selama 10 menit adalah $\frac{25}{36}$

Figure 5. Evidence of MS ATT results drawing conclusions in the form of solutions to problems.

Based on Figure 5, MS provided a conclusion that was consistent with the calculations and the context of the problem: so, the tank that is filled after pipe A has been operating for 10 minutes is $\frac{25}{36}$. The conclusion demonstrates that MS reviewed the obtained result before presenting the final answer. This process reflects the attributing indicator because it involves evaluating the solution and drawing an appropriate conclusion from the problem-solving process.

This evidence is also supported by the interview excerpt:

- P : So, what is the conclusion after working on this problem?
 MS : So, the result of filling the tank after pipe A has been operating for 10 minutes is $\frac{25}{36}$

Based on Figure 5 and the interview excerpt, it can be concluded that MS can draw conclusions appropriate to the context of the given problem. This process reflects the indicator of testing strategies (attributing), namely the activity of evaluating results and drawing conclusions from problem solving.

The analysis results indicate that MS has met the indicators of collecting data (differentiating), processing data (organizing), and testing strategies (attributing) in analytical thinking. This aligns with Laili dan Qomariyah (2021) who demonstrated that male students can complete the solution steps sequentially and recheck their results, although errors were still found in certain sections.

Analytical Thinking Test for Female Students (SP)

The indicator of data collection (differentiating) is seen when the SP writes down the known information in the problem. Evidence from the SP's ATT results in writing down the known information in the problem is shown in Figure 6.

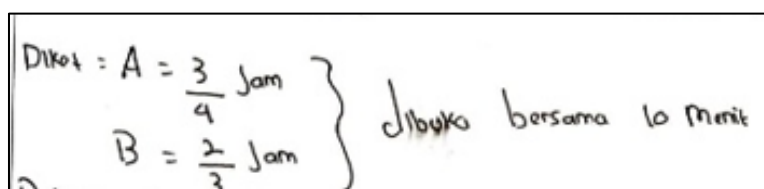


Figure 6. Evidence from the SP ATT results in writing down the known information in the problem.

Based on Figure 6, SP identified the information provided in the problem by writing that Pipe A fills up in $\frac{3}{4}$ hours and pipe B in $\frac{2}{3}$ hours. This indicates that SP was able to recognize and distinguish important information from the problem statement. The ability to identify and record the known information demonstrates the fulfillment of the differentiating indicator in analytical thinking.

This evidence is also supported by the interview excerpt:

- P : What is known in the problem?

SP : Pipe A fills up in $\frac{3}{4}$ hours and pipe B in $\frac{2}{3}$ hours.

SP also determines the question in the problem. Evidence from the SP ATT results in determining the question in the problem is shown in Figure 7 below.

Ditanya: berapa bagian tangki yang terisi Pipa A
Jawab: bekerja Sambilan Sama 10 menit

Figure 7. Evidence from SP ATT results determines the question asked in the problem.

Figure 7 shows that SP identified the question being asked, namely to find pipe A and pipe B. The question is how much of the tank is filled after pipe A has worked alone for 10 minutes. By explicitly stating the problem objective, SP demonstrated an understanding of the information that needed to be found. This activity reflects the differentiating indicator because SP was able to distinguish between known information and the information sought in the problem.

This evidence is also supported by the interview excerpt:

P : What is the question?

SP : pipe A and pipe B what is asked in the question how much of the tank is filled after pipe A works alone for 10 minutes.

Based on Figures 6 & 7, along with the interview excerpt, it can be concluded that SP can explain the written information according to the context of the problem. This process demonstrates the activity of sorting out important information from the problem according to the data collection indicator (differentiating).

The data processing (organizing) indicator can be seen from the way SP identifies the relationship between known information and the things asked in the question. The evidence of the ATT SP results identifying the relationship between known information and the question is stated in Figure 8.

Sambilan Sama 10 menit

$$A = \frac{3}{4} \times 60 \text{ menit} = \frac{180}{4} = 45 \text{ menit}$$

$$B = \frac{2}{3} \times 60 \text{ menit} = \frac{120}{3} = 40 \text{ menit}$$

$$\text{Laju A} = \frac{1}{45} \text{ tangki Permenit}$$

$$\text{Laju B} = \frac{1}{40} \text{ tangki Permenit}$$

$$\text{Laju gabungan} = \frac{1}{45} + \frac{1}{40} = \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360}$$

$$\frac{17}{360} \times 10 \text{ menit} = \frac{170}{360} = \frac{17}{36}$$

Figure 8. Evidence of SP ATT results identifies the relationship between known information and the question being asked.

Based on Figure 8, SP organized the known information, namely: Pipe A = $\frac{3}{4} \times 60$ Minutes = $\frac{180}{4} = 45$ Minutes, Pipe B = $\frac{2}{3} \times 60$ Minutes = $\frac{120}{3} = 40$ Minutes, Rate A = $\frac{1}{45}$ Tank

per minute, Rate B = $\frac{1}{40}$ Tank per minute, dan Combined Rate: $\frac{1}{45} + \frac{1}{40} = \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360} \times 10 = \frac{170}{360} = \frac{17}{36}$. SP then linked this information to the question being asked. This demonstrates the ability to identify relationships among mathematical information and organize it into a meaningful structure. Therefore, the organizing indicator was fulfilled.

This evidence is also supported by the interview excerpt:

- P : How do you relate the known and the question from the given problem?
 SP : Write down the known time, then convert it to minutes, then write down the question, which is how much of the tank is filled working alone for 10 minutes.

SP also solves the problem. The evidence for the ATT SP results is stated in Figure 9 below.

Handwritten mathematical work showing the solution for pipe rates and combined work:

$$\begin{aligned} \text{Jawab: Pipa A} &= \frac{3}{4} \text{ Jam} = 45 \text{ menit} \\ \text{Pipa B} &= \frac{2}{3} \text{ Jam} = 40 \text{ menit} \\ \text{Pipa A} &= \frac{1}{45} \text{ menit} \\ \text{Pipa B} &= \frac{1}{40} \text{ menit} \\ \frac{1}{45} + \frac{1}{40} &= \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360} \times 10 = \frac{170}{360} \\ \text{Pipa A} &= \frac{1}{45} \times 10 = \frac{10}{45} = \frac{2}{9} \\ \text{total} &= \frac{17}{36} + \frac{2}{9} = \frac{17}{36} + \frac{8}{36} = \frac{25}{36} \end{aligned}$$

Figure 9. Evidence of ATT SP results solving the problem

Figure 9 demonstrates that SP solved the problem, namely: pipe A = $\frac{3}{4} \times 60$ minutes = $\frac{180}{4} = 45$ minutes, pipe B = $\frac{2}{3} \times 60$ minutes = $\frac{120}{3} = 40$ minutes, rate A = $\frac{1}{45}$ tank per minute, rate B = $\frac{1}{40}$ tank per minute, combined rate: $\frac{1}{45} + \frac{1}{40} = \frac{40}{1800} + \frac{45}{1800} = \frac{85}{1800} = \frac{17}{360} \times 10 = \frac{170}{360} = \frac{17}{36}$. Pipe A = $\frac{1}{45} \times 10 = \frac{2}{9}$ with a total = $\frac{17}{36} + \frac{2}{9} = \frac{17}{36} + \frac{8}{36} = \frac{25}{36}$. This evidence indicates that SP was able to organize information comprehensively and develop a coherent solution strategy, reflecting the organizing indicator.

This evidence is also supported by the interview excerpt:

- P : Explain the steps you have taken to solve the problem from start to finish
 SP : Given that pipe A $\frac{3}{4}$ hours pipe B $\frac{2}{3}$ hours were opened together for 10 minutes, asked how much of the tank has been filled after pipe A worked alone for 10 minutes, answered pipe A multiplied by 60 minutes and 180 divided by four equals 45 minutes, then pipe B multiplied by 60 minutes and 120 divided by three equals 40 minutes. The rate of tank A is $\frac{1}{45}$ tanks per minute, the rate of

tank B is $\frac{1}{40}$ tanks per minute. The combined rate is $\frac{17}{36}$ so the tank's combined rate after pipe A operates alone for 10 minutes is $\frac{25}{36}$ parts.

Based on Figures 8 & 9, along with the interview excerpt, it can be concluded that SP can determine the solution steps written in a more coherent, detailed, and structured manner, with a clear description of each calculation stage. This process reflects the data processing indicator (organizing), namely organizing information and compiling it into a solution strategy.

The strategy testing indicator (attributing) is seen when SP tests and checks the solution to the problem shown in the interview excerpt:

- P : Did you double-check your answer?
 SP : Yes.

SP also draws a conclusion in the form of a solution to the problem. The evidence for the ATT results of SP drawing a conclusion in the form of a solution to the problem is shown in Figure 10.

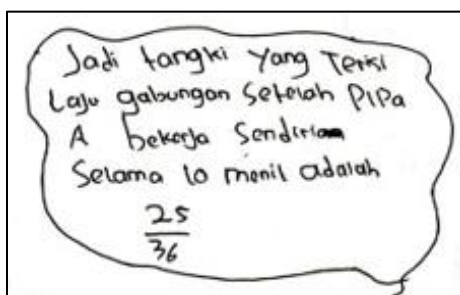


Figure 10. Evidence of SP ATT results drawing conclusions in the form of solutions to the problem.

Based on Figure 10, SP provided a conclusion that was consistent with the calculations and the context of the problem: so, the resulting tank's combined rate after pipe A operates alone for 10 minutes is $\frac{25}{36}$ parts. The written conclusion shows that SP evaluated the outcome and related it back to the context of the problem before presenting the final answer. This process reflects the attributing indicator, which involves reviewing the solution and drawing conclusions based on the results of problem solving.

This evidence is also supported by the interview excerpt:

- P : What did you conclude after working on the problem?
 MS : So, the combined velocity of the tank after pipe A operates alone for 10 minutes is $\frac{25}{36}$ parts.

Based on Figure 10 and the interview excerpt, it can be concluded that SP can draw conclusions appropriate to the context of the given problem. This process reflects the indicator of testing strategies (attributing), namely the activity of evaluating results and drawing conclusions from problem solving.

The analysis results indicate that SP has met the indicators of collecting data (differentiating), processing data (organizing), and testing strategies (attributing) in analytical thinking. This aligns with research by Firdaus and Shodikin (2022) which states that female students have better thinking skills in solving story problems on fractions. Furthermore, this aligns with research by Napui, Takaendengan, and Pauweni (2024) which suggests that many female students are meticulous in understanding information and writing it down well.

Comparison of Analytical Thinking of the Two Subjects

A comparison of the analytical thinking processes between MS and SP shows that both subjects met the indicators of collecting data (differentiating), processing data (organizing), and testing strategies (attributing) according to the indicators established by the researcher. Differences are evident in the way they process data and present solution steps. MS presented solution steps more concisely and directly to the core calculations, while SP presented solution steps in a more detailed and structured manner. These differences indicate variations in thinking styles within the analytical thinking process, not differences in the level of analytical thinking. The results of this comparison suggest that gender differences do not determine the quality of analytical thinking processes but rather influence the characteristics of processing and presenting information. The different presentation of steps also aligns with research by Tunu, Daniel, and Gella (2022) which found that female students wrote problem-solving steps clearly and completely, while male students wrote them concisely. Furthermore, this study aligns with Hidayah and Noer (2022) who argued that differences in thinking styles exist between male and female students when solving problems, resulting in a gap between male and female participation rates.

Overall, a comparison of the analytical thinking processes between MS and SP students shows that both subjects collected data, processed it, and tested strategies through indicators. Differences in these processes are evident in the way they structure and present the solution steps. MS presented steps concisely and directly, focusing on the core calculations, while SP presented steps in a detailed and structured manner. This finding suggests that gender differences influence the characteristics of the analytical thinking process, not the level of analytical thinking.

The findings of this study have important pedagogical implications for mathematics teaching and assessment. Since both male and female students demonstrated the ability to fulfill the indicators of analytical thinking, mathematics teachers should provide equal opportunities for all students to develop and demonstrate their analytical skills. Teachers should also recognize that students may express their analytical thinking in different ways. Some students may present solutions concisely and directly, while others may provide more detailed and systematic explanations. Therefore, assessment practices should not focus solely on the completeness or length of written solutions but should also consider the accuracy of reasoning and the achievement of analytical thinking indicators. Furthermore, teachers can design learning activities that encourage students to explain their reasoning processes, discuss

alternative solution strategies, and reflect on their problem-solving approaches to strengthen analytical thinking skills in mathematics learning.

CONCLUSION

Based on the research results and discussions related to the analytical thinking of eighth-grade junior high school students in solving fraction problems based on gender, the conclusion is that both male and female students have equal abilities in meeting analytical thinking indicators, such as collecting data (differentiating), processing data (organizing), and testing strategies (attributing) in solving fraction problems. This indicates that overall, both subjects possess good analytical thinking skills in fractions.

Differences in the characteristics of problem-solving methods were evident in the two subjects in this study. Male subjects tended to provide more concise solution steps, go directly to calculations, and focus on procedures. On the other hand, female subjects tended to elaborate on the solution steps in greater detail, organize them, and process information and draw conclusions carefully. The results for these two subjects indicate that gender differences do not determine their analytical thinking abilities in solving fraction problems, but rather influence the style and manner in which each subject processes and presents mathematical information. Therefore, these variations in analytical thinking processes reflect differences in the cognitive characteristics of the two individuals studied, not differences in the quality of analytical thinking abilities in general.

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