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Critical Thinking in Solving Two-Variable Equation Word Problems: A Case Study by Gender Identity

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Abstract: Junior high school students' critical thinking in solving systems of linear equations often exhibits weaknesses, particularly in assessment and reasoning stages, which may hinder deep algebraic understanding. This study analyses students' critical thinking abilities according to Facione's indicators and explores how gender identity, measured through the Bem Sex Role Inventory, influences these patterns. This research contributes novel insights by systematically examining the intersection of critical thinking development and gender identity in algebraic problem-solving contexts. A descriptive case study methodology employed purposive sampling of four ninth-grade students at a junior high school in East Java, classified as masculine male, feminine male, masculine female, and feminine female based on BSRI scores. Data were collected through written tests, semi-structured interviews, observations, and documentation, then triangulated in analysis. Findings revealed distinct patterns: masculine males excelled in analysis and reasoning but lacked assessment skills; feminine males showed strong comprehension and articulation yet weak reasoning; masculine females demonstrated proficiency in analysis and assessment with less systematic explanations; and feminine females exhibited strong comprehension and articulation but limited analytical abilities. This study provides the first comprehensive framework linking gender identity profiles with critical thinking patterns in mathematical problem-solving, offering evidence-based guidance for developing inclusive instructional strategies in junior high mathematics.

Keywords: critical thinking; gender identity; problem solving; systems of linear equation.

INTRODUCTION

Critical thinking is an essential life skill that students need to navigate in an increasingly complex world; it enables them to analyse information systematically, evaluate evidence objectively, and make reasoned decisions in both academic and real-world contexts (Facione, 1990). Beyond the classroom, these abilities are crucial for students' future success in higher education, career development, and civic participation, where they must constantly assess the credibility of information, solve complex problems, and adapt to rapidly changing circumstances (Sari & Juandi, 2023). In mathematics education specifically, critical thinking involves not only understanding mathematical concepts but also applying them strategically to solve multifaceted problems (Wang & Abdullah, 2024). To better understand and assess critical thinking in educational contexts, (Facione, 1990) identified five core indicators that serve as the framework for this study: interpretation (the ability to comprehend and clarify meaning from given information), analysis (the skill to identify relationships and break down complex information into components), evaluation (the capacity to assess the credibility and logical strength of statements or arguments), explanation (the ability to articulate reasoning and present evidence coherently), and inference (the skill to draw reasonable conclusions and formulate hypotheses based on available evidence). (Ennis, 2018) emphasises that these critical thinking components encompass specific skills such as problem classification, argument analysis, and evidence-based decision-making, which are essential for students' lifelong learning and success.

International assessments from recent years reveal concerning trends in students' critical thinking development globally. PISA 2022 results indicated that Indonesian students scored 366 in mathematics, well below the OECD average of 472, with only 28% reaching Level 2

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proficiency—the baseline level where students begin to demonstrate critical thinking skills in mathematical contexts (OECD, 2018). These data reveal persistent challenges in developing higher-order thinking abilities, with students particularly struggling in tasks requiring analysis of complex problems, evaluation of multiple solution strategies, and inference-making from mathematical representations. The gap between Indonesian students and international standards has remained substantial over consecutive assessment cycles, highlighting systemic issues in fostering critical thinking within mathematics education.

These international findings directly connect to the critical thinking skills measured in this study through Systems of Linear Equations in Two Variables (SPLDV) problem-solving. Research by (Rahmayanti, Syofiana & Ramadianti, 2022) demonstrates that Indonesian students particularly struggle with these transformation processes from verbal contexts to mathematical equations, directly reflecting the gaps identified in international assessments. Furthermore, (Sari & Lestari, 2020) found that 65% of junior high students failed at the solution-evaluation stage due to underdeveloped metacognitive skills—the ability to monitor and reflect on one's own thinking processes. What distinguishes this current research from previous studies is its systematic integration of Facione's comprehensive critical thinking framework with SPLDV problem-solving analysis, providing a more nuanced understanding of specific thinking processes rather than general problem-solving outcomes. Additionally, this study addresses a significant gap by examining how individual cognitive profiles influence critical thinking patterns, moving beyond aggregate performance measures to understand personalized learning needs.

The examination of gender identity's influence on critical thinking represents a crucial but understudied dimension in mathematics education research (Harahap, Dahlan & Purniati, 2025). Gender identity, as conceptualised through (Bem’s, 1974) framework, refers to psychological characteristics that individuals associate with masculinity and femininity, independent of biological sex. Research by (Reilly, Neumann & Andrews, 2019) indicates that gender identity significantly influences cognitive processing styles, with individuals exhibiting masculine traits often showing preference for systematic, analytical approaches, while those with feminine traits may demonstrate strengths in contextual interpretation and collaborative problem-solving. In mathematics education, (Hyde's, 2014) Gender Similarities Hypothesis suggests that observed gender differences in mathematical performance stem primarily from socio-cultural factors rather than inherent cognitive differences, making gender identity a more relevant factor than biological gender in understanding learning patterns.

The urgency of investigating gender identity's role in critical thinking becomes apparent when considering that traditional mathematics instruction often favours particular thinking styles, potentially disadvantaging students whose cognitive approaches differ from conventional expectations (Boaler, 2016). Moreover, (Else-Quest, Hyde & Linn, 2010) found that countries with more gender-equitable educational practices showed smaller gender gaps in mathematical achievement, suggesting that understanding and accommodating diverse gender identity profiles could significantly improve learning outcomes. By investigating how masculine and feminine gender identities influence the five critical thinking indicators in SPLDV problem-solving, this research aims to provide evidence-based recommendations for creating more inclusive mathematics instruction that recognises and builds upon students' diverse cognitive strengths, ultimately contributing to improved mathematical literacy and reducing achievement gaps in Indonesian education.

METHODS

This study employed a descriptive qualitative approach with a case study design to analyse junior high students' critical-thinking abilities in solving Systems of Linear Equations in Two Variables (SPLDV) word problems. The analysis was conducted from the perspective of gender identity (feminine and masculine). This case study methodology was chosen to allow for an in-depth exploration of individual students' thinking processes, which is essential for understanding the nuanced ways different gender identities manifest critical thinking indicators.

Four ninth-grade students at a public junior high school in East Java were selected through purposive sampling. These students were classified into four groups: masculine male, feminine male, masculine female, and feminine female. The decision to focus on four participants aligns with the principle of theoretical saturation in qualitative research, where the primary goal is a deep, comprehensive understanding of each case rather than statistical generalisation (Guest, Namey & Chen, 2020). This sample size enabled an intensive analysis of individual thinking patterns while representing the full spectrum of gender identity combinations (Bouncken, Czakon & Schmitt, 2025). The selection process began with all ninth-grade students completing the Bem Sex Role Inventory (BSRI) questionnaire. The BSRI consists of 60 personality characteristics rated on a 7-point Likert scale. Gender identity classification was determined by calculating separate masculinity and femininity scores using median splits. The four final subjects were selected based on the highest BSRI scores in their respective categories and teacher recommendations.

The instruments used included a contextual problem designed to measure Facione's critical-thinking indicators. The problem was: "Seorang petugas parkir menerima Rp17.000,00 dari 3 mobil dan 5 sepeda motor, sedangkan dari 4 mobil dan 2 sepeda motor ia menerima Rp18.000,00. Jika ada 20 mobil dan 30 sepeda motor, berapa banyak uang yang akan diperoleh?" (A parking attendant receives Rp17,000.00 from 3 cars and 5 motorcycles, while from 4 cars and 2 motorcycles he receives Rp18,000.00. If there are 20 cars and 30 motorcycles, how much money will be obtained?)

Additionally, a semi-structured interview protocol with questions was developed to explore each critical thinking indicator. For example, interpretation questions included, "Can you describe the first step you took when you saw this problem?"; analysis questions, "How did you form the two equations from the problem?"; evaluation questions, "How were you sure that your values were correct?"; explanation questions, "Can you explain why you chose the substitution method?"; and inference questions, "How did you connect the calculation results to your final answer?".

Data were collected through written problem-solving tests (60 minutes), semi-structured interviews (30-45 minutes), behavioural observations, and documentation of student work. Data analysis followed a four-stage triangulation approach: (1) individual case analysis using deductive coding based on Facione's framework; (2) cross-case comparison to identify patterns across gender identity categories; (3) triangulation of written work against interview data and observations; and (4) pattern identification linking gender identity with critical thinking profiles. Researcher bias was minimised through peer debriefing and member checking.

RESULTS AND DISCUSSION

After completing the BSRI questionnaire, the following are the results for the four subjects in terms of their critical thinking indicators when solving SPLDV word problems.

- Masculine Male Subject (DF)

Given: $3x + 5y = 17000$ x=car
$4x + 2y = 18000$ y= motorcycle
Question: How much money is obtained from 20 cars and 30 motorcycles?
Solution:
$3x + 5y = 17000 \rightarrow \times 2 \rightarrow 6x + 10y = 34000$
$4x + 2y = 18000 \rightarrow \times 5 \rightarrow 20x + 10y = 90000$
--------------------------- −
$-14x = -54000$
$x = 4000$
$3(4000) + 5y = 17000 \rightarrow 12000 + 5y = 17000 \rightarrow$
$5y = 5000 \rightarrow y = 1000$
Total money $= 20(4000) + 30(1000)$
$= 80000 + 30000 = 110.000$
Therefore, the amount of money obtained from 20 cars and 30 motorcycles is Rp110,000.

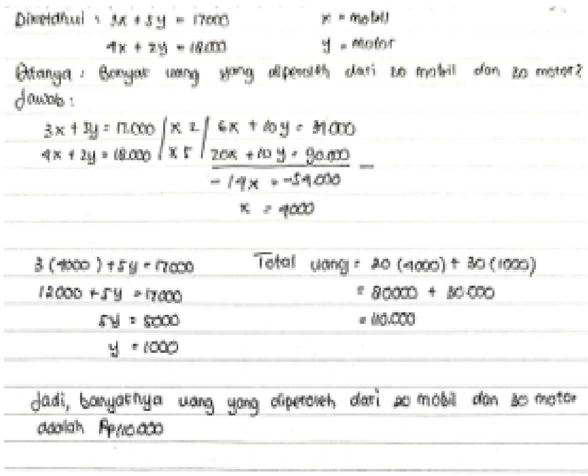

Figure 1. DF's Work Result

Based on Figure 1, which shows Subject DF's written work, an in-depth interview was conducted to explore his critical-thinking indicators. The following is an excerpt from the interview with Subject DF:

Interviewer : "Can you describe the first step you took when you saw this problem?"
DF : "I read the problem again to make sure which variables were involved, then I marked x and y on the paper."
Interviewer : "Why did you choose to identify the variables first?"
DF : "So I'd be clear on what was being asked, and I wouldn't get confused when starting to set up the equations."
Interviewer : "Why did you decide to use the elimination method?"
DF : "Both equations had coefficients that were easy to adjust for elimination. I modified the second equation so the coefficient of y would match the first one."
Interviewer : "Can you explain the substitution process you did?"
DF : "After eliminating y, I got the value of x. Then I substituted x into the original equation to calculate y. I wrote down each step so I wouldn't forget."
Interviewer : "How were you sure that x = 4000 and y = 1000 were correct?"
DF : "Because after substitution, both equations were satisfied—the results were consistent."
Interviewer : "Did you recheck your answers before submitting?"
DF : "I trusted my calculation right away, so I didn't check the result again."

Based on his written test and this in-depth interview, Subject DF correctly solved the problem. He was able to identify the given and required information (interpretation), formulate an accurate mathematical model and explain the relationships between variables (analysis and inference), and clearly articulate his solution steps (explanation). However, he did not review his answer, indicating a weakness in the evaluation aspect.

- Feminine Male Subject (RA)

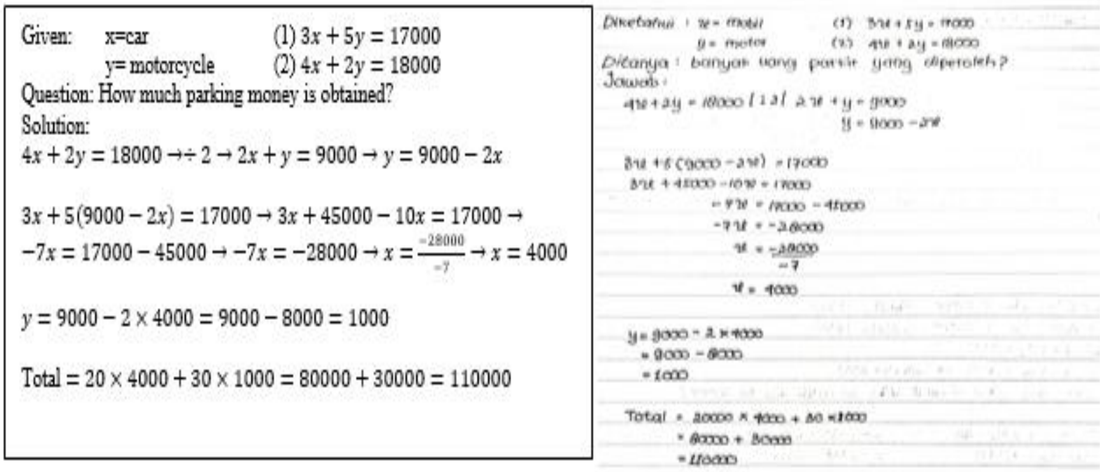

Figure 2. RA's Work Result

Based on Figure 2, which shows Subject RA's written work, an in-depth interview was conducted to explore his critical-thinking indicators. The following is an excerpt from the interview with Subject RA:

Interviewer : "What was the first thing you did when reading this problem?"
RA : "I immediately imagined the situation, then translated the problem sentences into two equations."
Interviewer : "How did you make sure you captured all the information in the problem?"
RA : "I reread the problem sentences while highlighting keywords like 'total', 'difference', and important numbers."
Interviewer : "Tell me about your process of breaking the problem into equations."
RA : "I wrote x and y as variables according to the context, then converted the verbal descriptions into mathematical form, although sometimes I missed small coefficient details."
Interviewer : "Why did you choose the substitution method?"
RA : "I thought substitution was faster because the second equation could be simplified, and one variable had a clear coefficient, so I could substitute the value directly."
Interviewer : "How did you connect the calculation results to your final answer?"
RA : "I looked at the values I got and tried plugging them back into the equation."
Interviewer : "What did you do to check your answer?"
RA : "I substituted once into one of the equations. If the result matched, I was confident it was correct."

Based on his written test and this in-depth interview, Subject RA also arrived at the correct final answer. He was able to identify the given and required information and create an appropriate mathematical model. He re-checked his answer (evaluation) and explained his solution process adequately (explanation). However, he did not provide a written or verbal conclusion demonstrating his final understanding of the result (weak inference).

- Masculine Female Subject (AD)

Given: 3 cars and 5 motorcycles yield 17,000
4 cars and 2 motorcycles yield 18,000
1.) $3x + 5y = 17000$
2.) $4x + 2y = 18000$
Question: How much money is obtained from 20 cars and 30 motorcycles?
Solution:
$2x + y = 9000 \rightarrow y = 9000 - 2x$
$3x + 5(9000 - 2x) = 17000 \rightarrow 3x + 45000 - 10x = 17000 \rightarrow$
$-7x = -28000 \rightarrow x = 4000$

$y = 9000 - 2 \times 4000 = 9000 - 8000 = 1000$

Total money $= 20 \times 4000 + 30 \times 1000 = 80000 + 30000 = 110000$

Therefore, the amount of money obtained by the parking attendant is 110,000.

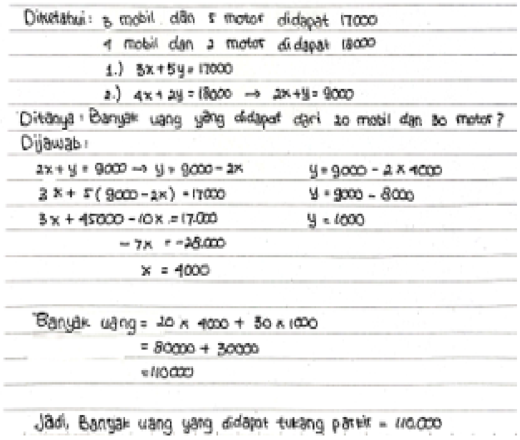
Diketahui: 3 mobil dan 5 motor didapat 17000
4 mobil dan 2 motor didapat 18000
1.) 3x+5y = 17000
2.) 4x+2y = 18000 → 2x+y = 9000
Ditanya: Banyak uang yang didapat dari 20 mobil dan 30 motor?
Dijawab:
2x+y = 9000 → y = 9000 - 2x
3x + 5(9000-2x) = 17000
3x + 45000 - 10x = 17000
-7x = -28000
x = 4000
y = 9000 - 2 x 4000
y = 9000 - 8000
y = 1000
Banyak uang = 20 x 4000 + 30 x 1000
= 80000 + 30000
= 110000
Jadi, Banyak uang yang didapat tukang parkir = 110.000

Figure 3. AD's Work Result

Based on Figure 3, which shows Subject AD's written work, an in-depth interview was conducted to explore her critical-thinking indicators. The following is an excerpt from the interview with Subject AD:

Interviewer : "What was the first step you took when you saw this problem?"
AD : "I read the problem slowly, then underlined important information like coefficients and constant values."
Interviewer : "How did you make sure you understood all the given data before forming the equations?"
AD : "I rewrote each sentence of the problem as bullet points, so it was clearer which parts were variables and which were constants."
Interviewer : "Describe your process of breaking the problem into two equations."
AD : "After identifying the key points, I constructed the equations one by one, making sure that addition or subtraction operations matched the context."
Interviewer : "Can you explain why you chose the substitution method?"
AD : "I chose substitution because it was easier to balance the coefficients, and I wrote each step in detail—although sometimes the sequence of steps jumped around."
Interviewer : "What made you confident about the values of x and y you obtained?"
AD : "The values matched the calculation results, and after I substituted them back into the equations, both sides were balanced."
Interviewer : "How did you double-check your answer before submitting it?"
AD : "I repeated the calculations at each step and compared the results across both equations to ensure consistency."

Based on her written test and this in-depth interview, Subject AD arrived at the correct final answer by accurately identifying the problem components and constructing an appropriate mathematical model. She also re-checked her calculations (evaluation). However, when asked to explain her problem-solving process, she appeared confused and less systematic in presenting her reasoning (weak explanation). Nevertheless, she was able to draw a conclusion consistent with her calculations.

- Feminine Female Subject (DS)

Given: $3x + 5y = 17000$
$4x + 2y = 18000$
Question: How much money does the parking attendant earn from 20 cars and 30 motorcycles?
Solution:
$3x + 5y = 17000 \rightarrow \times 2 \rightarrow 6x + 10y = 34000$
$4x + 2y = 18000 \rightarrow \times 5 \rightarrow 20x + 10y = 90000$
---------------------------- –
$-14x = -54000$
$x = 4000$

$3x + 5y = 17000 \rightarrow 3 \times 4000 + 5y = 17000 \rightarrow 12000 + 5y = 17000 \rightarrow$
$5y = 17000 - 12000 \rightarrow 5y = 5000 \rightarrow y = \frac{5000}{5} \rightarrow y = 1000$

$\text{Total} = 20 \times 4000 + 30 \times 1000 = 80000 + 30000 = 110000$

Therefore, the money earned is 110000.

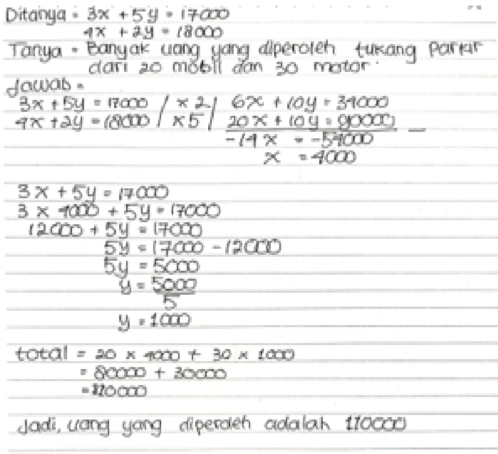
Ditanya = 3x + 5y = 17000
4x + 2y = 18000
Tanya = Banyak uang yang diperoleh tukang parkir dari 20 mobil dan 30 motor
Jawab =
3x + 5y = 17000 / x 2 / 6x + 10y = 34000
4x + 2y = 18000 / x 5 / 20x + 10y = 90000 –
-14x = -54000
x = 4000
3x + 5y = 17000
3 x 4000 + 5y = 17000
12000 + 5y = 17000
5y = 17000 - 12000
5y = 5000
y = 5000/5
y = 1000
total = 20 x 4000 + 30 x 1000
= 80000 + 30000
= 110000
Jadi, uang yang diperoleh adalah 110000

Figure 4. DS's Work Result

Based on Figure 4, which shows Subject DS's written work, an in-depth interview was conducted to explore her critical-thinking indicators. The following is an excerpt from the interview with Subject DS:

Interviewer : "What did you do when you first read this problem?"
DS : "I tried to understand the story right away, to figure out what was given and what needed to be found."
Interviewer : "How did you identify the variables and important information?"
DS : "I marked words like 'total', 'difference', and the numbers. From there, I could tell which one should be x and which one y."
Interviewer : "How did you form the two equations from the problem?"
DS : "I tried to create them directly from the story, but sometimes I got confused because it was hard to break the sentences into mathematical form."
Interviewer : "Can you explain your general problem-solving process?"
DS : "Once I had the equations, I used the elimination method. I wrote each step one by one so I wouldn't get confused and so I could review them later."
Interviewer : "How did you know that the x and y values you found were correct?"
DS : "I tried substituting them into one of the equations. If the result matched, I assumed it was correct, even though I still felt a bit unsure."
Interviewer : "Did you check your answers again?"
DS : "Yes, but only once. Usually, I just checked if the result matched the problem, but I didn't always verify it using both equations."

Based on her written test and this in-depth interview, Subject DS arrived at the correct final answer. She was able to identify the given information and construct an appropriate mathematical model. However, she could not logically explain the relationships between the variables and admitted that she solved the problem out of habit from previous exercises rather than deep understanding (weak inference). She did perform a re-check but was unaware of potential errors. Nonetheless, she clearly articulated her solution steps and stated a final conclusion.

Based on the critical thinking analysis of the four subjects, a summary was compiled according to the indicators, as shown in Table 1.

Table 1. Recap of Analysis of Critical Thinking Indicators for Each Student

Subjek	Gender	Indicator				
		Interpretation	Analysis	Evaluation	Explanation	Inference
DF	Masculine Male	✓	✓	x	✓	✓
RA	Feminine Male	✓	✓	✓	✓	x
AD	Masculine Female	✓	✓	✓	x	✓
DS	Feminine Female	✓	x	✓	✓	✓

These findings reveal that students' critical thinking tendencies vary according to their gender identity, with each gender identity exhibiting dominant tendencies in certain aspects of critical thinking. When comparing these findings with research by (Rahmayanti, Syofiana & Ramadianti, 2022), several important similarities and differences emerge. Both studies investigated junior high school students' critical thinking abilities in the context of systems of linear equations in two variables (SPLDV). (Rahmayanti, Syofiana & Ramadianti, 2022) found that overall, students' mathematical critical thinking abilities were in the moderate category, with high-ability students meeting all critical thinking indicators, moderate students meeting three indicators, and low-ability students only two indicators. In Rahmayanti's study, moderate and low-ability students often showed weaknesses in presenting solution steps systematically or in writing conclusions. This parallels the patterns found in the current study, where subjects RA (feminine male) and DS (feminine female) demonstrated weaknesses in inference or deep understanding, leading to incomplete conclusions. While (Rahmayanti, Syofiana & Ramadianti, 2022) provided a general overview of critical thinking ability levels, this research goes further by identifying specific profiles of strengths and weaknesses related to gender identity, providing a more nuanced understanding of how critical thinking manifests.

Regarding (Hyde's, 2014) Gender Similarities Hypothesis, this research examines gender identity (masculine and feminine) as factors influencing critical thinking patterns, rather than just biological sex. Hyde's Gender Similarities Hypothesis states that males and females are similar on most, but not all, psychological variables, with most observed differences being small or even trivial ($d \leq 0.10$). (Hyde, 2014) also emphasises that observed differences in mathematical performance largely stem from socio-cultural factors rather than innate cognitive differences. Our findings, which show different patterns in critical thinking tendencies based on gender identity, can be interpreted as consistent with Hyde's emphasis on socio-cultural influences. Although this study does not quantitatively measure the magnitude of differences (effect size) between gender identity groups, it demonstrates that the way critical thinking is manifested can vary qualitatively. This supports the idea that while overall cognitive capacity may be similar, specific profiles of strengths and weaknesses in critical thinking may differ depending on gender identity and how it interacts with the learning context. Thus, this research does not directly challenge the gender similarities hypothesis regarding the magnitude of differences in most variables but rather enriches understanding of the nuanced cognitive patterns associated with gender identity.

- Instructional Design Implications

Based on these findings and previous research, there are several important implications for instructional design. The first step involves addressing evaluation and metacognitive weaknesses. Research by (Sari & Lestari, 2020) found that 65% of junior high school students failed at the solution evaluation stage due to underdeveloped metacognitive skills. This finding is relevant to the evaluation weakness shown by the masculine male subject (DF) in this study. Therefore, instructional strategies should explicitly emphasise the process of rechecking answers and developing metacognitive skills—the ability to monitor and reflect on one's own thinking processes. The second aspect is the development of inference and analysis skills. The feminine male subject (RA) and feminine female subject (DS) showed weaknesses in inference and analysis. To address this, future instruction should help students connect abstract information with mathematical solutions and learn how to break down problem information into logical parts before formulating solution strategies. The third step involves the improvement of systematic explanation skills. The weakness in explanation demonstrated by the masculine female subject (AD) implies a need to encourage students to articulate their reasoning more systematically and structurally.

The fourth is the implementation of effective teaching methods. A literature review by (Sari & Juandi, 2023) identified that Problem-Based Learning (PBL) and Science, Technology, Engineering, and Mathematics (STEM) approaches are the most popular and effective methods for improving critical thinking abilities in mathematics education. PBL can encourage students to ask questions, discuss problems, and create solutions, which directly targets weaknesses in analysis and inference. STEM approaches educate students to become critical thinkers, and they can shape their critical thinking abilities and industrial mindset. The fifth factor to consider is the role of teaching materials and teacher attitudes. (Sari & Juandi, 2023) also emphasised the importance of well-designed teaching materials (e.g., mathematics comics, worksheets, e-modules) to trigger learning enthusiasm and support interpretation and analysis. Additionally, teachers' attitudes, such as using provocative questions, can encourage students to develop sceptical thinking habits and improve their analysis and evaluation skills.

Overall, these findings underscore the importance of instructional approaches that accommodate students' different thinking styles to optimise and balance the development of their critical thinking skills. By recognising varying critical thinking profiles across gender identities, educators can design more targeted and inclusive interventions. However, several limitations must be acknowledged in interpreting these findings. The small sample size (n=4) and single-school context limit the generalisability of the results to broader populations. The qualitative nature of data analysis introduces potential researcher bias in interpretation, despite triangulation efforts. Additionally, the cross-sectional design prevents examination of how critical thinking patterns may evolve or respond to instructional interventions. Cultural and socioeconomic factors that may influence both gender identity expression and critical thinking development were not systematically controlled in this study.

Future research should expand this investigation in several important directions: (1) longitudinal studies examining how critical thinking profiles develop and change across different mathematical topics and grade levels; (2) experimental intervention studies testing the effectiveness of differentiated instructional strategies based on gender identity profiles; (3) cross-cultural investigations to determine whether these patterns are consistent across diverse educational contexts; (4) mixed-methods studies with larger sample sizes to quantify effect sizes and statistical significance of observed patterns; and (5) investigation of additional variables such as socioeconomic status, prior mathematical achievement, and learning preferences that may interact with gender identity to influence critical thinking development. Such research would provide a more comprehensive understanding of the complex relationships between individual characteristics and mathematical thinking processes.

CONCLUSION

Based on the analysis of critical-thinking abilities in solving SPLDV word problems, it was found that critical-thinking tendencies varied according to gender identity. Masculine males demonstrated strengths in analysis and inference, as evidenced by their ability to deconstruct information and draw logical conclusions. However, a weakness appeared in evaluation, where they tended to rush decisions without rechecking. Feminine males excelled in interpretation and explanation, showing a strong grasp of problem content and clear articulation of their thought process. Nevertheless, they encountered difficulties in inference, particularly in connecting abstract information to mathematical solutions. Masculine females were superior in analysis and evaluation, displaying meticulousness in examining each step and assessing procedural correctness. Yet they were less systematic in presenting their explanations, causing their reasoning to be somewhat fragmented. Feminine females showed strengths in interpretation and explanation, able to comprehend problem context and articulate their answers clearly. However, they struggled with analysis, especially in breaking down problem information into logical parts before devising a solution strategy. Overall, these results indicate that each gender identity exhibits dominant tendencies in particular aspects of critical thinking.

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