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# MATHEMATICAL REPRESENTATION IN PROBLEM-SOLVING: A COMPARATIVE STUDY OF REFLECTIVE AND IMPULSIVE COGNITIVE STYLES

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## Abstrak

Representasi matematis adalah keterampilan penting yang memungkinkan siswa mengekspresikan, menginterpretasikan, dan menghubungkan konsep matematika melalui bentuk visual, simbolik, dan verbal. Penelitian ini mengeksplorasi perbedaan keterampilan representasi matematis antara siswa dengan gaya kognitif reflektif dan impulsif dalam menyelesaikan masalah sistem pertidaksamaan linear dua variabel. Dengan pendekatan deskriptif kualitatif, empat siswa sekolah menengah atas dipilih berdasarkan gaya kognitif mereka melalui Matching Familiar Figure Test (MFFT). Data dikumpulkan melalui tugas pemecahan masalah dan wawancara semi-terstruktur. Hasil penelitian menunjukkan bahwa siswa reflektif memiliki kemampuan representasi matematis yang lebih kuat, terutama dalam mengorganisasikan dan menerjemahkan informasi antar representasi visual, simbolik, dan verbal. Mereka menunjukkan pendekatan yang terstruktur dan analitis dalam pemecahan masalah, memastikan ketepatan dan koherensi dalam representasi mereka. Sebaliknya, siswa impulsif mengalami kesulitan dalam mengorganisasikan masalah, menggunakan representasi simbolik, dan menjelaskan secara verbal, sering kali menghasilkan representasi yang tidak lengkap dan kurang terstruktur karena kecenderungan mereka untuk mengutamakan kecepatan daripada ketelitian. Hasil ini menegaskan pengaruh gaya kognitif terhadap representasi matematis serta perlunya strategi pembelajaran yang disesuaikan. Penelitian lanjutan disarankan untuk memperluas cakupan matematika dan menerapkan intervensi yang dirancang untuk meningkatkan keterampilan representasi siswa sesuai dengan karakteristik kognitif mereka.

**Kata kunci**: Representasi matematis, gaya kognitif, reflektif, impulsif, pemecahan masalah.

## *Abstract*

*Mathematical representation is a crucial skill that enables students to express, interpret, and connect mathematical concepts through visual, symbolic, and verbal forms. This study explores the differences in mathematical representation skills between students with reflective and impulsive cognitive styles in solving two-variable linear inequality system problems. Using a qualitative descriptive approach, four high school students were selected based on their cognitive styles through the Matching Familiar Figure Test (MFFT). Data were collected through problem-solving tasks and semi-structured interviews. The findings indicate that reflective students demonstrate strong mathematical representation abilities, particularly in organizing and translating information across visual, symbolic, and verbal representations. They exhibit a structured and analytical approach to problem-solving, ensuring accuracy and coherence in their representations. In contrast, impulsive students struggle with problem organization, symbolic representation, and verbal explanation, often producing incomplete and less structured representations due to their tendency to prioritize speed over accuracy. These results highlight the influence of cognitive style on mathematical representation and suggest the need for tailored instructional strategies. Future research should expand the study to a broader mathematical scope and implement targeted interventions to enhance students' representation skills according to their cognitive characteristics.*

***Keywords**: Mathematical representation, cognitive style, reflective, impulsive, problem-solving*

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## INTRODUCTION

Mathematical representation is an important component in mathematics education and teaching. These skills are essential as they enable students to express, interpret, and connect mathematical ideas through various forms, such as symbolic notation, diagrams, graphs, and verbal explanations (Simbolon, 2019). Strong representation skills enable students to develop deeper conceptual understanding and apply mathematical knowledge effectively in problem-solving (Ilham & Astiati, 2024). According to the National Council of Teachers of Mathematics (NCTM), representation is one of the five process standards necessary for effective mathematics learning, alongside problem-solving, reasoning, communication, and connections (Mainali, 2021). These skills help students transition between different mathematical concepts and apply them in real-world contexts (Ilham & Astiati, 2024; Putra et al., 2024). However, the ability to construct and utilize mathematical representations varies among students, influenced by individual differences in cognitive processing and problem-solving approaches (Sobirin et al., 2023).

Cognitive style is one of the key factors that shape students' ability to represent mathematical concepts. It refers to an individual's habitual way of processing information and solving problems, which influences how they approach mathematical tasks (Batubara, 2023). In mathematics, cognitive style affects how students analyze problems, organize information, and select appropriate representations. Some students prefer a structured and analytical approach, carefully considering multiple aspects of a problem before forming a representation, while others rely on quick intuitive responses that may be less precise. Understanding cognitive styles is essential for developing effective teaching methodologies that foster mathematical understanding and representation among students (Wulandari, 2021).

Despite the recognized influence of cognitive style on learning, limited research has explored its impact on students' mathematical representation skills. Previous studies have primarily focused on cognitive style in relation to problem-solving accuracy and strategy use, but few have specifically examined how reflective and impulsive cognitive styles affect students' ability to construct and interpret mathematical representations (Pratama & Masduki, 2024; Yusrina et al., 2023). While mathematical representation skills play a crucial role in understanding abstract concepts, particularly in solving complex problems such as systems of two-variable inequalities. Therefore, further research is needed to investigate how these cognitive styles affect students' selection and use of mathematical representations, which could ultimately contribute to the development of more effective instructional strategies (Sobirin et al., 2023; Widyastuti & Jusra, 2022).

Several studies have examined the impact of cognitive styles on mathematical understanding. Cintamulya et al. (2024) found that reflective students exhibit greater accuracy in problem-solving, while impulsive students prioritize speed but are prone to errors. In the context of representation skills, Melinda (2017) analyzed students' mathematical representations in geometry based on their spatial cognitive styles and found that students with high spatial cognitive ability mastered all three indicators of mathematical

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representation, whereas those with lower spatial ability demonstrated limited mastery. Similarly, Amalia et al. (2020) compared mathematical representation skills in students taught using problem-based learning with GeoGebra versus realistic mathematics education, considering field-dependent and field-independent cognitive styles. Meanwhile, Fitriyani et al. showed that reflective students typically out-performed their impulsive counterparts in mathematical representation tasks, suggesting that reflective thinkers may leverage PBL's structured inquiry to construct deeper mathematical understanding (Fitriyani et al., 2021). Despite these studies, there remains a research gap concerning how reflective and impulsive cognitive styles influence mathematical representation in solving two-variable inequality systems.

This study aims to fill this gap by providing an in-depth exploration of how students with reflective and impulsive cognitive styles construct mathematical representations in the context of two-variable inequality systems. Unlike previous studies, this research not only examines students' accuracy in problem-solving but also provides a detailed description of how different cognitive styles shape their interpretation and representation of mathematical concepts. The findings are expected to contribute to the development of more effective instructional strategies tailored to students' cognitive characteristics, enhancing their ability to construct and utilize mathematical representations.

## METHODS

This study uses a qualitative descriptive approach to describe the mathematical representation skills of students with reflective and impulsive cognitive styles. The study focuses on understanding how cognitive styles affect students' understanding of linear-linear inequality systems. Conducted in a tenth-grade high school in South Sulawesi, Indonesia, this study targeted tenth-grade students. Out of a total of 50 students, four students were selected by purposive sampling as subjects based on their performance in the Matching Familiar Figure Test (MFFT), mathematical representation problem-solving tasks, and their communication skills. This selection procedure was strengthened by teacher input to ensure that the chosen students accurately represented distinct cognitive styles and were able to articulate their reasoning during interviews.

The research instruments used include the MFFT adapted from Warli, mathematical representation problem-solving tasks developed by the researcher, and interviews (Herianto, 2020). The representation tasks covered the topic of a system of linear inequalities in two variables and underwent expert validation by two mathematics education specialists to ensure content relevance, clarity, and construct alignment. Meanwhile, semi-structured interview guidelines were developed as a guide in gathering information from participants. These interview guidelines were validated by a qualitative research expert to ensure clarity, coherence, and consistency of the questions.

This study was conducted in several stages. The first stage, preparation, aimed to ensure the reliability and validity of the research instruments by adjusting the MFFT questionnaire for local language comprehension, developing mathematical representation tasks, and designing an interview guide to facilitate in-depth

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discussions with participants. The preparation stage also included obtaining expert judgment for all instruments to confirm their appropriateness for data collection. The second stage, implementation, involved administering the MFFT to all 50 participants, categorizing them into reflective and impulsive cognitive styles using accuracy and response-time scoring, and selecting two students with dominant reflective cognitive styles and two with dominant impulsive cognitive styles as research subjects. These selected students then completed the mathematical representation tasks on systems of linear inequalities, followed by individual interviews to explore their reasoning processes. The research instruments used in this study consisted of the MFFT test, the mathematical representation test, and an interview guide. The MFFT test was used to classify students' cognitive styles into reflective and impulsive, with language adjustments made to ensure clarity and comprehension within the local context. The mathematical representation tasks were developed by the researcher to assess students' visual, symbolic, and verbal representation abilities in solving two-variable linear inequality system problems and were validated by two experts in mathematics education for content relevance, clarity, and construct validity. The interview guide was designed to explore students' thought processes in depth and was validated by a qualitative research expert to ensure the consistency and clarity of the questions. Data were collected through tests, observations, and interviews. Expert validation confirmed that all instruments were valid and reliable for use in data collection.

The third stage, data analysis, entailed a qualitative process of observing, categorizing, and interpreting students' responses and interview data. Finally, the last stage, conclusion drawing, involved synthesizing the findings based on the results of data analysis. Triangulation across test results, observations, and interviews was conducted to enhance the credibility and accuracy of the findings. The data analysis techniques were adapted to each instrument used in the study. Data from the MFFT test were analyzed quantitatively to classify students into reflective and impulsive cognitive style categories based on their accuracy and response time. Data from the mathematical representation test were analyzed qualitatively through the processes of data reduction, data display, and conclusion drawing, focusing on indicators of visual, symbolic, and verbal representation. Meanwhile, data from the interviews were analyzed using the Miles et al. (2014) interactive model, which included transcription, coding, categorization, and interpretation to confirm and deepen the understanding of students' written responses. This structured approach ensured that each instrument contributed comprehensively to the overall analysis.

## RESULTS AND DISCUSSION

### 1. Mathematical Representations of Reflective Cognitive-Style Subjects

This section presents findings and discussions related to visual, symbol, and verbal representation abilities in reflective cognitive groups. These findings are based on the results of problem solving and clarification through the interview stage.

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a. Visual Representation

The results of the reflective group problem-solving that showed their visual representation ability were presented on the Figure 1.

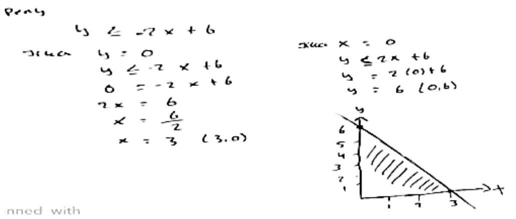

Figure 1**.** Example of a reflective participant's response on visual representation

Figure 1, illustrates that the subject (S-01) can construct and organize mathematical problems, as evidenced by their ability to determine the inequalities' intersection points. The subject represents these ideas by visualizing the solution region of the inequality system through a graph. The subject explains that the first step involves identifying the intersection points and using representation to create a mathematical model. The steps were carried out by drawing the complete solution region of the inequality and shading the appropriate area. Thus, it can be inferred that the subject relies on visual representation to solve the problem. This finding aligns with the study by (Fitriyani et al., 2021), which states that students with a reflective cognitive style tend to have highly developed visual representation skills.

Students with a reflective cognitive style typically exhibit excellent visual representation abilities. This cognitive style is characterized by a tendency to think deeply and carefully before responding, positively impacting their ability to understand and represent visual information. Research indicates that reflective students possess strong spatial abilities, enabling them to identify the spatial relationships between geometric elements and visualize objects from different perspectives (Satriani, 2024). This is reinforced by a study by Young and Shtulman, which found that reflective ability supports deeper conceptual understanding in science and mathematics, enabling students to overcome intuitive responses that are often incorrect (Young & Shtulman, 2020)

Furthermore, reflective students demonstrate superior problem-solving skills in tasks involving spatial and geometric content. They can effectively formulate, apply, and interpret visual information compared to students with an impulsive cognitive style (Damayanti et al., 2021). Other studies confirm that reflective students engage in a systematic thought process, including problem identification, analysis, evaluation, and alternative reasoning. This structured approach produces clearer and more precise visual representations (Awaliya & Masriyah, 2022). The ability to create visual representations is also reflected in the capacity of reflective students to develop mathematical models and graphical representations effectively in problem-solving (Astuti et al., 2021). With their meticulous and analytical approach, reflective students can connect mathematical concepts with relevant visualizations, enhancing their comprehension of the subject matter (Fitriani et al., 2023).

b. Symbolic Representation

The characteristics of the symbolic representation ability in the reflective group are presented in Figure 2.

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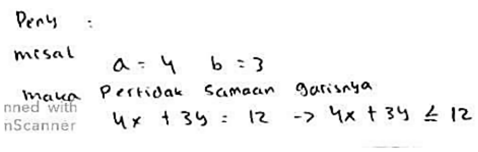


Figure 2. Example of a reflective participant’s response on symbolic representation

Figure 2 illustrates that the subject (S-01) can construct and organizing mathematical problems, as evidenced by their ability to assign variables $a$ and $b$ Subsequently, the subject (S-01) utilizes representation to develop a model involving mathematical expressions. In other words, the subject can accurately represent their thought processes by incorporating mathematical expressions. Thus, it can be inferred that the subject employs symbolic representation in problem-solving.

Furthermore, research indicates that reflective students are not only proficient in solving problems but also capable of expressing mathematical ideas through symbols and complex mathematical models. They can interpret symbols and present data in a visually comprehensible format, which serves as a strong indicator of advanced representational ability (Saputri & Faiziyah, 2023; Satriani, 2024). Therefore, the reflective cognitive style plays a crucial role in enhancing students' symbolic representation skills, which, in turn, positively impacts their mathematical understanding and achievement.

c. Verbal Representation

The results of the reflective group problem-solving that showed their verbal representation ability were presented on the Figure 3.

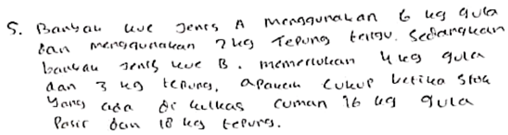

Figure 3. Example of a reflective participant’s response on verbal representation

Figure 3 illustrates that the subject (S-01) can construct, organizing, and communicating mathematical ideas, as evidenced by their ability to explain and elaborate on the information presented in the problem. The subject’s response also indicates their ability to translate between symbolic and verbal representations. Thus, it can be inferred that the subject employs verbal representation in problem-solving. This finding aligns with the study by Indrawati et al., (2019), which states that students with a reflective cognitive style are capable of creating verbal representations, meaning they can solve problems using words or written text.

Reflective cognitive style students demonstrate significant proficiency in verbal representation, which includes the ability to express mathematical situations and ideas using words. Astuti et al. (2021) found that reflective students can explain and describe mathematical problems verbally, reinforcing their ability to articulate mathematical concepts effectively. Similarly, (Chandra et al., 2021) emphasize that while both reflective and impulsive students may exhibit generally low mathematical representational skills, they still show potential in using verbal representation for problem-solving.

Furthermore, research by Saputri and Faiziyah (2023) highlights that students with a reflective cognitive style perform better in problem-solving when trained to utilize verbal representation. These findings suggest that verbal

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representation ability is not solely dependent on cognitive style but can also be enhanced through training and experience. Additionally, a study by Sarjana & Hayati (2020) improving students' verbal abilities contributes to their success in solving various types of mathematical problems, especially those that are verbal in nature, which often require mental adjustments to transfer information from narrative form into more formal mathematical representations.

**2. Mathematical Representations of Impulsive Cognitive-Style Subjects**

a. Visual Representation

The characteristics of the visual representation ability in the impulsive group are presented in Figure 4.

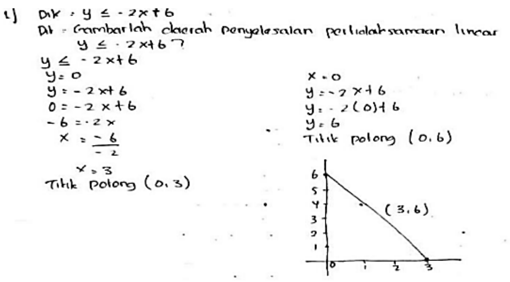


Figure 4. Example of an impulsive participant's response on visual representation

Figure 4 illustrates that the subject (S-02) demonstrates a strong understanding of the problem by effectively identifying the given information. This is evident in their ability to articulate what is known and what is being asked in the problem. The subject (S-02) is also capable of constructing and organizing the problem, as indicated by their ability to determine the intersection points of the given inequalities. Additionally, the subject successfully employs representation to develop a mathematical model by accurately sketching the solution region of the inequality and shading the appropriate area. In other words, the subject can translate their thought process into a graphical representation of the inequality's solution region. Therefore, it can be inferred that the subject utilizes visual representation in problem-solving.

This finding aligns with the study by Septiani et al. (2020), which suggests that students can sketch problems in the form of images to clarify their understanding. This is particularly evident in reflective students, who tend to be meticulous in problem-solving. Similarly, research by Gunawan et al. (2023) indicates that impulsive cognitive style students are also capable of producing effective visual representations, especially when solving problems that require geometric comprehension or visualization. The ability to utilize visual representation is further supported by findings showing that impulsive students, despite not always meeting high mathematical literacy standards, can successfully solve problems related to spatial and geometric content, particularly when trained to enhance their visualization skills (Saputri & Izzati, 2023).

Furthermore, students with an impulsive cognitive style often exhibit strong visual representation skills, even though they may not always follow a systematic approach to problem-solving (Syabaniah & Nuraeni, 2023). In addition, students who possess well-developed visual representation abilities tend to solve mathematical problems more efficiently. This is consistent with theoretical perspectives suggesting that visual representation serves as a crucial cognitive tool in understanding and solving mathematical problems (Azzahra & Sopiany, 2023).

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b. Symbolic Representation

The results of the impulsive group problem-solving that showed their symbolic representation ability were presented on the Figure 5.

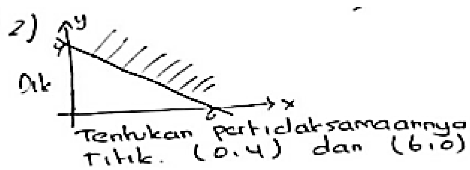


Figure 5. Example of an impulsive participant's response on symbolic representation

The findings from Figure 5 indicate that while the subject (S-02) is able to identify relevant information within the given problem, they struggle with constructing and organizing the problem effectively. This is evident in their inability to proceed beyond the initial steps toward obtaining a final solution. Furthermore, the subject does not utilize representation to develop a mathematical model involving inequality expressions. Instead, the subject merely identifies intersection points in Test I and performs multiplication on intersection points in Test II without progressing further in problem-solving.

These findings highlight a broader issue related to mathematical problem-solving skills among students with an impulsive cognitive style. These findings indicate impulsive students' difficulties in constructing mathematical models and organizing problem-solving steps effectively. This finding is in line with Sulisawati et al. (2019) that impulsive students have difficulty in building mathematical models, organizing problem-solving steps, and translating real-life situations into mathematical expressions. Moreover, impulsive students rely more on intuitive responses than systematically translating problems into mathematical expressions, which hinders their ability to generalize mathematical concepts across contexts (Septiani et al., 2020)

c. Verbal Representation

The characteristics of the verbal representation ability in the impulsive group are presented in Figure 6.

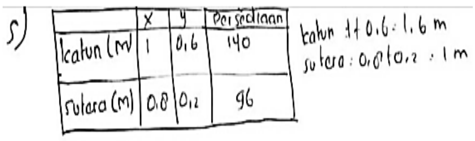

Figure 6. Example of an impulsive participant's response on verbal representation

The findings from Figure 6 indicate that the subject (S-02) struggles to construct, organize, and communicate mathematical ideas, as evidenced by their inability to explain or elaborate on the given problem information. The subject's responses and interview results further reveal their difficulty in translating between symbolic and verbal representations. Specifically, the subject is unable to articulate mathematical concepts in written or spoken form, which suggests a lack of verbal representation skills in problem-solving. This finding aligns with the study by Indrawati et al. (2019), which states that impulsive cognitive style students often face challenges in constructing symbolic representations, as they struggle to develop mathematical expression models. Additionally, these students demonstrate weaknesses in verbal representation, as they are unable to express problem-solving steps clearly through words or written text.

These challenges are characteristic of students with an impulsive cognitive style, who tend to focus on

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quick responses rather than structured reasoning. Impulsive students often have difficulty organizing their thought processes, which can hinder their ability to explain mathematical relationships coherently (Kurniawati et al., 2022; Salido et al., 2020). Their struggle to integrate different forms of representation suggests a reliance on intuitive rather than reflective problem-solving approaches (Kurniawati et al., 2022). To address this issue, instructional strategies should emphasize structured problem decomposition, encourage verbal reasoning exercises, and provide opportunities for students to articulate their mathematical thinking through guided discussions and written explanations.

### 3. Differences in Mathematical Representation of Reflective and Impulsive Cognitive Style Subjects in Understanding Two-Variable Inequality Systems

This section highlights significant differences in mathematical representation between reflective and impulsive cognitive styles, as summarized in the Table 1. These differences are evident across visual, symbolic, and verbal aspects of representation, affecting how students process and communicate mathematical problems.

Table 1. Mathematical Representation Differences on Reflective and Impulsive Groups

| Cognitive Style | Visual Representation | Symbolic Representation | Verbal Representation |
|---|---|---|---|
| **Reflective** | • Able to construct and organize problems.<br>• Accurately determines intersection points of inequalities.<br>• Represents thought processes through solution region graphs.<br>• Works carefully, re-checks solutions multiple times, and thinks systematically. | • Capable of assigning variables and forming mathematical models.<br>• Some subjects successfully use inequalities in models, while others struggle to complete the process. | • Able to explain and communicate mathematical ideas.<br>• Can translate between different representations and draw structured conclusions. |
| **Impulsive** | • Able to determine intersection points and create solution graphs.<br>• Problem-solving is rushed, careless, and lacks verification.<br>• Thought processes are unstructured. | • Struggles to simplify and organize problems.<br>• Unable to progress towards a solution.<br>• Does not effectively use symbolic representation in mathematical modelling. | • Unable to clearly explain mathematical concepts.<br>• Has difficulty translating symbollic representtations into verbal explanations.<br>• Struggles to construct coherent problem descriptions. |

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Table 1 shows that reflective subjects demonstrate a structured approach in their visual representations. They accurately determine the intersection points of given inequalities and effectively depict their thought processes by constructing graphical representations of solution regions. This ability suggests a high level of spatial reasoning and problem organization (Septiani et al., 2020). Additionally, reflective students tend to work meticulously, verifying their solutions multiple times before finalizing their answers. This habit aligns with research indicating that reflective thinkers engage in careful, step-by-step reasoning, leading to fewer computational errors (Satriawan et al., 2018). In contrast, impulsive subjects also exhibit the ability to determine intersection points and create solution graphs, but their approach is characterized by haste and carelessness. They tend to solve problems quickly without reviewing their answers, resulting in potential inaccuracies. Their unstructured problem-solving strategy suggests that they may prioritize speed over accuracy, a characteristic commonly associated with impulsive cognitive styles (Aini et al., 2020).

Reflective subjects show a stronger ability to use symbolic representation in problem-solving. They can assign variables and construct mathematical models that involve inequality expressions. However, variations exist among reflective learners, with some successfully forming complete models while others struggle to continue the process. This discrepancy may be attributed to individual differences in algebraic reasoning and conceptual understanding (Pratama & Masduki, 2024; Prayitno et al., 2022). Impulsive subjects, on the other hand, face significant difficulties in using symbolic representations. They struggle to simplify and organize mathematical problems, often failing to progress toward a final solution. Furthermore, they do not effectively utilize symbolic notation to develop mathematical models. Their challenges may stem from a lack of analytical planning and an inclination to focus on immediate calculations rather than conceptual understanding (Prayitno et al., 2022).

Reflective subjects exhibit strong verbal representation skills. They can articulate and communicate mathematical ideas clearly, effectively translating between different forms of representation, such as symbolic to verbal. Their structured approach allows them to provide well-organized explanations and conclusions, demonstrating a deep understanding of mathematical relationships (Septiani et al., 2020; Styoningtyas & Hariastuti, 2020). In contrast, impulsive subjects struggle significantly in verbal representation. They have difficulty explaining and conveying mathematical concepts, as seen in their inability to translate symbolic representations into verbal explanations. Additionally, their problem descriptions tend to be fragmented and unclear, suggesting a lack of coherence in their mathematical reasoning. This finding aligns with studies indicating that impulsive individuals often have weaker metacognitive skills, which affect their ability to verbalize and reflect on their thought processes (Ermis & Icellioglu, 2017).

The observed differences between reflective and impulsive students underscore the importance of tailored instructional strategies. Since reflective learners benefit from structured and thorough problem-solving methods, educators can reinforce these strengths

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by encouraging further self-monitoring and analytical reasoning exercises. Conversely, impulsive learners may require interventions that emphasize systematic problem-solving approaches, such as step-by-step guidance and verbal reasoning exercises, to enhance their ability to structure mathematical representations (Marita & Hord, 2017; Wang & Sperling, 2020).

Overall, the findings indicate that cognitive style plays a significant role in students' mathematical problem-solving processes. Reflective learners tend to produce more accurate, systematic, and interconnected mathematical representations, whereas impulsive learners often struggle with organizing information, verifying solutions, and articulating their reasoning clearly. These differences show that students' cognitive tendencies substantially shape both the quality and depth of their mathematical representations. Consequently, the results highlight the importance of differentiated instructional approaches that accommodate these variations. Teachers need to design learning activities that scaffold metacognitive regulation for impulsive learners—such as structured representation prompts, guided verification steps, and reflective questioning-while also providing opportunities for reflective learners to enhance their efficiency and flexibility in solving problems.

The implications and contributions of this study extend to both theory and practice in mathematics education. Theoretically, the findings deepen understanding of how cognitive styles influence students' representation processes and problem-solving behaviors, offering empirical evidence that enriches existing frameworks in cognitive-based mathematics learning. Methodologically, the study demonstrates the usefulness of combining representation analysis with cognitive-style profiling to obtain a more comprehensive view of learners' thinking processes. Practically, the results can guide educators and curriculum developers in creating instructional models that integrate the strengths of both reflective and impulsive learners, ultimately fostering a balanced development of analytical precision and intuitive reasoning. This study also serves as a reference for designing classroom interventions that better support students with diverse cognitive tendencies and improve their mathematical representation skills.

## CONCLUSION AND SUGGESTION

This study aimed to explore the mathematical representation skills of students with reflective and impulsive cognitive styles in solving two-variable inequality system problems. The findings reveal that reflective students exhibit strong visual, symbolic, and verbal representation abilities. They systematically analyze problems, carefully construct mathematical models, and effectively translate between different representational forms. In contrast, impulsive students demonstrate a fragmented approach to mathematical representation, often struggling with problem organization, symbolic representation, and verbal articulation. Their tendency to prioritize speed over accuracy results in less structured and incomplete representations. These findings confirm that cognitive style plays a crucial role in shaping students' mathematical reasoning and problem-solving strategies.

Despite its contributions, this study has limitations, including the small sample size and its focus on a single mathematical topic, which may

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affect the generalizability of the findings. Future research should explore a broader range of mathematical concepts and involve a larger, more diverse group of students to enhance the validity of cognitive style classify-cations. Additionally, experimental studies investigating instructional interventions tailored to different cognitive styles could provide deeper insights into effective strategies for improving mathematical representation skills in both reflective and impulsive learners.

The results of this study indicate the need for instructional approaches that are tailored to students' cognitive styles. Teachers are advised to provide structured guidance for impulsive students and encourage deeper analysis for reflective students. Training in visual, symbolic, and verbal representations should also be explicitly integrated into mathematics instruction.

The use of tests such as the MFFT can help identify students' cognitive styles to design appropriate strategies. Collaborative learning between reflective and impulsive students may also enhance understanding through mutual support.

Future research is recommended to expand the scope of mathematical content and participant numbers, as well as to examine the effectiveness of interventions designed to improve students' mathematical representation skills according to their cognitive styles.

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