

## **Profile of Mathematical Creative Thinking Ability of High School Students Reviewed from Cognitive Style**

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### *Abstract*

Vocational school students have distinctive characteristics that are influenced by a variety of factors, including their social, cultural, and cognitive backgrounds. In the world of education, the development of creative thinking skills is an important aspect for vocational school students. However, each student's level of creativity varies, and one factor that contributes to this difference is cognitive style. This study aims to examine the influence of cognitive style on the mathematical creative thinking ability of high school students in Sumedang Regency. The method used is a qualitative approach with a descriptive design, where data is collected through mathematical creative thinking tests as well as semi-structured interviews. The study participants totaled 28 students, who were categorized based on their cognitive styles into Field-Independent (FI) and Field-Dependent (FD) groups. Data analysis was conducted through the process of reduction, presentation, and concluding, which revealed that students' cognitive style influenced their understanding and response to mathematical information. The results of the study revealed that students with FI's cognitive style tended to have higher creative thinking skills, able to solve problems with a more flexible and complex approach. In contrast, students with FD cognitive style have difficulty thinking flexibly and adapting to various methods, so their level of creativity in solving math problems is lower. This finding is expected to provide insight for educators in designing more effective learning strategies to encourage the development of student creativity in mathematics.

**Keywords:** Cognitive Style, Mathematical Creative Thinking, Field Independent, Field Dependent

### **Abstrak**

Siswa SMK memiliki karakteristik khas yang dipengaruhi oleh berbagai faktor, termasuk latar belakang sosial, budaya, dan kemampuan kognitif. Dalam dunia pendidikan, pengembangan kemampuan berpikir kreatif menjadi aspek penting bagi siswa SMK. Namun, tingkat kreativitas setiap siswa berbeda-beda, dan salah satu faktor yang berperan dalam perbedaan ini adalah gaya kognitif. Penelitian ini bertujuan untuk mengkaji pengaruh gaya kognitif terhadap kemampuan berpikir kreatif matematis siswa sekolah menengah di Kabupaten Sumedang. Metode yang digunakan adalah pendekatan kualitatif dengan desain deskriptif, di mana data dikumpulkan melalui tes berpikir kreatif matematis serta wawancara semi-terstruktur. Partisipan penelitian berjumlah 28 siswa, yang dikategorikan berdasarkan gaya kognitif mereka menjadi Field Independent (FI) dan Field Dependent (FD). Analisis data dilakukan melalui proses reduksi, penyajian, serta penarikan kesimpulan yang menunjukkan bahwa pemahaman dan respons siswa terhadap informasi matematika dipengaruhi oleh gaya kognitif mereka. Hasil penelitian mengungkapkan bahwa siswa dengan gaya kognitif FI cenderung memiliki kemampuan berpikir kreatif yang lebih tinggi, mampu menyelesaikan masalah dengan pendekatan yang lebih fleksibel dan kompleks. Sebaliknya, siswa dengan gaya kognitif FD mengalami kesulitan dalam berpikir fleksibel dan menyesuaikan diri dengan berbagai metode, sehingga tingkat kreativitas mereka dalam menyelesaikan masalah matematika lebih rendah. Temuan ini diharapkan dapat memberikan wawasan bagi pendidik dalam merancang strategi pembelajaran yang lebih efektif guna mendorong pengembangan kreativitas siswa dalam matematika.

**Kata kunci:** Gaya Kognitif, Berpikir Kreatif Matematis, Field Independent, Field Dependent

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## **INTRODUCTION**

Since mathematics is essential to many facets of life, including counting and measuring, it is taught at all educational levels. Because of this, mathematics is a fundamental subject that plays a big

part in both everyday life and the advancement of science and technology (Kadir et al., 2022). Along with the development of the times, especially in the era of the Industrial Revolution 4.0, the world of education is required to produce graduates who are not only skilled in one field, but also creative, innovative, and able to communicate well to develop the field they are engaged in. These skills include critical thinking skills, problem-solving, and creativity that are indispensable in facing the challenges of an increasingly dynamic and competitive future (Maryanto & Siswanto, 2021).

Creative thinking, especially in the context of mathematics, is one of the abilities that students need to have. This is important because creative thinking allows individuals to find new solutions, develop original ideas, and confront problems with different approaches. In fact, individuals who are given the opportunity to think creatively can develop better, while those who are not given the opportunity tend to experience frustration and dissatisfaction (Susilawati et al., 2020). Therefore (Santi & Roza, 2019) says that the development of mathematical creative thinking skills has become very relevant in preparing students to face future challenges. Creative thinking is a process used by individuals to generate or present new ideas (Jaenudin et al., 2020).

The capacity for creative thinking in mathematics consists of several main components, namely fluency, flexibility, originality, and elaboration (Faroh et al., 2022). Each of these components plays a crucial role in helping students develop a creative and productive way of thinking. There are also various levels of creativity that can be measured, ranging from very creative to uncreative (Pratiwi et al., 2021). Through this component, the achievement of creative thinking can be measured by identifying through open-ended questions. Fluency has to do with the ability to generate multiple ideas easily. Flexibility refers to the ability to create diverse ideas. Novelty is the basis of authenticity, purity, and invention. Originality refers to the capability to generate amazing ideas, solve problems in unique ways, or use things or situations in innovative ways. Elaboration is a person's ability to provide details that enrich an existing relationship or framework (Jaenudin et al., 2020).

Vocational school students have unique characteristics that are influenced by various factors, namely social, cultural, and cognitive backgrounds (Nugroho, 2022). The cognitive abilities possessed by vocational school students are diverse, such as the ability to think critically, analytically, and creatively (Fatimah, 2018). In the context of education, it is important for vocational school students to develop creative thinking skills because creative thinking allows students to generate new ideas, solve problems with various approaches, and adapt quickly to changes that occur in the world of work (Adiastuty et al., 2022).

However, the ability to think creatively mathematically has not developed among students. Some studies show that many students feel insecure and consider math to be a difficult subject. This causes them to have difficulty finding formulas or ways to solve mathematical problems (Astria & Kusuma, 2023). In line with research conducted by (Rusmilah et al., 2022), that in the classroom students are not given the opportunity to express opinions or find answers in a different way from the methods that have been taught. This condition has an impact on the development of students' creative

thinking skills, so that their abilities are difficult to develop. In addition, the learning process that focuses less on developing creativity and more on knowledge transfer causes students to not have enough analytical, synthesis, and creativity skills (Astria & Kusuma, 2023).

The variation in students' levels of mathematical creative thinking ability is not solely determined by the learning model, but another factor is cognitive style (Adiastuty et al., 2022). Cognitive style refers to the way individuals process and organize the information received (Rainer & Christi, 2018). Research shows that cognitive styles have a great influence on students' creative thinking skills, because each cognitive style affects the way students understand and respond to mathematical information (Maryanto & Siswanto, 2021). Cognitive styles include relatively stable patterns of attitudes, preferences, or certain strategies that differentiate the way individuals feel, remember, think, and solve problems (Yusuf & Sukestiyarno, 2022). Thus, it can be said that cognitive style serves as the way individuals receive and process different stimuli and information in the context of learning.

Education experts categorize cognitive styles into three domains, namely: (1) differences in cognitive styles psychologically, including field-dependent and field-independent cognitive styles, (2) differences in cognitive styles based on conceptual tempos, namely impulsive cognitive styles and reflective cognitive styles, and (3) differences in cognitive styles according to the way of thinking, including intuitive-inductive cognitive styles and deductive logic (Amalya Putri & Arsyad, 2020).

The characteristics of the field-independent cognitive style tends to be more analytical and independent in thinking, while field-dependent cognitive style tends to be more effective in learning situations involving collaboration and social interaction (Wulan, 2019). The distinction between cognitive types that are field-dependent and field-independent can also help educators design appropriate learning strategies to enhance the mathematical creative thinking abilities of all students (Atun Nisa et al., 2024). Therefore, by applying different learning approaches, it can optimize the potential of mathematical creative thinking of field independent and field dependent students. By considering the characteristics and differences in mathematical creative thinking skills between students who are field-dependent and those who are not, educators can design more effective learning in improving mathematical creative thinking skills as a whole.

Several studies have analyzed creative thinking abilities from the perspective of cognitive style (Herawati et al., n.d.; Maryanto & Siswanto, 2021; Prihatiningsih & Ratu, 2020; Rosadi et al., 2022). However, there has been no research that analyzes the mathematical creative thinking ability of vocational school students from the perspective of cognitive style. Therefore, it is important to conduct more specific research to identify the relationship between cognitive style and regarding vocational school pupils' capacity for mathematical creativity, in order to design a more effective learning approach that suits their cognitive characteristics.

## METHOD

This study employs a qualitative descriptive method designed to illustrate natural phenomena that have occurred, already existed, or are ongoing (Nurfitriani et al., 2024). Researchers applied qualitative techniques to analyze how students solved problems and identified problems when working on mathematical creative thinking problems according to their cognitive type. The subjects of the study were 28 students of class X AKL 3 Vocational High School in Sumedang Regency, West Java, where the researcher acted as an instructor. This research will be carried out in the 2024–2025 academic year. The flowchart in this research is displayed in Figure 1.

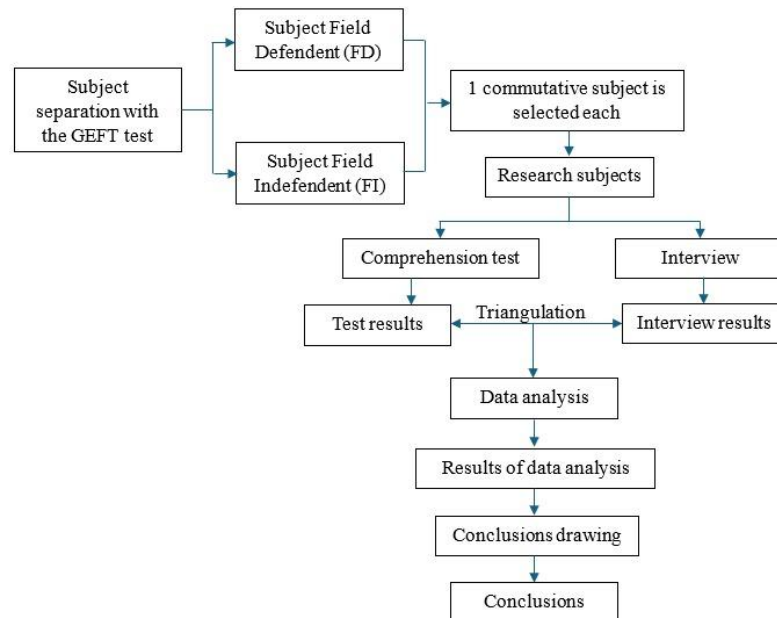


Figure 1. Flowchart research

Data collection is carried out in three stages. First, participants completed the Group Embedded Figures Test (GEFT) to identify their cognitive style. Second, they work on mathematical creative thinking problems. Finally, one student who prefers the FI learning method and one student who prefers the FD learning style are selected for further analysis.

The tools used in this study include the GEFT test for cognitive style assessment, a mathematical creative thinking test consisting of four questions, and a structured interview. The GEFT test consists of 25 pictorial questions, of which 7 are exercises and 18 are the main tests. Students who score more than nine participants are classified as field-independent, while those who score less than nine are categorized as field dependent (Nurfitriani et al., 2024). Scores on the mathematical creative thinking test are converted to a scale of 1-100 and categorized based on ability level. The determination of the score criteria is based on (Wahyuni & Palupi, 2022), which can be seen in the following table.

Table 1. Mathematical Creative Thinking Level

| <b>Level</b> | <b>Category</b> | <b>Criterion</b>         |
|--------------|-----------------|--------------------------|
| Level 0      | Not Creative    | If the number $\leq 20$  |
| Level 1      | Less Creative   | If the number $\leq 40$  |
| Level 2      | Quite Creative  | If the number $\leq 60$  |
| Level 3      | Creative        | If the number $\leq 80$  |
| Level 4      | Very Creative   | If the number $\leq 100$ |

To strengthen the results of the written test, a triangulation interview was conducted. Students are interviewed after completing mathematical creative thinking problems to find out their problem-solving process. Interview questions include the difficulties faced and how to do them. The interviewer also asks questions about the problems students face and asks provocative questions related to the concepts used. The data analysis method used in this study follows Miles and Huberman, specifically, data reduction, data presentation, drawing conclusions (Nurfitriani et al., 2024). First, the results of the GEFT test, creative thinking ability test and interviews were reduced or simplified or centralized. Furthermore, data analysis is carried out on the results of the GEFT test, creative thinking ability test, and interview results. Before being used in the study, all instruments underwent a validation process. The content validity of the instruments was assessed by three experts in mathematics education, who evaluated the clarity, relevance, and coherence of each item. The validity of the GEFT test and the mathematical creative thinking test was examined using the Aiken's V index, where a value above 0.75 indicates strong content validity. Additionally, the reliability of the mathematical creative thinking test was analyzed utilizing Cronbach's Alpha, with a reliability coefficient ( $\alpha$ ) above 0.70 considered acceptable. Based on the validation results, necessary revisions were made to ensure the clarity and appropriateness of the test items before administration. The results of the data analysis are then presented through data descriptions in the form of narrative text, graphs/tables, and relationships between categories. Finally, conclusions are drawn based on data collection in the field from tests, interviews, and consistent and valid documentation, so that the conclusions put forward are credible or can be trusted.

## **RESULT AND DISCUSS**

According to the study's findings on grade X students of high school in Sumedang Regency, information about students' cognitive styles is presented in Table 2. This table illustrates the distribution of students' cognitive styles which provides an understanding of how Cognitive styles influence their capability in solving mathematical problems, especially as it relates to mathematical creative thinking. This data can also help teachers in designing learning strategies that are more effective and in accordance with the cognitive needs of students.

Table 2. Cognitive Style Test Results

| <b>Cognitive Style</b>            | <b>Number of Students</b> |
|-----------------------------------|---------------------------|
| Field Independent Students (S-FI) | 9                         |
| Field Dependent Students (S-FD)   | 19                        |

Two students, one with a field-independent cognitive style and one with a field-dependent cognitive style, were chosen as research subjects based on their performance on the mathematics creative thinking ability test. These subjects are chosen based on each student's greatest result in the cognitive style category of the mathematics creative thinking ability exam. This selection's objective is to carry out additional interviews in relation to the test responses provided by pupils.

## SOAL!

1. Pabrik pada bulan pertama memproduksi 120 pasang sepatu, setiap bulannya hasil produksi mengalami pertambahan 30 pasang sepatu. Jumlah pasang sepatu di produksi pabrik pada tahun pertama adalah ....
2. Suatu perusahaan air minum pada bulan ke-2 dapat menjual 6.400 botol minuman. Sedangkan pada bulan ke-12 dapat menjual 10.400 botol minuman. Peningkatan penjualan setiap bulannya memenuhi barisan aritmatika. Maka jumlah penjualan minuman satu setengah tahun pertama adalah ...
3. Suatu tambang dipotong menjadi 7 bagian, sehingga membentuk barisan geometri. Jika panjang potongan tambang terpendek 4 m dan panjang potongan tambang terpanjang 256 m, maka panjang tambang sebelum dipotong adalah ...
4. Pak Budi membeli satu unit sepeda motor dengan harga Rp 18.000.000,00 pada awal tahun 2019, ia merencanakan mengganti kendaraannya setelah digunakan selama lima tahun. Ia memperkirakan terjadinya penyusutan terhadap nilai jual kendaraan sebesar 10% pertahun. Nilai jual setelah kendaraan digunakan selama lima tahun adalah ... (selesaikan dengan 2 cara)

Figure 2. Test questions (Santi & Roza, 2019)

The following are the results of the analysis of the answers to the mathematical creative thinking ability test given on arithmetic rows and series material by subjects with a field-independent cognitive style. The question asked students to calculate the number of pairs of shoes produced by the factory in the first year using various methods. Students are expected to find solutions with a variety of approaches and think creatively according to their own ideas and ideas.

Handwritten solution for question 1:

Dik:  $a = 120$   
 $n = 12$   
 $b = 30$

Dit:  $U_n, S_n$  ?

Jawab:  $U_n = a + (n-1)b$   
 $= 120 + (12-1) \cdot 30$   
 $= 120 + 11 \cdot 30$   
 $= 120 + 330$   
 $= 450$

$S_n = \frac{n}{2} (2a + (n-1)b)$   
 $= \frac{12}{2} (2 \cdot 120 + (12-1) \cdot 30)$   
 $= 6 \cdot 570$   
 $= 3.420$

Figure 3. Results of S-FI work on question number 1

Question number 1 measures the indicator of creative thinking ability, namely *fluency* (fluency in thinking). S-FI shows that students are able to provide more than one relevant idea, with complete and clear completion, thus demonstrating fluent thinking skills.

Handwritten solution for question 2:

Dik:  $U_1 = 6.400$   
 $U_{12} = 10.400$

Dit:  $S_6$  ?

Jawab:  $b = \frac{U_{12} - U_1}{12 - 1}$   
 $= \frac{10.400 - 6.400}{11}$   
 $= \frac{4.000}{11}$   
 $= 400$

$a = U_1 - b$   
 $= 6.400 - 400$   
 $= 6.000$

$U_6 = a + (6-1)b$   
 $= 6.000 + 5 \cdot 400$   
 $= 6.000 + 2.000$   
 $= 8.000$

Figure 4. Results of S-FI work on question number 2

Question number 2 tests the ability to think creatively, namely *originality*. The results showed that the students gave answers in their own way, the calculations were correct, but the information conveyed was not clear. In the originality indicator, it can be seen that students are not able to think originally.

3. Dik :  $U_1 = a = 4$   
 $U_n = 256$   
 Dit : Panjang kawat tembaga ( $S_n$ )  
 Jawaban :  $U_n = a + (n-1)r$   
 $4 + (n-1) \cdot 2 = 256$   
 $2n - 2 = 252$   
 $2n = 254$   
 $n = 127$   
 $r = \frac{U_n - U_1}{n - 1} = \frac{256 - 4}{127 - 1} = \frac{252}{126} = 2$   
 $S_n = \frac{n}{2} (2a + (n-1)r)$   
 $= \frac{127}{2} (2 \cdot 4 + (127-1) \cdot 2)$   
 $= \frac{127}{2} (8 + 252)$   
 $= \frac{127}{2} \cdot 260 = 127 \cdot 130 = 16510$

Figure 5. Results of S-FI work on question number 3

Question no 3 tests the indicator of creative thinking ability, namely *elaboration* (elaboration of ideas). S-FI indicates that students provide correct and detailed answers. However, in the *elaboration* indicator, it can be seen that some students are still not able to think in detail.

4. Dik : 1 juta rupiah = Rp 10.000.000  
 Peningkatan nilai jual 10% pertama  
 Dit : Nilai jual setelah dua kali peningkatan? (diketahui)  
 Jawab : 10% = 10/100 = 0,1  
 10.000.000 + 10% = 11.000.000  
 11.000.000 - 10% = 9.900.000  
 9.900.000 + 10% = 10.890.000

Figure 6. Results of S-FI work on question number 4

Question number 4 tests the indicator of creative thinking ability, namely *flexibility*. S-FI shows that students give answers in one way, but the calculation process and results are correct. In the flexibility indicator, students' mathematical creative thinking ability shows that S-FI is not able to think creatively when viewed from the aspect of flexibility of thinking.

1. Dik :  $a = 120$   
 $b = 80$   
 Dit :  $U_n = ?$  karena 7 tahun = 12 bulan  
 Jawab :  
 $U_n = a + (n-1)b$   
 $= 120 + (12-1)80$   
 $= 120 + 11 \cdot 80$   
 $= 120 + 880$   
 $U_n = 1000$   
 $S_n = \frac{n}{2} (2a + (n-1)b)$   
 $= \frac{6}{2} (2 \cdot 120 + (6-1) \cdot 80)$   
 $= 3 (240 + 400)$   
 $= 3 \cdot 640 = 1920$

Figure 7. Results of S-FD work on question number 1

Based on Figure 7, the S-FD shows that the student has provided more than one relevant idea even though the solution provided is less clear. On the fluency indicator, students' mathematical creative thinking skills show that S-FD can think fluently.

2. Dik :  $a = 18$   
 $b = 6400$   
 $U_n = 10.400$   
 Dit :  $S_n$   
 Jawab :  
 $S_n = \frac{n}{2} (2a + (n-1)b)$

Figure 8. Results of S-FD work on question number 2

Based on Figure 8, the S-FD shows that the student did not provide an answer. In the originality indicator, this indicates that students are unable to generate original thoughts.

$$\begin{aligned}
 3. S_n &= a \frac{(r^n - 1)}{r - 1} \\
 S_n &= 4 \frac{(2^{128} - 1)}{2 - 1} \\
 &= 4(2^{128} - 1) \\
 &= 4.127 \\
 &= 500
 \end{aligned}$$

Figure 9. Results of S-FD work on question number 3

According to Figure 9, the S-FD shows that there is an error in the answer given and is not accompanied by details. In the *elaboration* indicator, the results show that S-FD is not able to think in detail.

Figure 10. Results of S-FD work on question number 4

The S-FD in Figure 10 indicates that the learner provides the answer in two incorrect ways. When examined from the perspective of thinking flexibility, pupils' mathematics creative thinking skill in the flexibility indication indicates that they lack the capacity for creative thought. Table 3 shows the degree to which students with Field-Independent and Field-Dependent thinking styles. can solve arithmetic series and series issues using markers of mathematical creative thinking skills.

Table 3. Achievement of Indicators of Mathematical Connection Ability in Students with Cognitive Styles

| Subject Code | Indicator 1 | Indicator 2 | Indicator 3 | Indicator 4 |
|--------------|-------------|-------------|-------------|-------------|
| S-FI         | ✓           | ✓           | ✓           | ✓           |
| S-FD         | ✓           | -           | -           | -           |

Based on Table 3 which shows the achievement of indicators of mathematical the capacity for creative thinking influenced by cognitive style, it can be seen that subjects with the code S-FI (Field Independent) managed to achieve all indicators (1, 2, 3, and 4). This shows that S-FI subjects have good mathematical creative thinking skills, especially in the skills measured by these indicators. In contrast, subjects with the code S-FD (Field Dependent) only managed to achieve indicator 1, but failed to achieve indicators 2, 3, and 4. This indicates that students with the S-FD cognitive style may have difficulty mastering more complex creative thinking skills, so they need to pay more attention to the development of these skills.

Based on the results of research conducted on grade X students of vocational high schools in Sumedang Regency regarding mathematical creative thinking skills in arithmetic rows and series materials reviewed from students' cognitive styles, several relevant things were found related to differences in cognitive styles and their impact on their mathematical creative thinking skills. The findings of this research are consistent with various previous studies which showed that cognitive style has a significant influence on the way students solve mathematical problems, especially in the context of creative thinking.

This study shows that students' cognitive styles, namely field independent (FI) and field dependent (FD), have different impacts on their mathematical Creative thinking ability. Field independent (FI) cognitive styles are generally more analytical, where students with this cognitive style are able to solve problems in a more structured and in-depth way. Conversely, students with a field-dependent (FD) cognitive style tend to rely more on external cues and difficulty developing more complex solutions. These results are in line with research by (Firman Raharjo, 2024), which states that S-FDs often experience difficulties in separating important information from the broader context, making it difficult to develop complex solutions.

Field Independent (FI) gives students the freedom to think more freely and structured, while Field Dependent (FD) shows a tendency to be context-oriented and rely on a clearer structure in solving problems. Based on the results of this study, students with the FI cognitive style showed better mathematical creative thinking skills, successfully achieving all the measured indicators (fluency, originality, elaboration, and flexibility), while students with the FD cognitive style were only able to achieve fluency indicators and experienced difficulties in achieving other indicators. This is consistent with the findings in the study (Azahra & Subekti, 2024), which revealed that students with the FI cognitive style are better able to think creatively and solve math problems with a more innovative approach. As said by (Wulandari, 2017) FI students show a higher level of creativity by being more innovative in finding alternative solutions.

On the fluency indicator, which measures how many ideas or solutions a student can come up with, students with the FI cognitive style successfully show more than one relevant idea, with a complete and clear solution. This shows that fluency is an important indicator in measuring creative thinking skills related to the ability to generate many ideas in a short time. This result is in line with research by (Fatma Wati et al., 2023) which found that fluency is an important foundation in mathematical creative thinking because it helps students develop new ideas that are easy and flexible in overcoming mathematical problems.

Meanwhile, although FD students can also provide some relevant ideas but the solution is less clear. This shows that although FD students are able to generate many ideas, they are more likely to have difficulty in detailing and explaining their solutions in detail, as also explained by (Nurmalia et al., 2019), that FD students often have difficulty in separating information from its context. They tend

to receive information globally without distinguishing between existing components, making it difficult to analyze or plan problem-solving steps in a structured manner.

In originality, which measures students' ability to come up with new and different ideas, S-FI demonstrates the ability to provide answers in their own way even if the information presented is not always clear. This shows that students with the FI cognitive style have the potential to think originally, but they still need to improve their ability to communicate their ideas more clearly. In contrast, S-FDs are not able to provide original answers at all, which shows difficulties in generating new or innovative ideas independently. These findings are supported by (Hardiansyah et al., 2024), which states that the characteristics of FD students' thinking processes include thinking globally or using their own methods when facing complex problems.

In the elaboration indicator, the ability to develop ideas in detail, S-FI shows a good ability to give correct and detailed answers. However, some students still have difficulty in developing ideas in more detail. This indicates that while students with the FI cognitive style typically demonstrate a more structured and organized approach to thinking, they must also continue to develop their ability to detail the ideas and solutions they provide. Research conducted by (Aurelia Hidajat et al., 2018) supports this finding by suggesting that elaboration in mathematical creative thinking can be defined as the ability to develop, add, and enrich mathematical ideas.

On the other hand, S-FD shows difficulty in providing a clear and detailed elaboration of the answer. This is in line with research (Amini et al., 2023) that students with the FD cognitive style are less able to analyze problems well, less able to provide ideas, ideas and alternative answers, and less able to find ways to solve problems correctly and write down detailed answers to questions.

On the flexibility indicator, which measures students' ability to see problems from different perspectives and use different approaches, S-FI provides solutions in one way, even if the calculations are correct. This suggests that although students with the FI cognitive style think in a structured manner, they have not fully developed flexibility in how they solve problems. This is relevant to research by (Rosadi et al., 2022), which shows that although students with the FI style can think systematically, they are often stuck in one method of solving that has been shown to be effective for them.

Students with FD cognitive style are unable to solve problems in more than one way, which indicates difficulty in thinking flexibly and adapting to different approaches to solving problems. This is consistent with the findings (Prihatiningsih & Ratu, 2020), which suggests that FD students have a lower level of creative thinking ability in terms of flexibility.

The results of this study have important consequences for the advancement of more efficient mathematics learning strategies. Based on the results of the study, students with a field-independent cognitive style can more easily develop creative thinking skills, but they still need challenges to develop their flexibility and originality of thinking. In contrast, students with a field-dependent

cognitive style need more intensive support to enhance creative thinking skills, especially in the aspects of originality, elaboration, and flexibility of thinking.

Therefore, it is important for teachers to adjust their teaching methods by taking into account the student's cognitive style. For students with cognitive styles, FI tends to be more analytical and able to solve problems in a more structured way, while individuals with FD styles are more attached to the social context and surrounding situations. Students with FD cognitive style, a more structured approach and the use of visual or concrete aids can help them to understand and develop creative ideas. Meanwhile, for students with the FI cognitive style, learning that encourages the exploration of various solutions and approaches can stimulate their creativity further.

## CONCLUSION

According to this study, students' cognitive styles—field independent (FI) and field dependent (FD)—have a big impact on their capacity for original mathematical thought. Pupils with the FI cognitive type typically exhibit more complex and flexible problem-solving abilities as well as superior creative thinking abilities. Students with the FD cognitive style, on the other hand, struggle to think creatively and adjust to different methods, which affects how creatively they solve mathematical issues.

This study recommends that learning strategies be adjusted to students' cognitive styles. For students with FD cognitive styles, a more structured approach and the use of visual aids can help improve their understanding and creativity. Meanwhile, students with the FI cognitive style can benefit from learning that encourages the exploration of various solutions. These findings provide important insights for teachers to create more efficient lesson plans methods to develop students' creative thinking skills in the context of mathematics.

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