

Students' Mathematical Creative Thinking Process Based on Cognitive Style

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Abstract

This study aimed to describe students' mathematical creative thinking processes in solving statistical problems based on field-independent and field-dependent cognitive styles. A qualitative descriptive research design was employed in the context of statistics learning among tenth-grade students at SMA Teuku Umar. Four participants were purposively selected and classified as field-independent or field-dependent using the Group Embedded Figures Test (GEFT) based on Witkin's classification criteria. Data were collected through mathematical creative thinking tests and semi-structured interviews. Data were analyzed through data reduction, data display, and conclusion drawing, while the credibility of the findings was ensured through triangulation of test and interview data. The findings revealed that field-independent students demonstrated all stages of the mathematical creative thinking process preparation, incubation, illumination, and verification more systematically than field-dependent students. They understood problems comprehensively, generated multiple solution strategies, and carefully verified their answers. In contrast, field-dependent students experienced difficulties in understanding problems, selecting appropriate solution strategies, and verifying their answers, and they generated fewer alternative solutions. These findings suggest that students with different cognitive styles exhibit distinct mathematical creative thinking processes in solving statistical problems. Therefore, mathematics teachers should consider students' cognitive styles when designing instruction to support the development of students' mathematical creative thinking.

Keywords: Cognitive Style; Field Dependent; Field Independent; Mathematical Creative Thinking; Statistics

INTRODUCTION

Creativity is one of the essential competencies that students need to develop in 21st-century learning (Asrawati & Sirate, 2022). In mathematics education, creativity enables students to understand concepts, reason logically, think critically, and generate various alternative solutions to mathematical problems. However, mathematics learning continues to face several challenges. One of the major challenges is the predominance of traditional, teacher-centered instructional approaches, which provide students with limited opportunities to express and develop their ideas creatively. Furthermore, the learning models implemented in classrooms are not yet fully oriented toward fostering students' creativity. Assessment practices also tend to emphasize final answers rather than students' thinking processes during mathematical problem solving (Jagom et al., 2021). As a result, students' mathematical creative thinking skills have not been optimally developed. A preliminary observation conducted among tenth-grade students at SMA Teuku Umar revealed that many students experienced difficulties in solving statistical problems creatively. Most students relied on a single solution strategy, had difficulty generating alternative solutions, and rarely rechecked the accuracy of their answers. Interviews with the mathematics teacher further revealed that students tended to focus on obtaining the correct answer rather than explaining or reflecting on their problem-solving processes. These findings

indicate that students' mathematical creative thinking processes require further investigation, particularly in the context of statistics learning.

Creativity is closely related to an individual's ability to generate new and diverse ideas in solving problems. Watson and Clark, as well as Guilford, stated that the left brain works convergently, while the right brain works divergently. The left brain tends to focus on directed thinking to obtain the correct answer, whereas the right brain is more open to various possible solutions. Creativity is influenced by four important elements, namely the creative person, the creative process, the creative product, and an environment that supports creativity. The measurement of creativity can be seen through four main aspects, namely fluency, flexibility, originality, and elaboration (Yuli & Siswono, 2011). Pehkonen, (1997) explained that problem-solving instruction plays an important role in developing students' creative thinking. There are four reasons underlying the importance of problem solving in mathematics education: (1) developing students' cognitive abilities, (2) stimulating and enhancing creativity, (3) serving as an integral part of applying mathematical concepts, and (4) encouraging students to become more actively engaged and motivated in learning mathematics.

Creative thinking is a mental process that occurs through several stages. The creative thinking process can be analyzed using Wallas' theory (Maharani et al., 2017). Wallas' theory is one of the most commonly used theories of the creative thinking process and can serve as a framework for problem solving. The indicators of each stage in Wallas' creative thinking process are general in nature, making them highly possible to be further developed in more detail (L. N. Sari, 2016). In this study, Wallas' creative thinking stages were operationalized into observable indicators to guide data collection and analysis. The preparation stage was identified through students' ability to recognize the known and unknown information, interpret the problem, and formulate an initial solution plan, as reflected in both their written responses and interview explanations. The incubation stage was identified when students temporarily paused, reconsidered their solution strategies, or described a period of reflection before continuing the problem-solving process. The illumination stage was indicated by the emergence of new ideas, alternative solution strategies, or sudden insights expressed in students' written work and interview responses. The verification stage was identified through students' efforts to review the accuracy of their solutions, justify their reasoning, and revise their answers when necessary. These observable indicators served as the analytical framework for interpreting students' mathematical creative thinking processes in solving statistical problems.

The creative thinking process of each student is certainly different. These differences can be influenced by the cognitive styles possessed by students. Cognitive style refers to an individual's way of receiving, processing, storing, and using information to respond to situations or solve problems (Siahaan et al., 2018). According to Witkin et al. in (Alalouch, 2021) cognitive style is related to the way individuals perceive, reason, learn, and solve problems. Therefore, cognitive style becomes one of the important factors that can influence students' thinking abilities and creativity in mathematics learning.

Several previous studies have shown that cognitive style influences students' thinking processes in solving mathematical problems. Research conducted by Reza Puspita et al., (2022) showed that students with field independent and field dependent cognitive styles have differences in the process of solving mathematical problems. Field independent students tend to be more analytical and are able to process information independently compared to field dependent students. Another study conducted by Prihatiningsih & Ratu, (2020) found that students with field independent cognitive styles have higher levels of creative thinking than students with field dependent cognitive styles in solving mathematical problems. In addition, research by Khusnul Khotimah et al., (2022) showed that field independent students were able to fulfill the indicators of fluency, flexibility, and originality in creative thinking, whereas field dependent students only fulfilled some of the creative thinking indicators. However, most previous studies still focus on the results of students' creative thinking abilities and have not examined in depth the stages of the creative thinking process based on Wallas' theory in terms

of students' cognitive styles, especially at the junior high school level. In addition, studies relating mathematical creative thinking processes to field dependent and field independent cognitive styles are still limited. Therefore, further research is needed to describe in detail how students' mathematical creative thinking processes are influenced by their cognitive styles.

Based on the results of an interview with a mathematics teacher at SMA Teuku Umar, it was found that there had been no previous study regarding students' mathematical creative thinking processes based on cognitive styles. In fact, information about students' creative thinking processes can help teachers design appropriate strategies and learning materials to improve students' creativity in mathematics learning. This study aims to describe students' mathematical creative thinking processes based on field dependent and field independent cognitive styles. The novelty of this study lies in the analysis of the stages of students' mathematical creative thinking processes using Wallas' theory in terms of senior high school students' cognitive styles.

METHODS

Data were collected in three stages. First, all participants completed the Group Embedded Figures Test (GEFT) to identify their cognitive styles based on Witkin's classification criteria. Second, all participants completed a mathematical creative thinking test consisting of open-ended statistical problems. The test was designed to reveal students' mathematical creative thinking processes in solving statistical problems. Third, semi-structured interviews were conducted individually with the four selected participants, consisting of two students with field-independent cognitive styles and two students with field-dependent cognitive styles, after they had completed the written test. The interviews aimed to explore the reasoning underlying students' responses, clarify their written work, and obtain a deeper understanding of each stage of their mathematical creative thinking process. Students' written work, interview transcripts, and supporting research documentation were used as the primary sources of qualitative data.

The qualitative data were analyzed using the interactive analysis model proposed by Miles and Huberman, which consists of three stages: data reduction, data display, and conclusion drawing and verification. During the data reduction stage, students' written work and interview transcripts were organized, coded, and classified according to the four stages of Wallas' creative thinking process: preparation, incubation, illumination, and verification. In the data display stage, the coded data were systematically organized to facilitate comparisons between students with field-independent and field-dependent cognitive styles. Finally, conclusions were drawn and verified by identifying patterns and differences in the mathematical creative thinking processes demonstrated by the two cognitive style groups. The analysis was conducted iteratively throughout the study by continuously comparing evidence obtained from students' written work and interview transcripts.

The trustworthiness of the findings was established through method triangulation by comparing data obtained from students' written work, semi-structured interviews, and supporting documentation. The consistency of the findings across these data sources was used to enhance the credibility of the study's interpretations. Furthermore, the data were analyzed systematically using the indicators of each stage of Wallas' creative thinking process. Consequently, the interpretation of the qualitative data was grounded in a well-defined theoretical framework rather than relying solely on the researcher's subjective judgment.

RESULT AND DISCUSSION

Results

The Group Embedded Figures Test (GEFT) was administered to 30 students to identify their cognitive styles based on Witkin's classification criteria. The results showed that 12 students were classified as field-independent, while 18 students were classified as field-dependent. Based on the GEFT results, four students were purposively selected as the research participants to represent the two cognitive style groups. The selected participants consisted of

two students with field-independent cognitive styles and two students with field-dependent cognitive styles. The profile of the selected participants, including their subject codes, cognitive styles, GEFT scores, and data sources, is presented in Table 1.

Table 1. Profile of Selected Participants

Subject code	Cognitive Style	Geft Score	Data Source
S-01	Field Independent	14	GEFT, Written Test, Interview
S-02	Field Independent	12	GEFT, Written Test, Interview
S-03	Field Dependent	6	GEFT, Written Test, Interview
S-04	Field Dependent	5	GEFT, Written Test, Interview

Description and Analysis of Students' Mathematical Creative Thinking Processes Based on Field Independent Cognitive Style

a. Description and Data Analysis of the Subject S-01

Subject S-01 was selected as a research subject after the GEFT test results indicated that the subject had a field independent cognitive style. Based on the results of the mathematical creative thinking test and interviews, S-01 was able to go through the stages of the mathematical creative thinking process, namely preparation, incubation, illumination, and verification. The following presents the written answers of S-01.

Diket :	Banyak data : 13
	Nilai Minimum : 3
	Nilai maksimum : 13
	Yang sering Muncul : 4
	Nilai tengah :
Ditanya :	Minimum, maksimum, modus median, dan cara berbeda.

Figure 1. The answer of subject S-01 in the preparation process.

At the preparation stage, the subject understood the problem by writing down the known and asked information in the question. In addition, the subject utilized prior experience and referred to statistics textbooks to help solve the problem. This indicates that the subject prepared by connecting prior knowledge to the given problem.

Kumpulan data 1
3, 4, 4, 4, 6, 7, 8, 8, 9, 10, 11, 12, 13
Minimum : 3
Maksimum : 13
Modus : 4
Median : 8
Kumpulan data 2
3, 4, 4, 4, 4, 6, 7, 8, 9, 10, 11, 12, 13
Minimum : 3
Maksimum : 13
Modus : 4
Median : 8

Figure 2. The answer of subject S-01 in the illumination process

At the incubation stage, the subject sought inspiration by rereading the problem and connecting the given information to identify possible solutions. Furthermore, at the illumination stage, the subject successfully generated ideas and found several solution strategies. The subject was able to construct a data set according to the requirements of the problem by considering the median, mode, minimum value, and maximum value.

At the verification stage, the subject rechecked the obtained answer by comparing the results with the requirements of the problem. The subject also ensured that the solution steps

used were correct and appropriate. Based on the analysis of the written test and interview results, S-01 met the indicators of the mathematical creative thinking process at each stage, namely preparation, incubation, illumination, and verification. This is supported by the following interview excerpt.

- Researcher : What is the first thing you did when you saw this problem
 S-01 : I recalled the statistics material that had been previously studied and referred to the textbook on the statistics chapter
- Researcher : What is known from the problem?
 S-01 : The number of data is 13, the minimum value is 3, the maximum value is 13, and the mode is 4.
- Researcher : What is asked in the problem?
 S-01 : To construct several data sets using different methods.
- Researcher : Did you find more than one way to solve it?
 S-01 : Yes. In the first method, I determined that the median is located at the 7th data position because the number of data is odd. Then, I placed 3 as the minimum value, 13 as the maximum value, and 4 as the most frequent value, resulting in the data set: 3, 4, 4, 4, 6, 7, 8, 9, 10, 11, 12, 13.
- Researcher : What is the second method you used?
 S-01 : I made the number 4 appear four times so that it becomes the mode, placed 3 as the smallest value, kept the 7th data value as 8, and then completed the data set up to the maximum value of 13.
- Researcher : Are you sure your answer is correct?
 S-01 : Yes, because it is in accordance with the requirements of the problem and I have rechecked it.

Based on the findings from the mathematical proof problem and the interview above, the flow of Subject S-01's mathematical creative thinking process is shown in Figure 3 below.

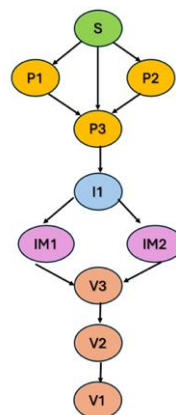


Figure 3. Flow of S-01's Mathematical Creative Thinking Process.

b. Description and Data Analysis of Subject S-02

After the researcher administered the GEFT test and the mathematical creative thinking test to subject S-02, the analysis results showed that S-02 was categorized as having a field independent cognitive style. Based on the test and interview results, the following data were obtained.

Diket : Banyak data : 13
 Nilai minimum : 3
 Nilai maksimum : 13
 Modus / yang sering muncul : 4
 Ditanya : minimum, maksimum, modus,
 median dengan cara berbeda

Figure 4. The answer of subject S-02 in the preparation process

At the preparation stage, S-02 understood the problem by rewriting the known and asked information. This is supported by the following interview.

- Researcher : What is the first thing you did when you saw the problem?
 S-02 : I tried to understand what the problem meant and how to solve it
 Researcher : Did you use any help to solve the problem?
 S-02 : I reread the statistics material in the textbook
 Researcher : What is known from the problem?
 S-02 : There are minimum, maximum, mode, and median values
 Researcher : What is asked in the problem?
 S-02 : To construct two data sets using different strategies

Based on the interview, S-02 used prior learning experience in statistics and prepared by reading relevant sources. This indicates that the subject has entered the preparation and incubation stages of the creative thinking process.

Data 1
3, 4, 4, 4, 6, 7, 8, 8, 9, 10, 11, 12, 13
minimum = 3
maksimum = 13
median = data ke-7 = 8
modus = 4 (muncul 3 kali)
Data 2
3, 4, 4, 4, 6, 7, 8, 8, 9, 10, 11, 12, 13
minimum = 3
maksimum = 13
median = data ke-7 = 8
modus = 4 (muncul 3 kali)

Figure 5. The answer of subject S-02 in the illumination process

At the illumination stage, S-02 began to generate ideas and construct the solution. The following is the interview excerpt.

- Researcher : Did you find more than one method?
 S-02 : Yes, there were two methods.
 Researcher : Explain the first method.
 S-02 : I started from the median. Since the number of data is 13, the median is at the 7th position, so I made sure the value is 8. Then I placed 3 as the minimum, 13 as the maximum, and made 4 the mode.
 Researcher : How about the second method?
 S-02 : I started from the mode by making the number 4 appear four times, then adjusted the data so that the median remained 8.

At the verification stage, S-02 rechecked the answer by ensuring that all requirements in the problem had been fulfilled. Based on this analysis, S-02 was able to carry out the mathematical creative thinking process well. Based on the findings and interview above, the flow of Subject S-02's mathematical creative thinking process is shown in Figure 4 below.

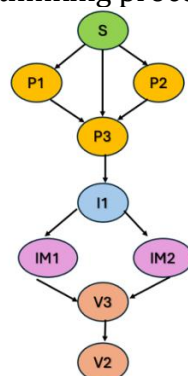


Figure 6. Flow of S-02's Mathematical Creative Thinking Process.

Description and Data Analysis of Students' Mathematical Creative Thinking Processes Based on Field Dependent Cognitive Style

c. Description and Data Analysis of Subject S-03

After the researcher administered the GEFT test and the mathematical creative thinking test to subject S-03, the analysis results showed that S-03 was categorized as having a field dependent cognitive style. Based on the test and interview results, the following data were obtained.

Diketahui :

Soal paling sedikit = 3
 Soal paling banyak = 13
 Soal paling sering muncul = 4
 Nilai yg berada ditengah = 8
 Ditanya : 2 data cara beda ?

Figure 7. The answer of subject S-03 in the preparation process.

- Researcher : What is the first thing you did when you saw the problem?
 S-03 : I wrote down the known and asked information according to the problem
 Researcher : What did you do after that?
 S-03 : I was confused about the meaning of the problem; I only knew that I had to construct two data sets.
 Researcher : Do you understand the given information?
 S-03 : Not really, I have forgotten this material.

At the incubation stage, S-03 tried to understand the problem by rereading it several times and reflecting for a while. When unable to find a solution idea, the subject also asked a classmate for help. Then, at the illumination stage, S-03 began to write the answer based on their own understanding.

Jawab:

Data 1 = 3, 4, 4, 4, 4, 7, 7, 8, 9, 10, 11, 12, 13, 13, 13
 Data 2 = 3, 3, 4, 4, 4, 6, 8, 9, 9, 10, 11, 12, 13

Figure 8. The answer of subject S-03 in the illumination process

- Researcher : How did you construct the two different data sets?
 S-03 : I just guessed
 Researcher : Are you confident with your answer?
 S-03 : Not really sure
 Researcher : Why is that?
 S-03 : Because the middle value is 8 and the number 4 appears most frequently
 Researcher : Why did the first data set become 14?
 S-03 : Oh yes, I was not careful enough.

Based on this analysis, S-03 went through the stages of the mathematical creative thinking process, but still experienced difficulties in understanding concepts and lacked accuracy in working on the tasks. Based on the findings and interview above, the flow of Subject S-03's mathematical creative thinking process is shown in Figure 7 below.

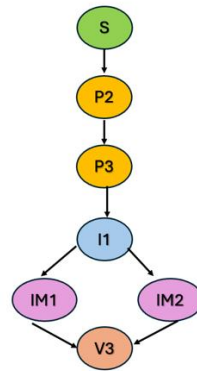


Figure 9. Flow of S-03's Mathematical Creative Thinking Process

d. Description and Data Analysis of Subject S-04

After the researcher administered the GEFT test and the mathematical creative thinking test to subject S-04, the analysis results showed that S-04 was categorized as having a field dependent cognitive style. Based on the test and interview results, the following data were obtained.

dik - Banyak data	: 13	Nilai tengah : 8
Nilai minimum	: 3	
" Maksimum	: 13	
Yg sering muncul	: 4	
dit - Minimum, Maksimum, Modus, median		
Jawaban : - minimum : 3		
- Maksimum : 13		
- Modus : 4		
- Median : 8		

Figure 10. The answer of subject S-03

At the preparation stage, S-04 rewrote the known and asked information; however, there were still errors due to lack of careful reading of the problem. This is supported by the following interview.

- Researcher : What is the first thing you did when you saw the problem?
 S-04 : opened the statistics book, recalled the material, then wrote down the known and asked information
- Researcher : What did you do after that?
 S-04 : I tried to solve the problem
- Researcher : Was there any mistake in your answer?
 S-04 : Yes, I incorrectly wrote the part of the question
- Researcher : Why did that happen?
 S-04 : Because I read the problem too quickly, so I was not focused

At the incubation stage, S-04 tried to find inspiration by rereading the textbook and recalling previously learned statistics material. Then, at the illumination stage, the subject began to determine the answer and write it down on the answer sheet.

- Researcher : How many ways did you think of to solve the problem?
 S-04 : I could only think of one way
- Researcher : What was your approach?
 S-04 : I made the number 4 appear most frequently, put 3 at the beginning, 13 at the end, and 8 in the middle
- Researcher : Was there any other way you could think of?
 S-04 : I have not thought of any other way
- Researcher : Are you confident that your answer is correct?
 S-04 : I think so

Based on the interview results and the subject's work, S-04 lacked accuracy from the preparation stage, so the answers provided were not fully correct. However, the subject was able to think of one solution method, although still lacked confidence during the verification stage. Based on the findings and interview above, the flow of Subject S-04's mathematical creative thinking process is shown in Figure 9 below.

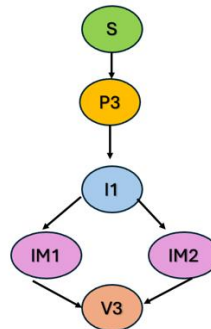


Figure 11. Flow of S-04's Mathematical Creative Thinking Process.

Discussion

The findings of this study indicate that students' mathematical creative thinking processes in solving statistics problems are influenced by their cognitive styles, namely field-independent and field-dependent cognitive styles. Based on the results of the GEFT, subjects S-01 and S-02 were categorized as field-independent, while subjects S-03 and S-04 were categorized as field-dependent. These differences in cognitive styles were reflected in each stage of the mathematical creative thinking process demonstrated by the students when solving the problems.

Students with a field-independent cognitive style demonstrated better abilities in understanding problems, identifying solution strategies, and verifying their answers. During the preparation stage, subjects S-01 and S-02 were able to accurately restate the information provided in the problem as well as the questions being asked. In addition, both subjects were able to connect their prior knowledge of statistical concepts, such as the minimum, maximum, median, and mode, to the given problem. These findings are consistent with previous research Prihatiningsih & Ratu, (2020) which found that students with a field-independent cognitive style tend to demonstrate better mathematical creative thinking abilities than those with a field-dependent cognitive style in solving mathematical problems. Other research conducted by (Ramadhani et al., 2019) also reported that field-independent students were able to solve mathematical problems effectively during the stage of implementing the solution plan, further indicating their relatively strong problem-solving abilities.

During the incubation stage, field-independent students attempted to recall their previous learning experiences and reviewed statistical concepts from their textbooks to strengthen their understanding. This is consistent with Tampa et al., (2022) who found that field-independent students tend to recall previous experiences and modify existing knowledge when developing solutions during the incubation and illumination stages. (Alimuddin et al., 2019) Furthermore, during the illumination stage, the students were able to identify more than one solution strategy. Subjects S-01 and S-02 first determined the median because the number of data points was odd, and then arranged the minimum, maximum, and mode values according to the conditions specified in the problem. In addition, the subjects were able to develop an alternative strategy by determining the mode first before identifying the median. The ability to generate more than one solution strategy indicates flexibility in mathematical creative thinking (Aldino et al., 2021). This finding is also in line with Alimuddin et al. (2019), who examined the creative thinking process of field-independent students using Wallas' stages and identified flexibility as one of the indicators of mathematical creativity (Aldino et al., 2021).

During the verification stage, field-independent students rechecked their solutions by ensuring that all the conditions specified in the problem had been satisfied. These findings are supported by previous research conducted by Hidayat et al., (2019) which explains that field-independent students tend to be able to analyze and review the steps used in solving mathematical problems independently and systematically. In contrast, students with a field-dependent cognitive style experienced difficulties in understanding the problem and determining appropriate solution strategies. During the preparation stage, although subjects S-03 and S-04 were able to restate the given and required information, they still encountered difficulties in fully understanding the problem. Subject S-03 admitted to having forgotten some of the statistical concepts, while subject S-04 made mistakes due to reading the problem too quickly, which reduced their level of focus. These findings are supported by previous research conducted by Mirlanda & Pujiastuti, (2018) which states that students with a field-dependent cognitive style tend to require support from their surrounding environment in order to understand information and solve mathematical problems.

During the incubation stage, field-dependent students tended to rely on external assistance, such as rereading the problem multiple times, consulting their textbooks, and asking their peers for help (Witkin, 1977). This indicates that they still experienced difficulties in developing solution ideas independently. Furthermore, during the illumination stage, field-dependent students were only able to identify one solution strategy and were unable to generate alternative approaches. Their solutions were also largely based on estimation rather than systematic reasoning (Loka Son et al., 2021).

During the verification stage, field-dependent students did not thoroughly review their answers. Subject S-03 lacked accuracy, resulting in a set of data that did not meet the requirements of the problem, while subject S-04 remained uncertain about the correctness of the obtained solution. These conditions indicate that the mathematical creative thinking process of field-dependent students had not yet been carried out optimally. This finding is consistent with (Widya Pratama, 2019) who reported differences in the creative thinking processes of field-independent and field-dependent students across Wallas' four stages, with field-independent students demonstrating a more complete creative thinking process than field-dependent students.

Overall, the findings of this study support previous research indicating that students with field-independent cognitive styles tend to demonstrate greater flexibility, analytical thinking, and independence in solving mathematical problems than students with field-dependent cognitive styles (D. P. Sari et al., 2026). The differences identified across the four stages of Wallas' creative thinking process can be explained through Witkin's cognitive style theory. Students with field-independent cognitive styles were better able to analyze problem information, organize relevant concepts, and independently develop multiple solution strategies during the preparation and illumination stages. Furthermore, they demonstrated stronger self-monitoring skills during the verification stage by reviewing and refining their solutions. In contrast, students with field-dependent cognitive styles tended to rely on external guidance, experienced difficulties in reorganizing problem information, and generated fewer alternative solution strategies. These characteristics affected the continuity of their creative thinking processes throughout the stages of Wallas' model (Witkin, 1977).

These findings suggest that cognitive style is associated with differences in how students engage in mathematical creative thinking when solving statistical problems (Yulianto et al., 2021). From a mathematics education perspective, this study contributes to the existing literature by providing a process-oriented analysis of students' mathematical creative thinking using Wallas' framework rather than focusing solely on creative thinking outcomes. This perspective is consistent with (Alimuddin et al., 2019), who examined students' creative thinking processes through the preparation, incubation, illumination, and verification stages of Wallas' model. The findings also imply that mathematics teachers should design instructional activities that accommodate students' different cognitive styles. For example, based on differences in

students' need for guidance and independence, teachers may provide more structured scaffolding for field-dependent students while offering open-ended and exploratory tasks for field-independent students to encourage the generation of multiple solution strategies. Such differentiated instructional approaches may better support the development of students' mathematical creative thinking in statistics learning.

CONCLUSION

The findings of this study suggest differences in students' mathematical creative thinking processes associated with field-independent and field-dependent cognitive styles when solving statistical problems. Students with field-independent cognitive styles demonstrated more systematic creative thinking processes than students with field-dependent cognitive styles across the stages of Wallas' model. These findings contribute to mathematics education by providing a process-oriented understanding of mathematical creative thinking from the perspective of cognitive style. From a practical perspective, mathematics teachers are encouraged to consider students' cognitive styles when designing instruction by implementing differentiated scaffolding, including more structured guidance for students with field-dependent cognitive styles and open-ended, exploratory learning tasks for students with field-independent cognitive styles. This study involved only four participants from a single school and focused on statistical problems; therefore, the findings should be interpreted within this context, and their transferability to other settings should be considered with caution. Future research should involve more participants, different mathematical topics, and diverse educational contexts to further explore factors associated with students' mathematical creative thinking processes.

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