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Students' Pseudo-Thinking Process in Solving Mathematics Problems in Terms of Learning Style

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Abstract: Pseudo-thinking occurs when students believe something is true or false when it is not entirely true or false. This research aims to study students' pseudo-thinking process in solving mathematics problems in terms of learning styles. Data was obtained using learning-style questionnaire instruments, written tests, and interviews. The method of data analysis applied in this study used the Miles and Huberman model. These research' outcomes demonstrate that 1) students with visual learning styles in solving mathematics problems are more about remembering what they have seen, such as looking at books and blackboards, visual students experience pseudo-true and pseudo-false, 2) students with auditory learning styles in solving mathematics problems are more about remembering what they hear, such as listening to explanations from the teacher, auditory students experience pseudo-false, and 3) kinesthetic learning style students in solving mathematics problems are more about remembering from people's examples and then practicing and remembering how to do it before, kinesthetic students experience pseudo-false.

Keywords: pseudo thinking, solving mathematics problems, learning styles.

▪ INTRODUCTION

Mathematics is very useful in everyday life, especially for students. Students who study mathematics acquire a methodical and thorough thought process that helps in solving problems and is trained in calculating (Cumhur 2022; Dahiana, Herman, and Nurlaelah 2024). Mathematics is a real branch of science that is arranged systematically and deals with numbers, operations, and logical reasoning and has rules with strict requirements (Aragón et al. 2024; El Bhih et al. 2024; Cheung and Kwan 2021; Dahiana et al. 2024). For students to understand and comply with all applicable rules, they must actively think and build their knowledge based on previously obtained information. In addition, teachers have the responsibility to provide interesting and meaningful learning opportunities to children so that they are eager to think and solve problems that arise (Lauermann 2014). Therefore, an important part of everyday life is mathematics (Barbieri and Miller-Cotto 2021; El Bhih et al. 2024; Corfield 2001; Delaney and Devereux 2020).

Based on the results of observation on October 17, 2023, in class V at MIN 2 Jember, it shows that students lack understanding of the steps they must use in solving mathematics problems. This is evident in the expressions of students who appear confused when given a problem that is slightly different from the problem that has been explained; therefore, the teacher must repeat what students must do to solve the problem. Some students understand the question and answer it correctly, but when asked about the process, they are unable to provide the right answer. This is also supported by the results of an interview on January 05, 2024, with the fifth-grade homeroom teacher, who explained that not all children are like that; depending on how the teacher explains, there are indeed some children like that. According to Vinner (1997), such a situation is referred

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to as pseudo-thinking in solving problems, a state where students don't apply their minds to solve problems.

In solving mathematics problems that students first do, students must be able to understand concepts, understand problems, and be able to connect a concept with other concepts. Mathematics problem solving is the process of interpreting mathematics situations, usually requiring several cycles to reveal, test, and revise mathematics interpretations, involving sorting out mathematics problems, integrating, modifying, revising, or improving groups of mathematics concepts from various topics inside and outside mathematics (Amalina and Vidákovich 2023; Supriadi, Jamaluddin Z, and Suherman 2024). According to Polya (1973), several steps must be taken in problem-solving, namely: 1) Understanding the problem, 2) Problem-solving planning, 3) Performing the problem-solving plan, and 4) Rechecking the answers obtained. The ability to solve mathematics problems for students is very important because it can help them develop a positive mindset that allows them to make the best decisions in various circumstances (Phuong Uyen, Huu Tong, and Ngoc Han 2021; Supriadi et al. 2024). Students often have difficulties when trying to solve mathematics problems. Students often understand concepts and can solve problems and learn results quickly, but the thought process is wrong (Cahdriyana et al. 2019; Supriadi et al. 2024). Students' difficulty in solving problems so that they are spotty in responding to them is an error in the student's thinking process.

Errors in the thinking process made by students are a form of the pseudo-thinking process (Sulistyorini 2018). Pseudo-thinking is a process of thinking students are impulsive/spontaneous, fast, unconscious, and uncontrolled; they also make mistakes, misconceptions occur, memorize formulas, imitate procedures, and have fuzzy memories when they are faced with problem-solving (Muslim, Usodo, and Pratiwi 2021). Pseudo-thinking in elementary school students arises from their natural way of thinking in dealing with problems, their inability to organize information when solving problems, the use of fictitious procedures, and their lack of previous experience in solving problems (Alamsyah, Susiswo, and Hidayanto 2019; Nizaruddin and Kusmaryono 2023). Many elementary school students experience this, where there is a lack of observing pseudo-thinking and other thinking errors that are often overlooked and addressed (Alamsyah et al. 2019; Nizaruddin and Kusmaryono 2023). It is the errors in students' thinking processes that cause them to think pseudo.

This pseudo-thinking process will be reviewed based on the student's learning style. Learning style is the way students respond to and utilize the stimuli they encounter during the learning process (Prasetya et al. 2024; TOPU 2024). One of the factors that support students' numeracy literacy skills and help in a component the teaching and learning process is learning style (TOPU 2024). Three categories exist for learning style, namely; visual (seeing), auditorial (hearing), and kinesthetic (doing). According to Muslim et al. (2022) explained that the learning style of visual students is more likely to learn by seeing, observing, or using the sense of sight. When learning, students with an auditorial learning style usually prefer to hear or use their sense of hearing (Teresia and Sulistyani 2023; Turmuzi et al. 2024). Meanwhile, the learning style of kinesthetic students refers to learning by movement, touch, or the use of the sense of touch and movement (Teresia and Sulistyani 2023; Turmuzi et al. 2024). All people have different styles that they have

learned, although many of them do not realize it. As a result, they are unable to maximize the process of absorbing information effectively.

Research on pseudo-thinking in solving mathematics problems has been widely studied. Research on pseudo thinking in solving mathematics problems such as in writing (Anggraini, Kusmayadi, and Pramudya 2018; Cahdriyana et al. 2019; Kusmaryono, Ubaidah, and Basir 2020; Muslim et al. 2021; Nizaruddin and Kusmaryono 2023; Setiawan et al. 2023; Subanji and Nusantara 2016; Sulistyorini 2018; Vinner 1997). Pseudo-thinking processes are often caused by students' lack of understanding of an idea and their low ability to solve problems (Kusmaryono et al. 2020). In our world, every individual is different from other individuals. Likewise, in terms of intelligence, the potential of each student is different (Turmuzi et al. 2024). The importance of this research is that researchers are concerned about students' incorrect understanding in solving mathematics problems, which will result in them thinking pseudo-thinking; therefore, researchers are interested in conducting research to find out students' pseudo-thinking processes in solving mathematics problems in terms of learning styles.

▪ METHOD

Research Design

This research was conducted on mathematics subjects in the even semester of the 2023/2024 class V academic year at MIN 2 Jember. The research carried out is a type of descriptive qualitative research in which the results of student work are analyzed by pseudo-thinking processes based on each student's learning style. According to Arikunto (2019), descriptive qualitative research is research that aims to examine current events, situations, or problems; this research is also used to convey findings.

Research Subject

In this study, 28 class V students at MIN 2 Jember were given the problem of calculating operations on mixed number material. Class V was chosen because this class has a high level of student heterogeneity (diversity) in terms of mathematics and good communication skills. The subjects taken in this research were six subjects consisting of two students with a visual learning style, two students with an auditory learning style, and two students with a kinesthetic learning style. The reason for determining the research subjects as two students in each learning style was a comparison in analyzing the results of the written test for this research.

Research Instrument

The instruments used in this study are: 1) Learning style questionnaire used to determine students' learning styles in the form of 14 multiple choice statements, 2) Written tests used to determine students' pseudo thinking processes in the form of 2 story problems, and 3) Interviews used to confirm students' pseudo thinking in the form of 9 semi-structured questions. The first instrument is a questionnaire. A questionnaire is a data collection technique in which research subjects are given a list of questions or written sentences to answer (Sugiyono 2022). The learning style questionnaire used in this research is the result of the adoption of a learning style questionnaire designed by (Sugianto 2021).

The second instrument is a written test. A written test is where questions and answers are submitted in writing and given to a person or group of students at the same

time and place (Sugiyono 2022). Written test on mixed arithmetic operations of integers consisting of 2 story problems. Written tests are used to find out students' answers to solving mathematics problems. This written test is also used to determine students' pseudo-thinking processes based on the results of their final answers. Pseudo-thinking in this research refers to the opinion of (Subanji and Nusantara 2013, 2016; Wibawa 2016), namely pseudo-thinking based on the final results/answers given, pseudo-true thinking, and pseudo-false thinking, which can be seen in Table 1.

Table 1. Indicators of pseudo thinking

Type of Pseudo Thinking	Indicator of Pseudo Thinking
Pseudo-True Thinking	a. When a student gives the correct answer to a question but solves it incorrectly.
	b. hen a student writes down a concept that seems correct, but his understanding of the concept is false.
Pseudo-False Thinking	c. When a student gives an incorrect answer to a question, but after reflection can reason correctly and can correct the answer.
	d. When a student writes a concept incorrectly, but his understanding of the concept is correct.

Table 1 shows the indicators of pseudo-thinking that occur in students; if only one indicator appears in a student, then the student experiences pseudo-true thinking or pseudo-false thinking. The third instrument is an interview. An interview is a meeting of two individuals to discuss and share ideas through questions and responses to create meaning around a particular subject (Sugiyono 2022). The interview used was semi-structured. The interview guide in this research refers to indicators of problem-solving according to (Polya 1973). This interview was conducted after the research subjects completed the written test. Interviews are used to find out the reasons for students' answers, where the reasons are students' understanding of solving problems in the questions. The following are the interview questions used in the research, which can be seen in Table 2.

Table 2. Interview questions used in the research

No.	Questions
Q-1	Tell me what you know from this problem?
Q-2	Then what is asked from this problem?
Q-3	Can what you know answer the question from the problem?
Q-4	So do you understand what is known and asked about this problem?
Q-5	What formula do you use to answer this question?
Q-6	Try to explain the formula you used to answer this question!
Q-7	Can the steps from the formula answer the question?
Q-8	Did you check your answer again?
Q-9	How did you check the correct answer?

Data Analysis

The Miles and Huberman model is the data analysis method employed in this study; the steps are as follows: 1) Data reduction is carried out to classify the results of student learning style data and student written test results so as to get 6 research subjects and then

conduct interviews, 2) Presenting data is done by presenting the results of data in the form of learning style questionnaires, written tests, and interviews from 6 research subjects in a coherent manner, namely 2 people with visual learning styles, 2 people with auditorial learning styles, and 2 people with kinesthetic learning styles, 3) Drawing Conclusions is done by concluding the main idea of the discussion at the data presentation stage (Sugiyono 2022). The stages are carried out to obtain satisfactory results are: 1) The first stage is to give a learning style questionnaire to 28 students in one class; this is employed to acquire the type of learning style of students, 2) The second stage is giving questions to 28 students; this is used to obtain research subjects and students' thinking processes, whether pseudo occurs, 3) The third stage is to conduct interviews with six subjects; this is used to analyze student answers and find out exactly the pseudo that occurs.

▪ RESULT AND DISSCUSSION

This research qualitatively describes students' pseudo-thinking processes in solving mathematics problems. The first stage carried out was to provide a learning style questionnaire on March 28, 2024. The results of the learning style questionnaire filled out by 28 students showed that there were six types of learning styles in class V, with detailed data can be seen in Table 3.

Table 3. Results of learning style questionnaire data

No	Learning Style Type	Amount
1.	Visual	12 students
2.	Auditory	7 students
3.	Kinesthetic	4 students
4.	Visual-Auditory	3 students
5.	Visual-Kinesthetic	1 student
6.	Auditory-Kinestetic	1 student
	Total	**28 students**

Table 3 shows the findings of the questionnaire on learning style that was given to 28 students where there are twelve students with visual learning styles, seven students with auditory learning styles, four students with kinesthetic learning styles, three students with visual-auditory learning styles, one student with visual-kinesthetic learning styles, and one student with auditory-kinesthetic learning styles. The second stage was to give the second question on April 23, 2024. The results of students' answers to question number 1, which was answered by 28 students, showed that pseudo-occurrence occurred in 17 students, which Table 4 displays.

Table 4. Grouping of question number 1

Question	Pseudo-True	Pseudo-False	True	False
Mrs. Rani bought 9 meters of batik cloth at a price of 33,000 per meter and 7.5 meters of wolfis cloth at a price of 30,000 per meter. Then Mrs. Rani paid him with 6 100,000 notes. Mrs Rani distributed the money back to her 4 children. How much money does each of Mrs. Rani's children receive?	4	13	10	1

Table 4 shows that four students think pseudo-true, thirteen students think pseudo-false, ten students think real true, and one student thinks real false when completing problem number 1. Furthermore, the outcomes of the answers to question number 2 distributed to 28 students show that eight students experienced pseudo-false, as seen in Table 5.

Table 5. Grouping of question number 2

Question	Pseudo-True	Pseudo-False	True	False
There are three buckets containing water, the first bucket contains 4 liters of water, the second bucket contains 4 times more than the first bucket, and the third bucket contains 4 times more than the second bucket. How many liters of water are there in total in the bucket?	0	8	19	1

Table 5 shows that zero students are thinking pseudo-true, eight students are thinking pseudo-false, nineteen students are thinking real true, and one student are thinking real false when working on problem number 2. The following action is to choose six research subjects by taking two students with a visual learning style, two students with an auditory learning style, and two students with a kinesthetic learning style, which be seen in Table 6.

Table 6. Grouping of research subjects

Subject's Initials	Type of Learning Style	Subject Code
GRS	Visual	V_1
FAA	Visual	V_2
DAA	Auditory	A_1
ASA	Auditory	A_2
HWJ	Kinesthetic	K_1
MKSP	Kinesthetic	K_2

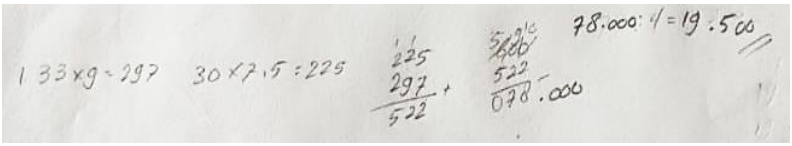
Table 6 shows that subject GRS has a visual learning style with subject code V1, subject FAA has a visual learning style with subject code V2, subject DAA has an auditory learning style with subject code A1, subject ASA has an auditory learning style with subject code A2, subject HWJ has a kinesthetic learning style with subject code K1, and subject MKSP has a kinesthetic learning style with subject code K2.

The third stage is to conduct interviews on May 20, 2024, with six research subjects. The second and third stages will be discussed simultaneously because these two stages are interrelated. The second stage was to give questions to 28 students (Table 4 and Table 5) and choose two subjects from each learning style (Table 6). From the results of selecting the six research subjects, it was found that subject V1 was a real pseudo-false and true-thinking subject who had a visual learning style. Subject V2 is a pseudo-true and pseudo-false thinking subject with a visual learning style. Subjects A1 and A2 are pseudo-false thinking subjects with an auditory learning style. Subjects K1 and K2 are real pseudo-false and true-thinking subjects with a kinesthetic learning style.

Pseudo Thinking of Subject V1 and Subject V2 Visual Learning Style

In the second stage, subject V1 in answering question number 1 seemed to think pseudo-false, where the answer showed that 78,000 divided by 4 resulted in 19,200. Subject V1 then answered and explained question number 2 well, and she thought it was true. The following is the answer to question number 1 of subject V1.

(a)



(b)

Figure 1. (a) Answer to question number 1 subject v_1 (pseudo-false thinking) (b) results of subject v_1's answers after reflection

Figure 1 shows the error in the initial answer to question number 1 of subject V1 when calculating the division of 78,000 divided by 4, and the result is 19,200. However, after subject V1 was reflected, she could correct her answer correctly, namely 78,000 divided by 4, and the result was 19,500. These are corroborated by the findings of the researcher's interview with subject V1 as follows.

P : Is 76,800 the same or not? Same 78,000.
V1 : (shakes head)
P : Not wrong, but not quite right. Have you tried correcting the answer? How to? You are not careful enough. Come on, try dividing 78,000 by 4 using porogapit.
V1 : (calculate 78,000 divided by 4 using the porogapit method with the guidance of the researcher)
P : Mean the result?
V1 : 19.500.

The results of the interview with subject V1 show that the pseudo-false thinking that occurred in subject V1 was due to subject V1's understanding of the value 2 in the remainder of the porogapit division; she assumed that the value 2 was the result, too. Even though the value of 2 is 2000, which can be divided further by 4, and the result is 500. When working on question number 1, subject V1 was less careful and rushed. When students react to a concept quickly or impulsively without first ensuring that their reaction is correct, the student experiences pseudo thinking as a result of losing control over their thinking (Nizaruddin and Kusmaryono 2023). Subject V1 did not understand what he had done, so he had not completed the problem solving, the results obtained were not rechecked (Kusmaryono et al. 2020). Although her answer was wrong, however after reflecting to correct her answer, subject V1 was able on how to correct her answer correctly (Subanji and Nusantara 2013, 2016; Wibawa 2016). This is also evidenced by

subject V1's response to her answers, which were less thorough and rushed when working.

Subject V2, in answering question number 1, seemed to be thinking pseudo-true. The answer to question number 1 looks as if it is correct, but when asked 19,500, the subject answered as follows. The response to question number 1, subject V2, is as follows.

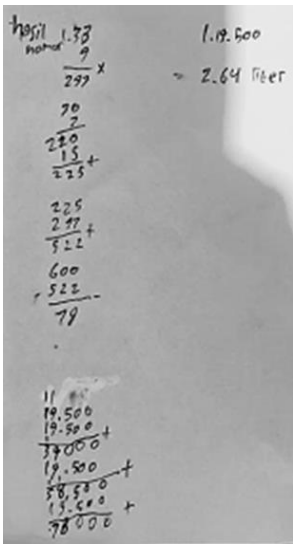


Figure 2. Answer to question number 1 subject v_2 (pseudo-true thinking)

Figure 2 shows the initial answer to question number 1 of subject V2, which is 19,500, which is correct. However, after reflection, subject V2 could not provide the correct reason for his answer and could not prove it. The outcomes of the interview provide credence to this, which is the interview with the researcher of subject V2.

P : 19.500 from?
V2 : 78 divided by 4.
P : How do i check it? Or summing? I asked yesterday (when working on the problem). Can you not divide 78,000 by 4 using porogapit?
V2 : Cannot.
P : Where did you get this? 19,500; see what friends have?
V2 : Try, miss.

The results of the V2 subject interview showed pseudo-true thinking in problem number 1, where it seemed as if the V2 subject's answer was correct, but the answer did not correspond to the procedure for working on mathematics story problems. When students do not understand one of the necessary concepts correctly, it leads to pseudo-thinking (Nizaruddin and Kusmaryono 2023; Setiawan et al. 2023). Subject V2 did not understand about division using porogapit, which resulted in him trying to answer the question correctly. Subject V2's answer in the interview is a behavior of pseudo thinking, although the answer is correct, but he is not sure of his answer and cannot provide justification for his answer (Kusmaryono et al. 2020). When a student writes down a concept that seems correct, but his understanding of the concept is wrong is pseudo-true thinking (Subanji and Nusantara 2013, 2016; Wibawa 2016).

Furthermore, subject V2 in answering question number 2 seemed to pseudo-false thinking, where the answer only showed the results of the third bucket, not all the water in the bucket. The following is subject V2 on the response to query number 2.

(a) (b)

Figure 3. (a) Answer to question number 2 subject v_2 (pseudo-false thinking) (b) Results of subject v_2's answers after reflection

Figure 3 is the initial answer to question number 2 subject V2 which is 64. 64 is the result of the third bucket only, not all the water in the bucket. However, after subject V2 reflected on his answer, he was able to correct his answer to 84. This is supported by the results of the findings from the investigator's conversation with Subject V2 as follows.

P : Likewise, the third bucket contains 4 times more than the second bucket. Where is it?
V2 : 16 times 4 (calculating 16 times 4 with stacked multiplication) 6 times 4 24, 1 times 4 4 plus 2 6.
P : How many liters does the third bucket contain?
V2 : 64.
P : Then, what was the result of the first and second buckets? 20. Then add 20 plus 64.
V2 : 20 plus 64 (calculating using stacked addition, where he also answered 6 plus 2 is 11, then corrected again) 84.

The results of the interview with subject V2 showed false pseudo-thinking in problem number 2, where subject V2 actually understood this problem number 2, but he only calculated the multiplication in the third bucket (Kusmaryono et al. 2020). Even though what was asked in the question was the whole water in the bucket. Students ignore one of the components of the concept that has been obtained, and they experience pseudo-thinking as a result of losing control of their thinking (Nizaruddin and Kusmaryono 2023). Although his answer was wrong, but after reflection to correct his answer, he can correct his answer correctly (Subanji and Nusantara 2013, 2016; Wibawa 2016).

Furthermore, conducting interviews with subjects V1 and V2 to find out their visual learning styles, the outcomes of the interviews are as follows.

P : How do you answer these questions? Do you usually look at explanations from books, explanations from teacher on the blackboard, or explanations from YouTube tutorials?

V1 : Sometimes I look at the book. Sometimes it can also be seen from the blackboard when the teacher is explaining.

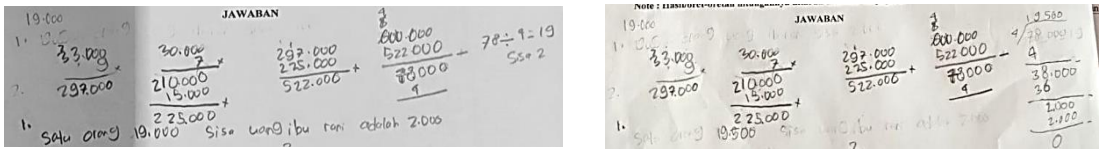
P : How do you answer these questions? Do you usually look at explanations from books, explanations from teacher on the blackboard, or explanations from YouTube tutorials?

V2 : Look from the book and see the teacher's explanation on the blackboard..

The results of the interviews of subjects V1 and V2 show that students who have a visual learning style in solving problems in problems are more concerned with remembering what they have seen, such as looking at books and blackboards. Visual students will learn through something by seeing in understanding information (Muslim et al. 2022).

Pseudo Thinking of Subject A1 and Subject A2 Auditory Learning Style

Subject A1 in answering question number 1 appears to think pseudo-false, where the answer shows 78 divided by 4, and the result is 19 remaining 2 or 78,000 divided by 4, and the result is 19,000 remaining 2,000. The following is subject A1 on the response to query number 1.



(a) (b)

Figure 4. (a) Answer to question number 1 subject a_1 (pseudo-false thinking (b) results of subject a_1's answers after reflection

Figure 4 shows the error in the initial answer to question number 1 subject A1, on the division of 78,000 divided by 4, the result of which she answered 19,000 remaining 2,000. However, after reflecting on her answer, subject A1 can correct her answer correctly to 19,500. There is findings are based on the interview results conducted by the researcher and subject A1, as follows.

P : Can be porogapit?

A1 : Forgot. What kind of porogapit?

P : Something like this (draws a line enclosing the porogapit). 78,000 divided by 4, let's write it down!

A1 : (calculates 78,000 divided by 4 using the porogapit method with the guidance of the researcher)

P : So, what is the correct correction for number 1?

A1 : 19.500.

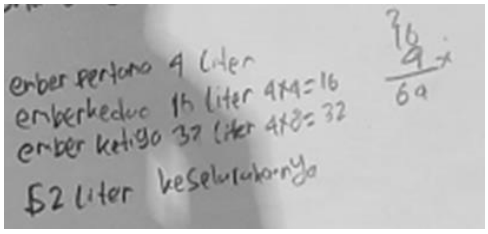
P : Did you check your previous answer? 19 leftover 2.

A1 : Checked, miss. But that's it.

The results of the A1 subject interview showed the occurrence of pseudo-false thinking in problem number 1, where subject A1 actually understood about the second problem number 1 but she only concluded that the result of 78,000 divided by 4 was 19,000 remaining 2,000 (Anggraini et al. 2018; Kusmaryono et al. 2020). Subject A1

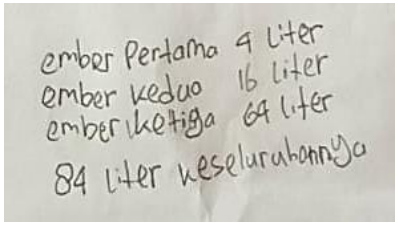
checked that the result of 19,000 multiplied by 4 was not 78,000, but she did not think about problem number 1 again when she found the answer. Students respond to a question in a hurry without checking the correctness of their response; these students experience pseudo-thinking due to loss of control over their thinking (Nizaruddin and Kusmaryono 2023). Although her answer was wrong, but after reflecting on subject A1 to correct her answer, it turns out that she can correct her answer correctly (Subanji and Nusantara 2013, 2016; Wibawa 2016).

Furthermore, subject A1 answered question number 2, appearing to think pseudo-false, where the answer was wrong in the calculation of the third bucket; she answered the third bucket 4x8 = 32, and the overall result of the bucket was 52 liters. Here is subject A1 on the response to query number 2.



Translation :
first bucket 4 liters
second bucket 16 liters, 4x4=16
third bucket 32 liters, 4x8=32
52 liters in total

(a)



Translation :
first bucket 4 liters
second bucket 16 liters
third bucket 64 liter
84 liters in total

(b)

Figure 5. (a) Answer to question number 2 subject a_1 (pseudo-false thinking) (b) results of subject a_1's answers after reflection

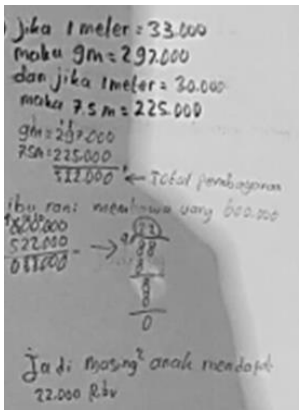
In Figure 5 shows the initial subject A1 on answer to question number 2 which is 4+16+31 = 52 liters; she made a mistake when answering the third bucket. However, after reflection subject A1 can correct her answer to 4+16+64 = 84 liters in total. This can be supported by the findings from the investigator's conversation with subject A1 as follows.

P : Then, the third bucket is 4 times more than the second bucket. What is the second bucket?
A1 : 16 liters. Oh, that's 16 times 4.
P : Heem. This is the writing (pointing to the result of 16 times 4 from the initial answer)
A1 : 64.
P : What do you do with the whole thing?
A1 : Plus. 84.

The results of the A1 subject interview showed the occurrence of pseudo-false thinking in question number 2, where subject A1 wrote the third bucket, which was 4x8 = 32 liters, but she also calculated 16x4 = 64 here, she spontaneously answered 4x8 in the third bucket (Cahdriyana et al. 2019; Kusmaryono et al. 2020). The student answered spontaneously without rethinking her answer, so the loss of control over her thinking the student to experience pseudo-thinking (Nizaruddin and Kusmaryono 2023). After reflection on subject A1, she spontaneously answered 4x4=12, but she can correct her

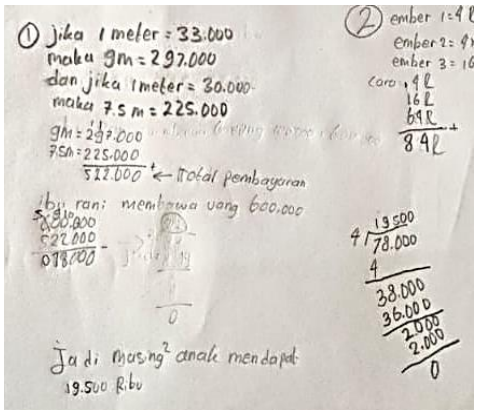
answer again; at the end of this reflection, subject A1 can correct her answer correctly (Subanji and Nusantara 2013, 2016; Wibawa 2016).

Subject A2 answered question number 1, appearing to think pseudo-false, where she calculated 600,000 - 522,000 = 88,000. The following is the answer in response to the query number 1 of subject A2.



Translation :
If 1 meter = 33,000
Then 9m = 297,000
And if 1 meter = 30,000
Then 7.5m = 225,000
297.000 + 225.000 = 522.000
Total payment = 522,000
Mrs. Rani brought 600,000
600.000 - 522.000 = 88.000
88 : 4 = 22
So, each child gets 22,000

(a)



Translation :
If 1 meter = 33,000
Then 9m = 297,000
And if 1 meter = 30,000
Then 7.5m = 225,000
297.000 + 225.000 = 522.000
Total payment = 522,000
Mrs. Rani brought 600,000
600.000 - 522.000 = 78.000
78.000 : 4 = 19.500
So, each child gets 19,500

(b)

Figure 6. (a) Answer to question number 1 subject a_2 (pseudo-false thinking) (b) results of subject a_2's answers after reflection

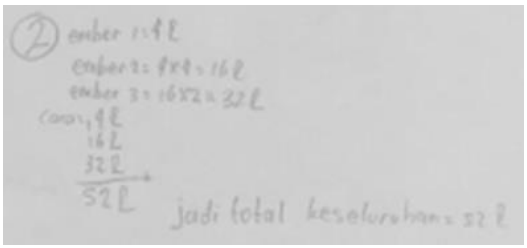
Figure 6 shows subject A2's error in answering question number 1 on the subtraction of 600,000 minus 522,000, and the result is 88,000. However, after subject A2 reflected on her answer, she was able to correct her answer correctly. There is findings from the investigator's conversation with subject A2.

P : That means it's not right. How much should this be? (pointing to 600,000 minus 522,000).
A2 : (think) 78,000.
P : Let's try 78,000 divided by 4.
A2 : (calculated 78,000 divided by 4 using the porogapit method).
P : So, what is the correct result?
A2 : 19.500.

The results of the interview with subject A2 occurred pseudo-false in question number 1, where subject A2 understood the question number 1; it is just that she was spontaneous when calculating 600 minus 522, and the two zeros were written 10 from borrowing the number 6 (Cahdriyana et al. 2019; Kusmaryono et al. 2020; Sulistyorini

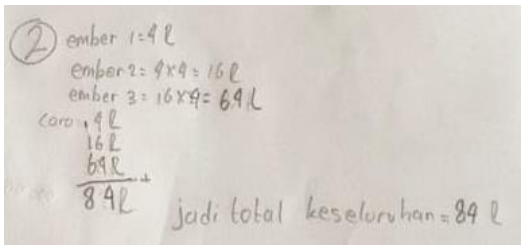
2018). Subject A2 answered the question spontaneously without thinking about the answer again, so she lost control of his thinking; she experienced pseudo-thinking (Nizaruddin and Kusmaryono 2023). Although her answer was wrong, but after reflecting on subject A2, she was able to correct her mistake and could correct her answer well (Subanji and Nusantara 2013, 2016; Wibawa 2016).

Furthermore, subject A2 answered question number 2, appearing to think pseudo-false, where she calculated the third bucket 16x2 even though in the question the third bucket was four times more than the second bucket. The following is answer number 2 of subject A2.



Translation :
Bucket 1: 4 liters
Bucket 2: 4x4= 16 liters
Bucket 3 : 16x2 = 32 liters
So, grand total = 52 liters

(a)



Translation :
Bucket 1: 4 liters
Bucket 2: 4x4= 16 liters
Bucket 3 : 16x4 = 64 liters
So, grand total = 84 liters

(b)

Figure 7. (a) Answer to question number 2 subject a_2 (pseudo-false thinking) (b) results of subject a_2's answers after reflection

Figure 7 shows the initial answer of subject A2 when working on problem number 2, namely 4+16+32=52, where she was not careful when answering the third bucket. However, after subject A2 reflected on her answer, she was able to correct the answer well. There is findings from the investigator's conversation with subject A2 as follows.

P : Then the correction is in? 2 replaced; how much?
A2 : Four (delete 2 replace 4).
P : The result is wrong. 16 times 4 what? 32 plus 32.
A2 : 64 (removing 32 in favor of 64).
P : Does the correction mean the correct one, the answer?
A2 : 84 liters.

The results of the A2 subject interview occurred pseudo-false in question number 2, where subject A2 spontaneously wrote the third bucket 16x2, but actually in the question the third bucket was 4 times more than the second bucket (Cahdriyana et al. 2019; Kusmaryono et al. 2020; Sulistyorini 2018). The second bucket contains 16 liters, then the third bucket is 16x4=64. Subject A2 understood problem number 2 but she was in a hurry and was not careful in answering the question. Subject A2 answered question number 2 in a hurry so that she lost control of her thinking, she experienced pseudo-thinking (Nizaruddin and Kusmaryono 2023). Although her answer was wrong, but after reflecting on subject A2 to correct her answer, it turns out that she understands and can correct her answer correctly (Subanji and Nusantara 2013, 2016; Wibawa 2016).

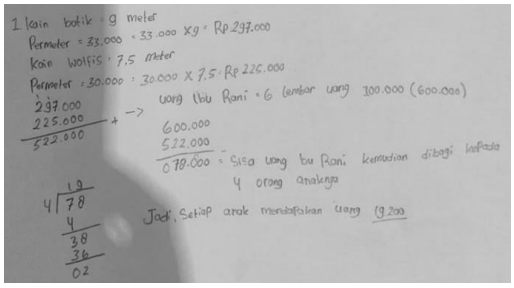
Furthermore, the researcher conducted interviews with subjects A1 and A2 to find out their auditory learning styles, and the following are the interviews.

P : How do you answer these questions? Do you usually listen to the teacher's explanation on the blackboard or YouTube tutorials or other explanations?
A1 : Whiteboard.
P : From the teacher mostly?
A1 : Yes.
P : Do you understand the teacher's explanation on the blackboard better?
A1 : Yes.
P : How do you answer these questions? Do you usually listen to the teacher's explanation on the blackboard or YouTube tutorials or other explanations?
A2 : Listen to the teacher's explanation.

The findings of interviews with subjects A1 and A2 show that students with auditory learning style are more adept at solving problems in problems are more likely to remember what they hear, such as listening to explanations from the teacher. Auditory students discover it more easily to understand the material just by listening to the teacher during the learning process (Teresia and Sulistyani 2023; Turmuzi et al. 2024).

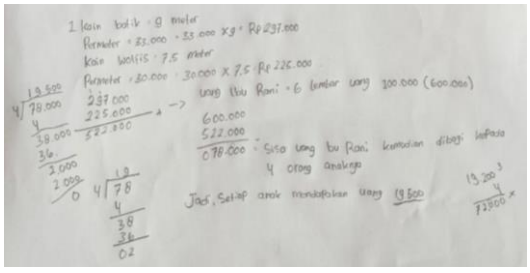
Pseudo Thinking of Subject K1 and Subject K2 Kinesthetic Learning Style

Subject K1 answering question number 1 seemed to think pseudo-false, where he calculated the result of 78,000 divided by 4 was 19,200. Here subject K1 appears to think pseudo when calculating division using porogapit. Then subject K1 answered and gave his explanation in the question number 2 correctly, here she thought correctly. The following is the answer to number 1 of subject K1.



Batik fabric: 9 meters
Permeter: 33.000 = 33.000 x 9 = 297.000
Wolfis fabric: 7.5 meters
Permeter: 30.000 = 30.000 x 7,5 = 225.000
297.000 + 225.000 = 522.000
Mrs. Rani's money: 6 bills of 100,000 (600,000)
600,000 - 522,000 = 78,000 Mrs. Rani's remaining money
Then divided to her 4 children
78 : 4 = 19
So, each child gets 19.200

(a)



Batik fabric: 9 meters
Permeter: 33.000 = 33.000 x 9 = 297.000
Wolfis fabric: 7.5 meters
Permeter: 30.000 = 30.000 x 7,5 = 225.000
297.000 + 225.000 = 522.000
Mrs. Rani's money: 6 bills of 100,000 (600,000)
600,000 - 522,000 = 78,000 Mrs. Rani's remaining money
Then divided to her 4 children
78.000 : 4 = 19.500
So, each child gets 19.500

(b)

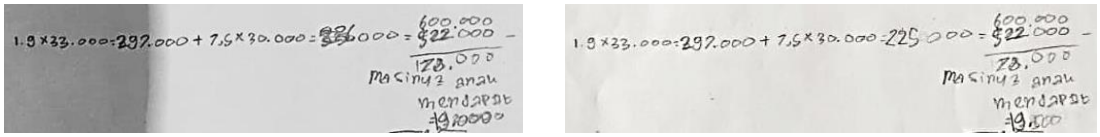
Figure 8. (a) Answer to question number 1 subject k_1 (pseudo-false thinking) (b) results of subject k_1's answers after reflection

Based on Figure 8, shows the initial answer of subject K1 in query number 1 which made an error in the division of 78,000 divided by 4, the result is 19,200. However, after reflecting on subject K1, she was able to correct her answer correctly to 19,500. This is findings from the investigator's conversation with subject K1, as follows.

P : Try to calculate 19,200 times 4 or 19,200 plus 19,200 up to 4 times. Is the result 78,000? Is it correct or not? Check it.
K1 : (calculates 19,200 multiplied by 4 serially)
P : Is the result the same as this? (points to 78,000)
K1 : No, miss.
P : That means your answer is not correct. Try to calculate again 78,000 divided by 4. 78,000 divided by 4 using porogapit.
K1 : (calculates 78,000 divided by 4 using porogapit with guidance)
P : Then the correction is correct?
K1 : 19,500 (removed 19,200 replaced 19,500).

The results of the K1 subject interview show the occurrence of a pseudo-false in question number 2 which is caused by her not checking her answer again and only concluding that 19,200 is the correct answer (Anggraini et al. 2018; Kusmaryono et al. 2020). As seen in her initial answer when calculating 78 divided by 4 the result is 19 remaining 2, subject K1 considers the remaining 2 in the result of his porogapit is also the result, so she writes the answer 19,200. Subject K1 did not understand one of the concepts correctly, so she experienced pseudo-thinking (Nizaruddin and Kusmaryono 2023). Although his answer was wrong, however when a reflection was done on subject K1 using the porogapit method by writing 78,000 divided by 4, she could correct her answer correctly (Subanji and Nusantara 2013, 2016; Wibawa 2016).

There is also subject K2 answering question number 1 appearing to think pseudo-false, where he calculates 7.5 times 30,000 the result is 336,000, and 600,000 minus 522,000 the result is 178,000. Then subject K2 answered, gave his explanation, and re-worked the question number 2 correctly. The following is answer number 1 of subject K2.



(a) (b)

Figure 9. (a) Answer to question number 1 subject k_2 (pseudo-false thinking) (b) results of subject k_2's answers after reflection

Based on Figure 9, shows the initial answer of subject K2 in question number 2 which experienced a class error in calculating 7.5 multiplied by 30,000 the result is 336,000 and 600,000 minus 522,000 the result is 178,000. But after subject K2 reflected, he could correct his answer. This is findings from the investigator's conversation with subject K2, as follows.

P : Is it true that 7.5 times 30,000 is the result? This is not the result.

K2 : 225,000 (removed 336,000 replaced 225,000)
P : How much should it be?
K2 : (calculating 600,000 minus 522,000) 78,000.
P : Forgot. Let me teach you. 78,000 divided by 4.
K2 : (calculates 78,000 divided by 4 using porogapit with guidance from the researcher)
P : So, what is the correct answer?
K2 : 19,500 (removed 19,000 replaced 19,500).

The results of the K2 subject interview show pseudo-false thinking due to not being careful in calculating multiplication and subtraction (Anggraini et al. 2018; Cahdriyana et al. 2019; Kusmaryono et al. 2020; Sugianto 2021). Where shown in the initial answer when calculating 7.5 times 30,000 and 600,000 minus 522,000. Subject K2 was spontaneous in answering the question without checking it again, so he experienced pseudo-thinking (Nizaruddin and Kusmaryono 2023). Although his answer was wrong, but after reflection to correct his answer, subject K2 could correct his answer correctly (Subanji and Nusantara 2013, 2016; Wibawa 2016). To find out students' kinesthetic learning styles, researcher conducted interviews with subjects K1 and K2, the outcomes of the interviews are as follows.

P : How do you answer these problems? Do you usually remember how to do the problems you did before? Or do you remember people's examples and then practice?
K1 : Examples of people.
P : How do you answer these problems? Do you usually remember how to do previous similar problems?
K2 : Remembering how to work.

According to the findings of interviews with subjects K1 and K2, students with a kinesthetic learning style are more adept at solving problems in problems are more likely to remember people's examples and then practice and remember how to do it before. Kinesthetic students will move and see in remembering information (Teresia and Sulistyani 2023; Turmuzi et al. 2024).

▪ CONCLUSION

Pseudo-thinking does occur in students in solving mathematics problems about story problems in everyday life on the material of numerical numbers, pseudo in solving mathematics problems experienced by 5th-grade students of MIN 2 Jember. These research' outcomes demonstrate that 1) students with visual learning styles in solving mathematics problems are more about remembering what they have seen, such as looking at books and blackboards, visual students experience pseudo-true and pseudo-false, 2) students with auditory learning styles in solving mathematics problems are more about remembering what they hear, such as listening to explanations from the teacher, auditory students experience pseudo-false, and 3) kinesthetic learning style students in solving mathematics problems are more about remembering from people's examples and then practicing and remembering how to do it before, kinesthetic students experience pseudo-false. Students who experience this pseudo-thinking are unable to perform the stages of problem-solving properly. Pseudo-thinking that occurs in students in solving mathematics

problems needs to be considered by the teacher. Teachers need to realize that there are students who experience pseudo-true thinking and pseudo-false thinking in solving the problems that have been given. This is important to improve the quality of student understanding.

This research is limited by one topic of pseudo thinking, namely pseudo thinking based on the final result/answer. Therefore, in implementing further research, it is recommended to use pseudo-conceptual thinking, pseudo-analytical thinking, pseudo-true thinking, and pseudo-false thinking so that the pseudo-thinking process can be more broadly elaborated.

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