Desimal: Jurnal Matematika Vol 7 No 2 (2024) 163-176

Contents lists available at DJM

DESIMAL: JURNAL MATEMATIKA

p-ISSN: 2613-9073 (print), e-ISSN: 2613-9081 (online), DOI 10.24042/djm

http://ejournal.radenintan.ac.id/index.php/desimal/index

Exploration of students' computational thinking skills in solving fractional number problems judging from learning style

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ARTICLE INFO

Article History
Received : 07-04-2024
Revised : 14-05-2024
Accepted : 15-06-2024
Published : 20-07-2024

Keywords:
Computational Thinking; Learning Style; Mathematics; Student.

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Doi:
10.24042/djm.v7i2.21878

ABSTRACT

Computational thinking skills play an important role in the 21st century in helping students solve mathematical problems. One of the problem-solving abilities of students is influenced by learning style. The purpose of this study is to explore students' computational thinking skills through visual (V), auditory (A), and kinesthetic (K) learning styles. This research uses a qualitative approach with a case study design. This study uses data collection instruments such as test questions, learning-style questionnaires, and interviews. Before being used, the test questions were validated by two mathematics education experts and tested on five grade V students. Using the test results and the learning style questionnaires, the researcher selected three visual students, one auditory student, and two kinesthetic students. Based on the findings of the research, learning style does not affect students' computational thinking capacity. Students with visual, auditory, and kinesthetic learning styles can meet all indicators of computational thinking: abstraction, pattern recognition, algorithmic thinking, and generalization.

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INTRODUCTION

In this era of increasingly sophisticated technology, education as the front line should be able to contribute to the change of human life for the better. Humans are expected to have skills that can meet these changes by developing computational thinking skills. Computational thinking is becoming increasingly impotant, strategically to solve various problems and is used mainly in mathematics, science, and engineering (Hinterplattner et al., 2020; TASLIBEYAZ et al., 2020). Despite receiving widespread attention, it has been emphasized that computational thinking is a necessary skill for the 21st century, computational thinking has been described as analogous to mathematical reasoning involving beliefs, problem-solving, and justification (Rich et al., 2020). In education, it is necessary to pay attention to the curriculum to overcome this knowledge. (Wing, 2008) expanded the notion of computing and suggested that computational thinking (CT) should be considered a fundamental skill taught throughout the curriculum. Through computational thinking, students can develop the process and tendency to solve problems (Alfi Muyassaroh & masduki, 2023).

(Milicic et al., 2020) Computational thinking is the thought process required to formulate a problem and formulate a solution so that a computer (human or machine) can solve the problem effectively. There are many more definitions of computational thinking (Wing, 2006). In everyday life, computational thinking is as important as reading, writing and math operations, it is not just a computer science skill. (Kusuma Ardi & Masduki, 2023). (Liu et al., 2023) Computational Reasoning can be an important ability that everyone must learn in arithmetic instruction. It is a basic capacity, comparable to researching, composing, and calculating. In this definition, different sub-skills expressing the development of computational thinking are also included. Research (Aminah et al., 2023) relates computational thinking to higher level thinking skills used by students such as the Euclidean algorithm, decomposition process, and evaluation. (Gillott et al., 2020) students use steps to solve abstraction, decomposition, evaluation, generalisation/reuse, logical reasoning, and debugging/testing. Although the definition of computational thinking continues to be debated, most researchers generally think that referring to Wing, as the first person to coin the term, we conclude that computational thinking is an important ability to solve problems effectively. In this study, we analyzed student activities using abstraction, pattern recognition, algorithms and generalization (Krogh et al., 2022).

Based on research findings (Rodríguez-Martínez et al., 2020) elementary school students can develop mathematical ideas and computational thinking in early programs. Research (Krogh et al., 2022) also revealed that solving mathematical problems using computational thinking enables a combination of the Papertian constructivist approach where children learn mathematics through discovery and participation in computer activities. Research (Chookaew et al., 2020) Reveals the effects of three aspects of computational thinking: computational concepts, scientific concepts used by students during learning and understanding activities, computational practices: problem-solving practices, when learning occurs, Process calculations and points of view. Students' self-image and relationships between group members. In contrast to the results of the study (Rodríguez-martínez et al., 2022) ,which revealed that elementary school students' experience with computational thinking is still limited.

In another case (Veronica et al., 2022) found that students with different learning styles also have different problem solving abilities. This is in line with (Chen et al., 2023) that students' learning styles influence student problem solving. Each learning style can use different thinking skills to solve math problems. The learning style indicators used are auditory, visual and kinesthetic learning styles for all three studies. Each learning style can solve math problems with different thinking skills (Annisa Nur Fauziyah & Masduki, 2023). Thus, this study explores students' thinking skills regarding VAK learning styles. Therefore, further research is needed to explore the computational thinking of elementary school students in solving math problems if viewed based on learning styles. The findings of this study are expected to be a basis for educators who are interested in developing and improving students' computational thinking skills.

METHOD

This research is a research based on a case study with the form of a qualitative research. The case study design is suitable for this study because the researcher will explore computational thinking skills with the characteristics of students who have visual, auditory, and kinesthetic learning styles. In addition, students are selected according to their capacity to answer problems on the test of high computational thinking skills.

The procedures of the research can be seen in Figure 1.

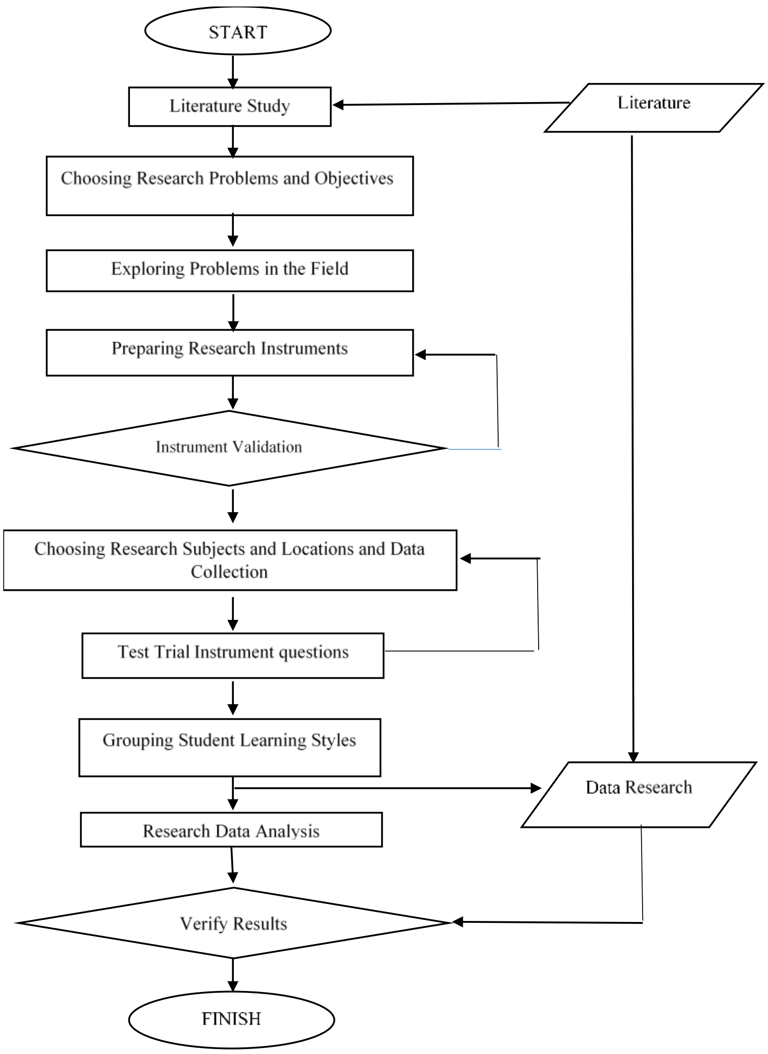
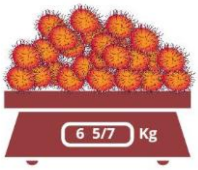


Figure 1. Research Phase

This study involves 18 students in one of the state primary schools in Karanganyar Regency, Central Java who are in class V. The researcher chose class V subjects because the material will be used to measure computational thinking skills, which is the number of fractions taught. Furthermore, six students were selected consisting of three visual learning styles, one auditory learning style, and two kinesthetic learning styles to be interviewed.

Table 1. Computational Thinking Fractional Number Problem of Class V Students

No	Question
1	 Mrs. Winda bought $6\frac{5}{7}$ kg of rambutan at the market. On the way back home, Mrs. Winda gave Mrs. Tiwi $2\frac{2}{5}$ kg of rambutan. Calculate the weight of the rambutan brought home by Puan Winda is ... Kg a. Write down the important things known in the question and what was asked in question number 1! b. After learning the important points and asking questions, investigate what solutions can be used to solve problem number 1! c. Write down the steps and solve problem number 1 in order! d. After solving the problem in order, write the conclusion from solving problem number 1!
2	Explain the cost of  producing seeds and fertilizers for paddy fields every season! a. Write down the important things known in the question and what was asked in question number 2! b. After learning the important points and asking questions, investigate what solutions can be used to solve problem number 2! c. Write down the steps and solve problem number 2 in order! d. After solving the problem in order, write the conclusion from solving problem number 2!
3	Raisya's mother  received several orders of cakes for her circumcision event. Raisya checked the supply of wheat flour that was still available which was $4\frac{1}{4}$ kg, while the flour needed for her mother to make cakes was $7\frac{1}{2}$ kg. Her mother asked Kiki to buy at the market, Kiki bought 5 kg of wheat flour. Count the leftover wheat flour she didn't use! a. Write down the important things known in the question and what was asked in question number 3! b. After learning the important points and asking questions, investigate what solutions can be used to solve problem number 3! c. Write down the steps and solve problem number 3 in order! d. After solving the problem in order, write the conclusion from solving problem number 3!

The research instruments used in this study include written tests, learning-style questionnaires, and interviews. In this study, the researcher adapted five fractional number material test questions from the LKS book, and AKM numeration questions as early as basic. Furthermore, two mathematics education experts validate the questions that have been prepared. Based on the results of the expert's validation, the researcher made improvements to the instrument, i.e. improved the wording of the questions to make it easier for students to understand. Then, the questions were tested on five primary school students in grade V. Based on the results of the experiment, the students could only complete three questions correctly from the given time of 35 minutes as provided by the school. Thus, the researcher only used 3 test questions to collect data on students' computational thinking skills, including questions on the implementation of fractional numbers. The test questions used in this study are included in Table 1.

Furthermore, the researcher used a learning style questionnaire using the options always, sometimes, ever, and never to identify students' learning style preferences organized based on learning style indicators. Data was obtained based on the results of a learning style questionnaire given to 18 students, as shown in Table 2.

Table 2. Student Learning Style Questionnaire Results Data

Learning Style	Siswa
Visual	14
Auditory	1
Kinesthetic	3
Sum	18

Based on Table 2, 14 students have a visual learning style, 1 has an auditory learning style, and 3 have a kinesthetic learning style. Furthermore, the researcher selected each student in each learning style, three visual learning style students, one auditory learning style student, and two kinesthetic learning style students for further exploration of the computational thinking process through interviews. Researchers selected students for each learning style based on high computational thinking ability test scores. To facilitate data analysis, students who learn best visually are labeled V1, students who learn best auditorily are labeled A1, and students who learn best kinesthetically are labeled K1.

The data obtained from the students' answers to the computational thinking skills test questions were then analyzed using the rubric as presented in Table 3. At this stage, the researcher obtains each student's computational thinking ability score on each indicator, which is the score of abstraction, pattern recognition, algorithmic thinking, and generalization indicators. Furthermore, to understand students' computational thinking skills more deeply, researchers conducted in-depth interviews to find out students' thinking processes in solving problems related to computational thinking indicators. The researcher made inferences about students' computational thinking skills at the next stage through the analysis of answers and interviews.

Table 3. Rubric on Assessing Students' Computational Thinking Skills

Assessment Aspect	Score Assessment Criteria	Score
Abstraction	Students can represent mathematical concepts in the form of symbols or mathematical language correctly on the problem.	3
	Students can represent mathematical concepts in symbols or mathematical language on problems but partially.	2
	Students can represent mathematical concepts in symbols or mathematical language about problems, but they need to be corrected.	1
	Students do not represent mathematical concepts in the form of symbols or mathematical language on problems or do not work.	0
Pattern Recognition	Students can correctly determine the appropriate pattern or formula for the problem.	3
	Students can determine the appropriate pattern or formula for the problem, but only partially.	2
	Students can determine a pattern or formula that fits the problem but is not correct.	1
	Students cannot determine the appropriate pattern or formula for the problem or do not do so.	0
Thinking Algorithms	Students can solve algorithms or sequential problem solving accordingly.	3
	Students can solve algorithms or solve problems sequentially but partially.	2
	Students can solve algorithms or solve problems sequentially but less accurately.	1
	The student can't solve the algorithm or solve the problem or not do it.	0
Generalization	Students can draw conclusions to solve problems correctly.	3
	Students can infer the solution of the problem but partially.	2
	Students can make inferences solving problems, but they are not correct.	1
	Students should not infer problem solving problems or not do so.	0

RESULTS AND DISCUSSION

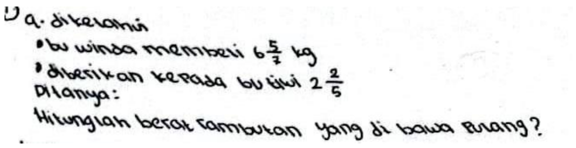


Figure 2. Response given by V1 to Question 1 on the Abstraction Indicator

Figure 2 shows that V1 can represent the weight of rambutan purchased by Mrs. Winda $6\frac{5}{7}\ kg$ and given to Mrs. Tiwi $2\frac{2}{5}\ kg$. V1 can also write the information asked on the question by representing the remaining weight of rambutan from the given problem. The following interview excerpt supports V1's answer.

Q:" Try to explain again why you wrote what you know and what was asked like that?"

V1: "I am writing this from a question, in the problem that Mrs. Winda knows to buy $6\ \frac{5}{7}$ kg, given to Mrs. Tiwi $2\ \frac{2}{5}$, asked to calculate the weight of rambutan brought home."

Thus, V1 can think computationally on abstraction pointers, representing mathematical concepts in symbols or notations.

All three subjects were able to recognize problem solving patterns. An example of V1's answer to question number 1 is shown in Figure 3.

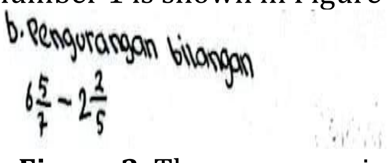


Figure 3. The response given by V1 to question 1 on the pattern recognition indicator

Figure 3 illustrates that V1 can correctly pattern or formula suitable for the problem. Mrs. Winda's initial rambutan weight pattern is $6\frac{5}{7}$ kg because $2\frac{2}{5}\ kg$ given to Mrs. Tiwi, so V1 uses the fractional number reduction operation which is: $6\frac{5}{7}$ - $2\frac{2}{5}$. The following interview excerpt supports V1's answer.

Q: "Try to explain why it is solved by subtracting numbers $6\frac{5}{7}$ - $2\frac{2}{5}$?"

V1: "Because Mrs. Winda rambutan $6\frac{5}{7}$ kg was given to Mrs. Tiwi $2\frac{2}{5}$ minus the number of fractions."

Therefore, it can be concluded that V1 can show computational ability in the pattern recognition indicator, that is, determine the appropriate pattern or formula to solve the problem.

All three subjects were able to complete the solution steps of the problem-solving questions correctly. An example of V1's answer to question number 1 is shown in Figure 4.

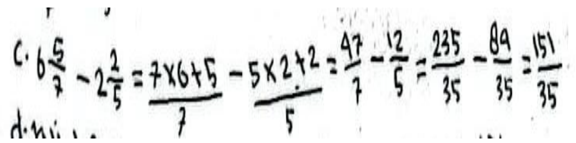


Figure 4. The response given by V1 to question 1 on the algorithm indicator

Figure 4 illustrates that V1 can correctly solve the algorithm or sequential problem solving. Convert mixed fractions to even fractions $\frac{7\times6+5}{7} - \frac{5\times2+2}{5} = \frac{47}{7} - \frac{12}{5}$ then equating the two denominators by finding the LCM from 7 and 5 to obtain the denominator 35, after the denominator is the same the value of the numerator is obtained as a result. $\frac{235}{35} - \frac{84}{35} = \frac{151}{35}$. The following interview excerpt supports V1's answer.

Q: "Try to explain the steps to solve the reduction of fractional numbers."

V1: "$6\frac{5}{7}$ - $2\frac{2}{5}$ is converted to common fractions $\frac{7\times6+5}{7}$ then $\frac{5\times2+2}{5} = \frac{47}{7} - \frac{12}{5}$ this is found first LCM equals $\frac{235}{35} - \frac{84}{35}$, and now subtract 235-84 = $\frac{151}{35}$."

Therefore, V1 shows computational thinking skills on algorithm indicators, that is, sequential problem solving.

All three subjects could correctly infer the solution to the problem from the question. An example of V1's answer to question number 1 is shown in Figure 5.

Figure 5. The response given by V1 to question 1 on the generalization indicator

Figure 5 illustrates that V1 can infer the solution of the problem correctly. So, the weight of rambutan brought home is $\frac{151}{35}$ kg. The following interview excerpt supports V1's answer.

Q: "Why did you conclude that the weight of the rambutan brought home was $\frac{151}{35}$ kg?"

V1: "That's the result of the sisk I wrote, according to the result of subtraction and question."

Thus, V1 can demonstrate computational thinking skills on the generalization indicator, i.e. making problem-solving inferences.

Subjects can represent mathematical concepts in symbols or mathematical language on problems accurately. An example of A1's answer to question number 2 is shown in Figure 6.

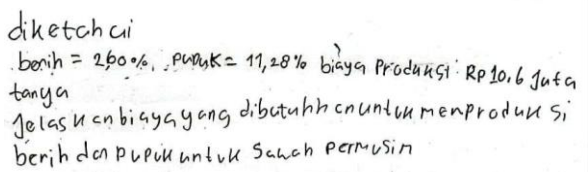


Figure 6. The response given by A1 to Question 2 on the Abstraction Indicator

Figure 6 illustrates that A1 can represent the cost of seed production = 2,60%, fertilizer = 11,28%, and production cost = Rp. 10.6 million. A1 can also write the information asked in the question by representing the remaining weight of rambutan from the given problem. The following interview excerpt supports answer A1.

Q: “Try to explain again why you wrote what you know and what was asked like that?”

A1: “Asked to see in the question, explain the costs required to produce seeds and fertilizers for exchange each season. See in the question where this picture is seed = 2,60%, fertilizer = 11,28%, Then asked the cost required to produce here production cost 10.6 million.”

Therefore, it can be concluded that A1 can show the ability to think computationally on abstraction indicators, which represent mathematical concepts in the form of mathematical symbols or notation.

Subjects can recognize patterns of problem solving. An example of A1's answer to question number 2 is shown in Figure 7.

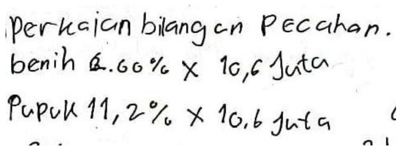


Figure 7. The response given by A1 to Question 2 on the Pattern recognition indicator

Figure 7 illustrates that A1 can correctly determine the appropriate pattern or formula for the problem. The cost pattern of seed production is 2.60%, and fertilizer 11.28%, then A1 uses fractional number multiplication operation which is seed 2.60%×10.6 million and fertilizer 11.28%×10.6 million. The following interview excerpt supports answer A1.

Q: “Try to explain why it is solved by multiplying fractional numbers?”

A1: “This is my percent after I can solve by multiplying your fraction number. “

Therefore, it can be concluded that A1 can demonstrate computational thinking skills on pattern recognition, which is to determine the appropriate pattern or formula to solve a problem.

The subject can complete the steps of solving the problem correctly. An example of A1's answer to question number 2 is shown in Figure 8.

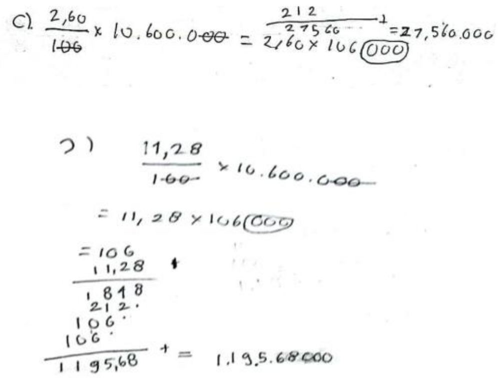


Figure 8. The response given by A1 to Question 2 on the algorithm Indicator

Figure 8 illustrates that A1 can correctly solve the algorithm or sequential problem solving. Converting a percentage number to a fractional number is multiplied by 10.6 million with a reduced product yielding fertilizer = 2,756,000 and seed = 1,195,680. The following interview excerpt supports answer A1.

Q: “Try to explain the steps to solve the reduction of fractional numbers?”

A1: “100 is zero crossed out miss 2 with 10.6 million. Continue multiplying the seed 2.60 × 160 by multiplication in order. The result is 2.7560.000, which is 11.28. Also multiplied by 106, the result is 1,195,680. “

Therefore, it can be concluded that A1 can demonstrate computational thinking skills in the Pointer Thinking algorithm, which solves problems sequentially.

The subject can correctly infer the solution to the problem from the question

question. An example of A1's answer to question number 2 is shown in Figure 9.

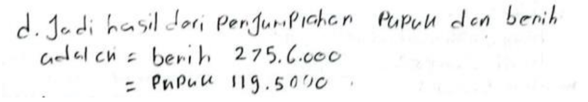


Figure 9. The response given by A1 to Question 2 on the Generalization indicator

Figure 9 illustrates that A1 can correctly deduce the solution to the problem. So, the amount of seed and fertilizer is 2,756,000 and 1,195,000. The following interview excerpt supports answer A1.

Q: “Why did you conclude that the required production cost of fertilizer is 1,195,000 and seed = 2,756,000?”

A1: “The product I wrote which is 1,195,000 I rounded.”

Therefore, it can be concluded that A1 can show computational thinking skills on the generalization indicator, which is to draw conclusions to solve problems.

Both subjects can represent mathematical concepts in symbols or mathematical language on problems accurately. An example of K1's answer to question number 1 is shown in Figure 10.

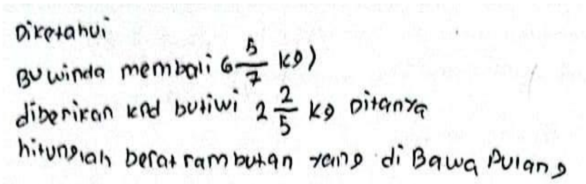


Figure 10. The response given by K1 to Question 1 on Abstraction indicators

Figure 10 shows that K1 can represent the weight of rambutan bought by Mrs. Winda $6\frac{5}{7}$ kg and given to Mrs. Tiwi $2\frac{2}{5}$ kg. K1 can also write the information asked in the question, by representing the remaining weight of rambutan brought home from the given problem. The following interview excerpt supports K1's answer.

Q: “Try to explain again why you wrote what you know and what was asked like that?”

K1: “This I only take the important part of the question, I continue to write here, Mrs. Winda bought $6\frac{5}{7}$ kg of rambutan which was given to Mrs. Tiwi $2\frac{2}{5}$ kg Calculate the weight of rambutan that Mrs. Winda brought home is ... Kg.”

Thus, K1 can think computationally on abstraction pointers, representing mathematical concepts in symbols or notation.

Both subjects were able to recognize problem-solving patterns. An example of K1's answer to question number 1 is shown in Figure 11.

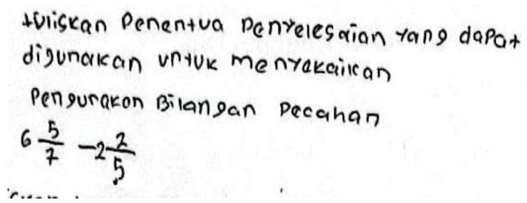


Figure 11. The response given by K1 to Question 1 on the Pattern recognition indicator

Figure 11 illustrates that K1 can correctly determine the appropriate pattern or formula for the problem. Mrs Winda's initial rambutan weight pattern was $6\frac{5}{7}$ kg because it was given $2\frac{2}{5}$ kg , so it must be by reducing the number of fractions $6\frac{5}{7} - 2\frac{2}{5}$. The following interview excerpt supports K1's answer.

Q: “Try to explain why it is solved by subtracting the number $6\frac{5}{7} - 2\frac{2}{5}$?”

K1: “Look at what is being asked; the weight of the rambutan brought home by Mrs Winda has decreased. The initial rambutan $6\frac{5}{7}$ was then given $2\frac{2}{5}$. So that's what can be deducted.”

Thus, K1 can demonstrate computational thinking skills on the pattern recognition indicator, which is to determine the appropriate pattern or formula to solve a problem.

Both subjects could complete the problem-solving steps correctly. An example of K1's answer to question number 1 is shown in Figure 12.

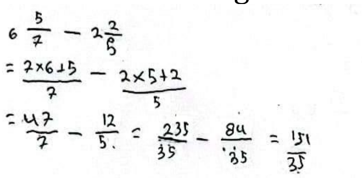


Figure 12. The response given by K1 to Question 1 of the algorithm Indicator

Figure 12 illustrates that K1 can solve the algorithm correctly or solve the problem sequentially. By changing the mixed fraction to an even fraction $\frac{7\times6+5}{7} - \frac{2\times5+2}{5} = \frac{47}{7} - \frac{12}{5}$ equalizing the two denominators by finding the LCM of 7 and 5 obtains the denominator 35; after finding the same denominator as the numerator, the result is $\frac{235}{35} - \frac{84}{35} = \frac{151}{35}$. The following interview excerpt supports K1's answer.

Q:“ Try to explain the steps to solve the reduction of fractional numbers?”

K1:“$6\,\frac{5}{7}$ - $2\,\frac{2}{5}$ equals the modified common fraction used for $\frac{47}{7} - \frac{12}{5}$ directly equates to the LCM finding denominator of 7 equals 5. This $\frac{235}{35} - \frac{84}{35} = \frac{151}{35}$ is only subtracted the upper 235 - 84 .”

Therefore, K1 shows computational thinking skills on the indicator of algorithmic thinking, which is sequential problem solving.

Both subjects could correctly infer the solution to the problem from the question. An example of K1's answer to question number 1 is shown in Figure 13.

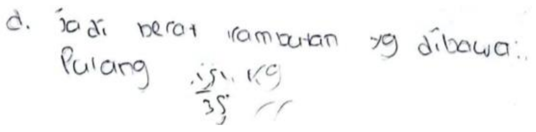


Figure 13. The response given by K1 to Question 1 on the Generalization indicator

Figure 13 illustrates that K1 can correctly deduce the solution to the problem. So, the weight of the hair brought home is $\frac{151}{35}$ kg. The following interview excerpt supports K1's answer.

Q: “Why do you conclude that the weight of rambutan brought home is $\frac{151}{35}$ kg.”

K1: “The result is $\frac{151}{35}$ which I wrote in part A is with what was questioned the result of reducing $6\,\frac{5}{7}$ - $2\,\frac{2}{5}$ = $\frac{151}{35}$ kg.”

Therefore, K1 shows computational thinking skills on the generalization cue, that is, making problem-solving conclusions.

Based on the data analysis of test results and interviews from the three learning styles, they have similarities in computational thinking, no differences are presented in Table 4. Table 4 shows that students with visual, auditory and kinesthetic learning styles can represent the mathematical concepts of the presented problems appropriately. All three subjects were abstracted on interviews and tests, breaking down complex problems into simpler ones. This is in line with (Gillott et al., 2020; Ishartono et al., 2021) based on his research findings, students with visual, auditory and kinesthetic learning styles can perform abstractions focused on the knowledge and skills required to answer mathematical problems correctly. Therefore, it can be concluded that the difference in students' learning styles does not affect the difference in students' computational thinking skills towards abstract indicators.

Pattern recognition is done at the process and abstraction level, defining structured patterns to explain how concepts or principles can be developed in the mind of an individual when solving problems (Adawiyah et al., 2021). From the three subjects, the learning style can identify the pattern of problem solving on the issue accordingly. Visual and kinesthetic subjects determine the correct pattern of subtraction of fractional numbers (Suherman & Vidákovich, 2022). The auditory subject accurately determines the multiplication pattern of fractional numbers. Therefore, it can be concluded that the difference in students' learning styles does not affect the difference in students' computational thinking skills towards pattern recognition indicators.

Table 4. Equation of computational thinking skills of students' visual, auditorial, and kinesthetic learning styles

Indicators	Visual	Auditory	Kinesthetic
Abstraction	Students can represent mathematical concepts in the form of symbols or mathematical language correctly on the problem.	Students can represent mathematical concepts in the form of symbols or mathematical language correctly on the problem.	Students can represent mathematical concepts in the form of symbols or mathematical language correctly on the problem.
Pattern Recognition	Students can correctly determine the appropriate pattern or formula for the problem.	Students can correctly determine the appropriate pattern or formula for the problem.	Students can correctly determine the appropriate pattern or formula for the problem.
Thinking Algorithms	Students can solve algorithms or sequential problem solving accordingly.	Students can solve algorithms or sequential problem solving accordingly.	Students can solve algorithms or sequential problem solving accordingly.
Generalization	Students can draw conclusions to solve problems correctly.	Students can draw conclusions to solve problems correctly.	Students can draw conclusions to solve problems correctly.

Algorithms run coherently; that is, it presents sequential pattern recognition. The problem is clearly described to determine the outcome of the question (Veronica et al., 2022). The representation that the subject makes is visual and kinesthetic, that is, it converts mixed fractions into common fractions and records the process required to solve them accurately. Additionally, auditory subjects represent the solution step by multiplying in order (Fang et al., 2023). Then, repeat or count to find the result. Although there are slight differences in writing the steps of the three subjects, the learning style can help us understand procedural knowledge accurately. Or solve a problem to get a solution. (Ishartono et al., 2021) Students who have visual, auditory, and kinesthetic learning styles can present solution steps with correct calculations. Therefore, the difference in students' learning styles does not affect the difference in students' computational thinking skills towards algorithmic thinking.

In generalization indicators, visual, auditory and kinesthetic subjects can correctly infer problem solving (Kholid et al., 2022). In this indicator, there is no significant difference between visual, auditory, and kinesthetic learning styles for all learning styles to get the correct results. This is in line with the results of the study (Ishartono et al., 2021). Students with visual, auditory and kinesthetic learning styles can make problem-solving inferences. Therefore, the difference in students' learning styles does not affect the difference in students' computational thinking skills on generalization indicators.

The findings of this study provide information about solving fractional number problems that can be solved appropriately after going through the thinking process of abstraction, pattern recognition, algorithms, and generalization. Differences in learning styles of students with high scores generally do not affect students' computational thinking skills (Khishaaluhussaniyyati et al., 2023). The results of this study are not for research. The results of this study differ from research (Rosida & Masduki, 2023) which states that learning styles influence problem solving on generalization indicators. This is also different from the results of the study (Utami & Masduki, 2023) which shows that the visual reasoning ability of kinesthetic students is better than students who have a visual and auditory learning style.

CONCLUSIONS AND SUGGESTIONS

The study concludes that the difference in student learning styles does not affect the computational thinking skills of students with high scores. Comparatively, students with visual, auditory, and kinesthetic learning styles have excellent computational thinking skills despite having different characteristics from the types of learning styles. But this does not affect students' computational thinking skills. Knowing students' learning styles and computational thinking skills is expected to give consideration to teachers in preparing, implementing and evaluating learning so that students still have positive potential to develop their computational thinking skills in the future.

Recommendations for further research are to develop and test more specific learning methods that can accommodate individual learning styles, and evaluate their effectiveness in improving students' understanding and skills in mathematics. Include more factors that may influence students' computational thinking skills, such as motivation, confidence, and environmental factors, to gain a more comprehensive understanding of how students learn mathematics.

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