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ANALYSIS OF JUNIOR HIGH SCHOOL STUDENTS' CRITICAL THINKING SKILLS IN SOLVING NUMERACY LITERACY PROBLEMS BASED ON LEARNING STYLES

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ABSTRACT
The low achievement of Junior High School students in numeracy literacy in the national Assessment shows that many students still have difficulty solving context-based problems that require critical thinking skills. One fakctor that influences this ability is differences in learning styles, which are often not fully accommodated in learning. This study aims to describe students' critical thinking skills in solving numeracy literacy essay questions based on learning styles. This study uses a descriptive qualitative method. The research sebjects were selected using a learning style questionnaire and critical thinking ability test given to 34 students in grades VIII-X at MTsN 1 banda Aceh, then 2 students with high critical thinking abilities were selected from each learning style. The subjects in this study were 6 students, namely 2 students with a visual learning style, 2 students with an auditory learning style, and 2 students with a kinesthetic learning style. Data collection was conducted by administreting learning style questionnaires, critical thinking tests in solving numeracy literacy problems, and interviews. The result of this study indicate that students with a visual learning style were able to meet all critical thinking ability indicators, namely interpretation, analysis, evaluation, and inference; students with an auditory learning style were able to meet three critical thinking ability indicators, namely interpretation, evaluation, and inference; students with a kinesthetic learning style were able to meet three critical thinking ability indicators, namely interpretation, analysis, and inference.
Keywords: critical thinking; learning style; numeracy literacy.

ABSTRAK
Rendahnya capaian literasi numerasi siswa SMP dalam Asesmen Nasional menunjukkan bahwa masih banyak siswa yang mengalami kesulitasn dalam menyelesaikan soal berbasis konteks yang menuntut kemampuan berpikir kritis. Salah satu faktor yang memengaruhi kemampuan tersebut adalah perbedaan gaya belajar yang seringkali belum sepenuhnya diakomodasi dalam pembelajaran. Penelitian ini bertujuan untuk mendeskripsikan kemampuan berpikir kritis siswa dalam menyelesaikan soal uraian literasi numerasi berdasarkan gaya belajar. Penelitian ini menggunakan metode kualitatif deskriptif. Pemilihan subjek penelitian dilakukan dengan menggunakan angket gaya belajar dan tes kemampuan berpikir kritis yang diberikan kepada 34 siswa kelas VIII-X MTsN 1 Banda Aceh kemudian dipilih 2 siswa yang memiliki kemampuan berpikir kritis tinggi dari setiap gaya belajar. Subjek dalam penelitian ini adalah 6 siswa, yaitu 2 siswa gaya belajar Visual, 2 siswa gaya belajar Auditori, dan 2 siswa gaya belajar Kinestetik. Pengumpulan data dilakukan dengan memberikan angket gaya belajar, tes kemampuan berpikir kritis dalam menyelesaikan soal literasi numerasi, dan wawancara. Hasil penelitian ini menunjukkan bahwa siswa dengan gaya belajar visual mampu memenuhi semua indikator kemampuan berpikir kritis yaitu interpretasi, analisis, evaluasi, dan inferensi; siswa dengan gaya belajar auditori mampu memenuhi 3 indikator kemampuan berpikir kritis yaitu interpretasi, evaluasi, dan inferensi; siswa dengan gaya belajar kinestetik mampu memenuhi 3 indikator kemampuan berpikir kritis yaitu interpretasi, analisis dan inferensi.
Kata kunci*: berpikir kritis; gaya belajar; literasi numerasi.*

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Introduction

The 2022 PISA results show that Indonesia's mathematics literacy score is 366, which is far below the OECD average of 472. PISA measures how well students can use their mathematical skills to solve real-world problems that require critical thinking (OECD, 2023). Based on the 2024 Education Report released by the Ministry of Education, Culture, Research, and Technology, only about 69.61% of junior high school/MTs students have achieved minimum competency in numeracy literacy (Kementrian Pendidikan Kebudayaan Riset dan Teknologi, 2025). This condition shows that the numeracy literacy skills of students in Indonesia, especially at the junior high school/MTs level, are in the moderate category and therefore still not optimal. In solving these problems, numeracy literacy questions not only require calculation skills, but also critical thinking skills. Students' critical thinking skills are greatly influenced by how they receive, process, and apply information, which is closely related to their learning styles. Differences in learning styles can determine the extent to which students are able to understand numeracy literacy questions, choose problem-solving strategies, and use critical thinking skills effectively. Problem based learning creates an active learning environment and can improve students' learning outcomes in solving real-life problems (Sugiharti, Vahlia & Rahmawati, 2025). Identify problems in implementing PBL in mathematics subjects, for example, how students can be given relevant and contextual problems (Darojah, Vahlia & Anwar, 2025). Therefore, it is important to examine students' critical thinking skills in solving numeracy literacy questions by considering their learning styles.

The relationship between learning styles and critical thinking skills has been the focus of a number of studies in various contexts. (Hayati, Fajriana, & Rohantizani, 2024) examined the relationship between learning styles and students' mathematical communication in numeracy AKM, but did not examine critical thinking aspects. (Mashuri, Sasomo, & Lestari, 2024) discussed critical thinking in solving mathematical problems based on learning styles, but did not specifically review the context of numeracy literacy. Meanwhile, (Trisnaningtyas & Khotimah, 2022) focuses on numeracy literacy based on learning styles, but does not specifically relate it to critical thinking. Therefore, this study attempts to fill this gap and is expected to provide new insights into analyzing the influence of learning styles on critical thinking skills in solving numeracy literacy problems, thereby providing a basis for innovation in mathematics learning strategies.

Numeracy literacy is an individual's ability to reason mathematically and formulate, apply, and interpret mathematical concepts to explain, describe, predict events, solve problems, and make decisions in various real-life contexts (Halidin, Chairuddin, & Purnomo, 2023). Numeracy literacy questions are designed to measure the application of mathematical concepts in real life with five main characteristics. First, they cover various mathematical domains, namely numbers, algebra, geometry, data, and uncertainty. Second, they are arranged in personal,

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socio-cultural, and scientific contexts to be relevant to everyday life. Third, it has three cognitive levels, namely understanding (Knowing), application (Applying), and reasoning (Reasoning). Fourth, it is presented in various formats, such as multiple choice, fill-in-the-blank, short answer, or essay (Asrijanty, 2022). Fifth, it is equipped with stimuli in the form of narratives, images, or tables to provide a clear context (Tim Erlangga Fokus AKM, 2021). With these characteristics, numeracy literacy questions not only test arithmetic skills but also train problem-solving and critical thinking. Based on these characteristics, it is hoped that teachers can develop questions that suit students' learning styles, thereby making learning strategies more adaptive. In addition, the findings of this study can also serve as recommendations for curriculum developers to design numeracy literacy assessment instruments that are more contextual and responsive to differences in student learning styles.

Based on sensory preferences, learning styles are divided into three main categories, namely visual (through sight), auditory (through hearing), and kinesthetic (through movement) (Asnawi, 2023; El-Sabagh, 2021). A person's learning style will then determine how they develop and apply critical thinking skills in various learning contexts. Students with a visual learning style are stronger at observing patterns, graphs, and diagrams (Rezki, Hasan, Akbar, Zaura, & Khwaengmek, 2024). Students with an auditory learning style are strong at understanding meaning through verbal explanations and drawing conclusions (Kayalar & Kayalar, 2017). Meanwhile, students with a kinesthetic learning style are strong in understanding concepts through practical application (Hafizha, Ananda, & Aprinawati, 2022; Sholikah & Arif, 2023). Thus, learning styles not only influence how students acquire information, but also how they analyze, process, and conclude an idea logically.

Students' difficulties in solving contextual numeracy literacy problems are generally caused by limited practice and differences in learning styles that have not been fully accommodated, because learning strategies still tend to be general in nature (Nurlatifah & Munandar, 2024; Umayrah & Wahyudin, 2024). According to Cooper and Dunne, in general, students' ability to solve context-based problems is still very weak compared to their ability to solve mathematics problems without real-world contexts. As a result, students have difficulty solving numeracy-based problems (Febrianti & Nurjanah, 2022; Sujadi et al., 2022). Thus, learning strategies that are more adaptive to students' learning styles are needed by providing a variety of contextual numeracy problems and real-world problem-based exercises.

Based on the above issues, the research question in this study is how junior high school students' critical thinking skills in solving numeracy literacy problems are influenced by their different learning styles. This study aims to analyze the relationship between learning styles and students' critical thinking skills in solving numeracy literacy problems, thereby providing a basis for the development of mathematics learning strategies that are more adaptive to the characteristics of junior high school students.

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Research Methods

This type of research is descriptive qualitative research that aims to analyze junior high school students' critical thinking skills in solving numeracy literacy problems based on learning styles. The research was conducted at MTsN 1 Banda Aceh with 34 students in grades VIII-X as subjects. The subjects in this study were 6 students with high critical thinking test scores, namely 2 students with visual learning styles, 2 students with auditory learning styles, and 2 students with kinesthetic learning styles. The research instruments used were a learning style questionnaire, a critical thinking test, and interview guidelines. The learning style questionnaire was used to identify students' learning style tendencies, consisting of 36 statements taken from the characteristics of learning styles according to De Porter and Henacki. This questionnaire used a Likert scale with 3 choices, namely Often (O), Sometimes (S), and Rarely (R), with a score of 3, 2, 1 for each statement.

The critical thinking test instrument consists of two stages, each stage consisting of two essay questions in the form of numeracy literacy in the domain of numbers and geometry in a personal context. In the first stage of the test, the numbers material concerns arithmetic number patterns, while the geometry material concerns the area of flat shapes in the context of the use of ceramics A and C. In the second stage of the test, the numbers material concerns triangular number patterns and the geometry material concerns the area of flat shapes in the context of the use of ceramics B. The essay questions in both stages of the test are in accordance with the indicators according to Facione in Table 1 below. (Faiziyah & Priyambodho, 2022). Critical thinking ability indikators shows in Table 1.

Table 1. Critical thinking ability indicators

No	Indicators	Sub-Indicators
1	Interpretation	Knowing what is known and what is asked in the question and explaining it in your own words.
2	Analysis	Plan the solution by converting the problem into a mathematical model.
3	Evaluation	Follow the steps to solve the problem and perform the calculations correctly.
4	Inference	Draw conclusions accurately based on the results of the solution.

Based on Table 1, the critical thinking indicators in this study include interpretation, analysis, evaluation, and inference. Interpretation emphasizes understanding the question, analysis emphasizes designing a solution model, evaluation emphasizes the accuracy of steps and calculations, and inference emphasizes drawing conclusions. These four indicators refer to Facione's critical thinking framework and form the basis for assessing students' ability to solve numeracy literacy problems.

Interview instruments were used to explore students' thought processes in solving numeracy literacy problems. Before each instrument was used, it was validated through expert testing involving mathematics education lecturers and mathematics teachers at schools.

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Data analysis techniques use the Miles and Huberman model, which consists of data reduction, data presentation, and conclusion drawing (Sugiyono, 2021)**.** Data from the learning style questionnaire was analyzed by accumulating answer scores to determine students' learning styles. Data from the numeracy literacy test was analyzed based on the fulfillment of critical thinking indicators by assessing students' answers to essay questions. Interviews were analyzed through transcription, then categorized to find patterns in students' thinking processes according to their learning styles. Data validity was checked using time triangulation, which is comparing the results of the first test with the results of the second test to ensure the consistency of students' abilities from the data obtained.

Results and Discussion

Based on the learning style questionnaire analysis given to 34 students in grades VIII-X, their learning styles were categorized. The questionnaire results showed that each subject had a different learning style. Based on the learning style identification results, there were 8 students with visual learning styles, 17 students with auditory learning styles, and 9 students with kinesthetic learning styles.

After classifying learning styles, all students were given a critical thinking test. The researchers then examined the students' answer sheets to identify their level of critical thinking skills. After analyzing the students' work, the researchers conducted semi-structured interviews with two students who had high critical thinking skills with a visual learning style, two students who had high critical thinking skills with an auditory learning style, and two students who had high critical thinking skills with a kinesthetic learning style. These interviews aimed to identify students' incomplete answers and the parts that students did not write in when completing the numeracy literacy questions. Next, the subjects were given a second test to ensure the consistency of the data obtained.

Analysis of answer sheets for question number 1 on high critical thinking skills and interviews with visual learning style students (V1)

Based on the results of the answer sheets and interviews from V1 for number 1, students demonstrated a consistent understanding in recognizing patterns and explaining them in depth. V1 was able to analyze recurring patterns, relate them to mathematical concepts, and apply the appropriate formulas, including triangular numbers in the second stage of the test. The student was also able to evaluate the calculation results well and draw conclusions about the limits of the pattern based on the available resources.

Analysis of answer sheets for question number 2 on high critical thinking skills and interviews with visual learning style students (V1)

Based on the results of the answer sheets and interviews from V1 for number 2, students demonstrated good interpretation skills, namely the ability to identify types of ceramics based on the floor plan and questions in both stages of the test. In the analysis, V1 was not only able to calculate, but also understand the concepts behind the calculations and relate them to real-world applications, such as ceramic tile installation. In the evaluation, the student understood the concept of area, determined the number of ceramic tiles, and applied decision-making logic.

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Subject V1 was also able to draw logical conclusions and determine the additional ceramic tile requirements based on the conditions given.

Analysis of answer sheets for question number 1 on high critical thinking skills and interviews with visual learning style students (V2)

Based on the results of the answer sheets and interviews from V2 for number 1, students have good interpretation skills. Students are able to understand basic patterns and calculate the number of matchsticks/marbles for each pattern accurately. The student has good analytical skills, understanding that the pattern is represented by a general formula, demonstrating the ability to generalize patterns. The student has excellent evaluation skills, being able to identify patterns and calculate the results correctly. The student can use appropriate logic and mathematical methods. The student has good inference skills, being able to draw conclusions based on the data provided. The student also considers resource limitations.

Analysis of answer sheets for question number 2 on high critical thinking skills and interviews with visual learning style (V2) students

Based on the results of the answer sheets and interviews from V2 for number 2, students have good interpretation skills, are able to identify information, and determine which rooms have ceramic tiles. In the analysis, V2 was able to calculate the area of the room correctly and according to the type of ceramic tile. In the evaluation, the student was able to make the right decision. In test 2, the student did not write down the reason why there were not enough ceramic tiles and did not calculate the ceramic tiles for the remaining area of the room, but the student was able to explain the reason during the interview stage. The student's inference skills are good, and the student is able to draw appropriate conclusions.

Analysis of answer sheets for question number 1 on high critical thinking skills and interviews with students on auditory learning styles (A1)

Based on the results of the answer sheet and interview from A1 for number 1, the student has good interpretation skills by understanding the question thoroughly and correctly identifying the number of marbles in each pattern. In the analysis, the student is able to recognize different patterns and use the appropriate method. The student's evaluation skills are also good. In test 1, the student was able to determine the number of matchboxes if the pattern was made up to pattern 7. In test 2, the student was also accurate in using the formula to calculate the number of marbles up to pattern 8. The student's inference skills are very good. In test 1, the student was able to determine the number of matchboxes, and in test 2, the student was able to determine the maximum pattern limit well.

Analysis of answer sheets for question number 2 on high critical thinking skills and interviews with students on auditory learning styles (A1) in Figure 1-2.

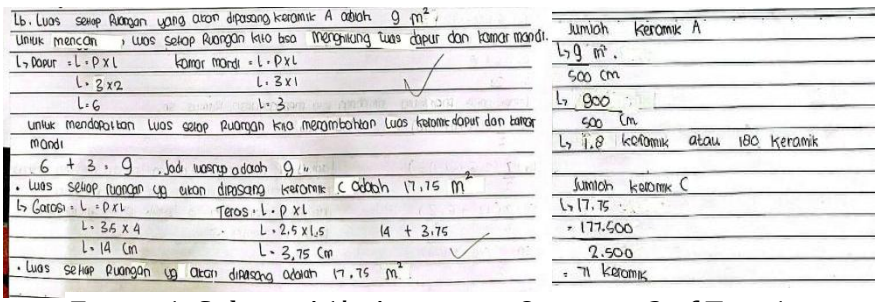

Figure 1. Subject A1's Answer to Question 2 of Test 1

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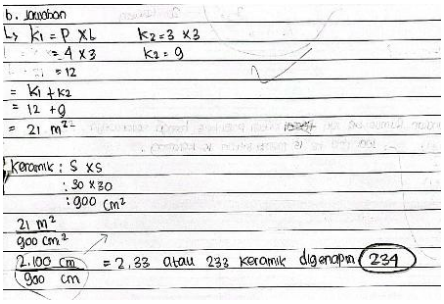

Figure 2. Subject A1's Answer to Question 2 of Test 2

Based on the results of the students' answer sheets in Figures 1 and 2, as well as the results of the interview with A1 for student number 2, the students demonstrated good interpretation skills by recognizing the type of ceramic based on the information in the floor plan and questions in both stages of the test. In the analysis, students understood Test 1 and Test 2 comprehensively, but they were inaccurate in converting units from cm2 to m2, resulting in incorrect calculations of the number of ceramics. In the evaluation stage, students obtained accurate results, but some of their calculation processes were incorrect. Their inference skills were quite good because they were able to make the right decisions and connect the requirements with the available number of ceramics.

Analysis of answer sheets for question number 1 on high critical thinking skills and interviews with auditory learning style students (A2)

Based on the results of the answer sheets and interviews from A2 for question number 1, students have good interpretation skills by accurately counting the number of matchsticks or marbles in each pattern and understanding the differences. In the analysis, students were able to apply the appropriate formula to solve number pattern problems. Student evaluation was also good, as evidenced by the selection and use of the correct formula and accurate calculations. Students' inference skills were strong, as they were able to draw conclusions based on the available information, including determining the limitations of the number of matches or marbles in forming certain patterns.

Analysis of answer sheets for question number 2 on high critical thinking skills and interviews with auditory learning style students (A2)

Based on the results of the answer sheets and interviews from A2 for question number 2, students have good interpretation skills in determining the right room for ceramic tile installation. In the analysis, students were able to calculate the area of the room correctly and according to the type of ceramic tile. Student evaluation was good, as demonstrated by systematic calculations of area and number of ceramic tiles. Students' inference skills were also good, as they were able to draw conclusions based on the evaluation of needs and availability of ceramic tiles. Analysis of answer sheets for question number 1 on high critical

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thinking skills and interviews with kinesthetic learning style students (K1) in Figure 3-4

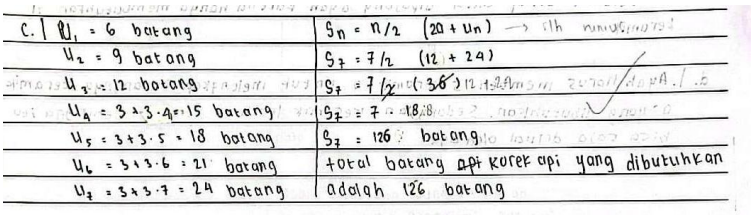

Figure 3. Subject K1's Answer to Question 1 of Test 1

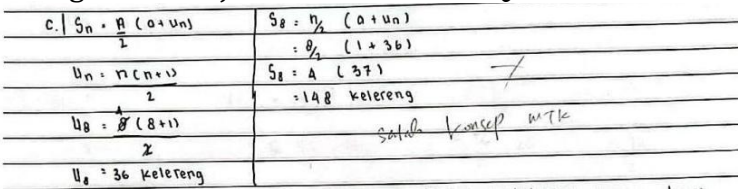

Figure 4. Subject K1's Answer to Question 1 of Test 2

Based on the results of the students' answer sheets in Figures 3 and 4, as well as the results of the K1 interview for number 1, students have good interpretation skills because they understand the concept of triangular number patterns and their differences from arithmetic patterns. In the analysis, the student was able to generalize the pattern in algebraic form and determine the number growth pattern according to the triangle rule. However, the student's evaluation skills were not good due to errors in writing the formula in both tests. The student's inference skills were good; the student was able to conclude that the number of matches was not sufficient for patterns 1 to 7, but the conclusion in the second stage test was still incomplete.

Analysis of answer sheets for question number 2 on high critical thinking skills and interviews with kinesthetic learning style students (K1)

Based on the results of the answer sheets and interviews from K1 for number 2, the students' interpretation skills were good, because K1 was able to identify the location of the ceramic tile installation correctly. The students' analytical skills were also good; they were able to calculate the area of the room correctly and in accordance with the type of ceramic tile used. The conversion of units from square meters to square centimeters was also correct. The student has good evaluation skills because they calculated the area and number of tiles systematically and correctly. The student has good inference skills. They were able to draw conclusions based on their evaluation of the number of tiles needed.

Analysis of answer sheets for question number 1 on high critical thinking skills and interviews with kinesthetic learning style students (K2) In Figure 5-6

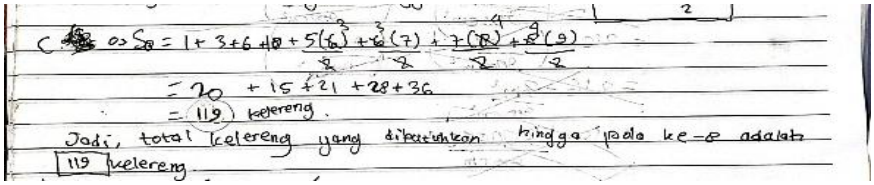

Figure 5. Subject K2's answer to question 1 of test 2

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Based on the results of the students' answer sheets in Figures 5 and 6, as well as the results of the K2 interview for number 1, the student has good interpretation skills because they can identify patterns in two different contexts (matchsticks and marbles). In terms of analytical skills, the student is able to apply the correct pattern and find the appropriate formula. However, their evaluation skills are not yet fully developed, as they made mistakes in substituting values in the first test, while in the second test they made mistakes in adding up the results. The students' inference skills are good, as they are able to conclude the shortage of matchsticks, add the required amount, and determine the maximum limit of the pattern based on the number of marbles available.

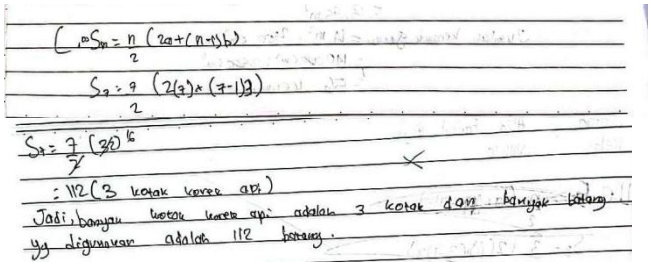

Figure 6. Subject K2's answer to Question 1 of Test 1

Analysis of answer sheets for question number 2 on high critical thinking skills and interviews with kinesthetic learning style students (K2)

Based on the results of the answer sheets and interviews from K2 for number 2, the student has good and consistent interpretation skills, as evidenced by the first and second test answers being consistent in understanding the relationship between the type of ceramic and its location. The student's analytical skills are very good, able to determine the area, develop strategies, and calculate the number of ceramics accurately. In the evaluation, the student was able to compare the number of ceramics available with those needed and perform the calculations correctly. The student's inference skills are also good, being able to conclude the number of ceramics needed based on previous calculations In Tabel 2.

Table 2. Critical thinking proficiency based on learning style

Critical Thinking Ability Indicators	Visual Subjects 1	Visual Subjects 2	Auditory Subjects 1	Auditory Subjects 2	Kinesthetic Subjects 1	Kinesthetic Subjects 2
Interpretation	✓	✓	✓	✓	✓	✓
Analysis	✓	✓	×	✓	✓	✓
Evaluation	✓	✓	✓	✓	×	×
Inference	✓	✓	✓	✓	✓	✓

Based on the research results and Table 2, there is variation in students' critical thinking skills based on their learning styles. Students with visual learning styles are able to meet all four indicators of critical thinking skills according to Facione, namely interpretation, analysis, evaluation, and inference. Meanwhile, auditory learners are only able to meet three indicators, namely interpretation, evaluation, and inference, but are not yet optimal in the analysis indicator.

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Students with a kinesthetic learning style also met three indicators, namely interpretation, analysis, and inference, but were not yet able to demonstrate their evaluation skills to the fullest. These findings confirm that learning style plays an important role in influencing how students access information, process data, and make decisions in solving numeracy literacy problems.

The dominance of visual learners' achievements in all critical thinking indicators can be explained by their characteristic of more easily understanding information in visual representations, such as tables, pictures, and illustrations. This tendency allows visual learners to more quickly identify the important parts of a problem, analyze the relationships between pieces of information, and evaluate the validity of an argument. These findings are in line with (Latifah, Prayito, & Rasiman, 2024; Setiana & Purwoko, 2020) which state that visual learners tend to excel at organizing pattern-based and visual representation information, making them more adaptable to numeracy literacy questions that often use tables and graphs. Conversely, the limitations of auditory learners on the analysis indicator show that their tendency to rely more on verbal explanations makes them less skilled at manipulating numerical data or understanding the relationships between variables presented visually. This reinforces the findings (Latifah et al., 2024; Wilujeng & Sudihartinih, 2021) stating that auditory learners find it easier to understand concepts through verbal explanations and discussions, but are less skilled at connecting quantitative information. In other words, auditory learners can understand the meaning of a statement and draw conclusions from explanations given by teachers or peers, but face difficulties when asked to analyze numerical data independently.

Kinesthetic learners tend to achieve lower scores on evaluation indicators due to their tendency to learn through real-life experiences and hands-on practice. (Safitri & Miatun, 2021) reveal that kinesthetic learners are more focused on concrete actions than deep reflection. This is evident in the research results, where kinesthetic learners perform quite well in interpretation and inference through practical experience, but are less capable of evaluation that requires logical and reflective consideration. Thus, the kinesthetic learning style strengthens experience-based understanding, but limits aspects of evaluation that demand higher reflective abilities.

The findings of this study indicate that learning styles influence variations in critical thinking skills in solving numeracy literacy problems. These results are in line with the study (Mashuri et al., 2024) which emphasizes differences in critical thinking skills based on learning styles, although the context used by Mashuri was not numeracy literacy. This study expands on these findings by showing that learning styles also have implications for critical thinking skills in the context of AKM-based numeracy literacy problems. On the other hand, this study also complements the findings of (Trisnaningtyas & Khotimah, 2022) which examined numeracy literacy based on learning styles but did not relate it to critical thinking skills. Thus, this study makes a new contribution by emphasizing that learning styles not only affect numeracy literacy achievement in general but also determine the fulfillment of critical thinking indicators for each type of learning style. Furthermore, although (Hayati et al., 2024) emphasizes mathematical communication in the context of AKM numeracy, the findings of this study

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reinforce the view that learning styles remain an important factor that influences students' ability to deal with contextual-based questions.

The strength of this study is that it provides a detailed description of students' critical thinking skills based on Facione's indicators for each learning style, thereby clearly mapping the strengths and weaknesses of each group of students. However, this study also has limitations, namely the relatively small number of subjects and its focus only on students with high critical thinking skills. This condition means that the results of the study cannot be generalized to the entire population of junior high school students with varying levels of ability. Therefore, further research is recommended to involve a larger number of subjects with different abilities, so as to produce a more comprehensive picture.

In practical terms, the results of this study have important implications for mathematics learning in schools. Teachers can use these findings to design adaptive learning strategies that suit students' learning styles. For example, presenting data in the form of graphs, diagrams, or tables can be increased to support visual learners, group discussions and verbal explanations can be optimized for auditory learners, while experiment-based activities or hands-on practice can be used to support kinesthetic learners. In addition, this research also contributes to curriculum and assessment development by providing a basis for the development of numeracy literacy instruments that are more contextual and responsive to variations in student learning styles. Thus, critical thinking skills, which are a key requirement in numeracy literacy, can be improved more effectively and evenly.

Conclusion and Suggestion

The results of the analysis of students' critical thinking skills in solving numeracy literacy problems based on learning styles show that students' learning styles, particularly visual, auditory, and kinesthetic, affect their ability to solve numeracy literacy problems. Students with visual learning styles showed the most optimal achievement because they were able to meet all critical thinking indicators. Auditory students were generally in the moderate category with limitations in the analysis aspect, while kinesthetic students were lower because they were not consistent in the evaluation indicators. These findings confirm that learning styles play an important role in determining variations in students' critical thinking achievements, so they need to be considered in numeracy literacy learning strategies at the junior high school level. The results of this study provide a practical overview for junior high school mathematics teachers in adjusting numeracy learning strategies according to students' learning styles, such as facilitating visual learners with graphs/diagrams, auditory learners with discussions, and kinesthetic learners with hands-on activities.

Based on these conclusions, the researchers offer several suggestions that they hope will be useful. Future researchers are advised to involve a larger number of subjects with varying levels of critical thinking skills so that the research results can be generalized more broadly. In addition, further research could use more diverse instruments or examine other levels of education to enrich our understanding of the relationship between learning styles and critical thinking skills in numeracy literacy.

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