



STUDENTS MATHEMATICAL LITERACY SKILLS ON FRACTIONS VIEWED FROM LEARNING INTEREST AND LEARNING STYLES

Nur Amin Ambon Talaohu*, Nessy Pattimukay, La Suha Ishabu

Elementary School Teacher Education Study Program, Pattimura University, Ambon City, Indonesia

Corresponding author email: nurtalaohu7@gmail.com

Abstract

Mathematical literacy among Indonesian elementary students remains low, particularly in contextual fraction problems, often due to internal factors like learning interest and styles. This study aims to describe fifth-grade students' mathematical literacy skills on fraction materials based on their learning interest and learning styles. A descriptive qualitative approach was employed. The subjects were 20 fifth-grade students, with selected participants chosen via purposive sampling. Data were collected through questionnaires, literacy tests, interviews, and documentation, then analyzed using the Miles and Huberman model. The results indicate that students with high learning interest demonstrate superior literacy skills, showing persistence and focus. Conversely, those with low interest tend to give up easily. Regarding learning styles, visual learners excel with illustrations, auditory learners prefer verbal explanations, and kinesthetic learners require concrete, practical involvement. The primary obstacle for all students is translating contextual problems into mathematical models. These findings highlight the necessity for differentiated context-based instruction to accommodate diverse psychological and sensory preferences in elementary mathematics education.

Keywords: *Elementary School; Fraction; Learning Interest; Learning Style; Mathematical Literacy*

Abstrak

Literasi matematis siswa sekolah dasar di Indonesia masih rendah, khususnya pada soal pecahan kontekstual, sering kali karena faktor internal seperti minat dan gaya belajar. Penelitian ini bertujuan untuk mendeskripsikan kemampuan literasi matematis siswa kelas lima pada materi pecahan ditinjau dari minat belajar dan gaya belajar mereka. Pendekatan kualitatif deskriptif digunakan dalam penelitian ini. Subjek penelitian adalah 20 siswa kelas lima, yang terpilih melalui teknik purposive sampling. Data dikumpulkan melalui angket, tes literasi, wawancara, dan dokumentasi, kemudian dianalisis menggunakan model Miles dan Huberman. Hasil penelitian menunjukkan bahwa siswa dengan minat belajar tinggi menunjukkan kemampuan literasi yang lebih unggul, ditandai dengan kegigihan dan fokus. Sebaliknya, mereka yang berminat rendah cenderung mudah menyerah. Ditinjau dari gaya belajar, siswa visual unggul dengan ilustrasi, siswa auditori lebih menyukai penjelasan verbal, dan siswa kinestetik membutuhkan keterlibatan praktis yang konkret. Hambatan utama seluruh siswa adalah menerjemahkan masalah kontekstual ke dalam model matematika. Temuan ini menyoroti perlunya instruksi berdiferensiasi berbasis konteks untuk mengakomodasi preferensi psikologis dan sensorik yang beragam dalam pendidikan matematika sekolah dasar.

Kata kunci: *Gaya Belajar; Literasi Matematis; Minat Belajar; Pecahan; Sekolah Dasar*

INTRODUCTION

Mathematical literacy is a crucial skill that enables individuals to formulate, apply, and interpret mathematical reasoning to solve real-world problems (Shamir & Levin, 2026). Despite its importance, Indonesian students' mathematical literacy remains alarmingly low (Dai, 2024). The 2022 PISA results revealed that Indonesia ranks below the OECD average, indicating that students still struggle to comprehend context-based problems, select appropriate solution strategies, and accurately interpret results (Bontchev et al., 2025).

The difficulty in mathematical literacy is highly pronounced in fraction materials, which are fundamental yet conceptually challenging for elementary students (Abrigo et al., 2026). Initial observations at SD Negeri 1 Poka revealed that fifth-grade students exhibit low mathematical literacy in fractions. When faced with contextual word problems that slightly deviate from standard examples, students become confused, lack initial problem-solving strategies, and rely heavily on the teacher's procedural demonstrations. They struggle to transform contextual information into mathematical models and interpret the calculation results back into real-life contexts, a common barrier when students are unaccustomed to analysis-based literacy tasks (Burger et al., 2026).

To address this issue, alternative solutions such as implementing Problem-Based Learning (PBL) or utilizing heuristic-based worksheets have been widely suggested to improve students' contextual reasoning and literacy skills (Amini et al., 2026). However, modifying external teaching methods alone is insufficient if internal psychological and cognitive factors are ignored. Students' confusion when facing slightly altered word problems indicates underlying barriers related to their internal motivation and information processing preferences (Moore et al., 2026). Therefore, the chosen solution in this study is to address these internal factors by deeply analyzing students' mathematical literacy through the lens of learning interest and learning styles. While learning styles—visual, auditory, and kinesthetic—determine how students effectively absorb, process, and represent mathematical information (Zheng et al., 2024).

Previous studies have examined mathematical literacy, learning interest, and learning styles separately, or focused primarily on non-contextual procedural mathematics (Bütüner et al., 2025). The novelty of this research lies in integrating these three variables simultaneously, specifically focusing on contextual fraction materials in elementary schools. This study aims to describe in depth the mathematical literacy skills of fifth-grade students on fraction materials based on their learning interests and learning styles. The expected result is to provide a comprehensive empirical map of how internal psychological factors and sensory preferences influence students' abilities to formulate, solve, and evaluate contextual fraction problems, which will serve as a foundational basis for teachers to design differentiated and adaptive learning strategies.

METHOD

This study employed a qualitative approach with a descriptive qualitative design to provide an in-depth description of fifth-grade students' mathematical literacy skills on fraction materials, specifically examined through the lens of their learning interest and learning styles. The research was conducted during the even semester of the 2025/2026 academic year, specifically from March 30 to April 1, 2026, at SD Negeri 1 Poka, located on Jl. Ir. M. Putuhena, Poka, Ambon. The primary objective of this research was to map and analyze how internal psychological factors, namely learning interest and sensory preferences in learning styles, influence students' abilities to formulate, solve, and interpret contextual fraction problems.

The research subjects comprised the entire population of 20 fifth-grade students at SD Negeri 1 Poka. For the qualitative phase, three students were selected using purposive sampling. The participants represented high, medium, and low learning interest categories while also reflecting different learning styles (visual, auditory, and kinesthetic), and the variations in their mathematical literacy test scores. This approach ensured the selection of a representative subset of students across different psychological and cognitive profiles to provide a comprehensive understanding of the research problem.

The research procedure was systematically divided into three main stages: preparation, implementation, and completion. During the preparation stage, initial observations and interviews with

the fifth-grade teacher were conducted to identify existing mathematical literacy issues, followed by the development and expert validation of the research instruments. The instruments consisted of mathematical literacy test items, learning interest questionnaires, and learning style questionnaires. These instruments were validated by mathematics education lecturers and elementary school teachers to ensure content validity, age-appropriate language clarity, and mathematical concept accuracy. In the implementation stage, data were collected by distributing the interest and learning style questionnaires to all 20 students to map their psychological characteristics and learning modalities. Subsequently, the mathematical literacy test was administered to evaluate their ability to formulate and solve contextual word problems. Following the selection of subjects via purposive sampling, in-depth interviews were conducted to explore their cognitive processes, and data triangulation was performed by interviewing the homeroom teacher to verify the validity of the test and interview data. Documentation was also utilized throughout the process to support data collection.

The collected data were interpreted and analyzed using the interactive model proposed by Miles and Huberman (2014), which consists of three concurrent flows of activity. First, data reduction was performed by selecting, focusing, and simplifying the raw data obtained from tests, questionnaires, interviews, and documentation. Second, data display was conducted by organizing the reduced data into systematic narratives, descriptive texts, and tables to facilitate a comprehensive understanding of the phenomena. Finally, conclusion drawing and verification were carried out to interpret the findings in relation to the research problem and objectives. Specifically, the data were interpreted descriptively to explain how varying levels of learning interest and distinct learning styles (visual, auditory, and kinesthetic) influence the students' step-by-step cognitive processes in identifying information, formulating mathematical models, executing calculations, and interpreting the results of contextual fraction problems.

RESULT AND DISCUSSION

Based on the research results, data were obtained in the form of learning interest questionnaire scores, learning style scores, and mathematical literacy skills test scores. The collected data were then analyzed descriptively and qualitatively to explain students' learning interest, learning styles, and mathematical literacy skills. Students' learning interest was measured using a Likert scale questionnaire containing 10 statements (5 positive and 5 negative) with four answer choices. The data were then calculated and analyzed descriptively to determine the level of learning interest of fifth-grade students at SD Negeri 1 Poka.

Table 1. Results Of Learning Interest Questionnaire

Category	Score Range	Number of Students
High	31-40	5
Moderate	21-30	7
Low	10-20	8

Based on Table 1, it is known that out of a total of twenty students, five students have a high learning interest in the score range of 31 to 40, seven students are in the moderate category with a score range of 21 to 30, while eight students are included in the low category with a score range of 10 to 20. It can be concluded that, in general, students' learning interest still needs to be improved because most students are in the low category. This condition can impact students' mathematical literacy skills, so efforts are needed to increase learning interest so that student learning outcomes become more optimal. Students' learning styles were measured using a Likert scale questionnaire containing 12 statements

with four answer choices. The data were then calculated and analyzed descriptively to determine the dominance of learning styles of fifth-grade students at SD Negeri 1 Poka.

Table 2. Results Of Learning Style Questionnaire

Dominant Learning Style	Number of Students
Visual	7
Auditory	6
Kinesthetic	7

Based on Table 2, it is known that out of twenty students, seven have a dominant visual learning style, six have an auditory learning style, and seven have a kinesthetic learning style. These results indicate that visual and kinesthetic learning styles are the most dominant among students.

Students' mathematical literacy skills were measured using a mathematical literacy skills test consisting of 4 contextual word problems on fraction materials based on mathematical literacy indicators. The results of the mathematical literacy skills test for fifth-grade students at SD Negeri 1 Poka are presented in the following table.

Table 3. Results Of Students' Mathematical Literacy Skills Test

Category	Score	Number of Students
High	87-100	3
Moderate	62-75	6
Low	37-50	11

Based on Table 3, it is known that out of twenty students, there is a variety of abilities divided into three categories. In the high category with a score range of 87 to 100, there are three students; in the moderate category with a score range of 62 to 75, there are six students; and in the low category with a score range of 37 to 50, there are eleven students. This shows that, in general, the mathematical literacy skills of fifth-grade students at SD Negeri 1 Poka are still classified as low. The dominance in the low category indicates that most students still experience difficulties in understanding and solving mathematical literacy problems.

Analysis of Mathematical Literacy Skills Based on Indicators

The analysis of mathematical literacy skills was conducted based on mathematical literacy indicators, namely: identifying information and mathematical forms based on real-world problems, transforming information from problems into appropriate mathematical models, using mathematical models as solutions to problems, and interpreting the results obtained as well as evaluating the reasonableness of the results related to real-life contexts.

Identifying information and mathematical forms based on real-world problems; At this stage, only four students were able to determine the known information but did not write down what was asked in the problem, while the other sixteen students were still less careful in understanding the contents of the word problem; they immediately used the relevant numbers in their calculation process.

Transforming information from problems into appropriate mathematical models; At this stage, students were able to perform mathematization by transforming contextual information into appropriate symbols and mathematical operations. Students succeeded in compiling mathematical sentences such as fraction multiplication and subtraction operations that reflect the logical relationships of the given problems.

Using mathematical models as solutions to problems; At this stage, students were able to operate the

compiled mathematical models to obtain numerical solutions. The calculation process carried out by students was mostly correct, where students applied mathematical algorithm procedures such as multiplication and division of whole numbers with fractions to get the result.

Interpreting and evaluating the results obtained; At this stage, students were able to conclude by linking the numerical calculation results back to the original context of the problem. Evaluation skills were seen when students provided logical reasons such as "enough" or "not enough" to assess the reasonableness of the results based on the limitations in the real situation.

Analysis of Mathematical Literacy Skills Viewed from Learning Interest

Based on the results of the learning interest questionnaire given to twenty fifth-grade students at SD Negeri 1 Poka, it is known that students' learning interest in mathematics learning on fraction materials varies. There are five students who show high learning interest with attention and enthusiasm, but when solving problems, only three out of five students were able to do well, while the other two did not. In addition, there are seven students with moderate learning interest who show good attention to learning but are not fully active in solving problems. Meanwhile, there are eight students who show low learning interest; students in this category appear less focused and easily feel overwhelmed when working on mathematical literacy problems. In general, learning interest affects students' earnestness in understanding and solving mathematical problems on fraction materials.

Analysis of Mathematical Literacy Skills Viewed from Learning Styles

Based on the results of the learning style questionnaire, it is known that fifth-grade students at SD Negeri 1 Poka have different learning style tendencies, namely visual, auditory, and kinesthetic. As many as seven students have a visual learning style; students with this learning style find it easier to understand material through images, text, and examples displayed directly. In addition, six students have an auditory learning style; students with this learning style find it easier to understand material through oral explanations and discussions. Meanwhile, seven students have a kinesthetic learning style and tend to find it easier to understand material through direct practice and learning activities that involve movement. These differences in learning styles indicate that each student has a different way of learning and understanding mathematical material, especially fraction material.

High Mathematical Literacy Analysis

Subject DMS

The image shows a handwritten worksheet with the following content:

1) $24 \times \frac{3}{8} = 3 \times 3 = 9$
 2) $24 - 9 = 15$
 3) $15 \times \frac{2}{3} = 10$
 4) $120 - 10 = 110$
 5) $110 \times \frac{1}{10} = 11$
 6) $120 - 11 = 109$
 7) $109 \times \frac{1}{10} = 10.9$
 8) $109 - 10.9 = 98.1$
 9) $98.1 \times \frac{1}{10} = 9.81$
 10) $98.1 - 9.81 = 88.29$
 11) $88.29 \times \frac{1}{10} = 8.829$
 12) $88.29 - 8.829 = 79.461$
 13) $79.461 \times \frac{1}{10} = 7.9461$
 14) $79.461 - 7.9461 = 71.5149$
 15) $71.5149 \times \frac{1}{10} = 7.15149$
 16) $71.5149 - 7.15149 = 64.36341$
 17) $64.36341 \times \frac{1}{10} = 6.436341$
 18) $64.36341 - 6.436341 = 57.927069$
 19) $57.927069 \times \frac{1}{10} = 5.7927069$
 20) $57.927069 - 5.7927069 = 52.1343621$
 21) $52.1343621 \times \frac{1}{10} = 5.21343621$
 22) $52.1343621 - 5.21343621 = 46.92092589$
 23) $46.92092589 \times \frac{1}{10} = 4.692092589$
 24) $46.92092589 - 4.692092589 = 42.228833301$
 25) $42.228833301 \times \frac{1}{10} = 4.2228833301$
 26) $42.228833301 - 4.2228833301 = 38.0059500009$
 27) $38.0059500009 \times \frac{1}{10} = 3.80059500009$
 28) $38.0059500009 - 3.80059500009 = 34.20535500081$
 29) $34.20535500081 \times \frac{1}{10} = 3.420535500081$
 30) $34.20535500081 - 3.420535500081 = 30.784819500729$
 31) $30.784819500729 \times \frac{1}{10} = 3.0784819500729$
 32) $30.784819500729 - 3.0784819500729 = 27.7063375506561$
 33) $27.7063375506561 \times \frac{1}{10} = 2.77063375506561$
 34) $27.7063375506561 - 2.77063375506561 = 24.93570379559049$
 35) $24.93570379559049 \times \frac{1}{10} = 2.493570379559049$
 36) $24.93570379559049 - 2.493570379559049 = 22.442133416031441$
 37) $22.442133416031441 \times \frac{1}{10} = 2.2442133416031441$
 38) $22.442133416031441 - 2.2442133416031441 = 20.197920074428297$
 39) $20.197920074428297 \times \frac{1}{10} = 2.0197920074428297$
 40) $20.197920074428297 - 2.0197920074428297 = 18.178128066985467$
 41) $18.178128066985467 \times \frac{1}{10} = 1.8178128066985467$
 42) $18.178128066985467 - 1.8178128066985467 = 16.36031526028692$
 43) $16.36031526028692 \times \frac{1}{10} = 1.636031526028692$
 44) $16.36031526028692 - 1.636031526028692 = 14.724283734258228$
 45) $14.724283734258228 \times \frac{1}{10} = 1.4724283734258228$
 46) $14.724283734258228 - 1.4724283734258228 = 13.251855360832405$
 47) $13.251855360832405 \times \frac{1}{10} = 1.3251855360832405$
 48) $13.251855360832405 - 1.3251855360832405 = 11.926669824749164$
 49) $11.926669824749164 \times \frac{1}{10} = 1.1926669824749164$
 50) $11.926669824749164 - 1.1926669824749164 = 10.734002842274248$
 51) $10.734002842274248 \times \frac{1}{10} = 1.0734002842274248$
 52) $10.734002842274248 - 1.0734002842274248 = 9.660602558046823$
 53) $9.660602558046823 \times \frac{1}{10} = 0.9660602558046823$
 54) $9.660602558046823 - 0.9660602558046823 = 8.694542302242141$
 55) $8.694542302242141 \times \frac{1}{10} = 0.8694542302242141$
 56) $8.694542302242141 - 0.8694542302242141 = 7.825088072017927$
 57) $7.825088072017927 \times \frac{1}{10} = 0.7825088072017927$
 58) $7.825088072017927 - 0.7825088072017927 = 7.042579264816134$
 59) $7.042579264816134 \times \frac{1}{10} = 0.7042579264816134$
 60) $7.042579264816134 - 0.7042579264816134 = 6.338321338334521$
 61) $6.338321338334521 \times \frac{1}{10} = 0.6338321338334521$
 62) $6.338321338334521 - 0.6338321338334521 = 5.704489204501069$
 63) $5.704489204501069 \times \frac{1}{10} = 0.5704489204501069$
 64) $5.704489204501069 - 0.5704489204501069 = 5.134040284050962$
 65) $5.134040284050962 \times \frac{1}{10} = 0.5134040284050962$
 66) $5.134040284050962 - 0.5134040284050962 = 4.620636255645866$
 67) $4.620636255645866 \times \frac{1}{10} = 0.4620636255645866$
 68) $4.620636255645866 - 0.4620636255645866 = 4.158572630081279$
 69) $4.158572630081279 \times \frac{1}{10} = 0.4158572630081279$
 70) $4.158572630081279 - 0.4158572630081279 = 3.742715367073151$
 71) $3.742715367073151 \times \frac{1}{10} = 0.3742715367073151$
 72) $3.742715367073151 - 0.3742715367073151 = 3.368443830365836$
 73) $3.368443830365836 \times \frac{1}{10} = 0.3368443830365836$
 74) $3.368443830365836 - 0.3368443830365836 = 3.031599447329252$
 75) $3.031599447329252 \times \frac{1}{10} = 0.3031599447329252$
 76) $3.031599447329252 - 0.3031599447329252 = 2.728439502596327$
 77) $2.728439502596327 \times \frac{1}{10} = 0.2728439502596327$
 78) $2.728439502596327 - 0.2728439502596327 = 2.455595552336694$
 79) $2.455595552336694 \times \frac{1}{10} = 0.2455595552336694$
 80) $2.455595552336694 - 0.2455595552336694 = 2.210036000103025$
 81) $2.210036000103025 \times \frac{1}{10} = 0.2210036000103025$
 82) $2.210036000103025 - 0.2210036000103025 = 1.989032399992722$
 83) $1.989032399992722 \times \frac{1}{10} = 0.1989032399992722$
 84) $1.989032399992722 - 0.1989032399992722 = 1.790129160000000$
 85) $1.790129160000000 \times \frac{1}{10} = 0.1790129160000000$
 86) $1.790129160000000 - 0.1790129160000000 = 1.611116244000000$
 87) $1.611116244000000 \times \frac{1}{10} = 0.1611116244000000$
 88) $1.611116244000000 - 0.1611116244000000 = 1.450004619600000$
 89) $1.450004619600000 \times \frac{1}{10} = 0.1450004619600000$
 90) $1.450004619600000 - 0.1450004619600000 = 1.305004157640000$
 91) $1.305004157640000 \times \frac{1}{10} = 0.1305004157640000$
 92) $1.305004157640000 - 0.1305004157640000 = 1.174503741876000$
 93) $1.174503741876000 \times \frac{1}{10} = 0.1174503741876000$
 94) $1.174503741876000 - 0.1174503741876000 = 1.057053367688400$
 95) $1.057053367688400 \times \frac{1}{10} = 0.1057053367688400$
 96) $1.057053367688400 - 0.1057053367688400 = 0.951348030919560$
 97) $0.951348030919560 \times \frac{1}{10} = 0.0951348030919560$
 98) $0.951348030919560 - 0.0951348030919560 = 0.856213227827604$
 99) $0.856213227827604 \times \frac{1}{10} = 0.0856213227827604$
 100) $0.856213227827604 - 0.0856213227827604 = 0.770591905044844$

Figure 1. Work Result of Subject DMS

Analysis of DMS's worksheet shows a very high level of mathematical literacy, where DMS can fulfill all literacy indicators comprehensively.

Identifying information and mathematical forms. At this indicator, DMS only wrote down the known information for problem number one (e.g., 24 cake parts, $\frac{3}{8}$ eaten), while for problem number

Transforming information into mathematical models. The subject shows strong mathematization skills. DMS transformed relationships between objects into appropriate numerical operations, such as using multiplication to determine the value of fraction parts and subtraction to find the remainder.

Interpreting and evaluating reasonableness of results. DMS did not just stop at numbers but was able to return the answer to the real context. In the "is it enough?" question, DMS provided a comparative argument "enough" because there are still fifteen pieces of cake left and the need is only ten. This proves an evaluation process where mathematical results support practical decisions.

Based on the analysis of subject DMS's worksheet, it is concluded that DMS has very high and systematic mathematical literacy skills. This is evidenced by the ability to identify information in writing, transform stories into appropriate mathematical models, and solve fraction calculations accurately without errors. In addition, DMS is very consistent in interpreting and re-evaluating calculation results into real-life contexts through logical conclusions at the end of each answer.

Subject CLO

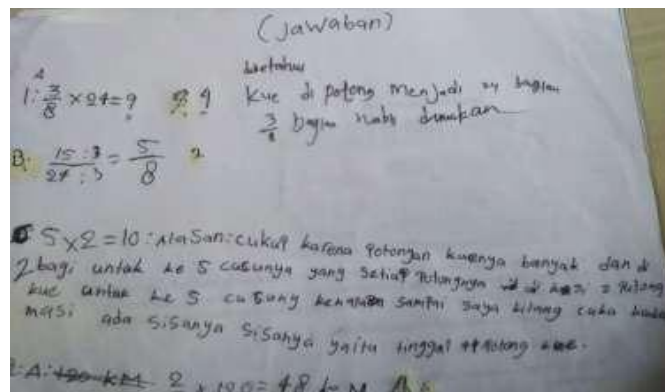


Figure 2. Work Result of Subject CLO

Identifying information and mathematical forms. Subject CLO was able to identify key numbers in the problem such as 24 cake parts and the fraction of cake eaten, but this identification tends to be direct without deep understanding of data relationships if the problem becomes more complex.

Using mathematical models as solutions. The calculation procedure was done quite well in the initial stages, such as finding the numbers 9 and 48, but subject CLO's accuracy decreased in the final

stages due to errors in solving advanced operations or skipping one of the solution stages.

Interpreting and evaluating reasonableness of results. This is the weakest indicator for subject CLO. The subject tends to provide brief conclusions without strong logical explanations; although answering "enough," the subject did not provide a detailed numerical comparison between "remaining available" and "total needs" in writing.

Subject CLO obtained a mathematical literacy score of 75, indicating a moderate level of mathematical literacy. Based on the learning interest questionnaire, CLO obtained a score of 20, which was classified as low learning interest. This low learning interest was reflected in incomplete problem-solving (e.g., stopping halfway on problem number 4) and the presence of numerous scribbles indicating hesitation during the thinking process.. Viewed from a kinesthetic learning style perspective, the student tends to interpret and evaluate results through a practical approach and informal language, such as in the explanation of problem number one using a long narrative about distributing cake to "grandchildren" to imagine the real situation physically, although this causes the student to lose focus on technical accuracy and standard mathematical procedures.

Based on the analysis of subject CLO's worksheet, it can be concluded that CLO has fairly good mathematical literacy skills but tends to be practical and less structured. CLO is able to identify information and create appropriate mathematical models directly in his mind, so he is able to write down the known elements on the answer sheet. Although the final calculation results are correct, the solution steps written by CLO tend to jump (instant) and lack depth in providing interpretive arguments or evaluation of results against real-life situations in the problem.

Low Mathematical Literacy Analysis

Subject DEL

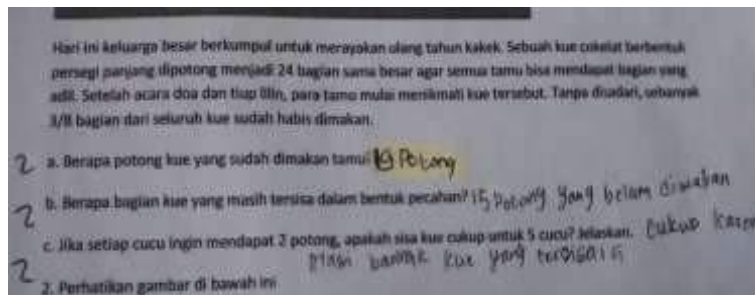


Figure 3. Work Result of Subject DEL

Analysis of DEL's worksheet shows significant constraints in the problem-solving process. Although the subject is categorized as having low mathematical literacy skills, subject DEL was unable to fulfil all mathematical literacy indicators.

Identifying information and mathematical forms. Subject DEL was able to identify initial data from the problem, such as the numbers 24 and the fraction $\frac{3}{8}$, but the subject seemed to have difficulty determining which information was relevant for the next step. The subject's focus was easily broken so the identified data was not used optimally.

Transforming information into mathematical models. Subject DEL's modeling ability is classified as low at this indicator; although knowing there are numbers, subject DEL often made mistakes in determining the correct mathematical operations. There was a tendency for the subject to just write down numbers without forming a complete mathematical sentence to answer the question.

Using mathematical models as solutions. This indicator shows major obstacles; subject DEL made errors in calculation procedures, with many answers stopping halfway or producing inaccurate numbers due to errors in dividing or multiplying fractions with whole numbers.

Interpreting and evaluating reasonableness of results. Subject DEL rarely interpreted the results; the final answers are often just numbers without descriptions like "enough" or "not enough." This shows that subject DEL has not been able to link mathematical calculation results with the context of real situations in the problem.

This very low score reflects moderate learning interest, seen from the student's effort to fill in all answers despite many fundamental concept errors and incompleteness in the formal calculation process. The visual learning style characteristic appears dominant through the way subject DEL interprets results, relying more on visual estimation from illustrations in the problem sheet rather than sequential mathematical calculations, so when evaluating the reasonableness of results in real-life contexts, the answers given tend to be visually descriptive but weak in numerical accuracy and coherent mathematical proof.

Based on the results of the analysis of subject DEL's worksheet, it can be concluded that DEL has low mathematical literacy skills and experiences obstacles in complex categorized problems. DEL is only able to identify information and create mathematical models in simple problems. When faced with problems that require staged reasoning, DEL has difficulty understanding information, makes mistakes in compiling mathematical models, so that the calculation operations produce incorrect answers. In addition, DEL is unable to interpret results or evaluate the reasonableness of answers because problem solving is often incomplete. This study is in line with research conducted by Jilink et al. (2025), which states that students with high learning interest and appropriate learning styles have better mathematical literacy skills compared to students with low interest and mismatched learning styles.

The findings show that, in general, the mathematical literacy skills of fifth-grade students at SD Negeri 1 Poka are still classified as low, with a dominance of 11 out of 20 students (55%) in the low category. Students struggle greatly when facing contextual word problems and tend to be confused about determining the initial steps if the problem model is slightly changed from the teacher's example. This finding aligns with the problems of mathematics learning in elementary schools stated by Arastoopour Irgens et al. (2024), that the main difficulty of students lies in solving mathematical word problems and the inability to think abstractly and deficiencies in understanding problem instructions. This is also reinforced by Bach et al. (2025), who states that mathematical literacy should be an individual's ability to understand the role of mathematics in real life. When students are only accustomed to "direct number problems" without problem analysis, their ability to formulate and evaluate real phenomena will not develop.

Research data shows a positive correlation between learning interest and mathematical literacy achievement. Students with high learning interest (like subject DMS) are very persistent, focused, and successfully complete problems with high categories. Conversely, 8 students with low learning interest tend to be less focused, give up quickly, have many hesitant scribbles, and do not complete problems (like subject CLO on problem number 4). This finding confirms the principles of learning mathematics according to Wade et al. (2026), which states that attention and motivation/interest are the main drivers of student learning activities, while activeness serves as a driving force to take the initiative to solve problems independently. In addition, this result is very much in line with research by Lewis et al. (2026), which emphasizes that students with high learning interest have far better mathematical literacy skills compared to students with low learning interest. Lack of interest makes students involvement in mathematical activities passive, as stated by Hu et al. (2024) regarding low interest as the core problem of school mathematics.

Findings show that the variety of student learning styles in the class (7 Visual, 6 Auditory, 7 Kinesthetic) affects how they process problems. Auditory subjects (DMS) can provide very strong and

coherent narrative-logical explanations during interviews and on worksheets to evaluate the reasonableness of results. Kinesthetic subjects (CLO) tend to use a practical approach and informal language, but give up quickly when seeing a sequence of fractions that are too complex. Subject DEL appears very dominant; he tends to interpret and estimate answer results based on visual estimates that he captures through illustration images or diagrams contained in the problem sheet. As a result, his descriptive answers visually appear to try to answer the context, but are very weak and inaccurate in terms of formal numerical computation and coherent mathematical proof.

This phenomenon is in accordance with the results of research Pospisilova et al. (2025), which found that students with auditory learning styles have the opportunity for high mathematical literacy skills because of their advantage in capturing the logical structure of language and communicating it back. Meanwhile, the finding that kinesthetic and visual students are at the moderate/low level in formal mathematical literacy is also supported by the study of Peng et al. (2026), which states that learning styles that are not facilitated with appropriate media in the classroom will trigger low understanding of abstract concepts such as fraction materials. According to Piaget's cognitive development theory in (Alam & Limo, 2025), elementary school students (6-11 years old) are at the concrete operational stage, so students with visual and kinesthetic learning styles need visualization or physical manipulation of fraction objects so that their cognition is built well.

Based on the findings above, the discussion focuses on the reality that conventional one-way teaching methods are no longer adaptive to the diversity of learning styles and low student interest in class V at SD Negeri 1 Poka. Teachers tend to provide mechanistic models (direct formulas) without honing real-context reasoning abilities.

As a concrete action plan from this research, the following steps are recommended: Implementation of Problem-Based Learning (PBL): Teachers must begin to design student worksheets (LKS) based on everyday life story problems (contextual) routinely so that students are accustomed to formulating (formulate) and evaluating (evaluate) mathematical results; Increasing Interest through Fun-Math: Integrating mathematical games or interactive digital applications to boost students' initial attention so that the low learning interest category (which currently dominates by 40%) can be reduced; Differentiated Learning Based on Learning Styles: For Visual students, the presentation of fraction material must be assisted with concrete media of images/graphs of cakes or pizza fractions. For Kinesthetic students, teachers can provide manipulative teaching aids in the form of fraction blocks that can be assembled and disassembled. For Auditory students, group discussion methods and verbal presentations need to be increased (Lestari et al., 2026; Puay et al., 2026).

The researcher realizes that the results of this study are not free from limitations that can affect the generalization of results, including: Limitations of Scope and Subjects: This study only involved 20 fifth-grade students in one school (SD Negeri 1 Poka) with very limited in-depth interview subjects (only 3 selected subjects). Therefore, these findings may not necessarily be absolutely generalized to all fifth-grade students in other schools or other regions with different cultural characteristics and student inputs.

CONCLUSION

This study concludes that fifth-grade students' mathematical literacy on fractions is generally low, primarily due to difficulties in transforming contextual problems into mathematical models and interpreting the results. Students with high learning interest demonstrate optimal, persistent, and focused literacy skills, whereas those with moderate to low interest tend to be passive and easily give up. Furthermore, learning styles significantly influence information processing: visual learners benefit

from illustrations, auditory learners from verbal explanations, and kinesthetic learners require concrete, practical involvement. Consequently, it is recommended that teachers implement differentiated, context-based learning strategies to accommodate diverse psychological and sensory preferences, while students are encouraged to regularly practice analytical word problems to enhance their mathematical reasoning and adaptability in real-world contexts.

REFERENCE

- Abrigo, M. R. M., Francisco, K. A., & Santos, K. C. P. (2026). School closures, shelter-use and learning outcomes in the philippines: evidence from 2019 TIMSS. *Economics of Education Review*, 110. <https://doi.org/10.1016/j.econedurev.2025.102738>
- Alam, M. J., & Limo, A. A. (2025). Discourse of John Dewey's "experiential learning theory": the case of quality primary education in Bangladesh. *Quality Assurance in Education*, 1–19. <https://doi.org/10.1108/QAE-04-2025-0110>
- Amini, R., Usmeldi, U., Fadillah, M. A., Media, A., Fitri, U., Helsa, Y., & Zulkarnaini, A. P. (2026). When interactivity becomes instruction: Effects of motivation-guided digital learning on elementary students' cognitive outcomes. *Social Sciences and Humanities Open*, 13. <https://doi.org/10.1016/j.ssaho.2026.102876>
- Arastoopour Irgens, G., Bailey, C., Famaye, T., & Behboudi, A. (2024). User experience testing and co-designing a digital game for broadening participation in computing with and for elementary school children. *International Journal of Child-Computer Interaction*, 42. <https://doi.org/10.1016/j.ijcci.2024.100699>
- Bach, K. M., Hofer, S. I., & Bichler, S. (2025). Adaptive learning, instruction, and teaching in schools: Unraveling context, sources, implementation, and goals in a systematic review. *Learning and Individual Differences*, 124. <https://doi.org/10.1016/j.lindif.2025.102781>
- Bontchev, B., Antonova, A., Terzieva, V., & Villarroja Soler, E. (2025). Learning and playing style differences between K12 and university students related to educational video games. *Interactive Technology and Smart Education*, 22(4), 660–687. <https://doi.org/10.1108/ITSE-09-2024-0223>
- Burger, L., Schneider, J. J., & King, J. (2026). Polysyncretic composing in play: youth virtual reality gaming for STEM learning. *English Teaching*, 1–21. <https://doi.org/10.1108/ETPC-09-2025-0221>
- Büttner, S. Ö., Güner, P., & Güler, M. (2025). Creative learning environments and mathematics self-efficacy as predictors of mathematics achievement: Insights from PISA 2022 across three countries – Korea, Canada, and Türkiye. *Thinking Skills and Creativity*, 58. <https://doi.org/10.1016/j.tsc.2025.101946>
- Dai, Y. (2024). Dual-contrast pedagogy for AI literacy in upper elementary schools. *Learning and Instruction*, 91. <https://doi.org/10.1016/j.learninstruc.2024.101899>
- Hu, Y., Tang, Y., & Wang, C. (2024). Learning and teaching strategies as related to language arts in China: A heterogeneity study. *Studies in Educational Evaluation*, 81. <https://doi.org/10.1016/j.stueduc.2024.101334>
- Jilink, L., Leseman, P., Slot, P., & Gevers, M. (2025). The role of after-school programs in supporting social and emotional learning: A synthesis of systematic reviews. *International Journal of Educational Research Open*, 9. <https://doi.org/10.1016/j.ijedro.2025.100546>

- Lestari, N., Sari, I. K., & Fitra, R. (2026). ANALYSIS OF STUDENTS' DIFFICULTIES IN SOLVING MATRIX OPERATIONS PROBLEMS. *JUPIKA: JURNAL PENDIDIKAN MATEMATIKA*, 9(1), 1–10. <https://doi.org/10.37478/JUPIKA.V9I1.7576>
- Lewis, M. C., Quimby-Moro, P., & Sánchez, L. E. (2026). “It must be provided for by the school”: Academic language in United States mathematics education as curricularized register, 1700–1975. *Linguistics and Education*, 93. <https://doi.org/10.1016/j.linged.2026.101534>
- Liu, J., Sun, D., Sun, J., Wang, J., & Yu, P. L. H. (2025). Designing a generative AI enabled learning environment for mathematics word problem solving in primary schools: Learning performance, attitudes and interaction. *Computers and Education: Artificial Intelligence*, 9. <https://doi.org/10.1016/j.caeai.2025.100438>
- Moore, K. S., Rabinowitz, G., Ali, S., Weckel, M., Lee, I., Gupta, P., & Chaffee, R. (2026). Design of a science integrated secondary school AI literacy curriculum: A youth & AI expert guided design-based research approach. *Computers and Education: Artificial Intelligence*, 10. <https://doi.org/10.1016/j.caeai.2026.100552>
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, California: SAGE Publications
- Peng, J., Yang, H., Lu, J., Xiang, Y., Liu, X., Wang, X., Gao, F., Zheng, Y., Yang, Z., & Xiao, Y. (2026). Machine learning algorithms in jointly developing prediction models for subsequent school bullying victimization in Chinese children and adolescents. *Psychiatry Research*, 364. <https://doi.org/10.1016/j.psychres.2026.117286>
- Pospisilova, D., Elgner, J., Dolezalova, M., Dankova, A., & Pospisil, K. (2025). Determinants of elementary school participation in the traffic education program. *Transportation Research Interdisciplinary Perspectives*, 34. <https://doi.org/10.1016/j.trip.2025.101770>
- Puay, P., Da, A., Ximenes, C., Naisau, A. I., Beda, W., & Dosinaeng, N. (2026). ANALYSIS OF GEOMETRIC CONCEPTS IN THE KABIR OF WEHALI VILLAGE COMMUNITY: AN ETHNOMATHEMATICS STUDY. *JUPIKA: JURNAL PENDIDIKAN MATEMATIKA*, 9(1), 11–19. <https://doi.org/10.37478/JUPIKA.V9I1.6137>
- Shamir, G., & Levin, I. (2026). Cultivating machine learning-related computational thinking in elementary school. *Thinking Skills and Creativity*, 61. <https://doi.org/10.1016/j.tsc.2026.102177>
- Wade, L., Beauchamp, M. R., Nathan, N., Smith, J. J., Leahy, A. A., Bao, R., Kennedy, S. G., Boyer, J., Diallo, T. M. O., Beacroft, S., & Lubans, D. R. (2026). Effects of a school-based leadership program on student leaders and their peers: The Learning to Lead cluster randomized controlled trial. *Contemporary Educational Psychology*, 84, 102444. <https://doi.org/10.1016/j.cedpsych.2026.102444>
- Zheng, Y., Zhang, J., Li, Y., Wu, X., Ding, R., Luo, X., Liu, P., & Huang, J. (2024). Effects of digital game-based learning on students' digital etiquette literacy, learning motivations, and engagement. *Heliyon*, 10(1). <https://doi.org/10.1016/j.heliyon.2023.e23490>