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STUDENTS' NUMERACY THROUGH COMPUTATIONAL THINKING-BASED DIGITAL WORKSHEETS WITH PALEMBANG LOCAL WISDOM CONTEXT

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ABSTRACT

This research is motivated by the persistent low level of students' numeracy skills in Indonesian secondary education. Several pedagogical approaches that may enhance students' numeracy include the use of digital worksheets, integration of Computational Thinking (CT), and incorporation of Palembang local wisdom as contextual learning elements. This research aims to describe students' numeracy skills through the use of CT-based digital worksheets with Palembang local wisdom context, an approach not previously explored in existing studies. This research employed a descriptive method using a qualitative approach. The research participants were 34 tenth-grade students at MAN 2 Palembang, while the research sample consisted of three students representing high, moderate, and low numeracy skills. Data collection techniques included pretest, posttest, and interviews. The results indicate clear variation across ability levels, with distinct differences in numeracy indicators interpreting analysis results to predict and make decisions. High-skill students demonstrated mastery of all numeracy indicators. In contrast, moderate- and low-skill students showed partial or minimal indicator achievement, particularly in interpreting results and constructing conclusions. The study implies that CT-based digital worksheets embedded with Palembang local wisdom contexts can support students' numeracy skill.

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1. INTRODUCTION

Numeracy is widely recognized as one of the key competencies required by students in the 21st century. It is not only related to the ability to perform arithmetic operations but also the capacity to apply mathematical knowledge and skills in various real-life situations (OECD, 2019). In the context of mathematics learning, numeracy represents the bridge between conceptual understanding and problem-solving in daily life (Mudzalifah & Maarif, 2023). Numeracy skills are key for students to access and understand the world, as well as provide them with an understanding of the importance of mathematics in modern life (Azizah, 2022). Students with strong numeracy skills are able to analyze a problem, select relevant information, determine and apply appropriate concepts to solve it, and interpret the results obtained (Astuti et al., 2024).

However, empirical evidence indicates that Indonesian students' numeracy skills remain at a relatively low level. Findings from the 2022 Programme for International Student Assessment (PISA) reported a decline in Indonesia's mathematics score, dropping from 379 in 2018 to 366 points (Alfaruqi & Nurwahidah, 2025). Furthermore, the Organisation for Economic Co-operation and Development (OECD) indicated that around 71 percent of Indonesian students had yet to achieve the minimum required level of mathematical proficiency (OECD, 2019). These findings suggest that many students struggle not only with grasping mathematical concepts at the abstract level but also with applying them in authentic real-world contexts. (Deda et al., 2023). This condition reflects the persistently low numeracy skills of Indonesian students (Sutrimo et al., 2024), particularly in the topic of trigonometric ratios (Apriatni et al., 2022; Firdaus et al., 2023).

One of the contributing factors to students' low numeracy performance is the limited implementation of innovative teaching strategies in mathematics instruction (Nurhami et al., 2024). This condition leads to a decline in students' motivation and interest in learning, resulting in suboptimal comprehension of the material and impacting the development of their numeracy skills (Muhtarom et al., 2022; Sari et al., 2023). In addition, the use of unengaging learning materials by teachers also contributes to the students' low numeracy skill (Widiastuti & Kurniasih, 2021). Cholid et al. (2022) further assert that the weak numeracy skills of students, particularly in trigonometric ratios, are caused by the limited use of supportive learning materials during the learning process. Thus, improving students' numeracy requires learning innovations.

According to Sopani et al. (2024), the use of student worksheets can serve as an effective approach to addressing students' low numeracy skills. Student worksheet designed with structured and sequential steps helps students gradually construct their mathematical understanding (Nurjihan & Bunawan, 2025). This is an essential component of numeracy. However, conventional worksheets still rarely train students to think procedurally and analytically in solving real-world problems. To address this limitation, one of the promising approaches to enhance numeracy skills is Computational Thinking (CT) (Sa'diyah & Eminita, 2024). CT emphasizes the thinking processes used to solve complex problems through structured steps, namely decomposition, pattern recognition, abstraction, and algorithmic thinking (Litia et al., 2023). These four CT components align with cognitive processes required in numeracy. By strengthening this processes, integrating CT supports students in solving such problems more logically, analytically, systematically, effectively, and efficiently (Zafrullah, Gunawan, et al., 2024).

Another factor that can support students' numeracy skills, particularly in trigonometric ratio topics, is the use of context in learning process. This is because trigonometric ratios are closely related to various aspects of daily life (Cahyani & Aini, 2021). The use of context makes learning more meaningful by helping students connect mathematical concepts with real-life situations (Soleha et al., 2024). One effective context for enhancing students' mathematical understanding is local wisdom (Sa'diah et al., 2021). Trigonometric ratios, which are often perceived as abstract, can become more accessible when connected to cultural objects that students encounter daily. In line with the emphasis on contextual learning, this study incorporates Palembang local wisdom as an embedded contextual element in the digital worksheets. Palembang's local wisdom which includes its culture, traditions, values, and surrounding environment can serve as a relevant and engaging learning context (Anzelina, 2023).

Previous studies have explored the effects of computational thinking on numeracy (Zafrullah, Gunawan, et al., 2024; Zafrullah, Hamdi, et al., 2024) and the integration of local wisdom in mathematics learning (Aini, Misbahudholam AR, et al., 2024; Hidayah et al., 2021). However, to date, no study has specifically examined students' numeracy following the application of computational thinking-based digital worksheets embedded with Palembang local wisdom. Therefore, this study aims to investigate the extent of students' numeracy skills after engaging with computational thinking-based digital worksheets contextualized with Palembang local wisdom.

2. METHOD

This study employed a descriptive research design with a qualitative approach, supported by quantitative scoring of students' numeracy performance. Students' numeracy skill can be seen from the indicators in Table 1.

Table 1. Aspects and indicators of numeracy

No	Indicators	Aspects that are measured
1	Analyzing information presented in various forms.	a. Students are able to determine the issue presented in the problem.
		b. Students are able to identify the steps for problem-solving.
		c. Students are able to identify information given in the problem.
2	Using numbers and basic mathematical symbols in solving problems.	a. Students are able to use numbers related to basic mathematics in solving problems.
		b. Students are able to use basic mathematical symbols in solving problems.
3	Interpreting analysis results to predict and make decisions.	a. Students are able to make conclusions and decisions based on the problem-solving steps.

The subjects in this study were 34 10th-grade students from MAN 2 Palembang, selected using purposive sampling. This research was carried out in three stages, i.e. preparation, implementation, and analysis. In the preparation stage, the researchers reviewed relevant literature related to numeracy, CT, and the integration of Palembang local wisdom in mathematics learning. In addition, researcher also determined the research location and subjects, as well as designed and validated the research instruments. Afterward, the implementation stage was conducted in four meetings, consisting of two learning sessions using the computational thinking-based digital worksheet (CTBD-worksheets) and two testing sessions, namely pretest and posttest. The final stage was data analysis, in which the data obtained from the implementation stage were analyzed.

Data collection techniques used were tests and interviews. The test was administered both before (pretest) and after (posttest) the intervention to measure changes in students' numeracy skills. The test consisted of three contextual essay questions that contained indicators of numeracy ability on the topic of trigonometric ratios within the context of Palembang local wisdom. The test used in this research can be seen in Figure 1.

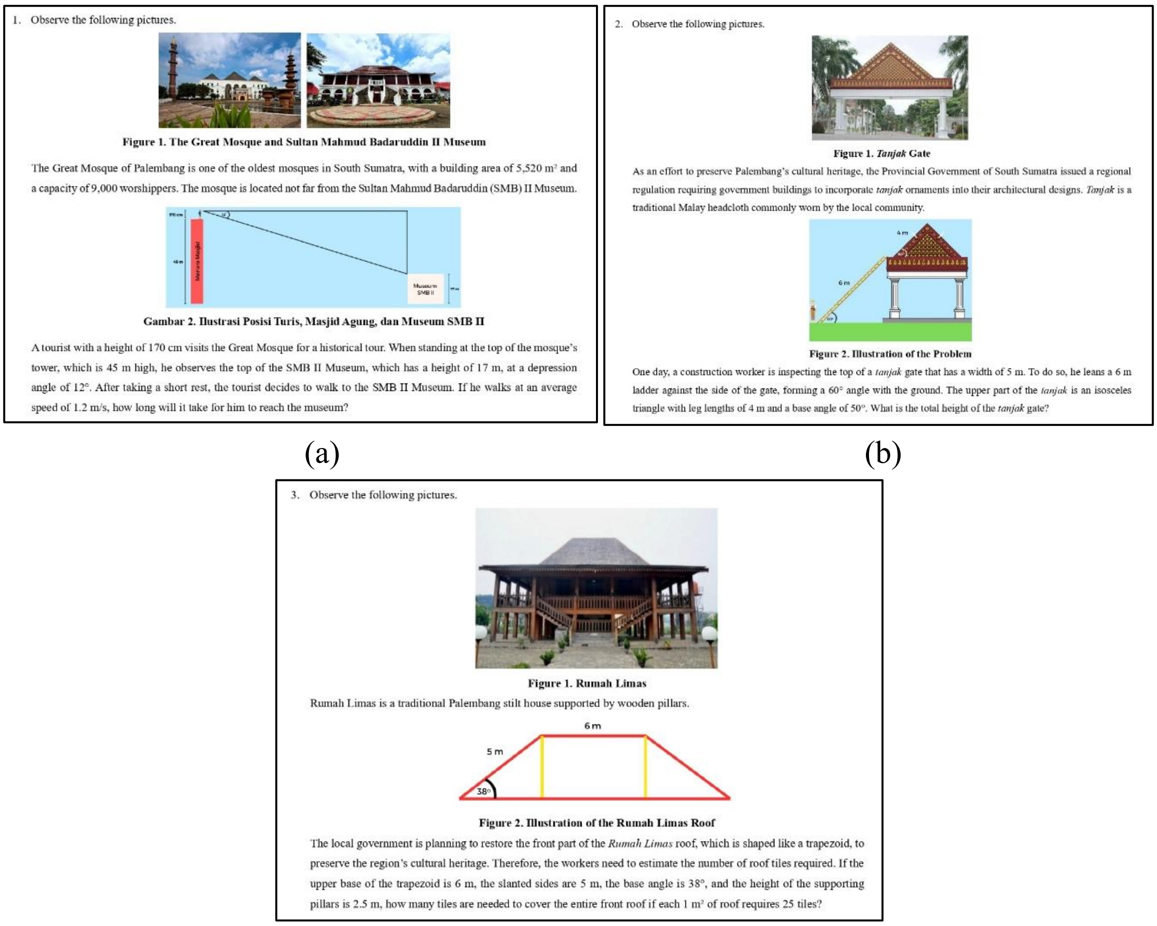

Figure 1. (a) Problem Number 1; (b) Problem Number 2; (c) Problem Number 3

The results of the students' numeracy tests were scored using a rubric developed based on numeracy indicators and validated by four mathematics education experts. Test data were first analyzed quantitatively and subsequently categorized into qualitative levels of numeracy according to Rezky et al. (2022) in Table 2, where x is students' numeracy skill achievment.

Table 2. Numeracy Skill Category

Numeracy Skill Achievment	Category
$80 \leq x \leq 100$	High
$50 \leq x < 80$	Moderate
$0 \leq x < 55$	Low

Another data collection technique was interviews, conducted to support and strengthen the analysis of the test results. Semi-structured interviews were conducted with three students selected using purposive sampling, each representing a different level of numeracy skill. The selection of interview subjects was based on several criteria, including: (1) participating in the entire learning process properly; (2) being able to express ideas clearly; and (3) numeracy test results representing each ability category.

3. RESULTS AND DISCUSSION

3.1. Results

The numeracy pretest was administered to 34 students at the beginning of the first meeting, before starting the learning process using the CTBD-worksheet. Meanwhile, the posttest was conducted after the completion of the learning activities. The descriptive statistics of the pretest and posttest data can be seen in Table 3.

Table 3. Descriptive statistics of numeracy pretest and posttets

	N	Min	Max	Mean	Standard Deviation
Numeracy Pretest	34	8	50	23.70	9.52
Numeracy Posttest	34	22	95	66	20

Table 3 shows that the minimum and maximum numeracy pretest scores are 8 and 50, respectively, with a mean score of 23.70 and a standard deviation of 9.52. Meanwhile, the numeracy posttest scores range from 22 to 95, with a mean score of 66 and a standard deviation of 20.

After being assessed and analyzed descriptively, the students' numeracy scores were categorized based on the criteria presented in table 2. The results of the pretest showed that all 34 students were classified in the low category, indicating that their initial numeracy ability was still limited before the learning with the CTBD-worksheet. Meanwhile, the posttest results are presented in table 4.

Table 4. Students' numeracy skill posttets category

Numeracy Skill Level	Total
High	10
Moderate	17
Low	7

Table 4 presents the distribution of students' numeracy levels based on the posttest results. The data show that 10 students (29.4%) were categorized as high, 17 students (50%) as moderate, and 7 students (20.6%) as low. Based on the findings, there was a shift in numeracy performance following the implementation of the CTBD worksheet. The comparison between the pretest and posttest results shows changes in the number of students within each proficiency category. This indicates an overall improvement in students' numeracy skills, as illustrated in Figure 2.

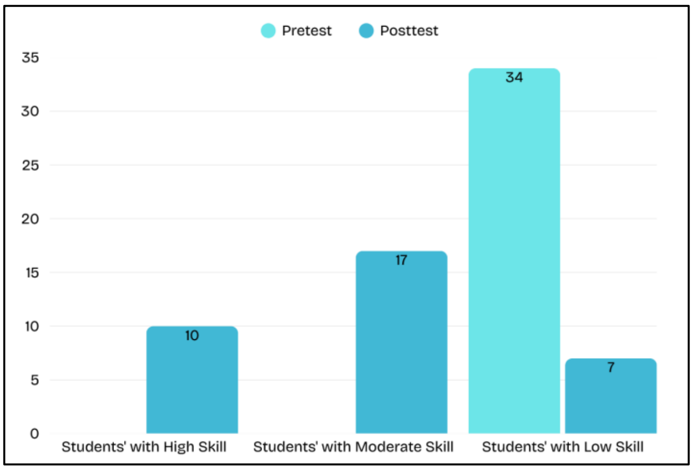

Figure 2. Improvement of students' numeracy skill

The improvement of students' numeracy skills is also shown by the Wilcoxon Signed Ranks Test results presented in Table 5. The analysis yields a Z-value of –5.087 with an Asymp. Sig. (2-tailed) value of 0.000, which is lower than the significance threshold of 0.05.

This indicates a statistically significant difference between the pretest and posttest scores, confirming that students' numeracy abilities improved after the implementation of the CTBD-worksheet.

Table 5. Wilcoxon test result

	Posttest - Pretest Numeracy Skill
Z	-5.087
Asymp. Sig. (2-tailed)	.000

To further examine students' numeracy skills after using the digital worksheets, one student from each ability level was selected as the research sample, as presented in Table 6. This selection was made to analyze in depth the differences in numeracy development across ability levels and to obtain a representative overview of the effectiveness of using digital worksheets in enhancing students' numeracy skills.

Table 6. Research sample

Sample Initial	Category
RA	High
AN	Moderate
FD	Low

Table 6. shows RA as a sample representing the high level of numeracy skill, AN as a sample representing the moderate level, and FD as a sample representing the low level. These three students were selected using the purposive sampling technique to show the characteristics of students' numeracy skill at each level. The results of the numeracy test for the three students, were then analyzed further as follows.

Student with High Level Numeracy Skill

Problem Number 1

RA answer to problem number 1 can be seen in Figure 3.

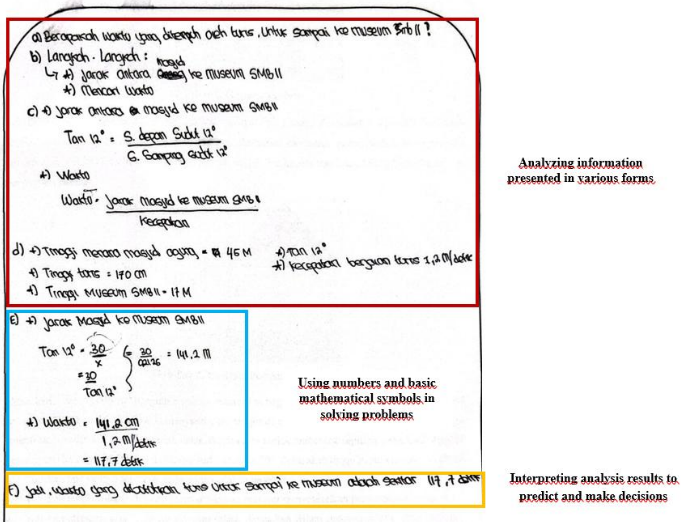

Figure 3. RA's answer to problem number 1

Based on Figure 3, the high-performing student fulfill all numeracy indicators. In the first indicator, analyzing information presented in various forms, the student was able to determine the main issue presented in the problem, namely calculating the time required for the tourist to reach the SMB II Museum. This is shown by the student's written problem identification at the beginning of the solution. Furthermore, the student successfully identified the steps required to solving the problem, recognizing that the time needed can be obtained by first determining the horizontal distance between the Great Mosque and SMB II Museum. The student was also able to identify relevant information given by writing important numerical values such as the height of the mosque tower, the height of the museum, the tourist's eye level height, the trigonometric rasio $\tan 12°$, and the walking speed of the tourist, all of which are necessary to solve the problem.

Furthermore, in the second indicator, using numbers and basic mathematical symbols in solving problem, students demonstrated the appropriate use of mathematical concepts. This is evident in the application of the trigonometric tangent ratio formula to determine the distance. The student represented the unknown distance using the variable x, showing proper symbolic representation. Subsequently, the student used the time formula by dividing the obtained distance by the given speed to determine the travel time.

In the third indicator, interpreting analysis results to predict and make decisions, the student able to make conclusions and decisions based on the problem-solving steps. The student interpreted the result by concluding that the tourist needs approximately 117.7 seconds to reach the SMB II museum on foot. Overall, the student demonstrated complete all numeracy indicators, with well-structured reasoning, accurate use of mathematical concepts, and a clear final interpretation of the result.

Problem Number 2

RA answer to problem number 2 can be seen in Figure 4.

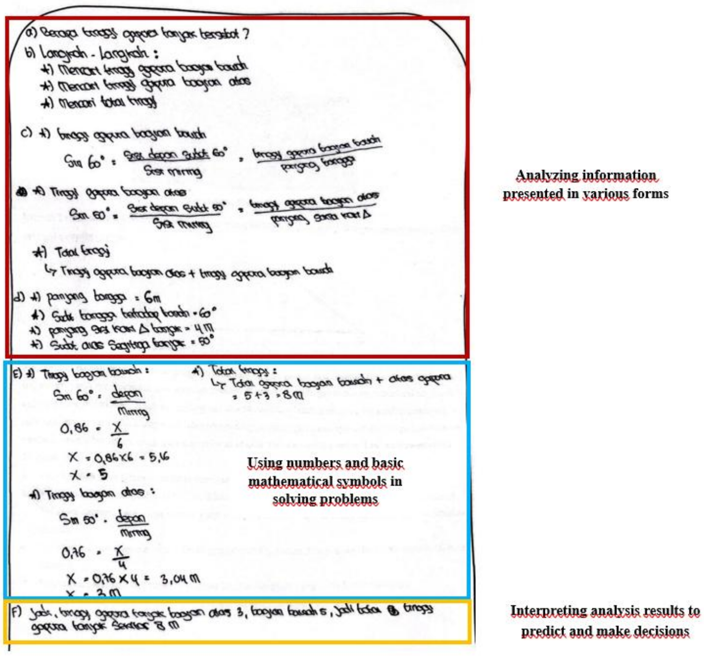

Figure 4. RA's answer to problem number 2

Furthermore, in question number 2, the high-ability student also fulfilled all numeracy skill indicators. In the first indicator, analyzing information presented in various forms, the student was able to identify the main issue, that is determining the height of the tanjak gate. In addition, the student correctly identified the steps needed to solve the problem. This is evident from the steps outlined by students by dividing the height of the gate into two parts: the height reached by the ladder and the height of the isosceles triangle at the top of the gate. The student also demonstrated the ability to sort out important information from the problem, such as the length of the top side of the gate (5 m), the ladder length (6 m) with an inclination angle of 60°, the length of the legs of the isosceles triangle (4 m), and the base angle of the triangle (50°). All of this information was used appropriately to determine the total height of the gate.

In the second indicator, using numbers and mathematical symbols in problem solving, students applied the concept of sine trigonometry to calculate the height reached by the ladder and the height of the isosceles triangle based on the angle of the base. The use of variables such as x and the writing of mathematical procedures show that the student is able to operate numbers and mathematical symbols precisely and accurately. After obtaining the height of each part, the student added them together to obtain the final result of the total height of the gate.

Furthermore, in the third indicator, interpreting the results of analysis to make decisions, the student wrote the final conclusion that the height of the tanjak gate is approximately 8 meters. This conclusion reflects a decision-making process based on the previous calculations.

Problem Number 3

RA answer to problem number 1 can be seen in Figure 5.

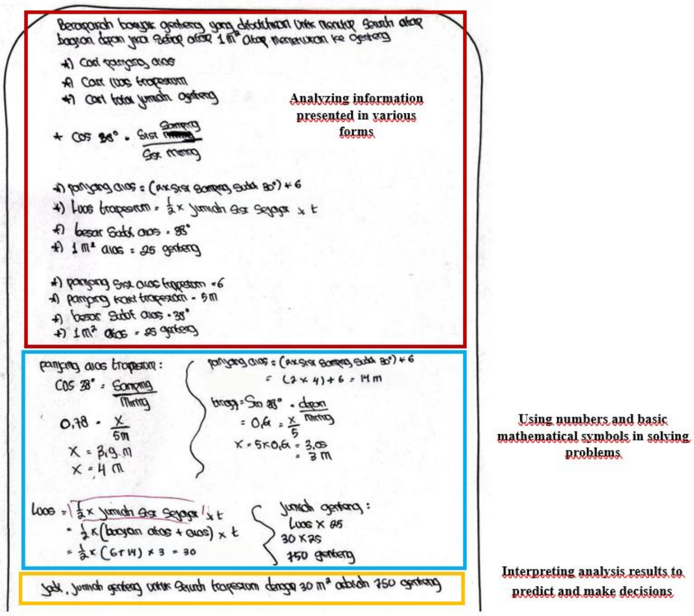

Figure 5. RA's answer to problem number 3

In solving problem number 3, the high-ability student also successfully satisfied all the numeracy skill indicator. For the first indicator, which analyzes information presented in various forms, the student was able to identify the main problem to be solved, namely determining the number of roof tiles needed to cover a trapezoidal front roof. The student also systematically identify the problem-solving steps, including calculating the length of the trapezoid's base and determining the area of the trapezoid as the initial step. Furthermore, the student was able to identify important information provided in the problem, such as the length of the top side and legs of the trapezoid, the size of the base angle, and the tile requirement per square meter.

For the second indicator, which using numbers and mathematical symbols in solving problem, the student applied trigonometric concepts by using the cosine rule to determine the length of the trapezoid's base and the sine rule to calculate its height. The student then used the trapezoid area formula to find the area of the front roof. Finally, the student multiplied this area by the number of tiles required per square meter (25 tiles/m²) to obtain the total number of tiles needed. These steps form a clear, systematic, and correct procedure.

For the third indicator, interpreting analytical results to make prediction and decision, the student was able to provide a conclusion. Although the wording was not entirely precise, for example, the student wrote "the entire trapezoid with 30 m²" instead of the more accurate "the entire front roof with an area of 30 m²", the conclusion still demonstrates that the student has a solid understanding of how to make decisions based on numerical analysis.

Student with Moderate Level Numeracy Skill

Problem Number 1

AN answer to problem number 1 can be seen in Figure 6 below.

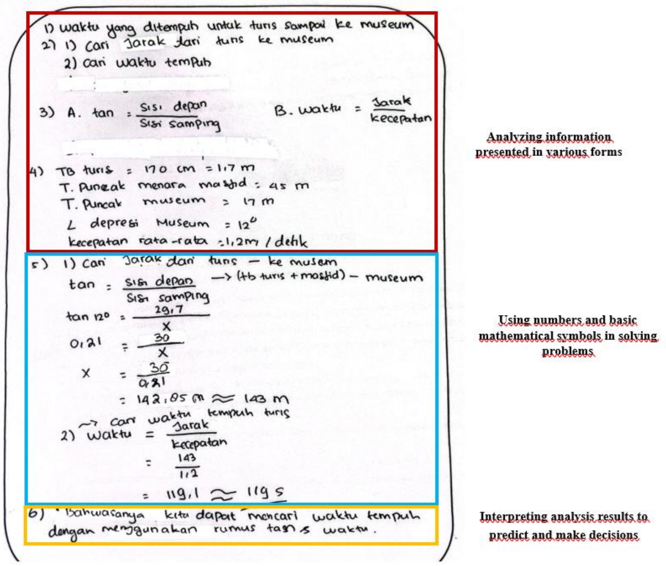

Figure 6. AN's answer to problem number 1

Unlike the high-ability student, there are numeracy indicators that have not been fully met by student with moderate abilities. In solving question number 1, the student fulfilled the first indicator. This is evident from the student ability to identify the main problem, namely determining the time needed by a tourist to walk from the Great Mosque to the SMB II Museum. The student was also able to determine the initial step for solving the problem by first calculating the distance between the two locations. In addition, the student was able to list relevant information provided in the problem, such as the tourist's height, the height of the mosque tower and the museum peak, the angle of depression, and the tourist's walking speed. These responses indicate that the student understands the context of the problem and recognizes the information and steps needed to solve it.

For the second indicator, using numbers and basic mathematical symbols in problem-solving, the student applied trigonometric concepts by writing the tangent formula $\left(\tan\theta = \frac{oppisite}{adjacent}\right)$ to determine the distance and used the time formula $\left(\text{time} = \frac{\text{distance}}{speed}\right)$ to calculate the travel time. However, the calculation process shown is not explained in sufficient detail. For example, the student did not clearly specify what "opposite" and "adjacent" refer to in the context of the problem. Nevertheless, the student still demonstrated the ability to use numbers and mathematical symbols adequately to solve the problem.

Finally, regarding the third indicator, interpreting analysis results to predict and make decisions, the student did write a conclusion about the travel time to the museum. However, this conclusion does not fully fulfill the third indicator because it has not interpreted the mathematical results obtained into the problem context. Furthermore, the conclusion appears not to be fully based on the calculation steps previously carried out. Therefore, the third indicator cannot yet be considered fully achieved by the moderate ability student.

Problem Number 2

AN answer to problem number 2 can be seen in Figure 7.

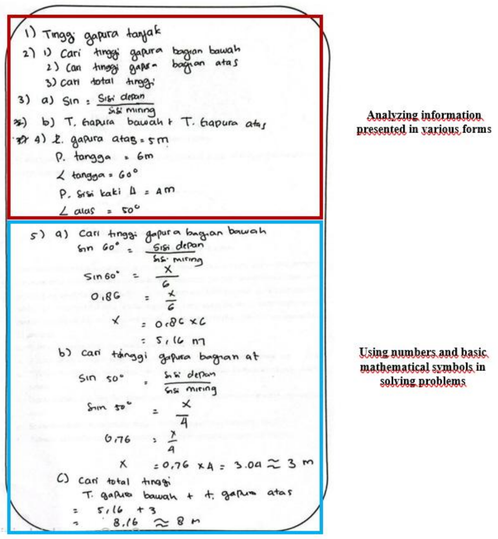

Figure 7. AN's answer to problem number 2

Based on Figure 7, the moderate ability student has not yet been able to fulfill all the numeracy indicators. In the first indicator, analyzing information presented in various forms, the student demonstrated an initial understanding of the problem. The student was able to identify the main problem and the steps needed to solve it, namely determining the height of the tanjak gate by first calculating the height of its lower and upper parts. However, the student was unable to select and sort important information appropriately. This was evident from the fact that the student rewrote all the information provided in the question, including information that was not actually required to solve the problem. This finding shows that the student understood the general context but had not yet developed the ability to extract and determine truly relevant information.

In the second indicator, using numbers and basic mathematical symbols in problem solving, the student was able to apply trigonometric ratio concepts. The student used the formula $\sin \theta = \frac{opposite}{hypotenuse}$ to determine the height of the lower and upper parts of the tanjak gate. However, the steps of the calculation were not explained in sufficient detail. The student did not provide an explanation of which parts were referred as the opposite side or the hypotenuse in the problem context. Nevertheless, the student still demonstrated basic skills in using numbers and mathematical symbols to solve the problem.

In the third indicator, interpreting the analysis results to make predictions and decisions, the student did not fullfiles the indicator. Although the student successfully obtained the height of the gapura tanjang through calculation, no conclusion was written at the end of the answer. The student did not reconnect the numerical results to the context of the problem. This lack of interpretation indicates that the student has not yet developed the ability to relate mathematical results to decision-making in real-life situations. Therefore, the third indicator is considered not fulfilled.

Problem Number 3

AN answer to problem number 3 can be seen in Figure 8. In the first indicator, which involves analyzing information presented in various forms, the student has demonstrated the ability to understand the problem. The student able to identify the main issue as well as the steps required to solve it, namely determining the number of roof tiles needed to cover a trapezoid-shaped roof by first calculating the area of the trapezoid

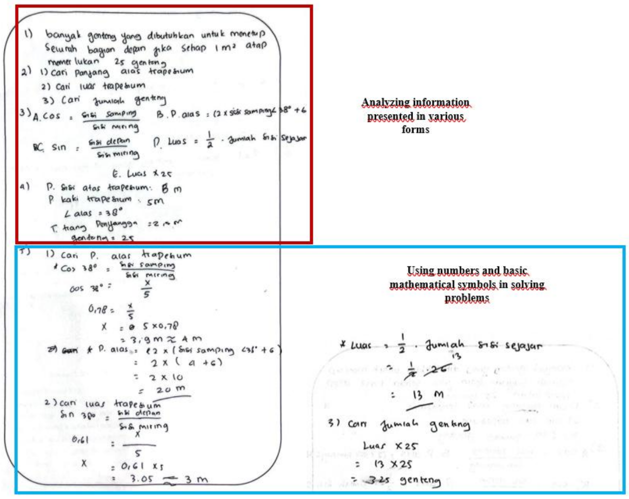

Figure 8. AN's answer to problem number 3

However, the student has not yet been able to filter the information that is truly relevant for solving the problem. This can be seen from the inclusion of unnecessary information, such as the height of the supporting pole, which is 2.5 meters. These findings indicate that the student understands the context of the problem in general but still struggles to extract key information directly related to the problem-solving strategy.

For the second indicator, which using numbers and mathematical symbols in solving problem, the student applied the trigonometric concepts of sines and cosines to calculate the trapezoid's base length and height. However, there was an error in calculating the area of the trapezoid. The error was evident in the area formula written by the students, which only used $\frac{1}{2} \times$ (the sum of parallel sides) without multiplying it by the height obtained. Moreover, the sum of the parallel sides was incorrect, as the trapezoid's base length should have been 14 cm, resulting from $(2 \times 4 \text{ m}) + 6$ m.

For the third indicator, which concerns interpreting the results of analysis to make predictions and decisions, was not met by the student. The student did not write any final conclusion regarding the number of roof tiles needed or the meaning of the calculation results within the context of the problem. This lack of a concluding statement indicates that the student has not yet been able to connect the mathematical analysis to decision making in a real-world situation. Therefore, the third indicator is considered not fulfilled.

Student with Low Level Numeracy Skill

Problem Number 1

FD answer to problem number 1 can be seen in Figure 9. Based on Figure 9, the low-ability student was unable to fulfilled most numeracy indicators. The student only demonstrated partial fulfillment of the first indicator, particularly in identifying the main problem, that is determining the time needed for a tourist to walk from the Great Mosque to the SMB II Museum. However, the student was not able to determine the appropriate steps for solving the problem. Although the student attempted to list the known information, the identification of relevant information was still inaccurate. This can be seen from the presence of information that does not align with the problem context, such as the tourist's walking speed written as "80 m/min", even though this value was not included in the problem. This error indicates that the student has not yet been able to correctly select essential information from the problem text.

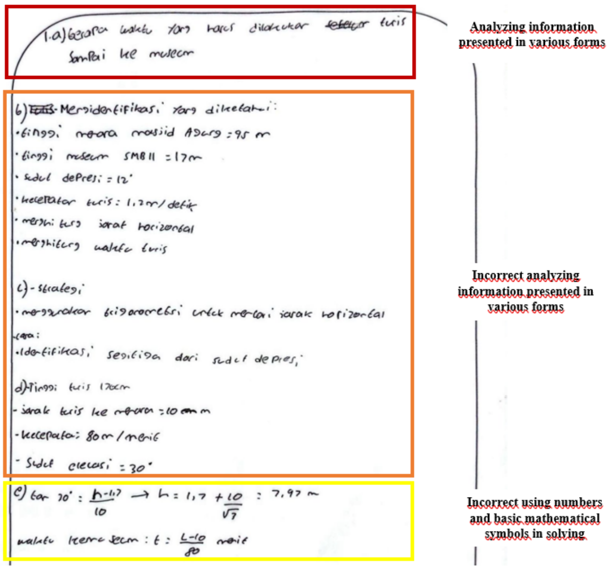

Figure 9. FD's answer to problem number 1

In the second indicator, using numbers and basic mathematical symbols to solve problems, the student did not show sufficient understanding. The calculations provided were unclear in origin, and there was no explanation of how the numbers used were related to the solution process. The student also did not apply trigonometric ratios correctly.

Furthermore, for the third indicator, which concerns interpreting the results of analysis to make predictions and decisions, the student did not meet the indicator. The solution was incomplete and the student did not provide any concluding statement regarding the result obtained or the meaning of the calculation within the problem context.

Problem Number 2

FD answer to problem number 2 can be seen in Figure 10.

For the first indicator, analyzing information presented in various forms, the student has shown an initial ability to identify the main problem, which is determining the height of the tanjak gate. However, the student has not yet been able to determine the appropriate mathematical steps needed to solve the problem.This can be seen from the steps written, such as "understanding the illustration and information" and "identifying concepts/formulas," without providing any explanation of the relevant mathematical procedures. The student also wrote trigonometric comparison concepts that are not used in solving the problem, such as cosine, indicating that the student has not yet been able to select the appropriate concept for the given task. In addition, the student has not been able to accurately identify relevant information, as shown by the inclusion of information that is not directly related to the solution, for example "the width of the gate = 5 m".

For the second indicator, which involves using numbers and basic mathematical symbols in problem solving, the student's ability is not evident. There is no calculation that shows correct use of formulas, numbers, or mathematical symbols. The student has not applied trigonometric concepts in the mathematical steps required to determine the height of the gate.

Furthermore, for the third indicator, namely interpreting the results of analysis to make predictions and decisions, the student also has not met the indicator. There is no complete calculation nor any final result that can be interpreted and the student did not write any conclusion regarding the solution to the problem.

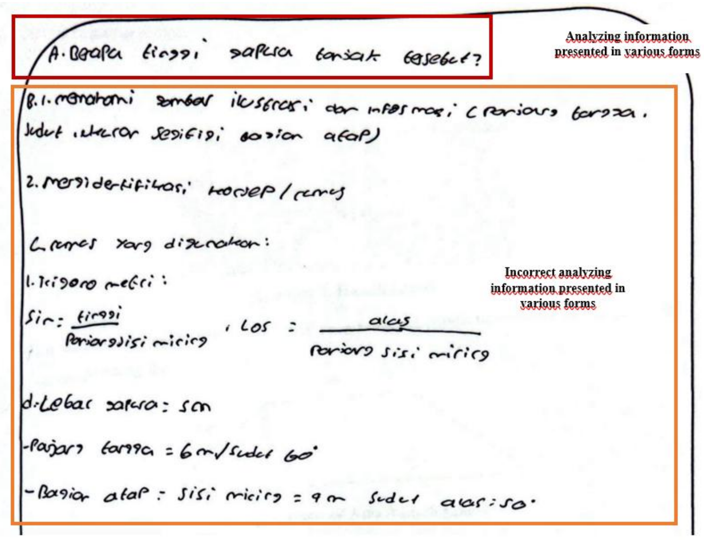

Figure 10. FD's answer to problem number 2

Problem Number 3

FD answer to problem number 3 can be seen in Figure 11 below.

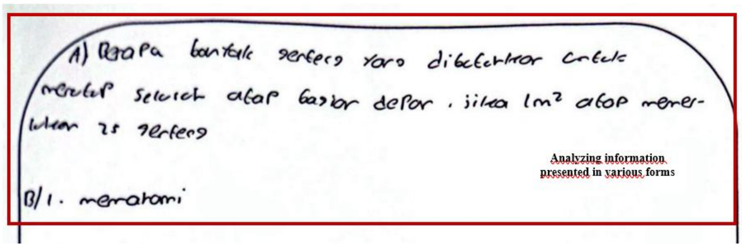

Figure 11. FD's answer to problem number 3

Based on the results of the student's work on question number 2, the low-ability student has not been able to meet most of the numeracy skill indicators. From the written response, the student only stated the main problem to be solved, that is determining the number of roof tiles needed to cover a certain part of the roof. This indicates that the student was able to identify the main problem as part of the first indicator. However, the student did not provide any further steps for solving the problem. Therefore, indicators 2 and 3 are not fulfilled.

Data Analysis Description

Based on the results of the analysis of students' answers, there are differences in the achievement of numeracy indicators at each level of student skill. This can be seen in table 7.

Table 7 presents the achievement of numeracy indicators categorized by student skill levels. Regarding the first indicator, students with high skills mastered all three measured aspects (a, b, and c). Students with moderate skills achieved aspects 'a' and 'b', whereas students with low skills were only able to achieve aspect 'a'. For the second indicator, both high and moderate skill levels successfully achieved aspects 'a' and 'b'.

Table 7. Achievement of numeracy

Indicators	Aspects that are measured	Skill Level		
		High	Moderate	Low
Analyzing information presented in various forms.	a	✓	✓	✓
	b	✓	✓	-
	c	✓	-	-
Using numbers and basic mathematical symbols in solving problems.	a	✓	✓	-
	b	✓	✓	-
Interpreting analysis results to predict and make decisions.	a	✓	-	-

In contrast, students with low skills did not meet the criteria for either aspect in this category. Finally, for the third indicator, only students with high skills successfully achieved the measured aspect. Neither the mpderate nor low skill student demonstrated achievement in this advanced indicator. In summary, high skill students fulfilled all indicators, moderate skill students achieved partial success, and low skill students were limited to the most basic aspect of information analysis.

3.2. Discussion

After going through the research stages that included preparation, implementation, and analysis, it was obtained that students' numeracy skills showed clear variations based on their ability levels, namely high, medium, and low. The following discussion describes the characteristics of students' numeracy skills based on the fulfillment of three numeracy indicators.

Student with High Level Numeracy Skill

High-skilled students successfully met all numeracy indicators the three problems they worked on. In the first indicator, students were able to identify the main problem and accurately sort out important and relevant information. Students also demonstrated the ability to formulate solution steps in a sequential, logical, and structured manner.

In the second indicator, high skill students were able to accurately apply mathematical concepts, including trigonometric ratios, formulas for the area of geometric shapes, and the relationship between speed, distance, and time. The calculation procedures were written systematically with a clear mathematical basis. This indicates that students not only understood the concepts but were also able to apply them in real-world situations. This finding aligns with previous research conducted by Widyatma & Ramadhani (2024), suggesting that students with high conceptual mastery are better able to use mathematical strategies flexibly and accurately to solve contextual problems.

In the third indicator, students also demonstrated the ability to interpret calculation results and write conclusions appropriate to the context. Although there were minor inaccuracies in the wording of the conclusions, students were still able to link the mathematical results to relevant decisions. This skill shows that high school students have reached a stage of complete understanding of numeracy, as explained in the study that students with strong mastery of concepts tend to be able to make conclusions based on quantitative analysis (Susbiyanto et al., 2019).

Student with Moderate Level Numeracy Skill

Students in the moderate category were generally able to meet the first and second indicators, but did not fully meet the third indicator in some questions. In the first indicator, students were able to identify the objective of solving the problem and understand the basic context of the problem. However, students still had difficulty selecting important information, as seen in their tendency to write down all available information, including irrelevant information. This indicates that students understand the general context but lack strong analytical skills in extracting relevant data. A similar situation was also found in previous research conducted by Shafara et al. (2024), indicating that students at this level often had difficulty selecting critical information in numeracy problems.

In the second indicator, students were able to use basic mathematical concepts, for example, trigonometric ratios or area formulas, but the solution steps were still lacking in detail. Some calculations were also not accompanied by explanations of which parts of the figure were referred to. Nevertheless, students still demonstrated a basic understanding of the use of numbers and mathematical symbols to solve problems.

In the third indicator, students were not yet able to fully interpret the calculation results. The student did not write down final conclusions or the meaning of the results obtained in the context of the problem. This condition confirms that students have not yet achieved high level numeracy skills that involve reflective and argumentative decision making. This is in line with research findings that indicate that students often experience difficulty connecting mathematical results to real-world situations (Anggoro et al., 2023).

Student with Low Level Numeracy Skill

The performance of students in the low category reveals fundamental gaps not only in conceptual understanding but also in cognitive processing of numerical information. In the first indicator, students were only able to identify the main problem in general. However, they were unable to determine relevant solution steps and often included information that was not relevant to the problem. This condition indicates that students were unable to interpret contextual information accurately. Previous research also shows that low ability students often experience misconceptions in understanding basic information in problems (Azmi & Ranti, 2024).

In the second indicator, students did not demonstrate the correct use of numbers and mathematical symbols. The calculations written lacked a clear basis, were not accompanied by appropriate formulas, and did not demonstrate a logical relationship between the concepts used and the desired results. These errors indicate that students also lacked a grasp of the mathematical concepts necessary for solving contextual problems.

In the third indicator, students were unable to interpret the results of the analysis or draw conclusions because the problem-solving process was not yet complete. The lack of conclusions indicates that students have not yet mastered basic numeracy skills that involve interpreting results in real-life contexts. This finding is consistent with research that suggests that low ability students tend to stall at the initial problem-solving stage and have difficulty reaching the interpretation stage (Latifah & Afriansyah, 2021).

Computational Thinking and Palembang Local Wisdom to Support Students' Numeracy Skills

The findings across the three ability groups also demonstrate how the integration of CT within digital worksheets contributed to supporting students' numeracy development. CT component such as decomposition, pattern recognition, abstraction, and algorithmic thinking helped guide students through structured problem-solving stages (Ostian et al., 2023; Septiana et al., 2024). High skill students were able to take full advantage of these CT scaffolds, as seen in their systematic identification of important information, selection of relevant mathematical concepts, and formulation of logical solution steps. This suggests that CT elements strengthened students' cognitive processes, particularly in breaking down contextual problems and organizing solution strategies, which are essential dimensions of numeracy.

Meanwhile, moderate skill students benefited from the CT-based structure in recognizing patterns and understanding the procedural steps, although they still struggled with abstraction and interpreting final results. This indicates that CT-oriented tasks can help reduce cognitive load (Amelia et al., 2024), but students at this level require additional support in connecting procedures to real-world meaning. For low-skill students, CT-based prompts offered initial guidance in understanding the problem, but the students were unable to move forward to more advanced CT stages, reinforcing the need for explicit scaffolding.

Furthermore, the integration of local wisdom within the worksheets played an important role in making the numeracy tasks more meaningful and relatable (Marina et al., 2025). The use of Palembang Local Wisdom context elements, such as Great Mosque, SMB II Museum, Tanjak Gate, and Limas House helped students visualize and connect mathematical concepts to familiar cultural settings. Such contextualization improves students' engagement and supports conceptual retention (Aini, AR, et al., 2024), especially for moderate and low-skill learners who often struggle with abstract numerical information.

These findings imply that teachers need to incorporate CT-based learning designs more intentionally to strengthen students' step by step reasoning in numeracy tasks. Teachers are encouraged to guide students through decomposition and abstraction stages explicitly, especially for those with low numeracy ability. Instructional materials should integrate culturally relevant contexts, such as Palembang local wisdom, to make mathematical problems more concrete, engaging, and meaningful. The results also highlight the importance of digital worksheets that combine CT scaffolding and contextual learning, as they provide structured problem-solving pathways that can accommodate students at different numeracy levels.

4. CONCLUSION

Based on the overall analysis of students' answers to the three numeracy problems, it can be concluded that students' numeracy skills vary significantly across the three identified levels between high, moderate, and low skill groups. Students in the high-skill group successfully met all numeracy indicators, from analyzing information, using numbers and mathematical symbols correctly, to interpreting calculation results to make logical conclusions. Meanwhile, moderate skill students demonstrated partial fulfillment of the numeracy indicators. The students were generally able to identify important information and begin the solution process, although several errors were still found. Conversely, students in the low-skill group were unable to fulfill most of the numeracy indicators. The students were often only able to identify the main problem without proceeding to the appropriate mathematical steps, and in some cases, did not write down the process or results of the solution at all. Overall, these findings indicate that there remains a need to strengthen students' numeracy skills through structured learning strategies, context-based digital worksheets, computational thinking activities, and scaffolding targeted at students with lower numeracy mastery for low skill students to achieve more optimal numeracy development.

This study also contributes to the existing literature by providing empirical evidence on how CT-based digital worksheets integrated with Palembang local wisdom can differentially support students' numeracy across ability level. However, this study is limited to a small qualitative sample of three students and focuses only on trigonometry content. Future research should involve larger samples, additional mathematical topics, and mixedmethod designs to further validate the effectiveness of CT-based digital worksheets in enhancing numeracy skills.

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