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Analysis of Numeracy Literacy Skills of Grade V Students in Solving Geometry Problems

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Abstract

This research aims to determine students' numeracy literacy abilities. This research includes descriptive analysis research with a qualitative approach. Data was collected through observation, tests, and interviews. The results of the research show that the numeracy literacy skills of 26 class V students at SDN Sugutamu are in the low category with an average score of 32. There are 2 students in the high category, 7 students in the medium category, and 17 students in the low category. Numeracy literacy indicators are not fulfilled due to student errors including 1) Not writing down aspects that are known and asked about in the question, 2) Not writing down the steps for completing the question, 3) The picture made does not match the question instructions, 4) Errors in determining the results of arithmetic operations, 5) Do not state decisions taken based on the answers obtained.

Keywords: Literacy Numeracy, Indicator, Students

Analisis Kemampuan Literasi Numerasi Peserta Didik Kelas V dalam Menyelesaikan Soal Geometri

Abstrak

Penelitian ini bertujuan untuk mengetahui kemampuan literasi numerasi peserta didik. Penelitian ini termasuk penelitian analisis deskriptif dengan pendekatan kualitatif. Data dikumpulkan melalui kegiatan observasi, tes, dan wawancara. Hasil penelitian menunjukkan bahwa kemampuan literasi numerasi dari 26 peserta didik kelas V SDN Sugutamu termasuk kategori rendah dengan skor rata-rata 32. Terdapat 2 peserta didik dengan kategori tinggi, 7 peserta didik dengan kategori sedang dan 17 peserta didik dengan kategori rendah. Tidak terpenuhinya indikator literasi numerasi disebabkan kesalahan peserta didik diantaranya 1) Tidak menuslikan aspek yang diketahu dan ditanyakan pada soal, 2) Tidak menuslikan langkah – langkah peneyelesaian soal, 3) Gambar yang dibuat tidak sesuai perintah soal, 4) Kesalahan pada menentukan hasil oprasi hitung, 5) Tidak menyatakan keputusan yang diambil berdasarkan jawaban yang diperoleh.

Kata kunci: Literasi Numerasi, Indikator, Peserta Didik

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INTRODUCTION

Education plays a very important role in shaping the younger generation of a nation, especially in facing the challenges of the 21st century (Sholikah & Pertiwi, 2021, p. 96). A characteristic of the 21st century is the rapid development of information and communication technology. Therefore, education needs to equip students with 21st-century life skills. Literacy is a life skill (Suprawata & Riastini, 2022). Good literacy skills significantly affect the acquisition of various information related to competencies in living life, as literacy can influence individual thinking in concluding, responding to the environment, and fostering a critical culture that produces an intelligent and competitive society (Nurwahid & Ashar, 2022, p. 214).

One of the literacy skills is numerical literacy. Numerical literacy is an individual's ability to apply mathematical knowledge to explain events, solve problems, and make decisions in everyday life (Wijaya & Dewayani, 2021, p. 2). (Sullivan, 2011) conceptualizes numerical literacy as informing mathematics, but also going beyond mathematics and having direct implications in life. The term numerical literacy is used to summarize and encompass all elements of practical mathematics.

Learning mathematics is not just about arithmetic (numeracy) because, in reality, this ability is not enough to deal with problems in daily life. Therefore, besides arithmetic skills, the next important skill is understanding concepts. With the ability to understand concepts, one can solve problems that occur in everyday life. Arithmetic skills, the ability to understand basic mathematical concepts, and the ability to solve real-life problems are referred to as numerical literacy skills (Journal et al., 2022, p. 342).

The urgency of numerical literacy is responded to by the Indonesian Ministry of Education by implementing the National Literacy Movement and the Minimum Competency Assessment. These efforts are made by the government to improve the quality of education in Indonesia, as seen from the concerning impact of the PISA (Program for International Student Assessment) assessment worldwide (Nurhayati et al., 2022, p. 724). In the 2018 PISA test in the field of mathematics, Indonesian students scored an average of 379, with an average score of 489 (OECD, 2018).

In numerical literacy, the content is divided into four groups: numbers, geometry, data and uncertainty, and algebra (Pusmenjar, 2017). Geometry is a part of the primary school curriculum (Standar Isi, 2006: 417). Geometry is one of the subjects in mathematics education that combines the use of symbols and mathematical formulas, where students are required to have knowledge, understanding, and application of geometric concepts, as well as the ability to analyze information related to geometric symbols. Learning geometry can help develop logical thinking, deductive reasoning, analytical reasoning, and problem-solving skills (Ismail & Sulfiyah, 2020, p. 2353).

Geometry in primary school consists of plane figures and solid figures. In-plane figures, there are two fundamental concepts: area and perimeter. In solid figures, the fundamental concept is volume (Akina, 2016). The concept of geometry is very close and recognizable to students in everyday life. Students can also use symbols, visual media, and concrete objects in learning geometry, making the opportunity to understand geometry considered greater compared to other branches of mathematics.

According to (Sari et al., 2021), students' ability to solve geometry problems is still relatively low. The low numerical literacy ability of students is due to their lack of understanding of the problems presented in the questions, insufficient practice in answering questions related to everyday problems, making it difficult for students to analyze information in the questions, which causes students to struggle in using numbers and symbols to formulate, present, and solve problems (Nurhayati et al., 2022, p. 730). To measure numerical literacy skills, clear indicators of numerical literacy skills are needed. These indicators are used as a reference that can provide an overview of each numerical

literacy skill being measured. According to (Han et al., 2017), there are three indicators of numerical literacy skills:

Table 1. Indicator of Numerical Literacy Skills

Numeracy Skill Indicators	
1.	Using various numbers and symbol related to basic mathematics to solve problems in various everyday contexts
2.	Analyzing information displayed in various forms (graphs, tables, charts, diagrams, etc.).
3.	Interpreting the results of the analysis to predict and make decisions.

METHOD

This research includes descriptive analysis research with a qualitative approach that aims to analyze and describe numeracy literacy skills in solving geometry content problems. In determining the research subjects, the researchers used a purposive sampling technique. According to (Sugiyono, 2017), the purposive sampling technique is a technique with certain considerations. A total of 26 grade V students of SDN Sugutamu participated in this research. Data collection was done through observation tests and interviews. The instruments used were a numeracy literacy skill test sheet and an interview guide. The test used was in the form of five descriptive questions related to geometry content. After completing the test, students were interviewed. The interview was based on the numeracy skill test that the research subjects had done. This way, the numeracy literacy skills of the students could be examined more deeply through the interview. The interview aimed to obtain data validation from the research subjects.

The collected data was then analyzed according to (Miles & Huberman, 1984), who stated that activities in data analysis include data reduction, data presentation, and conclusion drawing. Data reduction is related to the activity of correcting the results of students' numeracy tests and reducing interview results. Data presentation in qualitative research can be done in the form of short descriptions, relationship charts between categories, flowcharts, and the like. Conclusion drawing or research findings can be in the form of a description or an overview of an object that was previously unclear or obscure, and after being researched, it becomes clear. Data validity check in this research used triangulation with the method. According to (Patton, 1987: 329), method triangulation is checking the degree of trustworthiness of research findings from several data collection techniques. Method triangulation was obtained through observation, tests, and interviews.

Table 2. Interval Value of Numeracy Literacy Skill Test

Value Interval	**Category**
≤ 40	Low
$40 < \text{Value} < 71$	Medium
≥ 71	High

RESULTS AND DISCUSSION

The research results showed that the average score of the numeracy literacy skill test of the 26 students was 32, in the low category. The numeracy literacy skill test results were divided into 3 categories: high, medium, and low. The number of students in each category is presented in Figure 1 below..

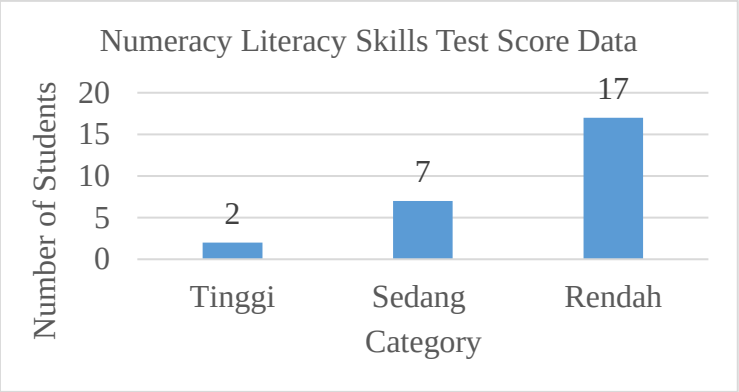

Figure 1. Numeracy Literacy Skill Test Scores Data

From the figure, it can be seen that the numeracy skills of grade V students of SDN Sugutamu are dominated by students with low numeracy skills. There are 2 students with high numeracy literacy skills, 7 students with medium numeracy literacy skills, and 17 students with low numeracy literacy skills. The percentage of students answering correctly for each numeracy literacy indicator is presented in the table below.

Table 3. Percentage of Students Meeting Numeracy Literacy Indicators in Test Questions

No.	Numeracy Literacy Skill Indicator	Question 1	Question 2	Question 3	Question 4	Question 5
N1	Using various numbers and geometry symbols	92%	46%	54%	38%	15%
N2	Analyzing information displayed in various forms	62%	15%	27%	27%	27%
N3	Interpreting the analysis results to predict and decide	31%	12%	19%	4%	15%

The table shows that not all students can meet the three indicators of numeracy literacy skills in solving numeracy literacy test questions with geometry content. The first indicator (N1), using various numbers and symbols related to geometry content, in question no 1 obtained the highest percentage, 92%, which means 24 out of 26 students met this indicator. As the questions increased, the number of students meeting the first numeracy literacy indicator decreased until it reached the lowest number in question no. 5, which is 15%, meaning only 4 out of 26 students met this indicator.

The second numeracy literacy indicator (N2), analyzing information displayed in various forms, obtained the second highest percentage for question no. 1, which is 62%, meaning 16 out of 26 students met this indicator. However, there was a significant decrease in question no. 2, where only 15% of students, or 4 out of 26, met this indicator.

The third numeracy literacy indicator (N3), interpreting the analysis results to predict and make decisions, had the lowest percentage in question no. 4, which is 4%, meaning only 1 out of 26 students met this indicator. The highest percentage for this indicator was in question no. 1, which is 31%, meaning 8 out of 26 students met this indicator.

Meeting or not meeting each numeracy literacy indicator does not affect the other indicators. If the first numeracy literacy indicator (N1) is met, it does not necessarily mean that the second (N2) and third (N3) indicators will also be met. Similarly, if the first indicator

is not met, it does not mean the other two indicators will not be met. Thus, to be considered to have good numeracy literacy skills, students must meet all three numeracy literacy indicators. According to (Amalia & Priyo, 2021), students who can use numbers and symbols related to algebraic operations and analyze information known and asked in questions do not necessarily have good numeracy literacy skills. Good numeracy literacy skills are defined by meeting all three indicators. This is seen in more detail when examining the results of the numeracy literacy test for each research subject.

1. High Numeracy Literacy Skill Students

There are 2 out of 26 students with high numeracy literacy skills. Subject ST was chosen as one of the students with high numeracy literacy skills. The score obtained by subject ST in the numeracy literacy skill test was 86.6, categorized as high. Below is an excerpt from the answer of subject ST with high numeracy literacy skills.

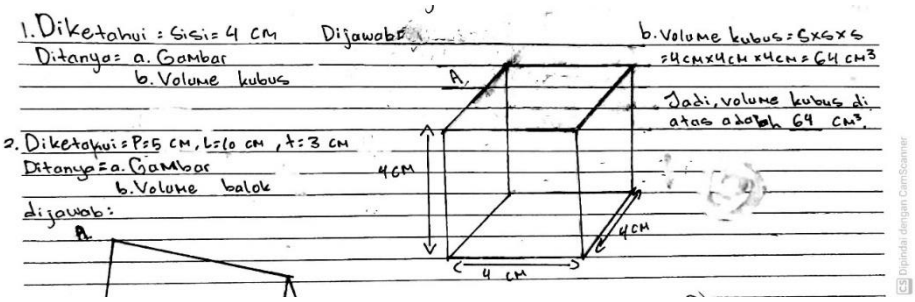

Figure 2. Excerpt from ST's Answer

The first indicator (N1), using various numbers and symbols related to geometry content, is well met by subject ST. From the answer excerpt above, it is evident that the student used various numbers, such as the number 4 for the side of the square, and mathematical symbols for geometry content, like the letter s to denote the side.

The second numeracy literacy indicator (N2), analyzing information displayed in various forms (graphs, tables, charts, diagrams, etc.), is seen in subject ST's ability to answer the known and asked aspects of the question. Although not written in full, subject ST could answer orally during the interview, as follows:

P : What do you know from question number 1 ?
ST : A cube with a side of 4 cm.
P : What is asked in that question ?
ST : Draw s cube with the ssame side length as Dayu's rubik, and find the volume of the cube ?

The third numeracy literacy indicator (N3), interpreting the analysis results to predict and make decisions, is seen in ST's answer. The formula used, the calculation steps taken, and the decision made are correct. However, the drawing of the cube was not accurate in size, showing a measurement error.

2. Medium Numeracy Literacy Skill Students

There are 7 out of 26 students with medium numeracy literacy skills. Subject SS was chosen as one of the students with medium numeracy literacy skills. The score obtained by subject SS in the numeracy literacy skill test was 60, categorized as medium. Below is an excerpt from the answer of subject SS.

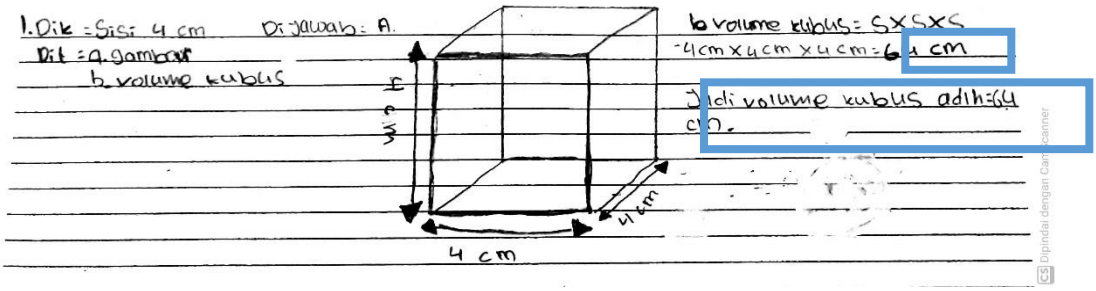

Figure 3. Excerpt from SS's Answer

The first indicator (N1), using various numbers and symbols related to basic mathematics to solve problems in various contexts, is evident from SS's answer. SS used numbers, like 4, and symbols for geometry content, such as s for the cube's side.

The second numeracy literacy indicator (N2), analyzing information displayed in various forms (graphs, tables, charts, diagrams, etc.), is seen in SS's ability to state the known and asked aspects orally during the interview, although not written fully in the test, as follows:

P : What do you know fro, question number 1 ?
SS : The side is 4 cm,
P : What is asked in that questions ?
SS : Draw a cube with the same side length as Dayu's rubik, and find the volume of the cube ?

The third numeracy literacy skill indicator (N3) is interpreting the results of the analysis to predict and make decisions. For subject SS, who has medium numeracy skills, the third numeracy skill indicator is shown more briefly, resulting in incomplete answers. From the answer excerpt above, it is evident that subject SS has not been able to fully interpret the analysis results to predict and make decisions. In stating the volume, subject SS only wrote "cm." Additionally, from the answer excerpt, it can be seen that there is a cube drawing labeled with a side length of 4 cm; however, when measured, the cube is actually 3 cm. This indicates that subject SS made an error in measuring the cube drawing, making it inconsistent with the question instructions.

3. Low Numeracy Literacy Skill Students

There are 17 out of 26 students with low numeracy literacy skills. Subject SR was chosen as one of the students with low numeracy literacy skills. The score obtained by subject SR in the numeracy literacy skill test was 46.6, categorized as low. Below is an excerpt from the answer of subject SR.

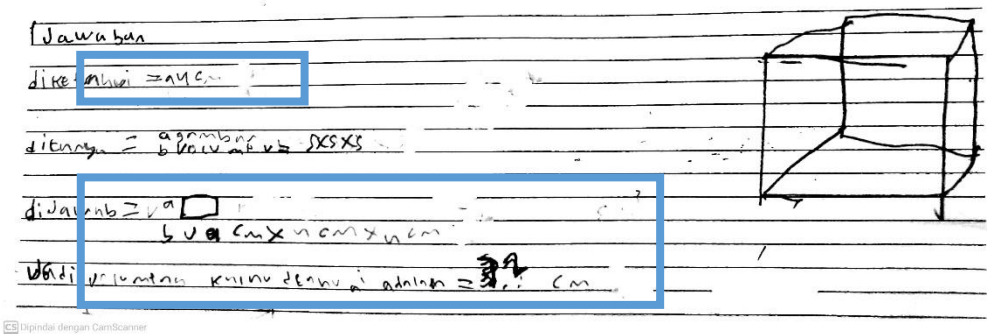

Figure 4. Excerpt from SR's Answer

The first indicator (N1), using various numbers and geometry symbols, is evident from SR's answer. SR used numbers, like 4, and geometry content symbols, such as s for the side.

The second numeracy literacy indicator (N2), analyzing information displayed in various forms, is shown in SR's oral response during the interview, though not written in the test, as follows:

P : What do you know from questions number 1 ?
SR : A rubik
P : What is asked in that question ?
SR : Draw a cube with the same side length as Dayu's rubik, and find the volume of the cube.

The third numeracy literacy indicator (N3), interpreting the analysis results to predict and make decisions, was not well demonstrated by SR. The calculation steps were incomplete, and the decision was incorrect and incomplete, with errors in the calculation and measurement.

Numeracy Literacy Skills

Table 4. Indicators of Numeracy Literacy Skills Met by ST in Each Question

Indicator of Numeracy Literacy Skills	Question 1	Question 2	Question 3	Question 4	Question 5	Total
NI	✓	✓	✓	✓	✓	5
N2	✓	✓	✓	✓	✓	5
N3	x	X	✓	✓	✓	3

Students who scored high in the numeracy literacy skill test can meet two to three numeracy literacy skill indicators, indicating that they possess high numeracy literacy skills (Amalia & Priyo, 2021, p. 149). Based on Table 4, the most frequently occurring numeracy literacy skill indicator is the first one (N1), which involves using various numbers and geometric symbols. Next, the second numeracy literacy indicator (N2), which involves analyzing the displayed information for the aspects known and asked, is written briefly. However, during the interview session, students can explain orally the aspects known and asked in the question in detail. This aligns with the research conducted by (Amalia & Priyo, 2021), which found that research subjects with high numeracy literacy skills were less complete in writing down what was known and asked in detail, but could explain it orally during the interview.

The indicator that appears less frequently is the third numeracy literacy indicator (N3), which involves interpreting the analysis results to predict and make decisions. This is due to students' mistakes in making measurements of geometric shapes. Therefore, the third numeracy literacy skill indicator is not met. This is in line with the research conducted by (Nurhayati et al., 2022) on subjects with high numeracy literacy skills, where the frequently appearing indicator was using various numbers or symbols and being able to analyze the information displayed in various forms of plane figures. However, the indicator that rarely appeared was interpreting the analysis results to write conclusions, which could only be done by subjects on certain questions.

Table 5. Indicators of Numeracy Literacy Skills Met by SR in Each Question

Indicator of Numeracy Literacy Skills	Question 1	Question 2	Question 3	Question 4	Question 5	Total
NI	✓	✓	✓	✓	x	4

N2	✓	✓	x	✓	✓	4
N3	X	X	x	x	✓	1

Students with medium numeracy literacy skills can meet one to two numeracy literacy indicators. Research subjects with medium numeracy literacy skills are quite capable of mastering numeracy indicators (Nurhayati et al., 2022, p. 728). The numeracy literacy indicators that frequently appear are the first indicator (N1), using various numbers and geometric symbols, and the second indicator (N2), analyzing information displayed in various forms (graphs, tables, charts, diagrams, etc.). These first and second numeracy literacy indicators are briefly presented in writing by the students in the literacy skill test. The third numeracy literacy indicator (N3), interpreting the analysis results to predict and make decisions, is not yet optimally demonstrated by students with medium numeracy literacy skills. This is consistent with the research conducted by (Baharuddin et al., 2021), which stated that subjects with medium numeracy literacy skills do not reach the conclusion stage in solving problems.

Table 6. Numeracy Literacy Ability Indicators Fulfilled by SR on Each Question

Indicator of Numeracy Literacy Skills	**Question 1**	**Question 2**	**Question 3**	**Question 4**	**Question 5**	**Total**
NI	✓	X	x	x	x	1
N2	X	x	x	x	x	0
N3	X	x	x	x	x	0

Students with low numeracy literacy skills can only meet one indicator, which is the first numeracy literacy indicator (N1), involving the use of various numbers and symbols related to basic mathematics to solve problems in various everyday contexts. This ability is only demonstrated by students in non-complex questions in the numeracy literacy skill test. For the second indicator (N2), analyzing information displayed in various forms (graphs, tables, charts, diagrams, etc.), students can only demonstrate this during interviews. The third numeracy literacy indicator (N3), interpreting the analysis results to predict and make decisions, is not shown by the students. According to (Pulungan, 2022), students with the lowest numeracy literacy test scores only meet one indicator due to errors they make, one of which is not concluding or interpreting the problem-solving process they have undertaken.

CONCLUSION

Learners with high numeracy literacy skills master two to three numeracy literacy indicators. Learners with moderate numeracy literacy skills can fulfill one to two numeracy literacy indicators. Learners with low numeracy literacy skills can only fulfill one indicator in simple problems. The unfulfilled numeracy literacy indicators by learners are caused by mistakes made by the learners. These mistakes include not writing down known aspects and questions completely. Not writing down the steps of solving the problem using geometric formulas of spatial shapes completely and accurately. Drawings made do not match the instructions of the problem and errors in determining the results of calculation operations. Additionally, learners do not state the decision-making sentence completely and accurately based on the obtained answers. Errors made by learners in solving numeracy literacy test problems can occur because learners are not accustomed to solving problems that contain numeracy literacy indicators.

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