

Identification of Numeracy Skills of Elementary School Students in Working on National Assesment Problems

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Sections Info Keywords: Learners Numeracy skill Misconception	ABSTRACT Objective: The study aims to determine the numeracy skills of students. In addition, this study aims to determine misconceptions in solving numeracy questions based on national assessments. Method: This research uses a descriptive qualitative method – data obtained from test results, documentation, and interviews with subjects. Results: The results of this study are that the numeracy skills of Genilangit 2 Elementary School have almost the same score as the 2024 Education Report Card score. Overall, the numeracy skills of Genilangit 2 Elementary school students are in the good category. However, it can still be optimized again for a better numeracy score. Students still experience misconceptions (conceptual, procedural, and technical errors) when solving numeracy problems. Novelty: The novelty of this research is that this research focuses on analyzing the numeracy skills of students who have taken computer-based national assessments done manually on paper. Later, more detailed information will be obtained about the numeracy skills of students and the misconceptions of numeracy students. This research explores detailed information because the questions given are in the form of descriptions so that students' steps in working on problems are known.

INTRODUCTION

Indonesia's education world is often associated with The Program for International Student Assessment, commonly known as PISA. PISA is a program established by a group of countries affiliated with the OECD (Organization for Economic Cooperation and Development). PISA was first organized in 2000. The initial purpose of PISA was to assist countries in reaching capable human resources and having the ability to suit their needs. Thus, the needs of the international market can be achieved. According to (Putrawangsa & Hasanah, 2022) the participation of Indonesian students in PISA aims to measure the student's reading and math skills early. The results of this measurement are then used as a basis for making policy changes related to the curriculum at school.

According to (Rahmawati et al., 2016), in 2015, PISA issued important data results in the field of education. Of the 50 countries participating in the PISA study, Indonesia was ranked 45th. Furthermore, as stated by (Ekowati et al., 2019), the achievements of elementary school students related to PISA in East Java Province show alarming numbers. This is evidenced by the need for more ability of elementary school students to work on problems that require mathematical thinking. PISA issued the latest survey data, which was released in 2018, on Science Literacy and Numeracy. (Faza et al., 2022) said that of the 79 countries surveyed by PISA, Indonesia ranked 74th or sixth from the bottom. Based on this information, literacy and numeracy skills in Indonesia still need to be maximized. PISA 2022 data from the Ministry of Education, Culture, and Research in December 2023 showed that Indonesia's numeracy score fell 13 points. The PISA numeracy score in 2018 was 379, while the PISA score 2022 was 366.

According to (Asbari et al., 2020), the Indonesian education report card is a digital platform that presents a report on evaluating the education system, which aims to improve the previous quality report card. Other supporting data that we get is related to the Education Report Card. According to (I Nyoman Kiriana & Ni Nyoman Sri Widiasih, 2023), the education report card is a measuring tool that helps identify educational problems and reflect on educational achievements in education units. Based on the search for data on the Indonesian Education Report Card in 2023, it shows that 46.67% of students have numeracy competencies above the minimum. This figure is included in the medium category.

Furthermore, the numeracy value on the Education Report Card in the Magetan Regency area is 1.65. The number on the education report card needs to be reflected on and evaluated to make improvements. In more detail, the data on the education report card of Genilangit 2 Elementary School in 2024 on the numeracy aspect is as follows: competence in the number domain gets a score of 51.94. Furthermore, the algebraic domain competency received a score of 48.84. Meanwhile, the Geometry domain gets a score of 46.08. Finally, the data and uncertainty domain scored 64.05.

Numeracy skills are the main abilities and rudimentary abilities of students. According to (Hermawati, 2022), one proof of the vitality of numeracy skills is the statement from UNESCO in 2006. UNESCO said that Numeracy is a crucial skill indicator for determining the progress of a country. Seeing how vital Numeracy is to the civilization of a country, it is necessary to take real action to improve numeracy skills. Of course, improving Numeracy skills aims to achieve the ideals of the Indonesian nation. According to (Basri et al., 2021), Numeracy skills have a close relationship with the progress of a nation. Therefore, concrete steps are needed to improve Numeracy skills. According to (Umer et al., n.d.), Numerical skills are essential skills that must be taught together in the early stages of education. The sentence means that Numeracy is a very important skill that must be taught thoroughly in the early stages of education.

According to (Sri Hartatik, 2020), numeracy skills are human skills in using numbers to solve everyday problems. In line with this statement is the opinion of (Mahmud & Pratiwi, 2019) who expressed the challenge of Numeracy ability as a skill in interpreting the analysis results. Then, the analysis results can be used to make predictions and guidelines for decision making. In line with the above opinion, the opinion of (Maulidina, 2019) states that students who are proficient and have mathematical skills will be able to process these basic mathematical numbers or symbols to be used as a reference in solving numeracy-related problems.

Research conducted by (Napsiyah et al., 2022) says that the numeracy skills of students still need to be improved. This is evidenced by the students' test scores with an average score of 51.14. Based on other research from (Sri Hartatik, 2020), which contains the results, most elementary PPG students still make many mistakes when writing numbers and symbols when doing math problems. The goal and steps are correct so that misconceptions will occur. This happens to students, especially grade 5 students, who

have a higher possibility of misconceptions. So, there is a need for more in-depth research to describe the misconceptions students have about working on numeracy problems.

The research has fundamental differences from other studies, such as research from (Katherina Estherika & Setianingsih, 2022) which examines the numeracy literacy skills of high school students. Likewise, research from (Sari et al., 2021) focuses on the geometry skills of 5th-grade elementary school students in national assesment. Research from (Ali & Ni'mah, 2023) says students' ability to solve geometry problems is still low and is due to several factors, such as their intellectual, attitudinal, and psychomotor abilities.

In contrast to previous research studies, this study analyzes the numeracy skills of students who have taken computer-based national assessments done manually on paper. Later, more detailed information will be obtained about the numeracy skills of students and the misconceptions of numeracy students. This study explores detailed information because the questions given are worksheets on how to work with students so that students' steps in working on problems are known. This is coupled with interviews with students to strengthen the information obtained. These problems and misconceptions can be anticipated and corrected so that the results of this study can be used as a basic foundation in determining steps in improving students' numeracy skills.

Based on the analysis of these conditions, this simple research's objectives include identifying students' numeracy skills. In addition, this research aims to find out misconceptions in solving numeracy questions on computer-based national assessments. This research is fundamental because detailed information related to the condition of students' numeracy skills will be obtained in this research. The information and data obtained are derived from various sources that support and are comprehensive. The research results can be used to determine the right steps and strategies for improving students' numeracy skills.

RESEARCH METHOD

This research was conducted to find out more detailed information about students' work on National Assesment questions. Because in National Assesment, information about how students solve numeracy problems cannot be known, the research carried out describes the numeracy skills of elementary school students in solving numeracy-related problems. In addition, it is also to find out the misconceptions students face in solving numeracy problems.

This simple research uses a qualitative descriptive method. Qualitative research is research that has a descriptive nature and has a tendency to analyze. The process and meaning-focused in qualitative research is based on the theory that is used as a guide so that the research is by the facts that occur in the field. The research was conducted at Genilangit 2 Elementary School. The sample of this simple research subject is grade5 students of Genilangit 2 Elementary School, totaling 17 people.

Furthermore, to obtain data, this research uses various methods. Various methods are used to strengthen the data supporting this simple research. The use of several methods is called data triangulation. According to (Susanto et al., 2023) the triangulation of methods is carried out by comparing information and data in various ways. One of the

methods used is the test method. Mathematics test questions in this focus on competency material in the number domain, the algebraic domain, the geometry domain, and the data and uncertainty domain, with a total of 8 questions. The details of the division of test questions consist of 1 question about numbers, 2 test questions about algebra, 2 test questions about geometry, and 2 test questions about data and uncertainty. The material selection was chosen because the numeracy material was mostly mathematics or numeracy material at the elementary school level. Questions about numbers were given only 1 because the value in this aspect was good enough, namely at the score.

The steps in this research began with making research instruments. The process of making this research instrument takes approximately two weeks. After preparing the instrument in the form of a test question, the next step is to validate it. Instrument validation is carried out by an expert, a senior teacher who teaches grade 5. In validating and improving this instrument, it is certain to experience revisions and improvements to the instruments that have been prepared. The process of validating and improving this instrument takes approximately two weeks.

The stage that must be carried out in this study is to test the instrument that the teacher has validated. At this stage, sampling was carried out. The sample was used as the subject of this simple research. The target of this research is elementary school students. The subjects of this study were students of Genilangit 2 Elementary School, totaling 17 students. The time given for students to work on this research instrument question is 60 minutes. The questions that students work on are seven numbers. Problem number 1 is a question about competence in the number domain. Questions on the competence of the geometry domain are contained in questions 2 and 3. Competence in the algebraic domain is contained in questions number 4 and 5. Furthermore, competence in the domain of data and uncertainty is contained in questions number 6 and 7.

Another necessary method in this study is to know students' misconceptions in solving numeracy problems. In this goal, other methods are needed to strengthen this research. Another method used is the documentation of test results. Then, the interview method is also needed for the research subject. This interview aims to confirm interesting findings in solving numeracy problems.

RESULTS AND DISCUSSION

Results

Before working on the instrument, the researcher asked permission from the principal and the class teacher, who was the research subject. Researchers explained that the confidentiality of the identity of students would be maintained in this simple research. In addition, the researcher explained the purpose of this study, namely to determine the Numeracy skills of elementary school students.

After testing the research instrument on fifth-grade students of Genilangit 2 State Elementary School, Poncol District, Magetan Regency, which is presented in accordance with the numerical indicators of (Han et al., 2017), the results are as in the data below.

Table 1. Test results of numeracy skills of students of SDN Genilangit 2

Student	1	2	3	4	5	6	7	Percentage %	Criteria
PD 1	1	1	1	1	0	1	0	71,42 %	Medium
PD 2	0	1	1	0	1	1	1	71,42 %	Medium
PD 3	1	1	1	1	1	1	1	100 %	High
PD 4	0	1	0	0	0	1	1	42,85 %	Low
PD 5	1	1	1	1	1	1	1	100 %	High
PD 6	1	1	1	1	0	1	1	85,71 %	High
PD 7	1	1	0	0	0	1	0	42,85 %	Low
PD 8	1	1	1	1	1	1	0	85,71 %	High
PD 9	0	1	0	1	0	1	1	57,14 %	Medium
PD 10	1	1	1	1	1	1	1	100 %	High
PD 11	1	1	1	1	1	0	0	71,42 %	Medium
PD 12	1	1	0	1	0	1	1	71,42 %	Medium
PD 13	0	1	1	0	0	1	1	57,14 %	Medium
PD 14	0	1	0	1	0	1	1	57,14 %	Medium
PD 15	1	1	0	0	1	1	1	71,42 %	Medium
PD 16	1	1	0	1	0	1	1	71,42 %	Medium
PD 17	0	1	0	0	0	1	1	42,85 %	Low
Percentage	64,70 %	100 %	52,94 %	64,70 %	41,17 %	94,11 %	58,82 %		

The data above shows that three learners could work on all questions related to Numeracy. At the same time, the other 14 learners could not answer the question exactly 100%. The overall average score of learners is 70.58. The highest score achieved by learners is 100. At the same time, the lowest score of students is 42.85, answering exactly three out of seven questions.

The percentage of students who solved the problem correctly was 64.70%. This means that the value of students in the number domain gets a score of 64.70. Furthermore, the correct percentage number of students is obtained based on the analysis of the geometry domain's numeracy competence shown in questions 2 and 3. In question number 2, the correct percentage is 100%. In question number 3, the correct percentage was obtained at 52.94%. So, the numeracy competence of the geometry domain of students is at 74.47%.

The numerical competence of the algebraic domain is shown in questions 4 and 5, and in question 4, the correct percentage is 64.70%. In question number 5, the correct percentage was 41.17%. So, the numeracy competence of the algebraic domain of students is 52.94%. Furthermore, in the numeracy ability of the data domain and uncertainty in questions number 6 and 7, the correct percentage number 6 is 94.11, and the correct percentage number 7 is 58.82%, so the correct percentage of students in solving numeracy problems in the data domain and uncertainty is 76.47%. Figures should be carefully explained in the text and cited in numerical order. Overall, the Numeracy competency scores of Genilangit 2 elementary school students are in the middle to upper criteria.

Discussion

First problem is a problem related to the number domain competency. More specifically, this question refers to the material on the least common multiple and greatest divinity factor. In problem number 1, 11 students can work on this problem correctly. While the other six have yet to be able to solve the problem correctly. The percentage of students who solved the problem correctly was 64.70%. The exciting findings from the way students solve the problem are shown below.

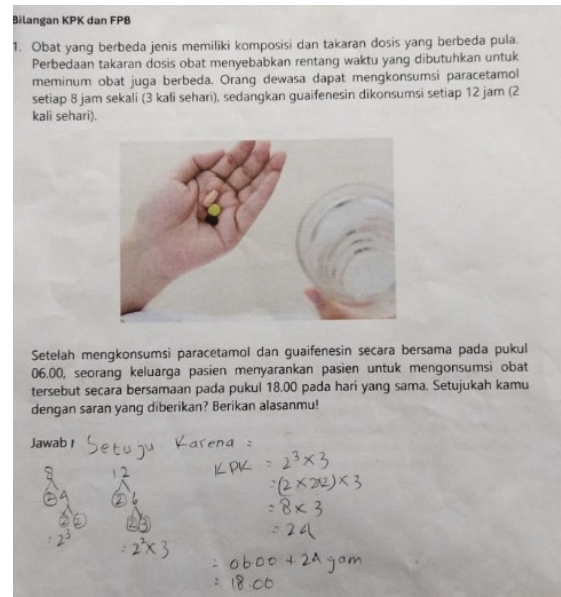


Figure 1. Results of Students' Work on Problem Number 1

Based on the picture above, students have misconceptions about working on problem number 1. Students can understand the steps used to solve the problem. The basic principle of solving using the Least Common Multiple has also been done correctly. The results of the Least Common Multiple are also correct, namely 24. However, when students add them up, they make mistakes. Learners experience errors in counting at the end. Based on the interview conducted with PD 9, it was found that PD 9 already knew the meaning of question 1. PD 9 explained that question number 1 was first searched for the Least Common Multiple and obtained the result 24. So that the medicine is taken simultaneously every 24 hours. 06.00 plus 24 hours is 18.00. This is where the misconception of PD 9 lies.

The errors that occur are the same as those found in the research from (Mufidah et al., 2021). Understanding errors occur when students cannot determine the work initially using the concept of Least Common Multiple or do not understand the problem. According to (Suciati & Sartika, 2023), this error can also be seen based on Newman's Error Analysis (NEA) as a problem-solving process error.

Problems number 2 and 3 are questions about geometry. In question number 2 shows that all students can answer correctly. In other words, the percentage of students who completed correctly was 100%. This shows that students understand basic geometry, namely the shape of the building space in the surrounding environment. The results of interviews with students about question number 2 showed that it was quite easy to

answer question number 2. In question number 2, only asked to determine the name of the spatial structure of a drawn object.

Question 3 is different from question 2. In question 3, 9 students were able to solve the problem correctly, while the other eight were not. So, the correct percentage in question 3 is 52.94%. There is an interesting phenomenon in this question. It can be seen from the picture of the work below.

B	Volume atap model tiruan rumah adat tersebut adalah 38.808 cm ³	✓
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Cara pengerjaan

$$\begin{aligned}
 V &= \frac{4}{3} \times \pi \times r^3 \\
 &= \frac{4}{3} \times \frac{22}{7} \times 21^3 \\
 &= \frac{4}{3} \times \frac{22}{7} \times 3 \times 21 \times 21 \\
 &= 1 \times 22 \times 3 \times 21 \times 21 \\
 &= 26612
 \end{aligned}$$

Figure 2. Results of Students' Work on Problem Number 3

The picture above shows that learners understand the method that will be used to solve the problem. However, some things need to be clarified about the roof of the Honai house. The roof of the house is a half-sphere. However, students work with the volume formula of a whole ball. In addition, there are errors when calculating. However, the learners' answers were correct in the end. Because question number 3 is made to resemble National assesment numeracy questions in the form of a true-false question model. Because the statement is a wrong question. Learners' answers are correct. However, there are misconceptions in the solution process. During interviews with students, information was obtained that students understood the meaning of question number 3, namely, finding the radius and volume of the sphere. Students also do not think the house's roof is half a sphere. Students still think that calculating the volume of the roof is by calculating the volume of a whole ball, not the volume of a half ball. This shows that there are still misconceptions among students.

The students' mistakes above can be said to be errors in understanding the concept of the problem. (Utami et al., 2019) stated that students experience errors because they do not understand the concept of the problem, even though they are actually able to calculate well.

The correct percentage of students was obtained based on the analysis and discussion of the numeracy competence of the geometry domain shown in questions 2 and 3. In question 2, the correct percentage is 100%. In question 3, the correct percentage was obtained at 52.94%. So, it can be said that the numeracy competence of the geometry domain of students is 74.47%.

The next discussion is about numeracy competence in the algebraic domain. Based on the data obtained from the trial on question number 4, information can be obtained that 11 students can answer this question correctly. Six learners have not been able to solve

the problem correctly. This means that the percentage of learners who can answer correctly is 64.70%. The percentage of success shows a number that is good enough.

There are exciting things from the test results on question number 4. Some students can work with almost the proper process, but the final results are still incorrect, so these students experience misconceptions. The results of the interview with PD 14 about question number 4 showed that the students could illustrate the question correctly. However, the students doubted whether to use repeated addition or number patterns. Even though students still hesitate when using number patterns, students choose less precise answers, as seen in the picture below.

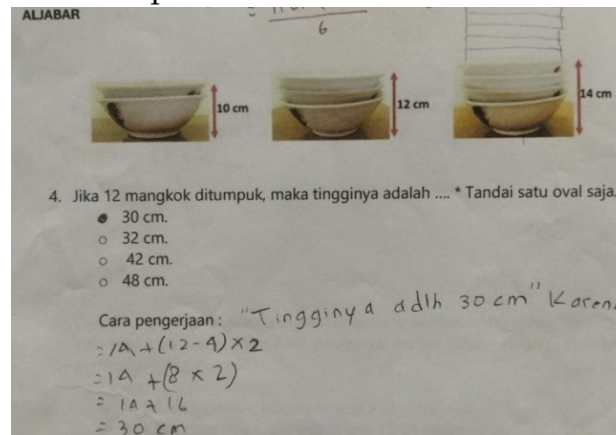


Figure 3. Results of Students' Work on Problem Number 4

The errors above are the same as those stated by (Jusniani & Suryakancanai, 2022). Errors in solving math problems, especially in algebraic material, depend on the ability to construct thinking. Good thinking construction can help students or college students determine good ideas to use, and good ways of thinking, eliminate errors in performing calculations and perform correct procedures.

The test results showed that seven out of 17 students had solved the problem correctly. So, ten students still experience misconceptions. In other words, the correct percentage of students is 41.17%. The results of observations on students' worksheets show that some students still work with inappropriate processes. In the process of solving the problem, students show incorrect steps. There are misconceptions in the process of solving the problem. It looks like the following picture.

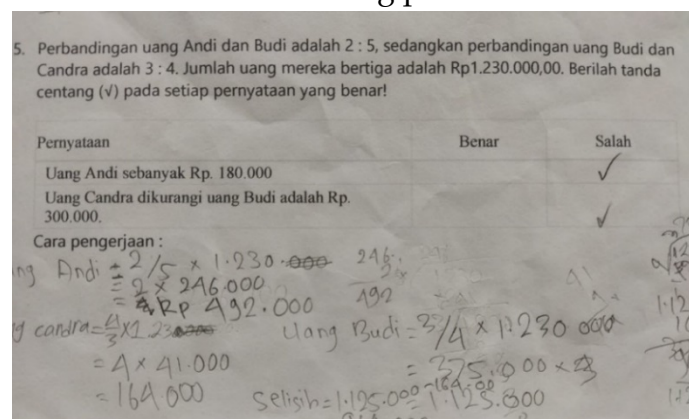


Figure 4. Results of Students' Work on Problem Number 5

PD 12 was interviewed to strengthen the information related to question number 5. The information obtained was that PD 12 experienced confusion in equating the comparison. Students are still confused about comparing Andi, Budi, and Candra's money. In this case, students experience errors in the concept of artistry. (Toha et al., 2018) Research also found cases of errors in the concept of working on mathematical comparison problems.

Based on the analysis and discussion of the numerical competence of the algebraic domain shown in questions 4 and 5, the correct percentage of students is obtained. In question 4, the correct percentage is 64.70%, while in question 5, the correct percentage is 41.17%. So, it can be said that the numeracy competence of the algebraic domain of students is 52.94%.

The next discussion is about the numeracy competency of the data domain and uncertainty. After analyzing the test results, the data obtained showed that in question number 6, the correct percentage was 94.11%. This figure is obtained from 16 students who solved the problem correctly out of 17. So, only one student still has misconceptions.

The results of PD 11's observations can be seen in PD 11's worksheet, which shows that problem number 6 is not done. Learners do not choose the specified options or fill in the information on how to work. This can be seen more clearly in the picture below.

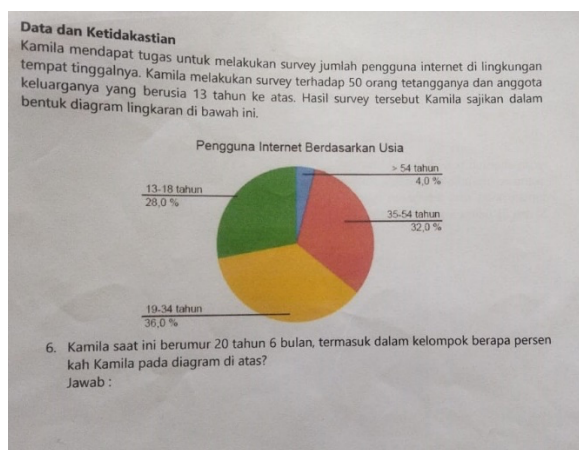


Figure 5. Results of Students' Work on Problem Number 6

The interview with PD 11 was conducted to obtain more detailed information. The results of the interview with PD 11 revealed that PD 11 forgot to work on sola number 6. When asked, PD 11 answered this question correctly. When presented with this question again, PD 11 chose the right answer.

Furthermore, in question number 7, the correct percentage was obtained at 58.82%. This figure is generated from 13 students who can solve the problem correctly out of 17 students in total. So, only four students still experience misconceptions. One interesting thing about the findings of students' misconceptions is that students only choose one correct answer. Even though it is written to choose the correct answer, there is more than one choice; this is also due to students' lack of understanding regarding the question.

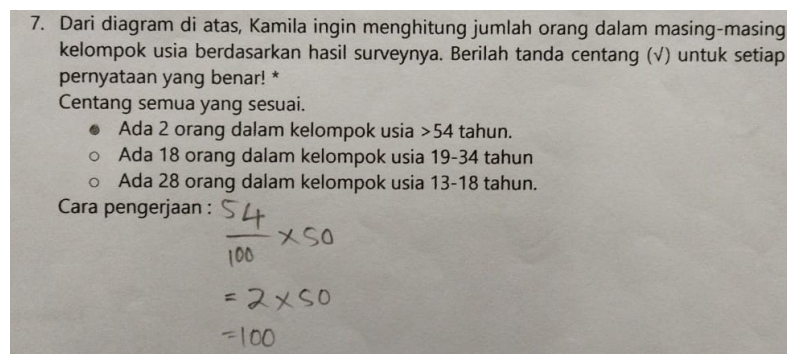


Figure 6. Results of Students' Work on Problem Number 6

The interview results with PD 8 revealed that PD 8 only checked the first choice and did not check the second and third choices. PD 8 considers the first choice correct, so the other choices are wrong. Even though the problem question asked me to choose the correct answer and more than one option, the lack of thoroughness in working on the problem is influential in this problem.

The mistakes experienced by students in questions number 7 and 8 are due to a lack of thoroughness in working on the problem. (Firdaus et al., 2021) states that the need for more care and thoroughness in working on this problem is included in the technical error category. The lack of thoroughness is due to students' lack of literacy skills. According to (Akmalia, 2023) low literacy skills can be one of the causes of low mathematical numeracy skills in students.

Based on the analysis results of questions 6 and 7, the correct percentage for question 6 is 94.11%, and the correct percentage for question 7 is 58.82%. Thus, the correct percentage of students solving numerical problems in the data domain and uncertainty is 76.47%.

CONCLUSION

Fundamental Finding: Based on the discussion and results of the research, this research can draw several conclusions. The conclusion is that the numeracy skills of Genilangit 2 Elementary School students in the number domain are 64.70%. The numeracy competence of students in the geometry domain is 74.47%. Students' algebraic domain numeracy competence is 52.94%. The data and uncertainty domain numeracy problem is 76.47%. The results of this research test show that Genilangit 2 Elementary School's numeracy skills have almost the same score as the 2024 Education Report Card score. Overall, Genilangit 2 primary school students' numeracy skills are in a good category. However, they can still be optimized to get a better numeracy score. In addition to the above conclusions, there are other conclusions, namely that there are misconceptions in solving several problems, namely errors in calculation. The steps of the solution are correct, but there is a misconception about calculating time. Furthermore, some misconceptions make people hesitant to choose how to solve the problem. When it is wrong to determine the steps to solve the problem, the answer will also be wrong. Another misconception is due to a lack of calculating accuracy, as in question 3. The next misconception is that I forgot to work on the problem, as happened in question number

6. Implication: In working on National Assessment problems, they are ideally accompanied by ways to solve the problems. Working steps and scribbles can be written on paper. This can be used as a basis for analyzing the abilities and misconceptions of students. **Limitation:** This research is limited to the numeracy skills of Genilangit 2 Elementary school students and to discussing the misconceptions of working on numeracy problems experienced by Genilangit 2 Elementary school students. **Future Research:** Suggestions that can be given in this study include improving students' numeracy skills. In addition, further research is needed to discover students' misconceptions about Numeracy competence. These misconceptions can be used for reflection and evaluation in further numeracy learning. Further suggestions need concrete actions appropriate for improving students' numeracy skills. This simple research can be used as a reference for the next relevant research

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