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Analysis of the Tenth Grade Students' Numeracy Literacy Ability in Solving Contextual-Based Story Problems

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Abstract

The aim of this study was to describe the tenth grade students' numeracy literacy ability in solving contextual-based story problems at SMK Negeri 4 Klaten in the 2022/2023 academic year. Taking research subjects using purposive sampling technique. The data collection techniques are documentation, tests and interviews. Based on the results of the study, it was obtained: students' numeracy literacy ability in identifying and understanding problems for students in the upper group had very good criteria (100%), students in the middle group had less criteria (50%) and students in the lower group had very poor criteria (0%); students' numeracy literacy ability in understanding and using symbols and numbers for group students with very good criteria (91.7%), middle and lower group students with very good criteria (87.5%); students' numeracy literacy ability in selecting and applying problem solving methods for students in the upper group had very good criteria (87.5%), students in the middle group had good criteria (79.2%), students in the lower group had good criteria (70.8%); as well as the ability of students' numeracy literacy in drawing and explaining the conclusions of the final results obtained from solving problems for students in the top group with very good criteria (91.7%), students in the middle and lower groups with good criteria (66.7%). In solving contextual-based word problems, students made several mistakes due to students' lack of accuracy and thoroughness both in reading the questions, writing answers and the calculation process.

Keywords: Numeracy Literacy Ability; Contextual-Based Story Problems

Introduction

Numeracy literacy is a very important part of literacy because it is able to hone individual abilities to reason about problems that occur in everyday life (Pratiwi et al., 2020). Numeracy literacy ability includes the ability to use mathematical symbols and numbers appropriately to solve problems in everyday life as well as analyze information presented in the form of tables, charts, graphs, and others, which are then interpreted in decision-making (Han et al., 2017). Numerical literacy ability has important role in learning mathematics because they are not only related to the application of formulas but also the need for students' critical thinking processes in solving problems. Numeracy literacy ability must also be possessed by students because they can help them solve mathematical problems related to everyday life (Pulungan, 2022). That way, students with

numeracy and literacy skills have a great chance of success in the future because their application refers to the context of everyday life.

Numerical literacy skills can be developed through story problems (Mahmud, M. R. and Pratiwi, 2019). This agrees with Larasaty et al. (2018), who state that numeracy literacy skills are very closely related to word problems because students are required to have the skills to understand and analyze mathematical problems. Story problems are defined as questions that are presented in the form of stories and relate to everyday life (Utami dan Zulkarnaen, 2019). Of the many math problems in the form of word problems, it turns out that contextual problems are more widely used to hone students' abilities. Contextual mathematical problems are mathematical problems that are directly related to real or abstract objects (Budianto, 2018). So in simple terms, contextual word problems are also referred to as story problems, which contain relevant problems and are directly related to situations that occur in everyday life. Therefore, using contextual problems in learning will make it easier for students to understand problems related to life situations in their environment.

Based on some of these things, the researchers tried to conduct research with the aim of describing how the numeracy literacy ability of tenth grade students in solving context-based story problems conducted at SMK Negeri 4 Klaten. The description of students' numeracy literacy ability is based on the indicators used by researchers.

Method

The type of this research uses descriptive qualitative methods. Descriptive qualitative methods obtain the data results are in the form of written sentences obtained from observations (Margono, 2014). The data results refer to the description of students' numeracy literacy ability in solving problems based on contextual-based story problems based on the indicators of numeracy literacy ability. In this research, the material is a system of linear equations based on indicators of numeracy literacy skills. The indicators are: 1) ability in identifying and understanding of problems, 2) ability in understanding by using symbols and numbers, 3) ability in choosing and applying the method to solve the problem, and 4) ability in concluding the final result of solving the problem. The subject research determine by using the purposive sampling from the tenth grade students of *Akuntansi dan Keuangan Lembaga (AKL)* in SMK N 4 Klaten.

In carrying out the research, students were given questions in the form of a numeracy literacy test which was done by the students. After obtaining the test results, students classified into three groups based on their level of academic ability, namely the upper, middle, and lower groups. Each level of academic ability taken by two students as research subjects that interviewed in depth regarding students who complete the numeracy ability test. Reference for grouping students' academic abilities described on the following table.

Table 1. Reference for Grouping Students

Category	Interval Value
Upper	$80 \leq n \leq 100$
Middle	$65 \leq n < 80$
Lower	$0 \leq n < 65$

Note: n = Value

Source: Depdiknas (in Rofiki, 2013)

The data collection techniques are documentation, tests, interviews, and documentation. The research instruments are test which contained three description questions and interview guide. The data analysis technique is based on the Miles dan Huberman (2007) model, namely data reduction, data display, and drawing conclusions. In the data reduction stage, the researcher collecting and grouping the data on students' numeracy literacy abilities obtained from test results, interviews, and documentation. In the data display stage, the researcher presents the research data in the form of an assessment of the percentage scores of students' numeracy literacy ability in each indicator from the test results. For assessing the percentage of students' numeracy literacy ability scores use the following formula.

$$X\ (\%) = \frac{\text{The score obtained}}{\text{Score maximum}} \times 100\%$$

According to Arikunto (2010) stated that criteria of numeracy literacy ability served below.

Table 2. Criteria of Numeracy Literacy Ability

Score Percentage (%)	Criteria
$80 \leq X \leq 100$	Very Good
$66 \leq X < 80$	Good
$56 \leq X < 66$	Sufficient
$40 \leq X < 56$	Poor
$0 \leq X < 40$	Very Poor

Note: X = Score Percentage of Numeracy Literacy Ability

According to the description above, the researcher concludes that the entire research data obtained from student test results, interviews, and documentation.

Results and Discussion

Based on the results of the numeracy literacy ability test in class X *Akuntansi dan Keuangan Lembaga (AKL)* 2 with a total 36 students, it found that there are 12 students whose academic abilities are from the upper group, 9 students whose academic abilities are from the middle group and 15 students whose abilities are from lower group. After knowing the categories of students' academic abilities based on the test results, the researcher determined the research subjects to conduct interviews about how the subjects complated the test as many as two students for each category. The list of researcher subjects for interviews is shown in the following table.

Table 3. Subject of Interview

Numb.	Interval Value	Category	Value	Subject of Interview
1	$80 \leq n \leq 100$	Upper	100	S13
2			85.7	S32
3	$65 \leq n < 80$	Middle	66.7	S11
4			76.2	S17
5	$0 \leq n < 65$	Lower	54.8	S18
6			54.8	S36

And the results of data analysis of students' numeracy literacy ability for each group based on indicators of numeracy literacy ability is shown in the following table.

Table 4. Indicator of Numeracy Literacy Ability

Indicator of Numeracy Literacy Ability	Academic Group	Research Subject	Score	Score Percentage	Average of Score	Criteria
Identificating and Understanding of Problem	Upper	S13	12 of 12	100%	100%	Very Good
		S32	12 of 12	100%		
	Middle	S11	6 of 12	50%	50%	Poor
		S17	6 of 12	50%		
	Lower	S18	0 of 12	0%	0%	Very Poor
		S36	0 of 12	0%		
Understanding by Using Symbol and Number	Upper	S13	12 of 12	100%	91.7%	Very Good
		S32	10 of 12	83.3%		
	Middle	S11	10 of 12	83.3%	87.5%	Very Good
		S17	11 of 12	91.7%		
	Lower	S18	11 of 12	91.7%	87.5%	Very Good
		S36	10 of 12	83.3%		
Choosing and Applying the Method to Solve the Problem	Upper	S13	12 of 12	100%	87.5%	Very Good
		S32	9 of 12	75%		
	Middle	S11	9 of 12	75%	79.2%	Good
		S17	10 of 12	83.3%		
	Lower	S18	8 of 12	66.7%	70.8%	Good
		S36	9 of 12	75%		
Concluding the Final Result of Solving the Problem	Upper	S13	6 of 6	100%	91.7%	Very Good
		S32	5 of 6	83.3%		
	Middle	S11	3 of 6	50%	66.7%	Good
		S17	5 of 6	83.3%		
	Lower	S18	4 of 6	66.7%	66.7%	Good

From the data analysis, Table 4 shows that there are differences in the numeracy literacy ability of students from each academic group in solving contextual-based story problems. Differences in student abilities can also be explored through in-depth interviews with subjects that show how students think in completing their tests. By conducting interviews, it was found that students' made mistakes when solving test questions. The detail of the students' numeracy literacy ability will be discussed in the following discussion.

1. **Students' Numeracy Literacy Ability in Identifying and Understanding the Problem**

   Based on the results of the test data, it was found that in identifying and understanding the problem, students in the upper group had very good criteria (100%), students in the middle group had poor criteria (50%), and students in the lower group had very poor criteria (0%). This means that both upper and middle group students are able to write down what is known and asked about the questions well, even though there are still mistakes in writing the answers.

   From the results of in-depth interviews with the subjects, it was found that each student from the upper, middle, and lower groups was able to state what was known and asked about the questions completely and correctly without any difficulty in understanding the sentences of the questions given, so that the ability to identify and understand problems is met properly. However, because the average score of students in the middle and lower groups is still not optimal, the ability of students to identify and understand problems is also not optimally fulfilled. This is because students from the middle group tend to focus more on how to work on the questions, while students from the lower group do not yet understand how to transform the information about the questions given into known and asked forms and deliberately ignore writing known and asked questions to shorten the time for doing the questions.

2. **Students' Numeracy Literacy Ability in Understanding by Using Symbol and Number**

   Based on the results of the test data, it was found that the students' ability to understanding by using symbol and number from the upper group students was very good (91.7%), while the middle and lower group students also had very good criteria (87.5%). This means that each student is able to make a mathematical model of the

equation according to the information from the problem, even though there are still mistakes in writing the answer.

Based on the results of in-depth interviews with the subjects, it was found that students from the upper, middle, and lower groups were able to explain the mathematical equation models obtained well. However, because the writing of the answers is still not optimal, the ability of students to understand and use symbols and numbers is also not optimally fulfilled. This is because each student made a mistake in writing the answer. For students from the upper group, they think that the description of the symbols does not need to be written down, and for students from the middle group, they do not understand how the concept of writing examples for symbol descriptions used in the mathematical model of the equation is correct. Students from the lower group made mistakes in writing down their answers due to a lack of accuracy in reading the questions and also in writing down the answers.

3. **Students' Numeracy Literacy Ability in Choosing and Applying the Method to Solve the Problem**

Based on the results of the test data, it was found that the students' ability to choosing and applying the method to solve the problem from the upper group had very good criteria (87.5%), from the middle group had good criteria (79.2%), and from the lower group had good criteria (70.8%). This means that each student is able to write down the problem-solving for each question properly even if there are errors in the answer.

From the results of in-depth interviews with the subject, it was found that both the upper, middle, and lower group students were able to choose and apply problem-solving methods well, even though there were a few errors in writing them, so that the ability to choose and apply problem-solving methods was not optimally fulfilled. This is due to errors made by students. Students from the upper group made a few mistakes due to their lack of accuracy in writing down their answers. Whereas students from the middle and lower groups both made a few mistakes in writing their answers because both of them had not been able to manage the time to work on the questions properly and because of the students' lack of accuracy in writing answers and when doing calculations. This resulted in the process of solving the problem of questions that have not been answered optimally.

4. Students' Numeracy Literacy Ability in Concluding the Final Result of Solving the Problem

Based on the results of the test data, it was found that students' ability to concluding the final result of solving the problem from the upper group had very good criteria (91.7%), while both students from the middle and lower groups had good criteria (66.7%). This means that each student draws a conclusion from the final result of solving the problem well, even though there are a few mistakes, so that the student's ability to draw and explain conclusions from the final result of solving the problem is still not optimally fulfilled.

From the results of in-depth interviews with the subjects, it was found that students from upper, middle, and lower group were able to draw conclusions from the final results of the completion, which were well obtained even though students made mistakes in writing their answers. For mistakes made by students from the upper group due to a lack of ability to manage the time to work on the questions properly. errors made by students in the middle group due to a lack of understanding by students in writing conclusions on solving the correct questions, incomplete answers written by students to answer questions, and a lack of accuracy when doing calculations. Whereas the mistakes made by students from the lower group were caused by the lack of accuracy of students in writing answers and when doing calculations, and the lack of accuracy of students in reading questions, which made the mathematical equation model written by students not in accordance with the information from the questions given.

Conclusion and Suggestion

1. Students' numeracy literacy ability in identifying and understanding problems for students in the upper group had very good criteria (100%), students in the middle group had less criteria (50%) and students in the lower group had very poor criteria (0%)
2. Students' numeracy literacy ability in understanding and using symbols and numbers for group students with very good criteria (91.7%), middle and lower group students with very good criteria (87.5%)
3. Students' numeracy literacy ability in selecting and applying problem solving methods for students in the upper group had very good criteria (87.5%), students in the middle group had good criteria (79.2%), students in the lower group had good criteria (70.8%)

4. Students' numeracy literacy ability in drawing and explaining the conclusions of the final results obtained from solving problems for students in the top group with very good criteria (91.7%), students in the middle and lower groups with good criteria (66.7%).

In solving contextual-based word problems, students made several mistakes due to students' lack of accuracy and thoroughness both in reading the questions, writing answers and the calculation process.

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