

Analysis of Students' Errors in Solving Class III C Mathematics Story Questions at SDNU

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Abstract

This study aims to analyze various forms of errors made by grade III C students at SDNU in an effort to solve mathematics problems in the form of narratives or story problems, this study applies a qualitative descriptive approach involving 27 students as participants. Data were collected through written tests and interviews. to identify the types of errors that appear at each stage of problem solving, namely understanding the problem, planning the solution, implementing the solution, and checking the results. The results of the study revealed that the most common errors occurred at the stages of understanding the problem, planning the solution, implementing the solution, and re-checking. Factors causing errors include a lack of understanding of basic concepts, low reading ability, and the teaching approach used is not optimal. Thus, this study recommends improvements in learning strategies, including regular practice of story problems and the use of varied methods, to help students improve their skills in solving mathematics story problems.

INTRODUCTION

Mathematics subjects have great significance in the structure of the basic education curriculum because they are the main factor in honing logical, analytical, and coherent reasoning skills in students. (Astri, 2023). One type of question commonly used in mathematics learning is in the form of narrative or story questions, which require students to understand the problem situation and change it into a mathematical model in order to find a solution. However, most students experience obstacles in solving this type of question.

Students may make errors at several stages when working on story problems, including from the stage of understanding the problem, converting information into a mathematical model, calculations, to writing the final answer. Previous research shows that the most significant errors occur in the final answer writing phase (35.9%), which is caused by a lack of understanding of the problem instructions and errors in the previous stage.

The second error found was process skills (27.6%), which was caused by a lack of accuracy and haste in calculations. The third error was the transformation problem (20.7%), which was caused by difficulty converting the language of the problem into a mathematical model and limited understanding of the solution method. The last error was related to understanding the problem (15.9%), which was influenced by a lack of understanding of the problem instructions and negligence in recording existing information (Era et al., 2022).

These errors may arise due to various factors originating from within the students themselves, such as minimal mastery of fundamental concepts in mathematics, low ability to read and understand texts, and minimal skills in applying problem-solving strategies (Ari et al., 2024). In addition, external factors such as the use of less than optimal teaching methods and minimal practice of story problems are also the cause of students experiencing obstacles in understanding and solving story-based math problems.

In addition, various studies have been conducted to analyze the errors made by students when working on mathematics problems in narrative form. For example, research by Muhammad et al. (2023) which uses the Fong scheme to identify various types of errors made by students can be in the form of misinterpretation of questions, errors in changing the information obtained, errors when carrying out the solution process, and errors in writing the final results. Other studies show that language skills play a significant role in solving mathematical story problems, where students with low verbal abilities tend to make more errors.

In addition, this study applies Polya's stages in identifying students who often make mistakes when solving story-based math problems. They found that mistakes often occur in the problem understanding and solution planning phases. The results of this study also revealed that mistakes often occur in the process skills implementation stage and in compiling the final answer. (Zeinul & Tuhfatul, 2023).

Students also show various errors in solving mathematical story problems that often occur due to obstacles in understanding the meaning or content of the problem, inaccuracy in determining the correct mathematical operation, and errors in making calculations. Errors made by students when solving story problems are often caused by a weak understanding of the concept and inaccuracy in the calculation process. (Gulvara et al., 2023) .

In an effort to improve students' understanding of mathematics, it is very important to analyze the various types of errors that they often make during the learning process.

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Analyzing these errors not only makes it easier for teachers to identify parts that require further handling, but also provides insight into how students think when solving math problems, especially those in the form of narratives or stories that require an understanding of concepts and integrated problem-solving skills.

Research conducted by Oktavianingsih et al. (2019) used Watson's error categories as a framework for classifying and understanding the types of errors that occur when solving mathematical story problems. The research findings revealed that most errors occurred at the stage of understanding the problem, where students had difficulty interpreting the information provided in the problem, as well as at the stage of performing calculations, which reflected a weak mastery of basic mathematical procedures and concepts. These findings emphasize the importance of a learning approach that emphasizes conceptual understanding, as well as the need for ongoing training in contextual problem-solving skills.

Based on this context, this study aims to examine in depth the various forms of errors made by grade III C students at SDNU in answering mathematical story problems. This study not only focuses on identifying the types of errors, but also explores the causes behind these errors, both in terms of conceptual understanding, application of mathematical operations, and logical reasoning of students. By comprehensively understanding the patterns and roots of the problems in these errors, it is hoped that the results of this study can provide a meaningful contribution to teachers in designing more targeted learning strategies. This strategy involves an approach that is tailored to the needs and character of students, and is focused on developing critical thinking skills and problem-solving skills to achieve the best understanding and resolution of mathematical story problems.

METHOD

This study applies a descriptive qualitative approach with the aim of describing various types of errors made by grade III C SDNU students in solving mathematical story problems. This approach was chosen because it allows researchers to understand students' mindsets and various factors that influence the occurrence of errors in solving the problem in depth.

This study involved all students of class III C at Nahdlatul Ulama Elementary School (SDNU), totaling 27 people. The selection of subjects was carried out using the total sampling method applied by involving the entire population as a research sample,

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considering the relatively small number of students and having fairly uniform characteristics. This approach was chosen to ensure that the data collected reflects the factual and comprehensive conditions regarding the errors that occurred in the class, so that the results of the study can describe the reality of learning comprehensively and accurately.

This study used a written test as the main instrument, which included four mathematical story questions, arranged based on curriculum indicators and adjusted to the cognitive ability level of grade III students. These questions were designed to detect errors in each step of solving mathematical problems, namely identifying problems, preparing a solution plan, implementing solutions, and evaluating the results obtained. In addition, researchers also utilized semi-structured interview guidelines to further explore the reasons behind the errors made by students.

Data collection was conducted using two techniques, namely through written tests and interviews. written tests were given to all students to find out the various types of errors that occurred. Then, an interview session was conducted with a number of students who had been selected based on the various types of errors they made, with the aim of understanding the causes of these errors in more depth.

Data analysis was conducted using an error analysis model based on Polya's steps, namely understanding the problem, planning solutions, implementing solutions, and checking results. Each student's answer was analyzed to determine the type of error at each stage. Data from interviews were analyzed using a thematic approach to identify factors that contributed to the error. The stages of data analysis include the process of summarizing data, organizing data systematically, and drawing conclusions from the data that has been presented.

To ensure the accuracy of the data, the researcher applied data triangulation techniques through various sources and different methods. Source triangulation was carried out by comparing the results of data obtained from written tests and interviews, while technical triangulation was applied through a comparison of various data collection methods. by utilizing various data collection methods, namely tests and interviews. As an additional step, the researcher also conducted member checking by asking for confirmation from the research subjects regarding the interview results to ensure the accuracy of the data obtained (Fakultas Psikologi, 2024).

This research was conducted in accordance with the principles of research ethics. Before starting the research, the researcher requested and obtained permission from the school and approval from the parents of the students. Throughout the research process, the identities of the students were kept confidential, and the information collected was used only for research purposes.

FINDINGS AND DISCUSSION

Based on the evaluation of the written exam and interview, it was revealed that grade III C SDNU students made a number of mistakes when working on math story problems. These mistakes can be grouped according to the stages of completion according to Polya, namely:

1. Problem Understanding

Not a few students have difficulty in capturing or understanding information presented in the form of story problems, especially because they have difficulty identifying the core of the problem, understanding the vocabulary used, and linking the information in the problem to the concepts they have learned. Some common mistakes that occur in students include:

- a. Students have difficulty understanding the language used in the questions so they are unable to find important information related to the problem.
- b. Students often misinterpret the questions contained in the problem.
- c. Students experience difficulties in linking the information obtained with relevant mathematical concepts

2. Completion Planning

At this stage, students often experience difficulties in developing appropriate problem-solving strategies, because they do not fully understand the basic concepts underlying the problem and tend to be confused in determining the strategies that must be used systematically. Some of the identified errors are:

- a. Students make mistakes at the stage of understanding the problem so that students are not aware of the formulas or concepts that need to be used.
- b. In the planning implementation and review stages, students have difficulty in identifying the correct mathematical operations to solve the problem, which results in errors.

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- c. Students show a lack of accuracy and have difficulty in compiling solution steps in a structured manner

3. Implementation of the Solution

At this stage, even though students have planned the steps to solve the problem, they still make mistakes when implementing them, including:

- a. Error while doing the calculation.
- b. Incorrect use of mathematical operations.
- c. Not being careful when copying numbers or symbols yourself

4. Re-examination

This stage indicates that students rarely re-verify the results they obtain. This causes previous errors to go undetected and uncorrected. The causes include:

- a. Students have not yet compared their answers with the information contained in the questions.
- b. Students do not review the steps they have taken

The results of this study are in line with previous studies showing that students often make mistakes at various stages when solving mathematical story problems. For example, Selviani's (2024) study revealed that mistakes often occur at the stage of understanding the problem, designing a solution strategy, implementing the strategy, and checking the results again. Meanwhile, Gulvana (2023) used the Fong scheme to identify various student errors, including errors in interpreting the problem, errors in changing the form or information, errors during the solution process, and errors in writing the final results.



Picture 1.
Interview Activity with Learners



Picture 2.
Activity Evaluating Learners

Factors Causing Errors

Mistakes made by students in solving math story problems can be influenced by factors from within themselves or by conditions or encouragement from their surrounding environment. From an internal perspective, lack of understanding of mathematical concepts, low ability to read and understand texts, and lack of skills in applying problem-solving strategies are the main causes. Meanwhile, external factors such as the use of inappropriate teaching methods and minimal practice of story problems also influence obstacles in understanding and working on math problems that are packaged in the form of stories or narratives. (Nita et al, 2020).

Effective Learning Strategies

To overcome existing problems, teachers need to plan more effective learning strategies, such as:

1. Improving Reading and Text Understanding Skills: With structured reading activities and group discussions, students can get used to understanding the information contained in story problems.
2. Provide Regular Practice with Story Problems: With sufficient practice, students will become accustomed to facing various types of story problems and will be able to recognize efficient solution patterns.
3. Using a Variety of Learning Methods: Such as problem-based approaches or contextual approaches, to stimulate student activity during the learning process.
4. Carrying out Assessments and Feedback Regularly: So that students can be aware of the mistakes they have made and are able to correct them at a later time.
5. With these steps, it is hoped that students' ability to solve mathematical story problems will improve, so that the objectives of learning mathematics at the basic level can be achieved well

CONCLUSION

From the results of the study on the analysis of errors of class III C students at SDNU in working on mathematical story problems, it can be seen that students experience various difficulties that affect their ability to understand and solve mathematical problems. Errors that occur at each stage of completion, from understanding the problem to re-checking, indicate an urgent need to improve the teaching methods and learning strategies applied.

Internal aspects, such as limitations in understanding basic concepts and low reading skills, as well as external factors, such as suboptimal teaching methods, are also major factors in the occurrence of errors made by students. Therefore, teachers must design systematic mathematics learning methods and encourage active involvement of students in the learning process, including increasing story problem exercises and using varied learning methods.

By implementing appropriate corrective measures, it is expected that students will be able to improve their skills when working on story-based problems in mathematics, so that learning objectives at the elementary school level can be achieved optimally. In addition, this study recommends further studies to explore other factors that can influence student errors and explore various more effective learning approaches in the context of mathematics teaching.

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