



# Profile of Elementary School Students' Errors in Solving Mathematics Story Problems: Literature Review

Dewi Rahmawati Noer Jannah<sup>1\*</sup>, Gunarhadi Gunarhadi<sup>1</sup> and Riyadi Riyadi<sup>1</sup>

<sup>1</sup> University of Sebelas Maret, Indonesia

\*dewirahmawatinj@student.uns.ac.id, gunarhadi1202@yahoo.com, riyadifkipuns@gmail.com

**Abstract.** This study describes elementary school students' errors in solving mathematics story problems and the factors that cause elementary school students to experience these errors. This study design is a literature review with a qualitative approach. The data were obtained from the analysis of secondary data sources in the form of national journals published in the last five years obtained from Google Scholar in the Publish or Perish (PoP) application appropriate to the focus of the study. Data collection techniques used documentation and literature studies. Data validity is tested by increasing persistence in the study. The articles that have been analyzed are then summarized into a complete discussion according to the focus. The results showed that some elementary school students' errors in solving mathematics story problems include: 1) understanding the problem; 2) converting information into mathematical statements; 3) linking to other concepts; 4) calculating; and 5) writing answer conclusions. Some factors that cause elementary school students to experience errors in solving mathematics story problems are 1) lack of learning the concept of story problems; 2) haste in answering; 3) lack of accuracy; 4) lack of student logic; and 5) forgetting the material.

**Keywords:** Errors, Mathematics, Story Problems, Elementary Students.

## 1 Introduction

Solving story problems tends to be more difficult than problems that only contain numbers because it requires several things, including 1) high thinking to understand the content of story problems related to mathematical objects that should be resolved; 2) creativity to change words into mathematical models; 3) the ability to choose the right calculation operation to solve the problem; and 4) the ability to conclude [1]. [2] also agreed that story problems require students to understand and adequately apply basic algebraic concepts, principles, rules, and techniques that have been previously learned. One of the important things in solving mathematics story problems is identifying the information needed to solve the problem. Misunderstanding the information in story problems can lead to errors in solving and calculating operations [3].

Many elementary school students often need help converting story problems into mathematical sentences, therefore they are not by the problem-solving taught by the

teacher [4]; [5]; [6]. Student's difficulties in solving math story problems cause students to easily make mistakes in solving math story problems. This can be seen in a study conducted by [7] which showed that elementary school students' errors in solving mathematics story problems lie in errors in understanding concepts and converting story problems into mathematical models, causing students to also be wrong in the calculation process. Then, a study by [8] also showed that elementary school students' errors in solving mathematics story problems, including 1) concept errors occur because students misunderstand the concept of fractions worth; 2) principle errors occur due to student errors in using the concept of fraction multiplication in fraction division; and 3) carelessness errors occur due to student errors in calculating both addition, multiplication, and division.

Based on the explanation that has been conveyed, it is necessary to analyze errors to determine the factors that cause student errors so that teachers can minimize or even overcome students' conceptual errors in solving mathematics problems [9]. Error identification is also useful for improving to have maximum learning outcomes and achievements [10]. Therefore, this study aims to describe elementary school students' errors in solving mathematics story problems and the factors that cause elementary school students to experience these errors. The novelty in this study includes a) using a literature review approach; b) examining journals in the scope of elementary school; and c) discussing not only the form of student errors in solving mathematics story problems but also the factors that cause these errors.

## **2 Research Methods**

This study uses the literature review method. A literature review is an activity of studying and critically analyzing the contents of manuscripts related to topics of interest [11]. Data collection in was obtained from a review of national journal articles according to the study focus: elementary school students' errors in solving mathematics story problems and the factors that cause elementary school students to make these mistakes. Based on a search using Google Scholar in the Publish or Perish (PoP) application, 14 relevant national journal articles published in the last five years (2019-2023) were found. Data validity was tested by increasing persistence in study through checking findings. The articles that have been analyzed are then summarized into a complete discussion according to the focus.

## **3 Result And Discussion**

Here are the analysis results of all journals about elementary school students' errors in solving mathematics story problems and the factors that cause elementary school students to experience these errors.

**Table 1. Analysis Results of All Journals**

No	Name	Title	Result
1	Ramadhini & Kowiyah (2022)	Analysis of Student Errors in Solving Mathematics Story Problems on Speed Material Using Kastolan Theory	The results showed that elementary school students' errors in solving mathematics story problems based on Kastolan's theory, including: a) conceptual errors, such as students are incomplete in writing known and asked and not choosing the right formula; b) procedural errors, such as not continuing the stages of working on the problem; and c) technical errors, such as not being careful in calculating and just writing answers. The factors that cause students to make these mistakes are a lack of learning of the concept of story problems, rush in answering questions, lack of accuracy, and lack of student logic.
2	Fitry, Khamdun & Ulya (2022)	Analysis of Student Errors in Solving Mathematics Story Problems in Class V at Ronggo 03 Elementary School Jaken District	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including a) reading errors 3 times; b) errors in understanding the problem 7 times; c) errors in transforming problems to mathematical formulas 5 times; d) errors in the calculation process 9 times; and e) errors in writing answers 2 times. These findings show that students make the most mistakes in understanding the problem, errors in transforming problems into mathematical formulas, and errors in the calculation process. The factors that cause students to make these mistakes are difficulties in understanding the problems, not understanding the concepts and operations of fractions, and needing to be more careful in solving math story problems.
3	Labibah, Damayani & Sary (2021)	Analysis of Student Errors Based on Newman's	The results showed elementary school students' errors in solving mathemat-

		Theory in Solving Story Problems on Fraction Material in Grade V Madrasah Ibtidaiyah	ics story problems based on Newman's procedure, including: reading errors, understanding errors, problem transformation errors, process skills errors, and final answer writing errors. The factors that cause students to make these mistakes are students' low ability to read mathematical symbols, students inaccuracy, cannot to use logarithms correctly, not mastering the concept of fractions, not understanding in determining the systematic solution of the problem, and not being accustomed to writing the final answer.
4	Chonesty, Syahrilfuddin & Putra (2021)	Analysis of Student Errors in Solving Mathematical Story Problems on Fraction Materials for Students in Elementary School	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: a) errors in understanding the problem with a percentage of 40.5%; b) errors in problem transformation with a percentage of 14.5%; c) errors in process ability with a percentage of 36%; d) errors in writing the final answer with a percentage of 62%. These findings show that students make the most mistakes in understanding the problem, process ability errors, and final answer writing errors. The factors that cause students to make these mistakes are not understanding the concept of the problem, being unable to convert story problems into mathematical models, not being able to use formulas correctly, not being able to perform arithmetic operations according to procedures, and not double-checking the answer sheet.
5	Yunita, Rini & Amaliya (2022)	Analysis of Student Errors in Working on Mathematics Problems in Class V Karang	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: errors in understanding the problem, errors in reading the problem, process

		Tengah 11 Elementary School	transformation errors, process skills errors, and errors in writing answers. The findings show that the error in writing the answer conclusion is the biggest error made by students. The factors that cause students to make these mistakes are confusion in understanding the problem in solving it, lack of thoroughness in working on the problem, not understanding the calculations used, laziness to write formulas and determine or write conclusions, and rush in working on problems.
6	Arrumaisya, Nurasiah & Uswatun (2021)	Error Analysis in Working on Mathematics Story Problems on Fraction Materials Based on Online Class IVElementary School	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: a) reading errors 20 times; b) errors in understanding the problem 71 times; c) errors in the calculation process 37 times; d) transformation errors 69 times and e) errors in the final answer 77 times. Based on the findings, students make the most mistakes in understanding the problem, problem transformation errors, and writing the final answer. The factors that cause students to make these mistakes are difficulty understanding the problem, not understanding the concepts and operations of fractions, and not being careful and hasty.
7	Nurila, Hastuti & Mariyati (2023)	Analysis of Student Errors in Solving Mathematical Story Problems on Mixed Fractions Class III 14 Mata-ran Elementary School in the 2022/2023 School Year	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: a) reading errors 4 times; b) errors in understanding the problem 29 times; c) errors in transformation 21 times; d) errors in calculation process skills 39 times and e) errors in writing the final answer 4 times. Based on these findings, students make the most mistakes

			in understanding the problem, problem transformation, and calculation process errors. The factors that cause students to make these mistakes are difficulty understanding the problem, not understanding the concepts and operations of fractions, forgetting and not being careful.
8	Hapsari, Ngatman & Wahyudi (2023)	Analysis of Student Errors in Solving Mathematical Story Problems About Angle Measurement in Class 4 of Kanding State Elementary School in the 2021/2022 Academic Year	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: a) errors in reading the problem by 43.9%; b) errors in understanding the problem by 8.7%; c) problem transformation errors by 16.5%; d) process skills errors by 2.6% and e) writing the final answer by 0%. These findings show that students make the most mistakes in reading problems, understanding problems, problem transformation errors, and process skills errors. The factors that cause students to make these mistakes, namely not understanding the sentence of the story problem, not understanding the material of angle measurement, not knowing how to write the known and questioned things and feeling short of time if they write what is known and asked in the problem, lack of accuracy in calculating, and students are in a hurry when doing calculations.
9	Pratiwi, Tiurlina & Fatihaturasyidah (2023)	Analysis of Students' Errors in Solving Story Problems of Building Space Class V Slipi 15 Pagi Elementary School	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: a) errors in reading the problem as much as 22.2%; b) errors in understanding the problem as much as 55.5%; c) problem transformation errors as much as 50%; d) process skills errors as much as 100%, and e) errors in writing the final answer as much as 100%. The

			findings show that many students experience errors in understanding the problem, problem transformation, process skills, and final answer writing errors. The factors that cause these errors are students' factors, mastery of concepts and ability to read and write.
10	Hasibuan & Napitupulu (2023)	Analysis of Errors in Solving Story Problems on Flat Buildings Material in Grade 4 of State Elementary School No. 101933	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: errors at the stage of understanding the problem, problem transformation errors, process ability errors, and final answer writing errors. The causes of students making these mistakes are confusion and feeling no need to determine what is known and what is asked, rushing to do the problem, unable to make a mathematical model of the problem they are working on, unable to determine what formula to use in solving the problem, and not enough time to do the problem.
11	Hartana, Yenni & Hartantri (2023)	Analysis of Errors in Solving Mathematics Story Problems Through Newman Procedures in Elementary School Students	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: errors in reading, errors in understanding the problem, errors in transformation, errors in the calculation process and errors in writing answers. The factors that cause student errors in solving mathematics story problems are a lack of understanding of the problem, a lack of understanding of the concepts and operations of calculating fractions, needing to be more careful and in a hurry.
12	Mustofa, Anif & Muhibbin (2022)	Analysis of Errors in Solving Mathematics Story Problems in Elementary School Students	The results showed that elementary school students' errors in solving mathematics story problems based on Newman's procedure, including: errors in reading, errors in understand-

			ing the problem, errors in the calculation process, and errors in writing the answer conclusion. The factors that cause students to make mistakes, namely difficulty understanding the problem in the problem, not understanding the concepts and operations of fractions and forgetting or not being careful, and haste.
13	Rismadani, Artharina & Cahyadi (2021)	Students' Difficulties in Solving Mathematics Story Problems on Fraction Material Class V 03 Semarang Jomblang Based on Polya's Problem-Solving Stages	The results showed that elementary school students' errors in solving mathematics story problems based on Polya's procedures, including: a) errors in understanding the problem, such as understanding the meaning of the story problem; b) the rechecking stage; c) the strategy planning stage and d) the strategy implementation, such as performing calculation operations that will be used in math story problems. The factors that cause students to experience these errors, namely students do not recheck their answers due to lack of time, lack of accuracy and confusion in solving problems.
14	Pramada Hajerina (2020)	Analysis of Student Errors in Working on Fraction Addition and Subtraction Problems Based on Watson Criteria	The results showed that elementary school students' errors in solving mathematics story problems based on Watson's procedure, including: a) errors in using data; b) errors in procedures, such as incorrect use of formulas, number operations, and operation signs; c) there is missing data; d) do not have a conclusion; e) do not use concepts or answer directly without a logical way, f) perform illogical manipulations, g) have used the right concept but are less skilled in manipulating formulas. The factors that cause students to make these mistakes are negligence, the subject is not careful in paying attention to the data, are less able to understand the purpose of the



			problem being sought, and the subject is not careful in the process of working on it, which according to the subject is too short causing the subject to rush.
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The analysis results of 14 journals in the table above show that journal number 1 discusses about errors that often occur in elementary school students in solving mathematics story problems based on the Kastolan stages are the following: 1) conceptual errors, such as incomplete writing known and questioned and not choosing the right formula; 2) procedural errors, such as not continuing the steps of working on the problem; and 3) technical errors, such as not being careful in calculating and just writing answers. Journals number 2 to 12 discuss about errors that often occur in elementary school students in solving mathematics story problems based on Newman's stages are the following: 1) errors in understanding the problem, such as not being able to determine what is known and asked in the problem; 2) transformation errors, such as not correctly converting story problems into mathematical models and incorrectly using formulas; 3) process skill errors, such as incorrectly performing arithmetic operations according to the correct procedure when solving the problem; and 4) final answer writing errors, such as not making an answer conclusion or not being precise in writing the final answer. Furthermore, journal number 13 discusses about errors that often occur in elementary school students in solving mathematics story problems based on Polya's stages are the following: 1) errors in understanding the problem, such as being able to understand what is known and asked in the given story problem; 2) errors in developing a solution plan, such as choosing a formula based on the relationship of the data; 3) errors in implementing the plan, such as performing calculation operations; and 4) re-checking errors, such as concluding the final answer. Finally, journal number 14 discusses about errors that often occur in elementary school students in solving mathematics story problems based on Watson criteria are the following: 1) improper procedures, such as incorrect use of formulas, number operations, and operation signs; and 2) response level conflicts, such as working on problems that do not use concepts or answering directly without logical way.

Based on the results of the analysis of all journals, it was found that elementary school students experienced many errors in solving mathematical story problems, including: 1) errors in understanding the problem; 2) errors in converting information into mathematical models; 3) errors in choosing formulas based on data relevance; 4) calculation errors; and 5) errors in writing answer conclusions. Therefore, to work on story problems well, students must be able to capture what is at issue in the problem clearly [24]. In addition, students should also have procedural fluency, which includes the ability to apply mathematical procedures efficiently, precisely and accurately [25].

The results of the analysis of journals 1 to 14 found that the causes of elementary school students' errors in solving math story problems, including: 1) students lack a lot of practice in learning the concept of story problems; 2) lack of time, so they were in a hurry to answer; 3) lack of accuracy, such as not double-checking the answer sheet; 4) lack of student logic; and 5) forgetting the material. Based on the explanation described, [26] also revealed that students make these mistakes generally because students are not

used to contextual problems, tend to memorize formulas without understanding the meaning of these formulas and concepts, and are accustomed to answering questions briefly. Students also need more interest, so they are lazy to think about solving story problems [27].

In order to overcome problems related to elementary school students' errors in solving mathematics story problems, a modern and innovative approach is needed to developing mathematical thinking, such as problem-solving skills [28][28]. Improving the teaching and learning process of mathematics in the classroom can use visual representations, such as pictures, curves, and using computers for mathematical visualization [29]

## 4 Conclusion

Based on the literature review, it can be concluded that some elementary school students' errors in solving mathematics story problems include 1) errors in understanding the problem; 2) errors in converting information into a mathematical model; 3) errors in choosing formulas based on data relevance; 4) errors in calculating; and 5) errors in writing answer conclusions. Some factors that cause elementary school students to experience errors in solving mathematics story problems are 1) lack of learning the concept of story problems; 2) haste in answering; 3) lack of accuracy; 4) lack of student logic; and 5) forgetting the material.

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