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# ANALYSIS OF UNDERSTANDING MATHEMATICS CONCEPTS ON NUMERATION ABILITY OF PRIMARY STUDENTS

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Article Information	ABSTRACT
Article History:	Numeracy abilities and understanding mathematical concepts are
Accepted: 05-07-2023 Revised: 19-04-2024 Published: 31-05-2024	mathematical concepts. Oleh karenaTherefore, the aim of these findings is to examine the relationship between understanding mathematical concepts and the numeracy abilities of elementary school students. Numerical skills have an important role in helping students understand mathematical concepts and
Key words:	apply them in real life situations, while a good understanding of mathematical concepts can help improve students' numeracy skills. For this
Numeracy abilities Mathematics Concept understanding	topic, literature was selected through a screening process based on journal criteria published within the last five years. Data collection in this research involves analyzing data obtained from journals relevant to the research topic. Thus, the results of this research show that numeracy skills and understanding mathematical concepts influence each other and are important to develop further together.
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#### 1. INTRODUCTION

Mathematics is a method for finding solutions or desired results to questions, whether in how to use information, apply knowledge of numeracy and mathematical skills to face mathematical problems in the real world. In 2000, *the National Council of Mathematics Teachers* (NCTM) stated in its book "Principles and Standards of School Mathematics" that students are expected to have five mathematical abilities which include (1) mathematical communication skills, namely being able to communicate effectively in a mathematical context; (2) the ability to think mathematically logically, namely being able to use logic in understanding and analyzing mathematical problems; (3) kemampuan solving mathematical problems involves skills in solving mathematical problems by applying appropriate strategies; (4) the ability to connect mathematical concepts, namely being able to understand the relationship between different mathematical concepts; and (5) the ability to represent mathematical ideas, namely being able to describe mathematical concepts using symbols, tables, diagrams, or other tools.

In addition, -the Ministry of National Education (2008), mathematics education in schools aims to facilitate students' understanding of mathematical concepts and be able to describe the relationships between these concepts, carry out mathematical manipulations when presenting mathematical ideas, apply mathematical concepts in problem solving, communicate Mathematical ideas involve the use of symbols, tables, diagrams, or other visual tools to describe situations or problems, as well as building attitudes that appreciate the relevance and benefits of mathematics in everyday life. (Siahaan, 2017).

According to the view expressed by the Ministry of National Education (2003:2), Understanding mathematical concepts is an important aspect of learning mathematics. When studying mathematics, skills or abilities in mathematics are expected to be demonstrated as a strong understanding of mathematical concepts and algorithms that describe the relationship between one concept and another with flexibility, precision and effective application in problem solving. In line with (Sumarmo, 1987:24), there are two types of conceptual understanding that are in line with this view, namely instrumental understanding and rational understanding. Instrumental understanding refers to an individual's understanding of concepts which is limited to remembering formulas to perform simple calculations. Meanwhile, rational understanding involves using diagrams or structures to solve complex problems. An idea, fact, or mathematical process is considered to be thoroughly understood when it can be related to a variety of interconnected relationships.

these mathematical elements are arranged in stages and orderly. Mathematical structures progress from simpler concepts to more complex concepts in an orderly sequence. NCTM (1989) issued a number of detailed guidelines for understanding mathematics, including: 1) Understanding concepts in oral and written form; 2) Ability to identify and create examples and non-examples; 3) Application of visualizations, diagrams and notations as representations of concepts; 4) integration of changes from one presentation to another; 5) understanding the meaning and interpretation of different concepts; 6) identify the characteristics of the concept and the conditions that define it; 7) comparison and contrast of concepts. When students can meet these indicators, they are considered to have the ability to understand mathematical concepts. These indicators are then translated into various questions that students can answer to measure their own abilities as a form of self-evaluation.

Elementary school students' numeracy abilities refer to students' ability to apply mathematics in various contexts and situations. Problems with elementary school students' numeracy abilities can be a significant problem when learning mathematics. There are factors that can influence elementary school students' numeracy skills, including students' lack of interest in mathematics, low teacher motivation, and the use of unsuitable learning methods. Generally, teachers often use routine questions that have definite answers and can be solved directly using methods and procedures (Kartikasari, Kusmayadi, & Usodo, 2016).

Teachers who are less trained in dealing with mathematical challenges or inexperienced in solving mathematical problems, the inability of teachers to provide and train students with various arithmetic problems that allow them to practice, as well as students' lack of experience in solving various types of arithmetic problems, can be factors that contribute to low student numeracy abilities. This is in line with (Hartatik, 2019) numeracy can be interpreted as students' ability to interpret data related to numbers or mathematics, formulate problems, analyze these problems, and find appropriate solutions. So therefore, In solving every problem faced, students need to have the ability to think critically and logically. This is necessary in the context of mathematics learning, because mathematics does not only involve the use of formulas, but also requires the individual's ability to analyze, connect ideas, and find the right answer.

skills are important because they help individuals develop rational thinking and reasoning skills in daily activities. Numerical skills also help individuals understand and interpret data, tables, figures, calculations, and other quantitative information. Apart from that, computing power is also needed in various areas of life such as finance, science, technology and business. According to Cockroft (1992), numeracy is the word for literacy. Number ability basically involves two aspects, namely the ability to understand and use numbers and the ability to solve problems related to numbers. Numeracy skills play a very important role in helping individuals in solving problems and making the right decisions in everyday situations.

Currently, there are concerns that Indonesian elementary school students have low numeracy skills, which are an integral part of the numeracy process. Therefore, it cannot be denied that numeracy skills involve students' ability to analyze, give reasons and solve problems involving numbers and mathematical operations which are crucial elements in numeracy skills. This is in line with Hasibuan's (2018:19) view, mathematics is a scientific discipline that has a definite and abstract nature. Mathematics provides various benefits for human life, and does not only require students to understand and follow mathematical rules so that they can make a profitable contribution to their lives.

students need to develop a deeper understanding of mathematical skills, because these skills have relevant applications in solving various number problems in the context of everyday life. Thus, the ability to count becomes one aspect of numeracy skills. Number skills also include abilities solve situations or problems using various numbers and basic mathematical notation. In line with Polya (1973) as quoted by Wahyudi and Anugraheni (2017:15), problem solving refers to a person's efforts to find a solution in a situation that requires achieving a goal that cannot be achieved immediately. Thus, there are several actions that can be taken to improve students' mathematical abilities at the elementary school level. Actions that can be taken are to include mathematics learning in an integrated manner with context of everyday life, so Students can relate mathematical concepts to real situations they experience. In addition, the use of an engaging and interactive learning environment can help increase students' interest and mathematical skills.

In line with Han (2017: 3), numeracy involves the ability and expertise in (a) using numbers and mathematical symbols to solve problems in everyday life, and (b) analyzing the data provided to make decisions. Meanwhile, according to Traffer (in Sari, 2015: 715), another perspective on numeracy is the ability to manage numbers and data in relation to problems and reality and evaluate statements that involve states of mind and estimates. Thus, numeracy is a skill for understanding and applying mathematical concepts.

Numeracy skills and mathematical abilities are very closely related. Numerical skills are the skills to apply and understand numbers and mathematical operations in everyday life situations. Mathematical ability involves conceptual knowledge of mathematics and proficiency in solving mathematical problems. Strong numeracy skills can contribute to improved ability to solve mathematical problems. According to Purwashi and colleagues (2018), numeracy refers to individual skills when applying, interpreting, and formulating mathematical concepts in a variety of contexts, including skills, mathematical thinking, and the ability to describe and explain using relevant concepts, procedures, and information. Apart from that, numeracy skills also enable individuals to estimate events that can be used to solve problems in everyday life. Therefore, having strong numeracy skills is very important in understanding and mastering mathematical concepts, as well as in develop students' skills when overcoming mathematical challenges.

Based on several previous studies that have been implemented, several studies have reviewed elementary school students' understanding of mathematical concepts (Unaenah, et al., 2019; Komarudin, et al., 2020; Aledya, V. (2019); Yuliyanti, N, 2019; Anderha , 2021; Baharuddin, 2017; Maghfiroh et al., 2017), and several studies that focus on mathematical conceptual knowledge (Ekowati, 2019; Hidayat & Alamsyah, 2020; Sari, et al., 2021; Rahmawati, 2021). However, until now there has been no study that describes or explains in detail the analysis of understanding mathematical concepts on the numeracy abilities of elementary school students. The aim of analyzing students' numeracy abilities is to understand the extent to which students understand basic mathematical concepts and their ability to apply them in real situations. The results of calculation analysis can be used to evaluate the effectiveness of the mathematics learning methods used and provide feedback to students on how to improve their numeracy skills.

Elementary school students' mathematical calculation abilities can be improved through various appropriate learning methods, such as real-world mathematics learning. Additionally, it is important to pay attention to students' cognitive levels when identifying effective learning strategies. This is in line with the view (Refiesta, 2021) that every person with high numeracy will have high learning achievement, and vice versa. Numerical competency refers to a student's ability to decipher information related to numbers or mathematics and formulate appropriate solutions. Therefore, learning mathematics requires computational skills, such as representing mathematical problems , using mathematical notation, and choosing an appropriate approach to solving the mathematical problem .

# 2. RESEARCH METHODS

This research adopts a literature study approach. This approach is used to search, collect and process relevant information sources. According to (Zed, 2008:3) states that the library research method is a library research method involving collecting literary sources, reading and taking notes, and managing research materials. In this research, data findings were obtained via the Google Scholar website based on the topic of analyzing understanding of mathematical concepts and numeracy abilities of elementary school students. Based on this topic, literature is processed through a filtering stage based on journal criteria published in the last 5 years. After reviewing this research, observations were made of several relevant journals to gain an understanding of students' abilities in gaining understanding of mathematical and numeracy concepts. The data collection technique used in this research is analyzing information obtained using journals that are relevant to the research topic. At this stage important data is grouped and then studied in depth according to the data and facts and then conclusions are drawn. Thus, 12 national research journals were collected which discussed understanding mathematical concepts on elementary school students' numeracy abilities.

No.	Researcher and Year	Research Title	Method	Results
1.	Een Unaenah, Muhammad	"Analysis of Class V	Descriptive	The level of
	Syarif Sumantri (2019)	Elementary School	qualitative	mathematical
		Students' Understanding		conceptual
		of Mathematical Concepts		understanding of class
		on Fraction Material"		V students is still
				relatively low.

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2.	Inna Rohmatun Kholidah , A A. Sujadi (2018)	"Analysis of Class V Students' Understanding of Mathematical Concepts in Solving Questions at Gunturan Pandak Bantul Elementary School in the 2016/2017 Academic Year"	Quantitativ e	understanding of mathematical concepts is known that 50.91% low category.
3.	Nor Aulia Mukrimatin, Murtono Murtono, and Savitri Wanabuliandari (2018)	"Understanding of Mathematical Concepts for Class V Students of Rau Kedung Jepara State Elementary School on Fraction Multiplication Material"	Quantitativ e	Students' understanding of concepts is still low
4.	Yunni Arnidha (2018)	"Analysis of elementary school students' understanding of mathematical concepts in solving flat figures"	Qualitative	Some students already have an understanding of the concept of modifying representations into different formats and recognize the characteristics associated with a mathematical concept.
5.	Anggi Nur A'ini Inayah, Gizka Paundria Nagari, Kevin Setiawan, Nur Anisah (2022)	"Improving Literacy- Numeracy Skills to Develop Conceptual Understanding in Students' Mathematics Learning"	Literature review	From the research findings, it is clear that understanding mathematical concepts plays a significant role in literacy and numeracy skills.
6.	Maulidina, Ana Puspita and Hartatik Sri (2019)	"Profile of Numeracy Ability of Primary School Students with High Skills in Solving Mathematical Problems"	Qualitative	Students who demonstrate high skills in this subject are able to effectively use numbers and basic mathematical symbols to overcome challenges in a variety of everyday life situations. They can also process data presented in various forms such as graphs, tables, diagrams and charts, and are able to interpret the results of the analysis to make accurate predictions and make the right decisions

7.	Ahmad Pernando Alfariji, Ria Sudiana M.Si., Etika Khaerunnisa M.Pd. (2022)	"The influence of the Knisley Learning Model on Mathematical Problem Solving Abilities based on Numeracy Literacy in Middle School Students."	Combinatio n	In terms of numeracy literacy, students in the experimental group showed more substantial improvements in mathematical problem solving skills compared to students in the control group.
0.	Sugama Maskar (2021)	Numeracy Ability in Solving Mathematical Problems on the Learning Achievement of Mathematics Education Students"	e	students' learning achievements will be in line with their level of numeracy ability. If students have high numeracy abilities, their learning achievements also tend to be high, and vice versa.
9.	Alfi Nurlaili Rahmawati (2021)	"Analysis of Numeracy Literacy Ability in Grade 5 Elementary School Students"	Qualitative descriptive	The results of research on 12 students indicated that out of a total of 12 students, there were 7 students with a low level of numeracy literacy ability, while the remaining 5 students had a moderate level of numeracy ability.
10.	Fadhilah Lailatul Maghfiroh, Siti Maghfirotun Amin, Muslimin Ibrahim, Sri Hartatik (2021)	"Effectiveness of the Indonesian Realistic Mathematics Education Approach on Students' Numeracy Literacy Abilities in Elementary Schools"	pre- experiment al designs	The PMRI approach has proven successful in its implementation, as seen from the average increase (N- gain) in students' numeracy literacy skills in the topic of integer counting operations of 0.594155. This figure is included in the medium category, which is in the range of 0.30 to 0.70.
11.	Ndacularak, IL, Randjawali, E., Nggaba, ME, Bima, SA, Ina, YT, Ishak, DD, & Rinawati, Y. (2023)	"Profile of Numeracy Ability of High Grade Elementary School Students in Malumbi, East Sumba Regency"	Quantitativ e	Research on elementary school students' numeracy skills, obtained through numeracy testing, students showed low performance in this category with an average score of 18.43.

12.	Triwahyu Riyatuljannah,	"Analysis of Students'	Qualitative I	Elementary age
	Suyadi Suyadi (2020)	Cognitive Development in	5	students who have
		Understanding	ş	good mastery of
		Mathematical Concepts	i	indicators of
		for Class V SDN	ι	understanding
		Maguwoharjo 1	1	mathematical concepts
		Yogyakarta"	S	show a better increase
			i	in cognitive abilities
			t	than other students.
			r	This happens because
			i	indicators of
			1	understanding
			1	mathematical concepts
			1	reflect the level of
			i	individual student
			(	cognitive development.

According to findings from research conducted by (Een, 2019), understanding of mathematical concepts still shows low numbers . Understanding mathematical concepts has a significant impact on a person's numeracy skills. Students can use conceptual understanding to solve mathematical problems. Conceptual understanding is also very important so that students understand what they are learning and it will be easier to carry out learning activities on higher-level material later. Numerical ability includes an individual's ability to understand, use and apply numbers in various everyday situations.

According to research conducted, a good understanding of mathematical concepts is needed to support students' numeracy skills. Numeracy ability itself requires mathematical skills to solve problems. Other research conducted also shows that the ability to understand mathematical concepts has a significant influence on numeracy skills. In fact, the main goal of learning mathematics is to achieve mastery of mathematics as a method for developing life skills, not just as a scientific discipline (Masyhud, 2016). In this context, having a strong understanding of mathematical concepts plays an important role in improving one's numeracy skills.

Understanding mathematical concepts plays a very important role in developing one's mathematical skills. Numeracy skills refer to students' ability to analyze information related to numbers in mathematics, then apply number concepts and arithmetic operation skills (Pagesti, 2018). The ability to calculate has an important role for students because it is closely related to the ability to solve mathematical problems in the context of everyday life. Therefore, have good numeracy skills will increase students' understanding of mathematical concepts. Apart from that, understanding mathematical concepts, numerical skills, logical and critical reasoning skills, and reading comprehension skills are also important aspects for understanding mathematics. Thus, to achieve effective and efficient mathematics learning, it is necessary to pay attention to a number of aspects mentioned previously.

Currently, there are challenges in understanding mathematical concepts which is the main focus in the mathematics learning process. Various approaches have been taken to increase students' understanding in learning mathematical concepts, including the use of suitable learning models and the development of students' social skills. This is in accordance with (Fadhilah, 2021)'s position that cultivating high numeracy skills requires various methods to make learning effective and support students' numeracy skills. Students' understanding of mathematical concepts can be influenced by various contributing internal and external factors. These factors can be considered when designing effective and efficient mathematics learning.

Research evidence also shows that the subject of mathematics study has an influence on students' mathematical abilities. Numeracy ability is one of the parameters for evaluating educational standards (Kurniawati & Kurniasari, 2019). In this research it was also found that it is important for students to have an understanding of mathematical concepts from an early age, namely from the time they enter the beginning of elementary school. Building a strong foundation in arithmetic is important for the development of arithmetic in elementary school, as difficulties in mathematics are often associated with learning deficiencies in earlier grades, especially a lack of understanding of arithmetic concepts. Therefore, to develop counting skills, children must first develop a concrete understanding of the quantities associated with each number before becoming familiar with the symbolic forms of numbers.

The findings from this research also strengthen Baharuddin 's (2020) thinking which states that students have the ability to relate mathematical problems to real contexts that are relevant to their lives . Having a solid understanding of mathematical concepts can make an important contribution in understanding mathematical obstacle situations for students. In order to face challenges in solving mathematical problems

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effectively, students need to have a deep understanding of these mathematical concepts, so that they can apply them in real contexts and overcome challenges in solving mathematical problems. As with numeracy skills, it can be concluded that a solid understanding of mathematical concepts can contribute to improving students' numeracy and reading abilities. So, in an effective and efficient mathematics learning process, it is important to pay adequate attention to understanding mathematical concepts and linking them to students' numeracy skills.

## 4. CONCLUSION

Based on the search results, it was found that numeracy skills and understanding mathematical concepts are related and influence each other. The following are several important points that can be explained: (1) Numerical abilities include knowledge and skills in applying numbers and mathematical symbols in solving problems; (2) Numeracy skills have an important role in developing conceptual understanding in mathematics learning; (3) Numerical skills enable students to respond to situations they have encountered or have never encountered, using mathematics as a basis for decision making and problem solving. (4) A strong understanding of mathematical concepts can contribute to improving students' numeracy and reading abilities; (5) Several learning methods can improve numeracy skills. From this it can be concluded that numeracy skills and understanding mathematical concepts influence each other and are important to develop and improve together. Numerical skills have the potential to support students in understanding mathematical concepts and applying them in real life. On the other hand, a good understanding of mathematical concepts of the other hand, a good understanding of mathematical concepts can play a role in improving students' numeracy and literacy skills.

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