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LITERACY SYNERGY: THE RELATIONSHIP BETWEEN READING AND NUMERACY LITERACY SKILLS IN ELEMENTARY SCHOOL STUDENTS

Transita Pawartani[1], Suyono[2], Intan Sari Rufiana[3]
[1,3] Graduate School, State University of Malang, Indonesia
[2]Faculty of Letter, State University of Malang, Indonesia
transita.pawartani.2321038@students.um.ac.id[1], suyono.fs@um.ac.id [2], intan.sari.pasca@um.ac.id [3]

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ABSTRAK

Abstrak: Penelitian ini bertujuan untuk menganalisis hubungan antara kemampuan literasi membaca dan kemampuan numerasi pada siswa kelas V Sekolah Dasar. Literasi membaca dan numerasi merupakan keterampilan dasar yang esensial, tidak hanya sebagai alat pemahaman informasi, tetapi juga sebagai fondasi penting bagi perkembangan individu dan kemajuan sosial. Penelitian ini menggunakan pendekatan kuantitatif dengan desain korelasional *ex post facto*. Sampel penelitian adalah total 42 siswa di salah satu SD Swasta di Kota Malang. Instrumen yang digunakan berupa tes literasi membaca dan numerasi yang valid dan reliabel. Uji normalitas dan uji linearitas dilakukan sebagai prasyarat uji hipotesis, Setelah kedua uji ini terpenuhi dilakukan uji hipotesis korelasi *Pearson Product Moment* kemudian dilanjutkan dengan uji determinasi. Hasil uji korelasi memperlihatkan hubungan signifikan antara kemampuan literasi membaca siswa dengan kemampuan numerasi. Hasil analisis data menggunakan *Pearson Product Moment* diperolehan taraf signifikansi 0,000 < 0,05. Selanjutnya, uji determinasi menghasilkan nilai 34,7%. Hasil analisis memperlihatkan bahwa kemampuan membaca siswa dan kemampuan literasi memberikan kontribusi sebesar 34,7% kepada kemampuan numerasi, sedangkan faktor lain memberikan kontribusi sebesar 65,3%. Hasil penelitian ini diharapkan dapat menjadi dasar bagi pengembangan strategi pembelajaran yang mengintegrasikan kedua keterampilan ini dalam pembelajaran siswa Sekolah Dasar.

Abstract: This study aims to analyze the relationship between reading literacy and numeracy skills in grade V elementary school students. Reading literacy and numeracy are essential basic skills, not only as a means of understanding information, but also as an important foundation for individual development and social progress. This study used a quantitative approach with an ex post facto correlational design. The research sample was a total of 42 students in one of the private elementary schools in Malang City. The instruments used were valid and reliable reading literacy and numeracy tests. Normality test and linearity test were conducted as prerequisites for hypothesis testing, after these two tests were met, the Pearson Product Moment correlation hypothesis test was carried out and then continued with the determination test. The correlation test results showed a significant relationship between students' reading literacy skills and numeracy skills. The results of data analysis using Pearson Product Moment obtained a significance level of 0.000 <0.05. Furthermore, the determination test resulted in a value of 34.7%. The analysis showed that students' reading ability and literacy skills contributed 34.7% to numeracy skills, while other factors contributed 65.3%. The results of this study are expected to be the basis for developing learning strategies that integrate these two skills in elementary school student learning.

A. INTRODUCTION

There are basic skills needed for student, that help individuals to navigate daily life and succeed in various aspects of society. Those basic skills are reading literacy, numeracy, digital literacy, communication skills, also critical thinking and problem-solving abilities. Reading literacy and numeracy are essential basic skills for students, not only as a means of understanding information but also as an important foundation for individual development and social progress (Ratnaya et al., 2024). These two abilities include the ability to think logically and systematically, understand and process information, and analyze data that is relevant in everyday life (Perdana, 2021). In the modern era, literacy and numeracy are also prerequisites for society to be able to adapt effectively to the rapid development of technology and information. This ability allows students to improve skills, knowledge and competencies that are relevant in the social environment, thus playing a role in the formation of an empowered society that is able to contribute to development (Hanemann, 2015). However, Indonesian students' reading literacy and numeracy

skills are still at a low level. The results of the 2022 Program for International Student Assessment (PISA) study of reading literacy ability ranked 71 out of 81 countries with a score of 359, 117 points below the average. Not much different from reading literacy, math literacy ranked 69th out of 81 countries with a score of 366, which is 106 points below the average (OECD, 2023). This emphasizes the need for research and strategies to improve these basic skills to support students' educational success.

Reading literacy and numeracy are two key skills in foundational literacies that are considered core skills and are important indicators to assess a person's readiness to face future challenges (Pratiwi, 2019; Guslisnawati et al., 2024). These two skills are part of the three literacies measured in the Program for International Student Assessment (PISA), an international benchmark for assessing the quality of education in various countries, which also plays a role in monitoring the achievement of the Sustainable Development Goals (SDGs) in point 4 regarding the quality of education (Rahayu et al., 2022; Hwa, 2023). Thus, PISA results often become a reference for the government to design and develop effective education programs, including in Indonesia through the Minimum Competency Assessment (MCA) which began to be implemented in 2021. This program aims to support the culture of reading literacy and numeracy among students in Indonesia (Patriana dkk., 2021). The Minimum Competency Assessment (AKM) is an effort to map and improve students' basic abilities in these two types of literacy, as they are considered the basis for the development of other skills. This focus is also based on the need to improve the quality of education at the primary level, so that students have good literacy skills to support their success in higher education (Pusmenjar, 2021).

Reading literacy is the ability to understand, utilize, assess, and reflect on various forms of literature for problem solving and personal growth as citizens of Indonesia and the world, which is intended to make a productive contribution to society (Hidayah et al., 2021). According to Harahap et al. (2022) the benefits of reading literacy for students are: (1) increasing students' vocabulary and knowledge, (2) increasing cognitive abilities, (3) increasing students' perspectives and experiences, (4) increasing students' cognitive abilities and memory strength in storing information from reading, (5) increasing students' focus and concentration abilities, and (6) training rational and critical thinking. To get the most out of reading literacy, mindfulness can be an effective strategy. By engaging mindfulness, students are invited to focus fully on the text they are reading, paying attention to every detail without distraction, resulting in deeper and more reflective understanding (Saputro et al., 2024). This is in line with Suyono (2006) who emphasizes that reading literacy is related to critical thinking so that in practice it is done with high attention.

On the other hand, Adeyemi & Adaramola (2014) explain numeracy involves solving real problems using numerical and symbolic representations, as well as analyzing data presented in various formats, such as charts, tables, and graphs, to interpret findings, draw conclusions, and make decisions. These skills include the ability to recognize, understand and apply numerical information in a variety of everyday situations. Westwood (2021) explains that numeracy refers to the skill of understanding and using numbers and mathematical concepts in everyday life. Numeracy includes the application of mathematical principles, processes, information, and tools to solve practical challenges in various relevant situations (Sa'dijah et al., 2023).

Although at first glance reading literacy and numeracy appear to be different abilities where reading literacy focuses more on language, while numeracy focuses on mathematics, they are closely related in the learning process. Good reading literacy can support students' understanding of numeracy problems, which are often presented in the form of story or text problems. According to Pusmenjar (2021) in the Minimum Competency Assessment (AKM), reading literacy is measured based on students' ability to find, understand and evaluate information from fiction and non-fiction texts in various contexts, including individual, social and cultural. Numeracy, on the other hand, prioritizes knowledge of mathematical concepts, applications and reasoning in everyday life, with problems generally presented in social and cultural contexts through complex texts. Therefore, students need good reading literacy skills to help them solve numeracy problems. This is in line with the opinion of Mardiyanti et al. (2022) who explained that the ability to understand the context in the text can help

students solve numeracy problems more effectively. In addition, reading literacy and numeracy also have the same element, namely critical thinking. Critical thinking in reading literacy is related to high attention in understanding, integrating, and evaluating information. Critical thinking in reading literacy is synergized with numeracy problem solving. This is in line with Darmawan et al. (2023) who explained that numeracy is related to problem solving, making decisions to solve problems requires critical thinking, which is a way of thinking that considers and integrates various perspectives.

However, many students experience difficulties in mastering numeracy literacy due to limitations in reading comprehension, especially when faced with contextual problems that require understanding information before solving numeracy problems (Aziz & Septriyanti, 2023). This situation shows that reading and numeracy literacy are not stand-alone skills, but rather skills that are interrelated and mutually reinforce each other in the learning process. Studies have found that reading difficulties can impair math development, as reading comprehension and mathematical skills share a common cognitive basis. Students who struggle with story problems may have sufficient computation skills but still fail to solve the problem, indicating the need to integrate reading comprehension and cognitive skills to succeed in math (Hamidi et al., 2022).

A number of studies have indicated a relationship between reading literacy and numeracy. For example, Susanti, (2022), showed a significant relationship between reading comprehension literacy and critical and creative thinking skills in mathematics in elementary school students. This is evidenced through the results of statistical analysis which shows a significance value (sig) <0.05. Another study by (Aziz & Septriyanti, 2023) showed that the value of the correlation coefficient between Indonesian language literacy and math numeracy literacy was “positive 0.953.” This relationship is categorized as strong, significant and unidirectional. This means that the increase in Indonesian language literacy of grade VIII students in the research sample is directly proportional to the increase in their mathematical numeracy literacy in solving math problems, and vice versa. This study underscores the importance of text comprehension skills as a foundation for solving context-based numeracy problems. However, existing studies tend to only reveal correlational relationships without exploring more deeply the specific contribution of reading literacy to students' numeracy skills, especially at the primary school level.

Based on this analysis, there is a gap in research regarding how reading literacy directly contributes to students' numeracy skills, especially in understanding, analyzing and solving text-based problems. Most of the existing research focuses more on the secondary education level, while the needs of primary school students who are just beginning to recognize the integration of reading literacy and numeracy receive less attention. To fill this gap, this study aims to specifically analyze the contribution of reading literacy skills to primary school students' numeracy skills.

By understanding these relationships and contributions, it is hoped that this research can provide recommendations for more effective and relevant learning strategies to improve both literacies in an integrated manner. In addition, this research is also expected to help primary school students be better prepared to face future educational challenges with better basic reading and numeracy literacy skills.

B. METHODS

This study used a quantitative approach with an ex post facto correlational research type. This approach was chosen because it aims to analyze the correlation between two variables, namely reading literacy skills and numeracy skills, without manipulating the variables studied. Thus, the ex post facto correlational approach is suitable to determine the extent of the relationship between reading literacy skills and numeracy skills of grade V students.

The sampling technique used in this study is Non-Probability Sampling, where the sample is selected without giving equal opportunities to each element of the population (Sugiyono, 2022). Given the research population of only 42 fifth grade students in one of the private elementary schools in Malang City, the total sample technique was used to involve the entire population as research respondents. With this total sample, all fifth grade students were used as research respondents, so that

the results obtained could represent the population as a whole.

The research instrument used was a test consisting of 20 questions, which had been tested for validity and reliability. The validity test results show that all items meet the criteria of good validity, with a validity coefficient above 0.3, while the reliability of the instrument shows Cronbach's alpha coefficient above 0.7, which indicates that this instrument is reliable. The test consisted of 10 reading literacy questions with a maximum score of 40 and 10 numeracy literacy questions with a maximum score of 40. The types of questions in this instrument include true-false and description questions to comprehensively measure various aspects of students' reading literacy and numeracy skills.

Data analysis to test the correlational hypothesis between the two research variables used the Pearson Product Moment correlation test. Before conducting the hypothesis test, a prerequisite test was conducted in the form of normality test and linearity test. The normality test was conducted using the Shapiro-Wilk method, provided that the data were normally distributed if the significance value (sig) > α = 0.05. Linearity test was conducted to ensure that the relationship between reading literacy and numeracy variables is linear, with linear criteria if the significance value on Deviation from Linearity> 0.05.

If the Pearson correlation test results show a sig (2-tailed) value < α = 0.05, then there is a correlation between reading literacy and numeracy skills of grade V students. In addition, the determination test was conducted to determine the contribution of the reading literacy variable to the numeracy variable. Through this analysis procedure, the research can find out the extent of the relationship between reading literacy skills and students' numeracy skills, as well as how much reading literacy skills contribute to numeracy skills.

C. RESULTS AND DISCUSSION

This study was conducted in class V of a private primary school in Malang City. The following results are generated from the use of SPSS to process the findings of students' reading literacy and numeracy skills:

1. Normality Test

Normality test is a data analysis that aims to determine whether the distribution of research data is normal (Nuryadi, 2017). The normality test used in this study is the Shapiro-Wilk test, because the number of respondents is less than 50. The Shapiro-Wilk test is carried out with a significance level of 5% or 0.05. The test criteria are as follows: if the probability value (p-value) is more than 0.05, the data is considered normally distributed; whereas if the probability value is less than or equal to 0.05, the data is considered not normally distributed (Ananda, 2018).

Table 1. Normality Test Results

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	df	Sig.	Statistic	df	Sig.
Reading Literacy	.132	42	.064	.960	42	.145
Numeracy	.125	42	.096	.972	42	.375

According to the results of the normality calculation, variable X has a significance value of 0.145 and variable Y has a significance value of 0.375. This research data is considered normally distributed because both probability values are greater than 0.05.

2. Linearity Test

In data analysis, the linearity test is used to determine whether the relationship between data is linear. Linearity refers to the assumption that the independent variable can predict the dependent variable in the relationship between the two. Linearity test is a requirement for testing research hypotheses, especially for correlation tests. The decision-making criteria in the linearity test are as follows: if the significance value of Deviation from Linearity is more than 0.05, then the relationship between variables X and Y is considered linear; however, if the significance value is less than or equal to 0.05, the relationship between variables X and Y is considered not linear (Rosalina et al., 2023).

Table 2. Linearity Test Results

			Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
	Between Groups	(Combined)	544.871	17	32.051	1.977	.061
Numeracy * Reading		Linearity	338.897	1	338.897	20.907	.000

Literacy		Deviation from Linearity	205.974	16	12.873	.794	.679
	Within Groups		389.033	24	16.210		
	Total		933.905	41			

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the linearity test calculation show that the significance value for variable X (reading literacy skills) and variable Y (numeracy skills) is 0.679. Because the Deviation from Linearity significance level value of 0.679 is greater than 0.05, the data in this study can be declared linear.

3. Pearson Product Moment Correlation Test

After going through the prerequisite test which showed that the data was normally distributed and linear, this study continued with the Pearson Product Moment correlation test to test the relationship between reading literacy skills and numeracy skills. Pearson product moment correlation test is a measure of the linear relationship between two interval or ratio variables and can have a value between -1 and 1. With using this test, we could have a simple way to assess the association between two variables; whether they share variance (covary) if the relationship is positive or negative, and the degree to which they correlate (Chee, 2015). The Pearson Product Moment correlation coefficient test was conducted with a significance level of 5% or 0.05. The test criteria are as follows: if the probability or significance value is less than 0.05, then the two variables have a significant relationship. Conversely, if the probability or significance value is equal to or greater than 0.05, then the two variables are considered not to have a significant relationship (Herawati & Edi, 2016).

Table 3. Pearson Product Moment Correlation Test Results

		Reading Literacy	Numeracy
Reading Literacy	Pearson Correlation	1	.602**
	Sig. (2-tailed)		.000
	N	42	42
Numeracy	Pearson Correlation	.602**	1
	Sig. (2-tailed)	.000	
	N	42	42

Based on the table above, the probability value or significance level is 0.000, which is smaller than 0.05. This indicates that the two variables have a significant relationship, in accordance with the criteria for the level of significance that has been set.

4. Determination Test

After knowing that there is a significant relationship between reading literacy and numeracy skills, the next step is to conduct a determination test to measure how much influence reading literacy has on numeracy skills. The following is the calculation of the coefficient of determination of reading literacy on numeracy skills.

Table 4. Determination Test Results

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.602[a]	.363	.347	3.857

Based on the results of data processing using SPSS, the Adjusted R Square value is 0.347. According to this coefficient of determination test result, students' literacy skills contribute 34.7% to their numeracy skills. Thus, students' literacy skills affect 34.7% of their numeracy skills, while other factors affect 65.3%.

This study was analyzed using the Pearson Product Moment correlation test and the Determination test to get a comprehensive picture of the relationship between variables. The results of the Pearson correlation test show that there is a significant relationship between reading literacy and numeracy, with a significance value of 0.000 <0.05. This indicates a significant relationship between the two variables. The results of this study are also similar to the research of Gloriani et al. (2023); Aziz & Septriyanti (2023); Susanti (2022); Ratnaya et al., (2024) which explains that reading literacy skills affect numeracy skills. Mutji & Suoth, (2021) state that reading literacy involves the ability to understand, analyze, access, and utilize information effectively. Deep reading literacy allows students to gain comprehensive knowledge from texts, so they more easily understand the context of numeracy

problems that must be solved (Almadiliana et al., 2021).

Students' numerical ability is significantly influenced by their understanding of the given numerical problems (reading literacy) as well as their working memory capacity. Working memory capacity can be enhanced by providing new material where students can identify recurring patterns in similar problems and find the appropriate methods and strategies to solve them. Additionally, students must possess strong textual and word comprehension. The material should also be developed in greater detail to ensure that students can absorb information more effectively (Samad & Nur, 2024). Reading literacy has great impact to numerical skills such as understanding instructions clearly, filtering relevant information, identifying patterns and relationships, interpreting problems in the right context, handling complex language, and critical and analytical thinking.

Whereas in solving numeracy problems that are generally presented in the context of complex daily life texts according to (Fitriani, 2015) dalam tahapan George Polya seorang siswa perlu in George Polya's stages a student needs to 1) understand the problem through reading comprehension, 2) plan problem solving, 3) solve the problem according to the plan, and 4) and recheck. Therefore, it is clear that students' literacy skills and their ability to solve numeracy problems are positively correlated. Numeracy problems are generally a form of math story problems. Solving numeracy problems requires high or strong literacy understanding from students.

This study found that reading literacy contributed 34.7% to students' numeracy skills, based on the results of the determination test with an Adjusted R Square value of 0.347. This shows that one-third of students' numeracy skills can be influenced by their comprehension of reading texts. This finding shows the importance of reading literacy as a factor that influences numeracy literacy, especially when students have to interpret numeracy problems or solve math problems in everyday contexts. Theoretically, the influence of literacy (informational and literary texts) in improving students' numeracy skills can be attributed to the fundamental role of early literacy and numeracy in facilitating students' acquisition and development of numeracy skills (Koponen et al., 2019). Literacy and numeracy are not just the ability to read, write and count, but also how students interpret information in everyday life (Kus, 2018). In this context, a student may fail to solve a numeracy problem not because of his or her ignorance of the numeracy concept, but rather because of his or her literacy limitations in understanding the instructions or text that accompany the numeracy problem (Howard et al., 2017).

Thus, the integration of reading literacy into numeracy learning is a very effective strategy for student development. Through this integration, students not only acquire basic skills in reading and counting, but also receive stimulation that supports their cognitive and affective development simultaneously (Jamilah & Akhmad, 2019). The learning process that combines reading literacy with numeracy allows students to more easily understand numeracy problems that are generally text-based and relate them to everyday experiences. This will provide broader benefits, because a strong understanding of text can improve their ability to solve complex problems that require critical analysis and effective application of mathematical concepts.

This integration of reading literacy into numeracy learning could be implemented with several strategies and approaches. Math problems can be presented in text form, that will allow students to read and understand. Strengthen student’s critical thinking helps student to analyze and solve problems more effectively. Enriching students' vocabulary, especially in numeracy terms, is critical because the language used in mathematics and numeracy problems directly affects how students understand and solve them. Students must be able to interpret the meaning of words, phrases, and instructions in math problems to apply the correct mathematical operations or strategies (Harahap, Sari, & Kurniawan, 2022). With this integration strategies, it would improve reading and numeracy literacy of the student.

D. CONLUSIONS AND RECOMMENDATIONS

The study emphasizes the significant relationship between reading literacy and numeracy skills, highlighting their interconnectedness in the learning process. Both skills are fundamental for student development,

playing a crucial role in students' ability to navigate daily life and succeed in various aspects of society. The results of this study showed a significant positive relationship between students' reading literacy skills and numeracy skills. The results of data analysis using Pearson Product Moment obtained a significance level of 0.000 <0.05. Meanwhile, the determination test obtained a value Furthermore, the determination test resulted in a value of 34.7%. The results of the analysis show that students' reading ability and literacy skills contribute 34.7% to numeracy skills, while other factors contribute 65.3%. Reading literacy is not only about reading skills, but also the ability to interpret information, which plays an important role in facilitating students' understanding of numeracy problems. The synergy between reading literacy and numeracy can help students develop cognitive and affective abilities as a whole, enabling them to be more resilient in facing learning challenges that require text comprehension and numeracy analysis.

Based on the results of the study, it is recommended that schools and educators integrate reading literacy into numeracy learning more systematically. With this approach, students will be better trained to understand instructions in text-based numeracy problems, so that their numeracy skills can be improved. Numeracy learning that utilizes reading texts can also provide a more contextualized experience, helping students connect numeracy concepts with real-life situations. In addition, teachers need to be given training that supports the development of teaching strategies that combine reading literacy with numeracy literacy. Further research is also recommended to explore this learning approach at various grade levels and broader contexts to strengthen empirical evidence regarding the benefits of synergy between reading literacy and numeracy for overall student development.

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