

Profile of Numeracy Literacy Ability and self-efficacy of Students in mathematics education

Abstract

Numeracy literacy is an essential part of supporting a student's future success. This study aims to describe the profile of numeracy literacy to determine its correlation with the self-efficacy of Integrated Islamic Elementary School Nurul Ilmi Jambi students from the perspective of mathematics learning. The approach used in this study is quantitative descriptive. Data in this study were collected through test techniques. Tests were conducted on two variables, namely numeracy literacy skills and self-efficacy. The population in this study was 268 grade VI students, while the sample was 29 grade VIB students who were taken randomly after the entire population was tested for homogeneity. The data were analyzed using two stages, namely the first determining the classification of the numeracy literacy ability profile into "high", "medium," and "low" groups. The second data analysis stage is to conduct a Pearson correlation test with the help of SPSS 25. The results of the study showed that, in general, the profile of numeracy literacy skills is in the "moderate" category, with an average score of 16. As for the self-efficacy variable, it obtained an average score of 25.8 in the "moderate" category. In addition, based on the correlation test, it is known that there is a significant positive correlation between the numeracy literacy score and the self-efficacy of students, with a correlation value of 0.433. Therefore, teachers must implement more systematic and integrated mathematics learning planning to increase students' self-efficacy. The increase in self-efficacy could improve students' numeracy literacy skills.

Keywords: numeracy literacy, self-efficacy, mathematics learning, Elementary School

Introduction

Education is one of the critical processes in human life to create a better generation. Zhang (2022) and Hartinah et al. (2024) stated that Education is essential to forming a superior and characterful generation. Meanwhile, Schwartz et al. (2023) and Maria & Hadiyanto (2021) noted that Education is one of the human needs in building human capital, which is the primary driver of human resources. Salim and Rahmad Prajo (2018) and ElSayad (2023) also stated that Education is an action that aims to change the attitudes and actions of individuals or groups during the maturation process through training and instruction. Through Education, generations (students) are trained, fostered, guided, and taught many things about knowledge and skills. This knowledge and skills are the provisions for a better, more advanced, and more developed future. Therefore, various countries continue creating innovations to develop a quality education process.

A critical factor in measuring the success of the education process is evaluating and measuring student learning outcomes. The better the learning outcomes of students, the better the learning process that has been carried out. In addition, the better the student learning outcomes are, the better learning objectives will be achieved. Thus, student learning outcomes can be used as a reference to determine the success of the planning and implementation of learning in the education process. This is as stated by Tavakoli & Gamlem (2024), Gladovic et al. (2024), and Giandari Maulana et al. (2024) that the results of evaluation and assessment in the education process are beneficial, especially in providing vital information to assist in decision making, consideration of determining policy direction, increasing understanding of certain conditions or phenomena, and can be used as problem-solving. Taylor et al. (2024) and Gultom et al. (2024) also stated that evaluation or assessment of learning outcomes affects the quality of learning in schools.

Related to learning outcomes, Aquino & Yambi (2020), González et al. (2024), Suprihatien et al. (2024), and Putra et al. (2024) stated that there are cognitive domains divided into six, namely knowledge, understanding, application, analysis, synthesis, and evaluation. The affective domain is the internalization of attitudes that indicate inner growth. It occurs when students are aware of the values received and then take a stance so that it becomes part of themselves in forming values and determining behavior. The psychomotor domain is related to skills or the ability

to act after receiving learning experiences. The objects of learning outcome evaluation are all evaluation targets, which include aspects of ability (psychomotor domain), personality aspects (cognitive domain), and attitude aspects (affective domain). Three learning outcomes are skills and habits, Knowledge and understanding, and Attitudes and ideals. Thus, it can be understood that learning outcomes can be measured in three domains, namely cognitive, affective, and psychomotor. The cognitive domain includes thinking skills, including creative, critical thinking, and literacy skills. The affective domain contains attitudes, manners, ethical norms, etc. The psychomotor domain includes the ability to do something (skilled) by the theory that has been learned. Thus, it can be understood that student learning outcomes in the education process are related to various domains.

One form of learning outcomes that is very important in the learning process is numeracy literacy. Salim and Rahmad Prajo (2018), Arofatul et al. (2024), Learner & Adulthood (2024) and Pasaribu et al. (2024) explain that numeracy literacy is knowledge and skills to (1) use various types of numbers and symbols related to basic mathematical concepts to solve problems that arise in various real situations (2) investigate data presented in various graphic formats, tables, diagrams, and the like (3) utilize understanding from the results of the analysis to estimate, conclude, and take action. Thus, this numeracy literacy ability is essential and is the basis for other abilities in quantifying data. Numeracy literacy skills are one of the main elements in supporting someone to achieve the peak of success in the future. More specifically, Serenata et al. (2024) stated that the indicators of numeracy literacy skills are using various numbers and symbols related to basic mathematics to solve problems in various contexts of everyday life, analyzing information displayed in various forms (graphs, tables, sections, diagrams, and so on), interpreting the results of the analysis to predict and make decisions. Numeracy literacy is an individual's ability to formulate, use, and interpret mathematics in various contexts to anticipate and make decisions in solving everyday life problems.

Various studies have shown that numeracy literacy is critical in both the learning process and social life in society. The results of previous studies show this; for example, research conducted by Widyati & Susanto (2023) and Jayanti & Cesaria (2024) found that numeracy literacy skills have a positive and significant effect on students' mathematics learning outcomes. In her writing, Pamela Ramadhan (2024) also stated that developing numeracy literacy in children early (PAUD Education) can encourage their cognitive development.

In addition to numeracy literacy, other learning outcomes include self-efficacy, which enters the affective domain. Self-efficacy is the ability to understand one's ability to do something. Waddington (2023) and Sahin et al. (2024) explain that self-efficacy refers to the belief that an individual can predict their ability to carry out a task or perform a task needed to achieve a particular result. In his writing, Athia Laili (2024) wrote that self-efficacy is a person's belief in their ability to succeed in certain situations or perform tasks and learn or perform certain levels of behavior. Samsalwa (2024) wrote that self-efficacy is a construct that describes an individual's belief in their ability to direct and realize behavior to achieve desired goals. According to Mahawati & Sulistiyani (2021), self-efficacy includes 1) Belief in one's abilities. 2) Optimistic. 3) Objective. 4) Responsible. 5) Rational and Realistic. Thus, self-efficacy is essential in supporting a person's personal development towards a quality life. This ability is one of the supporting factors in building relationships and collaboration. Considering society's current and future eras, self-efficacy is a fundamental part of supporting a person toward the peak of success.

Various studies have shown that self-efficacy is crucial in supporting a person's success and achieving their goals. This is demonstrated by Najmil & Retno's (2024) research that self-efficacy affects a person's psychology, especially in their fear of failure. Diah & Lestari (2024) also wrote that a person's self-efficacy affects post-college work readiness. The results of research by Wardanis et al. (2023), Basileo et al. (2023), Okweye (2024), and Wu (2024) show that self-efficacy affects a student's problem-solving ability and academic achievement. Meanwhile, Levinta et al. (2024) found that self-efficacy positively and significantly affects the ability to think creatively in mathematics. In the world of work, self-efficacy also has a positive effect on the professionalism of teachers in carrying out their duties (Ma'wa et al., 2024). Thus, self-efficacy broadly impacts a person's success in achieving their life goals.

As described above, the urgency of numeracy literacy and self-efficacy is not yet fully known and understood by teachers, especially in grade VI of SD Islam Terpadu Nurul Ilmi. This can be seen from several indicators, including the relatively weak learning oriented towards numeracy literacy and self-efficacy. In addition, several reference sources related to these variables are also still limited. Another critical factor is that there have been no research results at the school (related to numeracy literacy and self-efficacy), so they can be used as triggers for teachers to develop learning based on these two variables. Therefore, this study seeks to provide a clear and accurate picture of students' numeracy literacy abilities and their relationship with students' self-efficacy.

Method

This study aims to describe the profile of numeracy literacy to determine its correlation with the self-efficacy of Integrated Islamic Elementary School Nurul Ilmi Jambi students from the perspective of mathematics learning. The approach used in this study is quantitative descriptive. The population in this study was 268 grade VI students, while the sample was 29 grade VIB students who were taken randomly after the entire population was tested for homogeneity.

The data in this study were collected through test techniques. The test was conducted on two variables, namely numeracy literacy skills and self-efficacy. For the numeracy literacy variable, the indicators measured were (1) Recognizing and using mathematical symbols, (2) Interpreting data in tables, graphs, and diagrams, and (3) Making interpretations, conclusions, and decisions. The self-efficacy indicators measured in this study include: 1) Confidence in one's abilities, 2) Optimistic, 3) Objective, 4) Responsible, 5) Rational and Realistic. Numeracy literacy ability was measured using 30 multiple-choice test questions, with a maximum score of 30 and a minimum score of 0. Self-efficacy was measured using a questionnaire with a Likert scale. Each indicator of self-efficacy was measured with three questions. Thus, the total number of questions used was 15 questions. The maximum score obtained by students was 45, and the minimum score was 5. The data were analyzed using two stages, namely the first determining the classification of numeracy literacy ability profiles into "high", "medium," and "low" groups. The second data analysis stage was to conduct a Pearson correlation test with the help of SPSS 25.

Result and Discuss

This study aims to describe the profile of numeracy literacy to determine its correlation with the self-efficacy of Integrated Islamic Elementary School Nurul Ilmi Jambi students from the perspective of mathematics learning. The approach used in this study is quantitative descriptive. The results of the measurement of the two variables are shown in Table 1 below:

Table 1. Numeracy Literacy Profile of Grade VIB Students

Numeracy Literacy Indicators	Range of Score	Category	Number of respondents	Percentage
Recognize and use mathematical symbols.	21-30	High	14	48,3
	11-20	Medium	11	37,9
	0-10	Low	4	13,8
Total			29	100
Average	17,75	Medium		
Interpret data in tables, graphs, and diagrams	21-30	High	13	44,83
	11-20	Medium	13	44,8
	0-10	Low	3	10
Total			29	100
Average	15,87	Medium		
Make interpretations, conclusions, and decisions.	21-30	High	12	41,4
	11-20	Medium	15	51,7
	0-10	Low	2	6,9
Total			29	100
Average	16,66	Medium		

Based on Table 1 above, it can be seen that in the indicator of recognizing and using mathematical symbols, students who obtained scores in the range of 21-30, namely in the "high" category, were 14 people or around 48.3%. As for students who obtained scores in the range of 11-20, namely in the "medium" category, there were 11 people or around 37.9%, while students who obtained scores in the range of 0-10, namely in the "low" category, there were four people or around 13.8%. This indicator obtained an average score of 17,75 and was in the "medium" category.

Furthermore, in interpreting data in tables, graphs, and diagrams, students who obtained scores in the range of 21-30 in the "high" category were 13 people or around 44.8%. As for students who received between 11 and 20, namely in the "medium" category, there were 13 people or around 44.8%. Meanwhile, students who obtained a score range of 0-10 in the "low" category were three people or around 10.4%. In this indicator, the average score was 15,87 in the "moderate" category.

In the third indicator, namely making interpretations, conclusions, and decisions, students who obtained a score range between 21-30 in the "high" category were 12 people or around 41.4%. As for students who received

between 11 and 20, namely in the "moderate" category, there were 15 people or around 51.7%. Meanwhile, students who scored 0-10 in the "low" category were two people or around 6.9%. This indicator's average score was 16,66 in the "moderate" category.

Based on Table 1 above, the following is a profile of numeracy literacy of class VIB students of SD Islam Terpadu Nurul Ilmi in the form of a diagram (Figure 1)

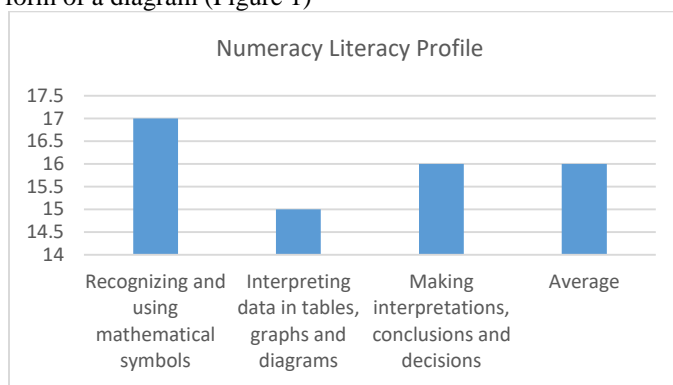


Figure 1: Numeracy Literacy Profile of Grade VIB Students of Nurul Ilmi Integrated Islamic Elementary School

Based on Figure 1 above, it can be seen that, generally, the literacy skills of grade VIB students of Nurul Ilmi Integrated Islamic Elementary School are still relatively low, namely in the "moderate" category. The data above also shows genuine efforts are needed to develop a program to improve students' numeracy literacy skills and future abilities.

Furthermore, for the self-efficacy variable, the measurement and data analysis results show diversity in each indicator measured. Based on the results of the data categorization analysis, the data display can be seen in Table 2 below:

Table 2. Self-Efficacy Profile of Grade VIB Students

Self Efficacy Indicator	Range of Score	Category	Number of respondents	Percentage
Confidence in one's abilities	32-45	High	14	48,3
	16-31	Medium	11	37,9
	5-15	Low	4	13,8
Total			29	100
Average	29,81	Medium		
Optimist	32-45	High	13	44,83
	16-31	Medium	13	44,83
	5-15	Low	3	10
Total			29	100
Average	26,89	Medium		
Objective	32-45	High	16	55,2
	16-31	Medium	9	31,0
	5-15	Low	4	13,8
Total			29	100
Average	19,76	Medium		
Responsible	32-45	High	14	48,3
	16-31	Medium	14	48,3
	5-15	Low	1	3,4
Total			29	100
Rata-rata	28,81	Low		
Rational and Realistic	32-45	High	14	48,3
	16-31	Medium	15	51,7
	5-15	Low	0	0
Total			29	100
Average	27,73	Medium		

Based on Table 2 above, the self-efficacy abilities of grade VIB students at SD Islam Terpadu Nurul Ilmi are very diverse. In the indicator of self-confidence, students who obtained a score range between 32-45, namely in the "high" category, were 14 people or around 48.3%. As for students who received between 16 and 31, namely in the "moderate" category, there were 11 people or around 37.9%. While students who obtained a score range of 5-15, namely in the "low" category, were four people or around 13.8%. This indicator's average score is 29,81 in the "moderate" category.

Furthermore, for the second indicator, optimism, 13 people, or around 44.83% of students, scored between 32 and 45 in the "high" category, as for students who received between 16 and 31, namely in the "moderate" category, 13 people or around 44.8%. Meanwhile, three people, or around 10.4% of students, scored 5-15 in the "low" category. In this indicator, the average score was 26,89 in the "moderate" category.

In the third indicator, objective, students who obtained a score range between 32-45, namely in the "high" category, were 16 people or around 55.2%. As for students who received between 16 and 31, namely in the "moderate" category, there were nine people or around 31.0%. While students who obtained a score range of 5-15, namely in the "low" category, were four people or around 13.8%. In this indicator, the average score was 19,76 in the "moderate" category.

For the fourth indicator, responsible, students who obtained a score range between 32-45, namely in the "high" category, were 14 people or around 48.3%. As for students who received between 16 and 31, namely in the "moderate" category, there were 14 people or around 48.3%. Meanwhile, students with a score range of 5-15 in the "low" category were one person or around 3.4%. In this indicator, the average score was 28,81 in the "moderate" category.

As for the fifth indicator, Rational and Realistic, students who obtained a score range between 32-45, namely in the "high" category, were 14 people or around 48.3%. As for students who received between 16 and 31, namely in the "moderate" category, there were 15 people or around 51.7%. While students who obtained a score range of 5-15, namely in the "low" category, were 0 people or around 0%. In this indicator, the average score was 27,73 in the "moderate" category.

Based on Table 2 above, the following diagram shows the self-efficacy abilities of class VIB students of SD Islam Terpadu Nurul Ilmi (Figure 2).

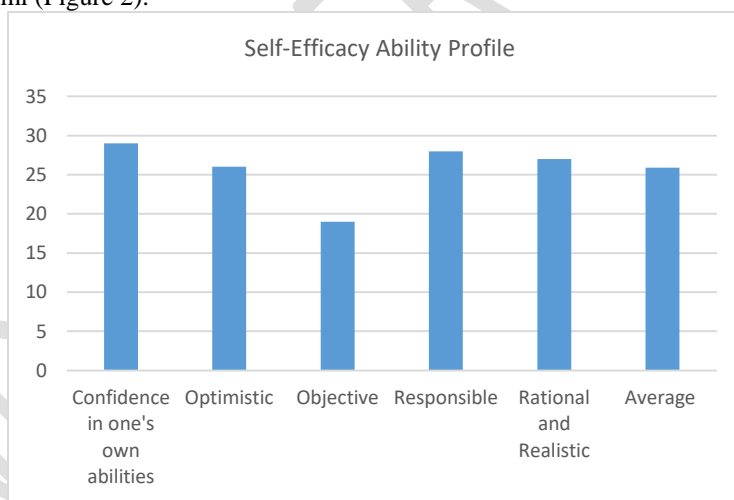


Figure 2. Profile of Self-Efficacy Ability of Grade VIB Students of Nurul Ilmi Integrated Islamic Elementary School

The following data result is a correlation test to see the correlation between numeracy literacy ability and self-efficacy of Grade VIB Students of Nurul Ilmi Integrated Islamic Elementary School. The results of the correlation test with the help of SPSS 25 software with its output can be seen in Table 3 below:

Table 3. Correlations

		Numeracy Literacy	Self Efficacy
Spearman's rho	Numeracy Literacy	Correlation Coefficient	1.000
		Sig. (2-tailed)	.433*
		N	.019
Self-Efficacy		Correlation Coefficient	1.000
		Sig. (2-tailed)	.433*
		N	.019

*. Correlation is significant at the 0.05 level (2-tailed).

Based on Table 3 above, a correlation coefficient 0.433 was obtained with a moderate or sufficient category. However, the correlation was significant. Thus, it can be understood that there is a substantial correlation between numeracy literacy and self-efficacy of grade VIB students at SD Islam Terpadu Nurul Ilmi Jambi. Therefore, the better the numeracy literacy score, the better the students' self-efficacy and vice versa. The results of the measurement and data analysis above show that, in general, the profile of numeracy literacy abilities of grade VIB students at SD Islam Terpadu Nurul Ilmi is in the "moderate" category with an average score of 16. As for the self-efficacy variable, it obtained an average score of 25.8 in the "moderate" category. In addition, based on the correlation test, it is known that there is a significant positive correlation between the numeracy literacy score and the self-efficacy of students, with a correlation value of 0.433. Therefore, teachers must implement more systematic and integrated mathematics learning planning to increase students' self-efficacy. The increase in self-efficacy could improve students' numeracy literacy skills.

The first finding of this study is that, in general, the profile of numeracy literacy skills of grade VIB students of the Nurul Ilmi Integrated Islamic Elementary School is in the "moderate" category, with an average score of 16. The data informs teachers that there is a need to improve students' numeracy literacy skills more systematically and consistently. This increase in ability can provide more significant opportunities for their success in the future. Numeracy literacy skills can increase the ability to use numbers and mathematical symbols so that they can solve problems in everyday life, investigate data in various forms of tables and graphs, and utilize the results of the analysis to predict, conclude, and make decisions (Salim and Rahmad Prajo, 2018).

In addition, the following finding is that for self-efficacy, grade VIB students of the Nurul Ilmi Integrated Islamic Elementary School obtained an average score of 25.8 with the "moderate" category. This finding should be the basis for teachers to improve students' self-efficacy. The results of the study prove that self-efficacy has a positive impact on a person's success in the future, for example, in terms of problem-solving abilities. Students with good self-efficacy tend to have better problem-solving skills (Yuliyani et al., 2017). In addition, self-efficacy also plays a role in increasing students' learning motivation (Nur Hasanah, Roni Faslah, 2023), increasing work readiness (Diah & Lestari, 2024), increasing creative thinking skills (Levinta et al., 2024), increasing work professionalism and reducing stress (Ma'wa et al., 2024). Therefore, teachers must make serious plans considering students' self-efficacy abilities to increase their chances of success in the future.

This study's results align with the research conducted by Mellyzar et al. (2021), which found a relationship between self-efficacy and numeracy literacy with a correlation level of 49.5. Faiza et al. (2024) also found that students' numeracy literacy abilities are influenced by self-efficacy. Thus, it can be understood that the two variables are interrelated and related to a significant correlation level. Therefore, teachers need to consider various learning models that have the potential to develop one or both of these variables together.

Conclusion

The results of the study show that, in general, the profile of numeracy literacy abilities of grade VIB students of SD Islam Integrated Nurul Ilmi is in the "moderate" category with an average score of 16. As for the self-efficacy variable, it obtained an average score of 25.8 in the "moderate" category. In addition, based on the correlation test, it is known that there is a significant positive correlation between the numeracy literacy score and student self-efficacy, with a correlation value of 0.433. Therefore, teachers must implement more systematic and integrated mathematics learning planning to increase students' self-efficacy. The increase in self-efficacy could improve students' numeracy literacy skills.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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