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Analysis of Numeracy Literacy of SMP Negeri 5 Cimahi Class VII Students in Terms of Self-Efficacy

Wardono[1], Fani Laffanillah Fathurrohman[2], Scolastika Mariani[3], Kristina Wijayanti[4], Murbangun Nuswowati[5], Arief Agoestanto[6]

Abstract

This study aims to analyze numeracy literacy in terms of self-efficacy. This research is descriptive qualitative research with the subjects as many as 40 students of class VII-D SMP Negeri 5 Cimahi. The research subjects were selected using purposive sampling technique by classifying the self-efficacy scale (high, medium, and low), 1 student each was taken so that the number of research subjects was 3 out of 40 students. The findings of this study indicate that in the first case, 1 student with a high self-efficacy category showed very capable in all indicators. The next case, 1 student with a moderate self-efficacy category showed quite capable, still not able to analyze information, while the third case, 1 student with a low self-efficacy category showed not able to interpret the results of the analysis to predict and make decisions, and only able to analyze information displayed in various forms (graphs, tables, diagrams, and so on).

Keywords: *Numeracy Literacy, Self-Efficacy.*

Introduction

Literacy activities in Indonesia have evolved to meet students' needs for the skills necessary to become literate or numerate citizens. (Rakhmawati & Mustadi, 2022). Literacy is fundamental to understanding more complex concepts every day in the 21st century (Deda et al., 2023). In this sense, literacy is how a country can avoid illiteracy and enable its citizens to interact and compete around the world (Iswara et al., 2022). Numeracy literacy is one of the important skills that students must master (Campbell et al., 2020). The importance of numeracy literacy is used by the daily need to use and apply various mathematical concepts (Deshpande et al., 2017; Getenet, 2023; Hong et al., 2020). To improve students' numeracy literacy is inseparable from the availability of learning resources (Chang, 2023). Numeracy literacy skills are very important to be applied in learning mathematics at school. Numeracy plays an important role in determining the approach to learning mathematics in schools and making math learning more relevant to students. (Kemendikbud, 2017). According to the Organization for Economic Cooperation and Development (OECD) in 2016, the most undesirable outcome of low mathematical literacy is not only limited access to employment, but also poor health and little social and political participation in the nation.

In this study, using questions that are in accordance with numeracy literacy indicators according to the reference Kemendikbud (2017). The description of numeracy literacy indicators will be explained in Table 1 below.

[1] Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia, Email: wardono@mail.unnes.ac.id, (Corresponding Author)
[2] Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia.
[3] Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia
[4] Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia.
[5] Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia
[6] Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia

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Table 1. Self-efficacy Categorization Group Boundaries

No.	Numeracy Literacy Indicator
1.	Use a variety of numbers and mathematical symbols to solve practical problems in the context of daily life.
2.	Analyze information (graphs, tables, charts, diagrams, etc.).
3.	Interpret the results of the analysis to make predictions and decisions.

Numeracy literacy in learners is closely related to their self-efficacy. Often teachers have applied the self-efficacy framework extensively to encourage secondary school students to have better literacy and numeracy skills (Begum et al., 2021). Parental trust directly and positively affects students' math achievement, and resources indirectly and positively affect students' self-efficacy (Kung & Lee, 2016). According Bandura (1997) self-efficacy is a person's belief in their abilities that will affect how they act in certain situations and conditions. Bergqvist et al. (2020) define self-efficacy as focusing on an individual's ability to complete a particular task and on a conception of the future; self-concept has a stronger relationship with the social environment and involves self-assessment based on the past. In research Salsabilah & Kurniasih (2022) the results of this study show that learners who have low self-efficacy have poor numeracy literacy skills. In addition, the results of this study also show that the better the self-efficacy of students, the better their numeracy literacy skills.

Based on the explanation above, it is stated that this research was conducted with the aim of revealing in depth about students' numeracy literacy that is advanced from self-efficacy. It is different from previous studies because in general it is more focused on numeracy literacy or more focused on solving problems in numeracy literacy without reviewing the affective.

Literature Review

Numeracy Literacy

One of the literacy skills that are important to develop is numeracy literacy. Numeracy literacy is a derivative or branch of mathematical literacy. This ability leads individuals to recognize the role of mathematics in life and make good judgments and decision making (Meeks et al., 2014). Numeracy literacy is closely related to solving mathematical problems. If there is no problem solving the benefits of learning mathematics are limited. This is because the core of learning mathematic is problem solving (NCTM, 2000).

Numeracy literacy is a branch of mathematical literacy, but there are differences between numeration and mathematics. The difference lies in the empowerment of this knowledge and skills (Kemendikbud, 2017). The application of numeration includes the skills to apply mathematical concepts and rules in everyday situations. Numeration deals with the social life of individuals using mathematical concepts. Numeration is interpreted as an ability, confidence, and mathematics in learning activities at school, home, work, and life in general (National Council for Curriculum and Assessment, 2011). Numeracy literacy are used to solve problems in everyday life, not limited to only presented questions at school (Grasby et al., 2020).

Self-Efficacy

To better develop students' problem-solving skills, it is important to study in depth the factors that influence them. Social cognitive theory states that self-efficacy refers to an individual's assessment of their ability to organize and perform actions, and this assessment significantly affects their perseverance when facing problems and challenges (Bandura, 1997), and it an internal factor that contributes to success in learning and education (Capron Puozzo & Audrin, 2021). Tende & Deme (2023) states that self-efficacy plays an important role in problem solving. Self-efficacy is an individual's belief in his or her ability to succeed in a particular task or situation, which influences how they face challenges and set goals (Schunk, D. H., & DiBenedetto, 2021). Furthermore, higher self-efficacy equips students with the skills and attitudes necessary for success (Alhadabi & Karpinski, 2020).

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Self-efficacy is important to apply in school learning to students. This is because self-efficacy changes students' views and improves performance in mathematics learning, so that better learning results are obtained (Salsabilah & Kurniasih, 2022). Given the importance of students' self-efficacy in their mathematics education, understanding how self-efficacy changes over time and what factors influence the strength of self-efficacy is critical and can have implications for teaching practices (Street et al., 2022). In research (Salsabilah & Kurniasih, 2022) showed the results that students who have low self-efficacy, have less numeracy literacy. In addition, the results of this study also show that the better the self-efficacy of students, the better numeracy literacy. Educators have widely applied the self-efficacy framework to promote numeracy and literacy excellence among secondary school students. For example, Ozkal (2019)evaluated the relationship between self-efficacy and Mathematics achievement and found that 6th, 7th, and 8th graders' self-efficacy beliefs positively predicted their Mathematics achievement.

Methodology

This research is a descriptive research with a qualitative approach. Data collection techniques in this study used numeracy literacy test instruments. The subject retrieval technique used purposive sampling technique. The subjects of this research were students of class VII-D SMPN 5 Cimahi which amounted to 40 people. The selection of research subjects begins with classifying the students' self-efficacy scale starting from the level (high, medium and low). Subjects were given a questionnaire to measure the level of self-efficacy then grouped into 3 categories and each selected 1 student based on the level of student self-efficacy. The data generated from filling out the self-efficacy questionnaire was analyzed by adding up all the scores (X) on the student self-efficacy scale into $\sum X$, determining the average value ($\bar{X}$), and standard deviation (SD), then determining the group boundaries as in Table 2 below.

Table 2. Self-efficacy Categorization Group Boundaries

Category	Criteria
$X \geq (\bar{X} + SD)$	High
$(\bar{X} - SD) \leq X < (\bar{X} + SD)$	Medium
$X < (\bar{X} - SD)$	Low

The following data on self-efficacy classification results are listed in Table 3 below.

Table 3. Self-efficacy Classification Results

Criteria	Number of students	Percentage
High	6	15%
Medium	28	70%
Low	6	15%
Total	**40**	**100%**

This study used a self-efficacy questionnaire and a five-item numeracy literacy test. To collect data, this study used numeracy literacy tests and interviews to obtain information and find variations in numeracy literacy in terms of self-efficacy. In analyzing the data, the technique described by Miles and Huberman was used. The stages of analyzing Miles and Huberman's data are divided into 3 (three) stages, namely reducing data, presenting data, and drawing conclusions. (Sugiyono, 2016).

Results

In this section, the analysis of numeracy literacy of students with high, medium, and low self-efficacy levels is presented. Analysis of numeracy literacy results measured through indicators of using various kinds of numbers and symbols related to basic mathematics to solve practical problems in the context of everyday life, analyzing information displayed in various forms (charts, tables, diagrams, and so on), and interpreting the results of the analysis to predict and make decisions.

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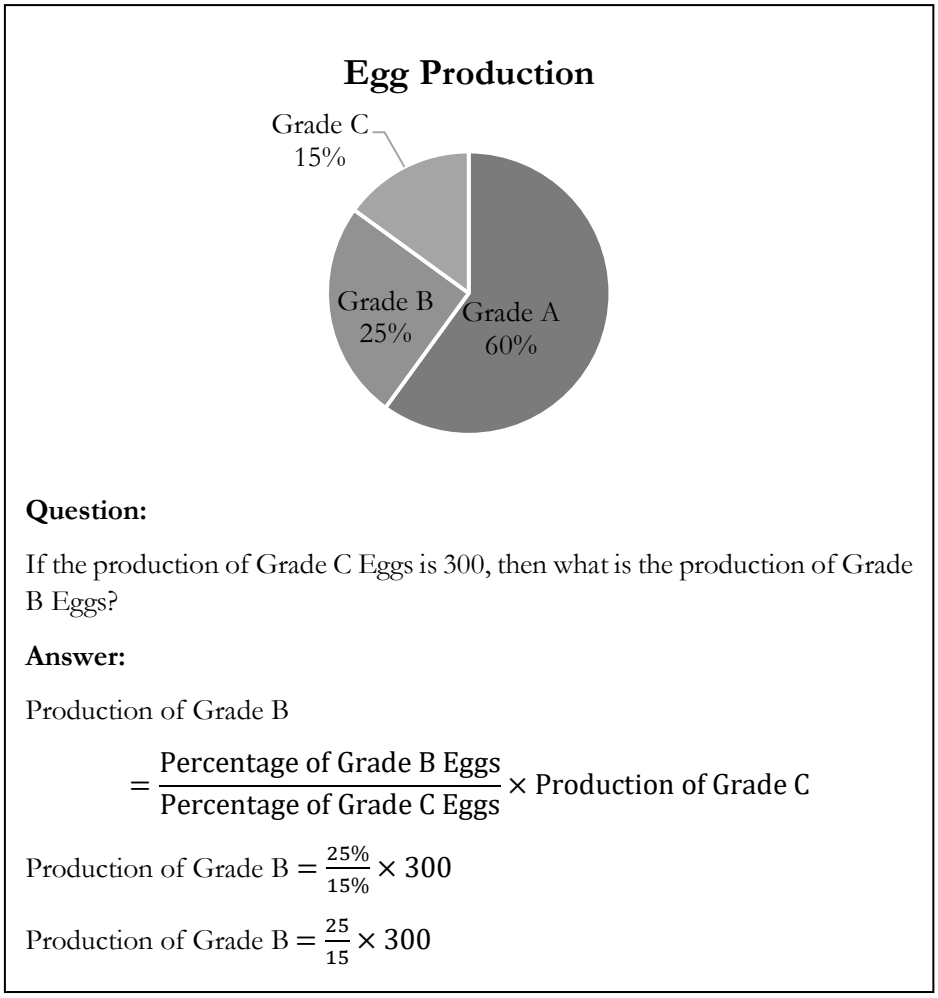
Indicator 1: Use a variety of numbers and symbols related to basic mathematics to solve practical problems in the context of daily life in



Question:

If the production of Grade C Eggs is 300, then what is the production of Grade B Eggs?

Answer:

Production of Grade B

$$= \frac{\text{Percentage of Grade B Eggs}}{\text{Percentage of Grade C Eggs}} \times \text{Production of Grade C}$$

$$\text{Production of Grade B} = \frac{25\%}{15\%} \times 300$$

$$\text{Production of Grade B} = \frac{25}{15} \times 300$$

Figure 1. Test Results of Subject S-1 Indicator 1

Based on the Test Results in Figure 1 above, it can be seen that S-1 is able to use various kinds of numbers and symbols related to basic mathematics to solve problems in various contexts of daily life. In doing the test, S-1 was able to use numbers to calculate the amount of grade B egg production correctly. Based on the results of the interview, it was found that S-1 could use numbers appropriately. S-1 can explain how to use numbers to calculate grade B egg production from what is known in the problem.

Indicator 2: Analyze information displayed in various forms (graphs, tables, diagrams, etc.).

Question:

Which is the largest grade of egg production?

Answer:

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Figure 2. Test Results of Subject S-1 Indicator 2

Based on the test results in Figure 2 above, it can be seen that S-1 is able to analyze information displayed in various forms (graphs, tables, diagrams, etc.). In terms of analyzing information, S-1 is able to correctly analyze the information in the pie chart. S-1 can analyze the bar chart to answer related to the most grade of egg production. S-1 has answered correctly that the most grade of egg production is grade A. Based on the results of the interview, it was found that S-1 could analyze the information correctly. S-1 can explain how to analyze information from the pie chart in the problem.

Indicator 3: Interpret analysis results to make predictions and decisions.

Question:

What does the above pie chart conclude about the egg production of different grades?

Answer:

The egg production each month has the highest egg quality of grade A which

Figure 3. Test Results of Subject S-1 Indicator 3

Based on the test results in Figure 3 above, it can be seen that S-1 is able to interpret the results of the analysis to predict and make decisions. In doing the test, S-1 can provide conclusions from the pie chart contained in the problem, it's just a little wrong from the answer "every month", while in the question "last month". The answer written by S-1 is quite precise. Based on the results of the interview, it was found that S-1 could interpret the results of the analysis quite accurately. S-1 can explain the conclusion based on the analysis results in the problem.

Based on the analysis of numeracy literacy by considering indicators of using various kinds of numbers and symbols related to basic mathematics to solve practical problems in the context of everyday life, analyzing information displayed in various forms (charts, tables, diagrams, etc.), and interpreting the results of the analysis to predict and make decisions. through data triangulation from test results and interviews, it can be seen that subjects who have a high level of ability, managed to meet all three indicators. This shows that subjects who have numeracy literacy can be categorized as very capable.

Analysis of Numeracy Literacy Subjects with Middle Self-efficacy Category

Indicator 1: Use a variety of numbers and symbols related to basic mathematics to solve practical problems in the context of daily life.

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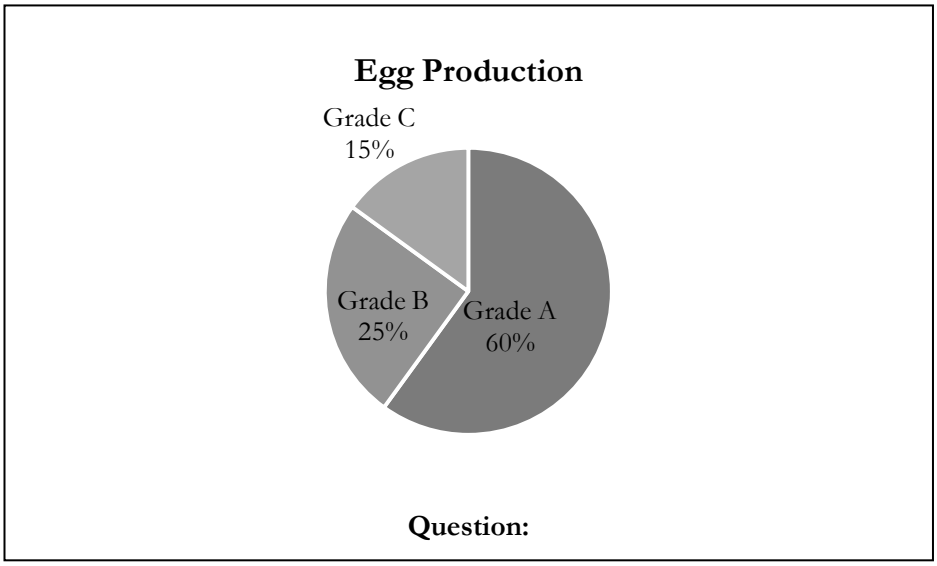

Figure 4. Test Results of Subject S-4 Indicator 1

Based on the Test Results in Figure 4 above, it can be seen that S-4 is able to use various kinds of numbers and symbols related to basic mathematics to solve problems in various contexts of daily life. In doing the test, S-4 directly wrote the answer without using numbers to calculate the amount of grade B egg production, the answer written by S-4 was still incorrect. Based on the results of the interview, it was found that S-4 could not use numbers very precisely. S-4 answered by just writing any number.

Indicator 2: Analyze information displayed in various forms (graphs, tables, diagrams, etc.).

Question:

Which is the largest grade of egg production?

Answer:

Figure 5. Test Results of Subject S-4 Indicator 2

Based on the Test Results in Figure 5 above, it can be seen that S-4 is able to analyze information displayed in various forms (graphs, tables, diagrams, etc.). In terms of analyzing information, S-4 is able to correctly analyze the information in the pie chart. S-4 can analyze the bar chart to answer related to the most grade of egg production. S-4 has answered correctly that the highest grade of egg production is grade A. Based on the results of the interview, it was found that S-4 could analyze the information very precisely. S-4 can explain how to analyze information from the pie chart in the problem.

Indicator 3: Interpret analysis results to make predictions and decisions.

What does the above pie chart conclude about the egg production of different grades?

Answer:

The higher the grade, the more eggs are produced.

Figure 6. Test Results of Subject S-4 Indicator 3

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Based on the Test Results in Figure 6 above, it can be seen that S-4 is able to interpret the results of the analysis to predict and make decisions. In doing the test, S-4 can provide conclusions from the pie chart contained in the problem and the results of the amount of production from each grade. The answer written by S-4 is correct. Based on the results of the interview, it was found that S-1 has not been able to interpret the results of the analysis. S-4 has not been able to explain the conclusion based on the analysis results in the problem.

Based on the analysis of numeracy literacy by considering indicators of using various kinds of numbers and symbols related to basic mathematics to solve practical problems in the context of everyday life, analyzing information displayed in various forms (graphs, tables, diagrams, etc.), and interpreting the results of the analysis to predict and make decisions. through data triangulation from test results and interviews, it can be seen that subjects who have a moderate level of ability, by fulfilling two indicators. This shows that subjects who have numeracy literacy can be categorized as quite capable.

Analysis of Numeracy Literacy Subjects with Low Self-efficacy Category

Indicator 1: Use a variety of numbers and symbols related to basic mathematics to solve practical problems in the context of daily life.

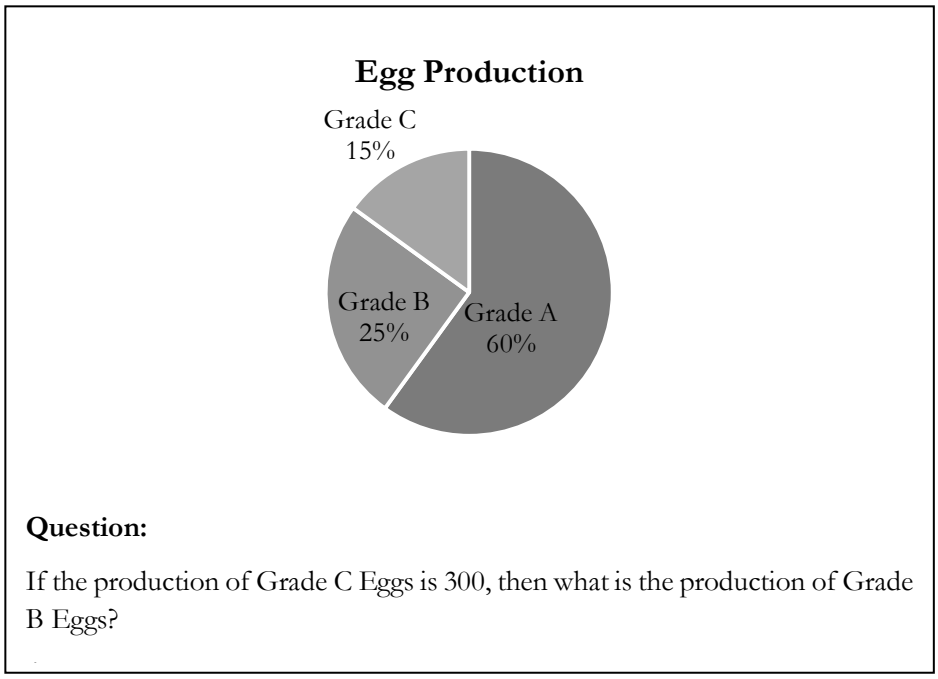

Figure 7. Test Results of Subject S-6 Indicator 1

Based on the Test Results in Figure 7 above, it can be seen that S-6 has not been able to use various kinds of numbers and symbols related to basic mathematics to solve problems in various contexts of daily life. In doing the test, S-6 directly wrote the answer without using numbers to calculate the amount of grade B egg production, the answer written by S-6 was still incorrect. Based on the results of the interview, it was found that S-6 could not use numbers correctly. S-6 could not explain how to use numbers to calculate grade B egg production from what was known in the problem.

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Indicator 2: Analyze information displayed in various forms (graphs, tables, diagrams, etc.).

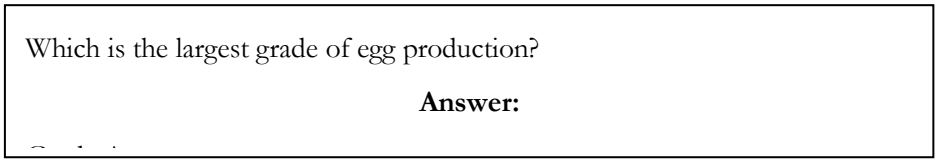

Figure 8. Test Results of Subject S-6 Indicator 2

Based on the Test Results in Figure 8 above, it can be seen that S-6 is able to analyze information displayed in various forms (graphs, tables, diagrams, and so on). In terms of analyzing information, S-6 is able to correctly analyze the information in the pie chart. S-6 was able to analyze the bar chart to answer about the highest grade of egg production. S-6 has answered correctly that the highest grade of egg production is grade A.

Indicator 3: Interpret analysis results to predict and make decisions.

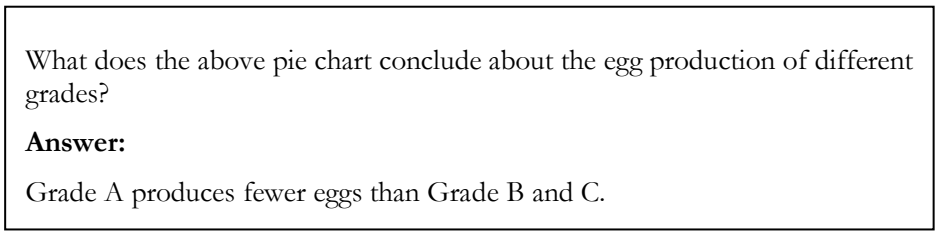

Figure 9. Test Results of Subject S-6 Indicator 3

Based on the test results in Figure 4.49 above, it can be seen that S-6 has not been able to interpret the results of the analysis to predict and make decisions. In doing the test, S-6 has not been able to provide conclusions from the pie chart contained in the problem and the results of the amount of egg production, because the highest grade production is grade A eggs, only S-6 answers that grade A eggs are the least production. The answer written by S-6 is not correct.

Based on the analysis of numeracy literacy by considering indicators of using various kinds of numbers and symbols related to basic mathematics to solve practical problems in the context of everyday life, analyzing information displayed in various forms (graphs, tables, diagrams, etc.), and interpreting the results of the analysis to predict and make decisions. through data triangulation from test results and interviews, it can be seen that subjects who have a low level of ability, by fulfilling one indicator. This shows that subjects who have numeracy literacy can be categorized as incapable.

Discussion

In this study, the numeracy literacy of high self-efficacy category learners generally fulfills all numeracy literacy indicators. Learners in the medium self-efficacy category are able to use a variety of numbers and symbols related to basic mathematics to solve problems in a variety of daily life contexts, can analyze information displayed in various forms (graphs, tables, diagrams, and so on), and can interpret the results of the analysis to predict and make decisions. But learners with moderate self-efficacy category are still lacking in interpreting the results of analysis to predict and make decisions. Learners with low self-efficacy category generally only fulfill the numeracy literacy indicator, namely analyzing information displayed in various forms (graphs, tables, diagrams, etc.). Learners with low self-efficacy category are less able to interpret the results of the analysis to predict and make decisions. Learners with low self-efficacy category have not been able to use numbers and symbols related to basic mathematics to solve problems in a variety of daily life contexts. This is supported by research Salsabilah & Kurniasih (2022) stated that the better and

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higher the self-efficacy of students, the better numeracy literacy in working on problems. In line with Nurtiana & Adirakasiwi (2022) stated that students who have a high level of self-efficacy have good numeracy literacy skills. High self-efficacy is positively associated with better math problem solving skills, which shows the importance of self-efficacy in numeracy literacy (Öztürk et al., 2020). *High self-efficacy is associated with greater motivation and ability to cope with adversity, which is important for academic and professional success.* (Unterfrauner, E., Voigt, C., & Hofer, 2021). Learners with moderate self-efficacy ability are able to answer questions correctly, although they do not make conclusions from the questions asked. (Rahmi et al. 2020). In research Trieu & Abeyta (2023) stated that teachers can help improve self-efficacy by connecting learning to real situations, learners feel more motivated and confident in their academic abilities. Learning that is relevant to real life usually motivates students more because they see the practical benefits. This motivation increases self-efficacy because students feel more confident that they can apply their knowledge effectively. (Shahab, Y., et al, 2019; Rafiola, R., el al, 2020). Low self-efficacy also affects their attitude towards learning, making them less willing to take risks or face challenges. (Kusumojanto, 2017).

Conclusion

Based on the results of the analysis and discussion, it can be concluded that students still experience difficulties in numeracy literacy, especially for low and medium ability students. Conversely, students who have high abilities do not experience difficulties in solving these math problems. In addition, the results of this study also show that the better the self-efficacy of students, the better numeracy literacy. Students with high self-efficacy category fulfill 3 (three) indicators of numeracy literacy, this shows that students with high self-efficacy category have good numeracy literacy. Students in the medium self-efficacy category fulfill 2 (two) numeracy literacy indicators, this shows that students in the medium self-efficacy category have fairly good numeracy literacy. Meanwhile, low self-efficacy category students fulfill 1 (one) indicator of numeracy literacy, this shows, students who have low self-efficacy, have less numeracy literacy.

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