



Analysis of Students' Statistical Literacy Ability Based on Learning Anxiety : A Phenomenological Study in High School Students

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Abstract: This study aims to analyze students' mathematical literacy skills based on learning anxiety aspects. The research method used is phenomenology with a qualitative approach. Data collection techniques through mathematical literacy tests, learning anxiety questionnaires, observation and in-depth interviews. The subjects of this study are 7 students of MAN 2 East Jakarta who were selected based on purposive sampling techniques from the aspect of learning anxiety. The data analysis used is an interactive model from Miles and Huberman which has four main stages, namely data collection, data reduction, data presentation, and conclusion drawing. The results of this study show that learning anxiety, especially in cognitive and behavioral aspects, has a significant effect on statistical literacy ability. Learners with low anxiety showed better literacy achievement, while those with high anxiety tended to have difficulty understanding and applying statistical concepts. These findings emphasize the importance of anxiety management in mathematics learning to improve students' statistical literacy. Therefore, adaptive learning approaches and psychological support are needed to help learners overcome anxiety and improve their literacy skills.

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Introduction

The Minister of Education, Culture, and Research Technology began to enforce an independent curriculum in 2022, with one of the programs being Independent Learning. The implementation of the Independent Curriculum adjusts learning to the characteristics, interests, abilities, and learning styles of students to create a more personalized, meaningful, and flexible learning process. In addition, students can be more actively involved in learning that is relevant to their needs and potentials. The Merdeka Learning Program aims to create a fun learning environment at school, both for teachers and students, by focusing on the development of students' cognitive abilities, one of which is mathematical literacy (Naufal & Amalia, 2022).

Mathematical literacy reflects a person's ability to formulate, operate, and interpret mathematical principles to solve problems in real-life contexts (Ramadhan et al., 2023). In line with what was expressed by Akras et al.,(2024) and Amelia et al., (2022) that mathematical literacy is the ability to think effectively to solve problems which plays an important role in self-development and facing daily challenges. Mathematical literacy skills, as reading and writing skills, have a crucial role in understanding basic concepts, interpreting information and solving various problems, especially those related to daily life (Ekawati et al., 2020; Miftahul Jannah & Miftahul Hayati, 2024). Furthermore, statistical literacy refers to a person's ability to read, understand, assess, and convey information presented in the form of



tables, graphs, or diagrams, in order to make the right decisions in daily life (Fitri et al., 2023; Mahmudah & Setianingsih, 2022). Statistical literacy needs to be mastered by students because in daily life, anyone can play a role in producing data as well as in understanding and using available data (Laurentia Noviafta Widya & Sukoriyanto, 2023).

In fact, the literacy of high school students is still relatively low. This is proven globally by PISA, an international study that assesses the quality of the education system by measuring reading, mathematics, and science literacy organized by the OECD. In 2022, only 18% of Indonesian students were able to achieve the basic level (level 2) of mathematics literacy, far below the OECD average of 69%, and decreased compared to 2018 (OECD, 2022). Research Kholifasari et al., (2020) It proves that a large number of students still have difficulty in translating mathematical problems packaged in the form of narratives of daily life into mathematical format. In line with research Masfufah & Afriansyah (2021) revealed that students can only solve PISA questions at levels 1 and 2 which shows that their mathematical literacy skills are low. Likewise, the statistical literacy ability of students is still relatively low, namely in research Irdatul Fitri et al., (2023) and Fiqih Fadillah (2021) stating that students' statistical literacy ability is still low in each indicator, due to the limited understanding of statistical concepts. One of the factors that hinder literacy achievement is anxiety learning mathematics which is psychological and complex.

Math anxiety is defined as negative emotions in the form of feelings of discomfort, worry, fear, anxiety, or distress that arise when a person faces a situation related to mathematics, and this condition can hinder the learning process, especially when in unsupportive circumstances (Harefa et al., 2023; Lestari et al., 2020; Napitupulu et al., 2023). Anxiety in learning mathematics can have a negative impact on students' learning achievement. Seta et al., (2021) Revealing the impact of math anxiety not only hinders students' learning process but also contributes to a decline in overall math ability. One example is research conducted by Lestari et al., (2020) explains that students who have low mathematical anxiety are much more able to solve problems correctly than students who have high mathematical anxiety.

Students need good anxiety management in order to overcome the anxiety they experience. As conveyed by Muhamad Safa'udin (2024) that anxiety management techniques such as progressive relaxation techniques have a significant influence on anxiety and learning concentration. Anxiety in learning mathematics that dominates students' minds can reduce learning motivation, complicate the thinking process, interfere with concentration, and ultimately have an impact on students' ability to understand the material (Fadhilah & Syarifatul, 2024). Therefore, anxiety management is very important so that students can be more optimal in learning and the academic results they get. Of course, this anxiety of learning mathematics is caused by many factors. According to Jalal (2020), Math learning anxiety is affected by a lack of confidence, negative perceptions, low learning frequency, less supportive learning situations, and the complexity of materials, such as statistics. Statistics as a complex subject requires high literacy skills, but many students have difficulty understanding concepts, reading graphs, choosing formulas, and answering questions carefully (Jusniani & Setiawan, 2023; Oktaviranda & Asmara, 2021; Wisesa & Riajanto, 2022).

From some of the studies that have been presented above, there have not been many studies on the subjective experiences of students facing mathematics anxiety and its impact on mathematical literacy, and generally only use anxiety levels as a measuring tool. This research raises the aspect of mathematical anxiety as a mathematical literacy measurement



tool that is an element of novelty. It is hoped that this research will provide an in-depth understanding of learning anxiety and effective strategies to overcome it to improve the quality of mathematics education.

Research Method

This study uses a phenomenological method with a qualitative approach. This approach was chosen with the aim of analyzing the mathematical literacy profile of MAN students on statistics topics based on the aspect of learning anxiety, by exploring the factors that students consider as the cause of mathematical anxiety in solving mathematical literacy problems, as well as understanding the phenomenon of anxiety in depth in order to improve the ability of students to solve these problems according to the level of anxiety they experience. The subjects of this study were 7 students of MAN 2 East Jakarta who were selected by purposive sampling. Subject selection criteria include: (1) learners who exhibit symptoms of math anxiety based on anxiety aspects, (2) willingness to participate in research, and (3) ability to articulate their experiences well. (4) have anxiety criteria with the categories of somatic domain, cognitive domain, attitudinal and mathematical knowlegde. The data analysis technique used is an interactive model from Miles and Huberman (2014) with four main stages, namely data collection, data reduction, data presentation, and conclusion drawing. Data was collected through the dissemination of questionnaires, mathematical literacy tests, and interviews.

Learning Anxiety Questionnaire

Students' learning anxiety is categorized into four aspects, namely somatic domain, cognitive domain, attitudinal, and mathematical knowledge. This learning anxiety questionnaire consists of 25 statements which are modifications of previous research conducted by (Cavanagh & Sparrow, n.d.) that has been tested for validity and reality by mathematics lecturers. The answer choices on the questionnaire used the likert scale guideline which consisted of 4 choices, namely strongly disagree, disagree, agree, and strongly agree. The selection of students for the literacy test and interview stage is seen from the highest scores obtained from each aspect of learning anxiety. Based on the results of the questionnaire that has been distributed to 37 students, an overview of the various statistics learning anxiety experienced. The results of the categorization of the learning anxiety questionnaire based on its aspects are presented in table 1.

Table 1. Results of Categorization of Learning Anxiety Questionnaire Based on Its Aspects

Aspects	Number of students	Presentase	Subject Code
Somatic domain	2	5,4%	S
Cognitive domain	21	56,7%	C
Attitudinal	12	32,4%	A
Mathematical Knowledge	2	5,4%	M

Furthermore, each research subject will be given a code to facilitate the presentation of the analysis. Subjects in the somatic domain aspect (S) were selected by two people with subject codes S1 and S2. Then, the subjects in the cognitive domain (C) aspect were selected by two people with subject codes C1 and C2. The subjects in the attitudinal aspect (A) were selected by two people with subject codes A1 and A2. Furthermore, the subject in the mathematical knowledge aspect is selected by one person with the subject code M1.



Mathematical Literacy Ability Test

The mathematical literacy ability test instrument was obtained from the AKM ANBK class XI questions totaling 5 questions in the mathematics literacy sub-test with the selected material, namely statistics. The research subjects were obtained from 2 students with the highest somatic scores, 2 students with the highest cognitive scores, 2 students with the highest attitudinal scores, and 1 student with the highest mathematical knowledge score. Indicators of mathematical literacy ability are used to measure the results of students' answers, namely formulating, applying, and interpreting. This indicator was adopted from the research (Sausan & Wibowo, 2024) which can be described in the table below.

Tabel 2. Indicators of Mathematical Literacy Ability in Statistics Materials

No	Indicator	Indicator Definition
1	Formulate	Ability to recognize important information, analyze data, and understand the relationship between language, context, symbols, and data in statistical problems.
2	Apply	Ability to use concepts, facts, procedures, and statistical reasoning to solve data-driven problems and draw conclusions from the process of solving them.
3	Interpreting the Results	Ability to understand and infer statistical data logically

Results and Discussion

Student Learning Anxiety

The results of statistical learning anxiety diagnostics showed that out of a total of 37 students who participated in learning, 7 main subjects had been selected to be analyzed in depth based on the variation in anxiety aspects possessed. This analysis aims to describe the form of learning anxiety experienced by students in solving mathematical literacy problems, especially in statistical content. The majority of subjects experienced anxiety in the cognitive aspect, which was characterized by difficulty understanding the problem, doubt in choosing a solution strategy, and uncertainty about the answer. According to Sausan and Wibowo (2024), cognitive anxiety is the main inhibiting factor in solving PISA-based mathematical literacy problems, because it affects the thinking process and understanding of mathematical concepts. In addition, some subjects showed symptoms of somatic anxiety such as sweaty, restless, and nervous hands, which are physiological responses to psychological stress when working on the problem. This is in line with the opinion (Cavanagh & Sparrow, n.d.) which states that mathematical anxiety involves cognitive, somatic and affective aspects that affect each other.

Affective anxiety was also found in subjects who showed low confidence in completing math tasks, which had an impact on learning motivation and uncertainty about work outcomes. According to Sausan and Wibowo (2024), Affective anxiety can reduce students' persistence in facing challenging math problems, thereby hindering the development of mathematical literacy optimally. These results show that the learning anxiety experienced by students is complex and interrelated. Therefore, a learning approach that is more responsive to the psychological condition of students in order to create a learning environment that supports the development of mathematical literacy more optimally.

Statistical Mathematical Literacy Achievement Analysis

The analysis of students' mathematical literacy achievement in class XI statistics learning was carried out by considering learning outcomes, mathematical literacy indicators, and aspects of learning anxiety. Based on the learning outcomes of statistics, students are



expected to be able to understand the basic concepts of statistics, process and present data, and interpret the results of data analysis in various contexts. The results of the observation showed that most of the students were active in learning, especially in group discussions. This indicates that in general students have achieved a basic understanding of statistics. However, when asked to explain the results of their work, some learners experience anxiety, which can affect confidence in communicating their understanding. Furthermore, a mathematical literacy ability test was carried out for students who were selected based on the aspect of learning anxiety. The following are the results of the achievement of students' statistical literacy skills based on the aspect of learning anxiety.

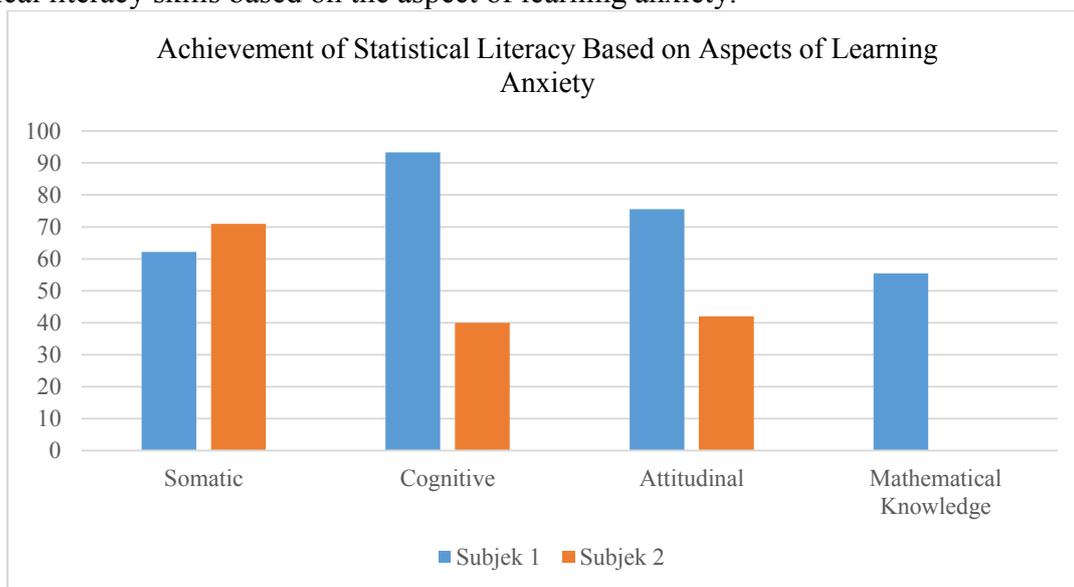


Figure 1. Graph of Achievement of Students' Statistical Literacy Ability Based on Learning Anxiety Aspects

Based on the figure, in the somatic domain aspect, S1 obtained a score of 62.2 and S2 obtained a score of 71, indicating that S2 with lower somatic anxiety had higher statistical literacy achievement than S1. In the cognitive domain, C1 obtained a score of 93.3 and C2 obtained only a score of 40, indicating the striking difference that students with low cognitive anxiety, due to negative thoughts such as fear of failure, feel incapable. Next, in the attitudinal aspect, A1 obtained a score of 75.5 and A2 obtained a score of 42, indicating that a positive attitude towards statistics has an impact on higher literacy achievement and attitudes towards mathematics affect interest, confidence, and activeness in learning (Masfufah & Afriansyah, 2021). In the aspect of mathematical knowledge, M1 obtained a score of 55.5 which shows that anxiety due to lack of understanding of basic concepts quite affects statistical literacy skills, so it is necessary to improve understanding of prerequisite concepts.

Based on the indicators of mathematical literacy ability, students are assessed in the aspects of understanding problems, applying statistical concepts, and interpreting results logically. Five of the six groups were able to solve the problem correctly, which shows that they are quite good at understanding and applying concepts. However, the anxiety that arises when explaining the answers indicates that students still face challenges in the aspect of mathematical communication. This difficulty can have an effect on their ability to interpret data in depth and relate it to real-world situations. When associated with the aspect of learning anxiety, the majority of students (21 people) experienced cognitive anxiety that had an impact on understanding and processing mathematical information, 12 students



experienced attitudinal anxiety which affected motivation to learn statistics, and two students experienced mathematical knowledge anxiety which showed difficulty in understanding basic concepts.

Although students are generally able to achieve mathematical literacy indicators, anxiety is still an obstacle in communication and interpretation of results, so learning strategies such as supportive discussions, concept scaffolding, relaxation techniques, and oral communication training are needed to increase confidence and statistical comprehensions (Amelia et al., 2022; Safa'udin & basith arham, 2024; Seta et al., 2021).

Quality Analysis of Mathematical Literacy Test Completion

Results of Solving Statistical Mathematical Literacy Problems in Formulating Indicators Somatic Domain Aspects

Subjects S1 and S2 on the somatic aspects of the domain show differences in the formulating indicators. S1 subjects with high somatic anxiety only met the formulating indicators in questions 1, 2, and 4. Meanwhile, S2 subjects who had a lower level of somatic anxiety were able to meet these indicators on questions 1 to 4. This suggests that lower somatic anxiety allows students to be more consistent in formulating statistical problems, and that good management of physical emotions can support the achievement of mathematical literacy indicators evenly. The following is one of the results of solving S1 and S2 mathematical literacy questions can be seen in the image below.

Ⓛ Diket = Jumlah Produksi Padi & Luas Penean
 Dit = Data Tertinggi ke terendah

Jawab - Februari - Januari = $3,63 - 2,04 = 1,59$ Ⓛ (Naik)
 Maret - Februari = $9,17 - 3,63 = 5,54$ Ⓛ (Naik)
 April - Maret = $8,94 - 9,17 = -0,23$ Ⓛ (Turun)
 Mei - April = $4,57$ Ⓛ (Turun)
 Juni - Mei = $4,31 - 4,57 = -0,26$ Ⓛ (Turun)
 Juli - Juni = $4,64 - 4,31 = 0,33$ Ⓛ (Turun) (Naik)
 Agustus - Juli = $2,00 - 4,64 = -2,64$ Ⓛ (Turun) (Naik)
 September - Agustus = $5,60 - 2,00 = 3,60$ Ⓛ (Turun) (Naik)
 Oktober - September = $4,23 - 5,60 = -1,37$ Ⓛ (Turun) (Naik)
 November - Oktober = $3,31 - 4,23 = -0,92$ Ⓛ (Turun) (Naik)
 Desember - November = $2,65 - 3,31 = -0,66$ Ⓛ (Turun) (Naik)

Jawab = $5,54 - 4,57 - 1,59 - 4,56 - 1,37 - 1,26 - 0,26 - 0,29 - 1,33 - 0,23 - 0,66$

∴ Jadi tertinggi adalah bulan Feb-Mar
 Dan terendah Mei-Juni

Figure 2. S1 Completion Results

Based on Figure 2 and Figure 3, it can be seen that S2 shows the fulfillment of good formulating indicators. This can be seen from the way S2 writes down known data and systematically compiles the difference in rice production from month to month to find the order of the largest and smallest increase. Meanwhile, S1 lacks the fulfillment of the indicators of formulating optimally. Although the data is known and the questions are well mentioned, they are not detailed and complete. This is because S1 is more anxious than S2 as evidenced by the answers to the results of interviews that the researcher conducted to S1 that he felt nervous and anxious when he got the mathematical literacy question.

Cognitive Domain Aspects

Subjects C1 and C2 on the indicators formulate, both show striking differences in the fulfillment of the indicators. C1 has low cognitive anxiety, successfully meets the indicators on all questions (questions 1 to 5). Meanwhile, C2, which has high cognitive anxiety, only meets the formulating indicators in questions number 1 and 5. The following is one of the results of solving C1 and C2 literacy questions which can be seen in the picture below.

Ⓛ Diketahui = Produksi Padi di Desa Sukajadi pada Tahun 2019

- Jan = 2,04 ton	- Juli = 4,64 ton
- Feb = 3,63 ton	- Ags = 5,60 ton
- Maret = 9,17 ton	- Sept = 4,23 ton
- Apr = 8,94 ton	- Okt = 3,31 ton
- Mei = 4,57 ton	- Nov = 2,65 ton
- Juni = 4,31 ton	- Des = 1,70 ton

Ⓛ Ditanya = Urutan peningkatan Jumlah Produksi padi dari yang terbesar ke terendah?

- ① Feb - Maret → $3,63 \text{ ton} - 9,17 \text{ ton} = \text{bertambah } 5,54 \text{ ton}$
- ② Jan - Feb → $2,04 \text{ ton} - 3,63 \text{ ton} = \text{bertambah } 1,59 \text{ ton}$
- ③ Juli - Ags → $4,64 \text{ ton} - 5,60 \text{ ton} = \text{bertambah } 0,96 \text{ ton}$
- ④ Juni - Juli → $4,31 \text{ ton} - 4,64 \text{ ton} = \text{bertambah } 0,33 \text{ ton}$

Figure 3. S2 Completion Results

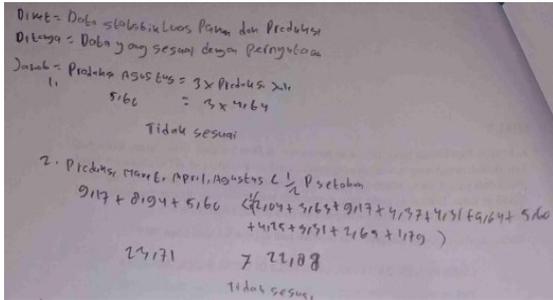


Figure 4. C1 Completion Results

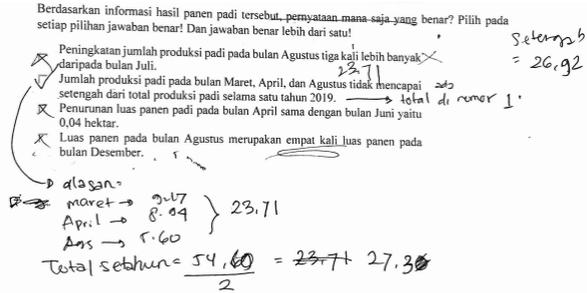


Figure 5. C2 Completion Results

C1 is seen writing down what is known and asked about the question even though it is not as detailed as it is known. But this is quite better than C2 which does not write down the formulate indicator at all in the problem. This reflects that a low level of mental disorders such as overthinking, fear of failure, or other negative thoughts helps C1 to focus and be able to identify and formulate statistical problems thoroughly and consistently. Then, C2 shows that high cognitive anxiety can hinder students' ability to understand the context of the problem and formulate the problem model correctly. This is evidenced by the results of interviews between researchers and C2.

Researcher: "What are your main difficulties in solving mathematical literacy problems?"

C2 : "My main difficulty is when I see it. I'm confused, what is this, how to find the answer. So I was confused about the point of the question".

Thus, high cognitive anxiety has a negative effect on the fulfillment of formulating indicators and is an important aspect that needs to be minimized in the learning process.

Attitudinal Aspects

Subjects with attitudinal aspects for A1 and A2 showed differences in the fulfillment of formulating indicators that were closely related to attitudes towards mathematics, such as interest, motivation, and confidence in facing problems. Subject A1, who has a positive attitude towards learning statistics, is able to meet the indicators of formulating all questions (questions 1 to 5). This shows that a good attitude provides internal encouragement for students to be more confident in understanding the context of the problem, identifying important information, and formulating problems correctly (Masfufah & Afriansyah, 2021). On the other hand, subject A2, who had a negative attitude, only met the formulating indicators in questions 1, 2 and 5. Low motivation and dislike of the material may make A2 less thorough or not make a maximum effort in understanding the problems given, so that the fulfillment of indicators becomes inconsistent. The following is one of the results of solving mathematical literacy problems for statistical materials A1 and A2 which can be seen in the image below.

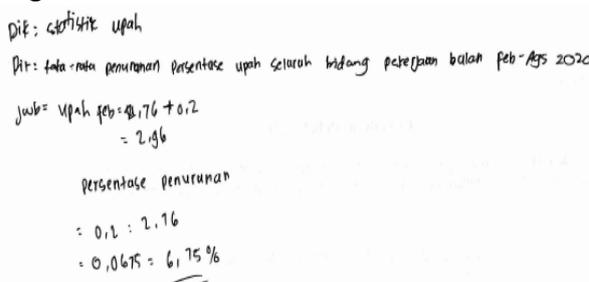


Figure 6. A1 Completion Results

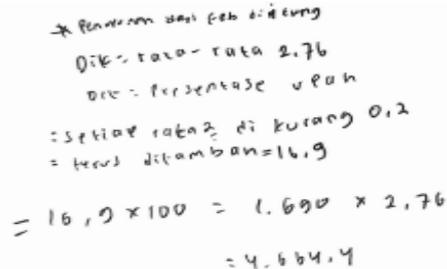
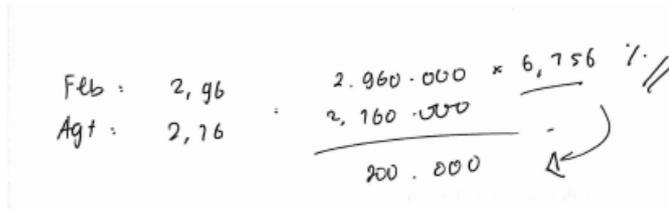


Figure 7. A2 Completion Results

A1 shows good formulating skills by understanding the context of the question and formulating relevant information, i.e. calculating the average wage decrease and its percentage accurately. Meanwhile, A2 seems inappropriate in formulating information. A2 only writes the indicator of formulating one of the statement options, not formulating the information from the whole problem. A1 shows a better understanding of the context of the problem and the corresponding mathematical thinking process. On the contrary, A2 shows the need for improved ability to identify relevant information and organize it into a correct mathematical representation form. Thus, a positive attitude towards statistics has been proven to play a major role in students' success in formulating statistical problems.

Mathematical Knowledge Aspects

Formulating indicators require students to understand the context of the problem and construct mathematical models based on the available information, which is highly dependent on mastery of basic mathematical concepts. The subject of M1 only meets the formulating indicators in questions 1 and 5, while in questions numbers 2, 3, and 4 it is not fulfilled. This shows that the weak mastery of basic concepts makes it difficult for students to compile mathematical models and interpret data correctly (Jusniani & Setiawan, 2023; Oktaviranda & Asmara, 2021). The following is an example of a picture of solving M1 mathematical literacy problems in statistics material.



Feb : 2,96
Agt : 2,16

$$\begin{array}{r} 2.960.000 \times 6,756 \\ \hline 2.160.000 \\ \hline 200.000 \end{array}$$

Figure 8. A2 Completion Results

Based on figure 8, M1 has not shown the ability to formulate in the aspect of mathematical knowledge because it directly performs calculations without the formulation of a mathematical model or explanation of the context, which shows that the understanding of the problem is still weak and focuses on numbers. Therefore, it is necessary to reduce anxiety due to weak basic concepts through strengthening prerequisite materials and learning that emphasizes connections between concepts to improve the ability to formulate statistical problems correctly and systematically.

Results of Solving Statistical Mathematical Literacy Problems in Implementing Indicators Somatic Domain Aspects

Based on mathematical literacy questions, S1 meets the indicators of applying, but in questions number 2, 3, and 4, he only writes the solution on statements that are considered correct. Based on figure 2, there are many inappropriate scribbles and strategies, reflecting anxiety. S1 wrote all the months in his answer even though he was only asked the month with the increase. On the other hand, based on figure 3, S2 shows a more systematic performance with a good solution strategy on questions number 1, 3, 4, and 5, and understands the problem well, although in question number 2 he also only answers statements that are considered correct. This difference can be influenced by the level of learning anxiety in somatic aspects, such as physical symptoms such as nervousness or restlessness, which is more dominant in S1 than S2. High somatic anxiety can interfere with concentration and mathematical reasoning, making it difficult for S1 to apply concepts appropriately. Meanwhile, S2 is able to manage anxiety better, so his cognitive processes are less disrupted, allowing him to think more clearly and structured in solving problems.



Cognitive Domain Aspects

C1 and C2 both meet the indicators of applying to all questions. However, the quality of their answers differed significantly. C2 received a score of 40 out of 100 due to errors in understanding the problem and choosing strategies, as well as showing inaccuracy due to nervousness when working on the problem, such as only answering statements that were considered correct. This shows that high cognitive anxiety affects the application of concepts and accuracy, as conveyed by Sausan and Wibowo (2024) that cognitive anxiety interferes with the process of thinking and decision-making in solving problems, including understanding concepts and choosing the right strategy. In contrast, C1 showed good quality of a solution strategy, was able to understand the questions of each question correctly and obtained a score of 93.3 out of 100. In complex multiple-choice questions, C1 evaluates all statements in detail and concludes "appropriate" or "inappropriate" based on the results of the calculation. C1 not only relies on memorization, but also analyzes the context and adjusts the answers to the problem situation, thus meeting the indicators applying well.

Attitudinal Aspects

The research subjects in the attitudinal aspect both met the implementing indicators by writing a solution strategy for all problems, but the quality was different. A1 shows the ability to apply well with proper and systematic calculation strategies, such as calculating the average wage, the difference between wages, and the percentage decrease correctly, showing an understanding of the context of the problem and the concept of the percentage decrease. Instead, A2 appears confused and uses irrelevant strategies, such as multiplying percentages by the number of workers and a certain value, which shows a lack of understanding of the concept. A2 also has weaknesses in understanding stories, is afraid to ask questions, and is easily distracted when studying, so they lack focus and show a negative attitude towards math. This attitude affects confidence and the ability to apply concepts appropriately (Masfufah & Afriansyah, 2021).

Mathematical Knowledge Aspects

The subject of Mathematical Knowledge (M1) showed that despite experiencing anxiety related to mastering mathematical concepts and procedures, M1 was still able to solve mathematical literacy problems quite well, especially in the indicators of applying. This is reflected in his ability to write down complete completion steps and try to apply strategies to each problem, although in question number 4 which can be seen in figure 8, there are mistakes in choosing or applying the appropriate strategy. The mistake was not due to a lack of effort, but due to a lack of understanding of the relevant concepts, so M1 used a familiar strategy although not right. This shows that anxiety in the aspect of mathematical knowledge can hinder the accuracy of the application of concepts, even though students have the initiative to try to solve problems. This anxiety does not always make students passive, but it can reduce confidence in evaluating the strategies used. Therefore, conceptual guidance and exercises with appropriate feedback are needed to support students with learning anxiety in this aspect.

Results of Solving Statistical Mathematical Literacy Questions on Indicators of Interpreting Results

Students with anxiety in the somatic aspect of the domain, namely S1, provide answers and good reasons for questions number 1, 4, and 5. While S2 provides the conclusion of the answer along with the correct reason for questions 1, 2, and 5. Although S1 and S2 were only able to interpret the results on 60% of the questions, this shows that anxiety has not completely inhibited critical thinking skills, so there is still a lot of room for improvement.



Light support such as breathing exercises, positive affirmations, or the habit of working on contextual questions in a calm atmosphere can be an effective first step to building confidence and consistency in understanding the meaning of the problem.

Furthermore, students with cognitive aspects, C1 wrote down all the answer conclusions based on the results of their calculations on the overall question. C2 writes down the interpretation of the results on questions 1 and 5 only. These differences in interpreting results provide an idea of how cognitive anxiety affects thinking and decision-making in solving mathematical literacy problems in statistical materials. This difference also suggests that the impact of cognitive anxiety is highly dependent on how learners deal with it. C1 is able to manage his cognitive anxiety and continue to carry out the thought process until the interpretation stage. Furthermore, the subject attitudinal 1 (A1) writes the conclusion of the calculation results obtained in questions number 1, 2, and 5. Attitudinal subject 2 (A2) writes the conclusion of the results in questions number 1, 2, 3, and 5. Slightly higher A2 performance in the indicator interpreting results suggests that attitudinal anxiety does not always result in the same barriers between learners.

Next, students with the mathematical knowledge aspect write down the results of their completion in the form of conclusions in several questions. Indicators interpret results into indicators that are often forgotten by students. In fact, this indicator is very important because it is a sign that students really understand the questions that are solved in their entirety. M1 gave an interpretation of the results on questions 1 and 5. Understanding the basic concepts of mathematics that is not yet strong is the main obstacle in drawing conclusions on statistical mathematical literacy problems. To overcome anxiety in this aspect, educators need to build a meaningful understanding of concepts through contextual questions, group discussions, or daily life approaches. A deeper understanding will foster students' confidence and gradually improve their mathematical literacy skills.

Conclusion

The results of the study show that learning anxiety has a significant impact on the mathematical literacy ability of students at MAN Jakarta. There are four aspects of anxiety that affect mathematical literacy, namely the somatic, cognitive, attitudinal and mathematical knowledge aspects. In the somatic aspect, physical reactions such as pounding heart and sweaty hands interfere with students' concentration in understanding and formulating problems. Meanwhile, cognitive anxiety is characterized by negative thoughts, such as fear of failure and inadequacy. The attitudinal aspect is characterized by a negative attitude towards mathematics that hinders students' learning efforts. The mathematical knowledge aspect shows that a weak understanding of basic mathematical concepts reduces the ability to relate problems to the appropriate context. On the other hand, students with low anxiety showed better ability to apply systematic and confident solution strategies in answering questions. These findings confirm the importance of managing learning anxiety to improve mathematical literacy, as well as the need for a more adaptive learning approach to support students in overcoming the anxiety experienced.

Recommendation

Based on the findings, it is recommended that educators implement learning strategies that are responsive to students' psychological conditions, particularly learning anxiety. Contextual problems, collaborative discussions, and positive reinforcement can help reduce anxiety and



enhance students' mathematical literacy. Future research may involve more diverse subjects and explore specific interventions to support students with high anxiety levels.

References

- Akras, A., Pujiastuti, H., & Rafianti, I. (2024). Systematic Literature Review : Analisis Kemampuan Literasi Matematis di Kabupaten Serang. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 08(03), 2158–2169.
- Amelia, I., Syamsuri, S., Santosa, C. A. H. F., & Fatah, A. (2022). Meta Analisis: Pengaruh Model Pembelajaran Terhadap Kemampuan Literasi Matematis Siswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 6(2), 1720–1730. <https://doi.org/10.31004/cendekia.v6i2.1410>
- Cavanagh, R., & Sparrow, L. (n.d.). Measuring mathematics anxiety: Paper 2 - Constructing and validating the measure. *Paper Presented at the AARE Annual Conference*, 1–13.
- Ekawati, R., Susanti, & Chen, J. C. (2020). Primary Students' Mathematical Literacy: a Case Study. *Infinity Journal*, 9(1), 49–58. <https://doi.org/10.22460/infinity.v9i1.p49-58>
- Fadhilah, & Syarifatul, M. (2024). Pengaruh kecemasan matematika terhadap prestasi belajar matematika siswa SMP & SMA. *Jurnal Inovasi Pendidikan Matematika*, 5(2), 169.
- Fadillah, F., & Munandar, D. R. (2021). Analisis kemampuan literasi statistis dalam pembelajaran matematika di masa pandemi. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, 4(5), 1157–1168. <https://doi.org/10.22460/jpmi.v4i5.1157-1168>
- Fitri, I., Setyaningrum, W., & Pulungan, D. A. (2023). Fenomena Literasi Statistik Pada Pembelajaran Matematika Siswa Sma Di Lhokseumawe Aceh. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 12(2), 1927. <https://doi.org/10.24127/ajpm.v12i2.7000>
- Harefa, A. D., Lase, S., & Zega, Y. (2023). Hubungan Kecemasan Matematika Dan Kemampuan Literasi Matematika Terhadap Hasil Belajar Peserta Didik. *Educativo: Jurnal Pendidikan*, 2(1), 144–151. <https://doi.org/10.56248/educativo.v2i1.96>
- Jalal, N. M. (2020). Kecemasan Siswa pada Mata Pelajaran Matematika. *J-PiMat: Jurnal Pendidikan Matematika*, 2(2), 256–264.
- Jusniani, N., & Setiawan, E. (2023). Literasi Matematis Siswa MTs Pada Materi Statistika. *Hexagon: Jurnal Ilmu Dan Pendidikan Matematika*, 1(1), 30–37. <https://doi.org/10.33830/hexagon.v1i1.4926>.
- Kholifasari, R., Utami, C., & Mariyam, M. (2020). Analisis Kemampuan Literasi Matematis Siswa Ditinjau Dari Karakter Kemandirian Belajar Materi Aljabar. *Jurnal Derivat: Jurnal Matematika Dan Pendidikan Matematika*, 7(2), 117–125. <https://doi.org/10.31316/j.derivat.v7i2.1057>
- Laurentcia Noviafta Widya, & Sukoriyanto. (2023). Analisis Literasi Statistik Siswa SMP dalam Menyelesaikan Soal Model PISA. *Indiktika : Jurnal Inovasi Pendidikan Matematika*, 5(2), 136–145. <https://doi.org/10.31851/indiktika.v5i2.11603>
- Lestari, H., Fitriza, R., & A, H. (2020). Pengaruh Kecemasan Matematika (Mathematics Anxiety) Terhadap Kemampuan Pemecahan Masalah Peserta Didik Kelas VII MTS. *Math Educa Journal*, 4(1), 103–113. <https://doi.org/10.15548/mej.v4i1.1325>
- Mahmudah, L., & Setianingsih, R. (2022). Kemampuan Literasi Statistis Siswa Sma Ditinjau Dari Gaya Kognitif Sistematis Dan Intuitif. *MATHEdunesa*, 11(1), 255–267. <https://doi.org/10.26740/mathedunesa.v11n1.p255-267>



- Masfufah, R., & Afriansyah, E. A. (2021). Analisis Kemampuan Literasi Matematis Siswa melalui Soal PISA. *Mosharafa: Jurnal Pendidikan Matematika*, 10(2), 291–300. <https://doi.org/10.31980/mosharafa.v10i2.662>
- Miftahul Jannah, & Miftahul Hayati. (2024). Pentingnya kemampuan literasi matematika dalam pembelajaran matematika. *Griya Journal of Mathematics Education and Application*, 4(1), 40–54. <https://doi.org/10.29303/griya.v4i1.416>
- Napitupulu, N. L., Mevianti, A., & Leonard. (2023). Pengaruh Kecemasan Matematika terhadap Kemampuan Penalaran Matematika Peserta Didik. *Journal of Instructional Development Research*, 3(1), 27–36.
- Naufal, H., & Amalia, S. R. (2022). Peningkatan Kemampuan Literasi Matematika Siswa di Era Merdeka Belajar Melalui Model Blended Learning. *Seminar Nasional Pendidikan Matematika*, 3(1).
- OECD. (2022). PISA 2022 Results Factsheets Indonesia. *OECD (Organisation for Economic Co-Operation and Development) Publication*, 1–10. https://www.oecd.org/en/publications/pisa-2022-results-volume-i-and-ii-country-notes_ed6fbcc5-en/indonesia_c2e1ae0e-en.html
- Oktaviranda, A., & Asmara, A. (2021). Kemampuan Literasi Melalui Pengembangan Soal pada Materi Statistika. *JKPM (Jurnal Kajian Pendidikan Matematika)*, 7(1), 15. <https://doi.org/10.30998/jkpm.v7i1.10620>
- Ramadhan, S., Prubaningrum, M., Raudyathauzahra, & Setyaningrum, W. (2023). Penggunaan Teknologi untuk Mengembangkan Literasi Matematika Peserta Didik pada Kurikulum Merdeka. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 12(3), 3231–3245.
- Safa'udin, M., & basith arham, A. (2024). Pengaruh Teknik Relaksasi Progresif terhadap Peningkatan Konsentrasi dan Prestasi Matematika Siswa SMA yang Mengalami Kecemasan Ujian. *DHARMA PENDIDIKAN STKIP PGRI NGANJUK*, 19(2), 117–125. <https://doi.org/10.69866/dp.v19i2.531>
- Sausan, T., & Wibowo, M. U. (2024). Analisis Kemampuan Literasi Matematis Peserta Didik Sekolah Menengah dalam Menyelesaikan Soal PISA Konten Quantity Ditinjau dari Math Anxiety. *Science, Tecnology, Religious, Economic, and Social Humanitis (STREAS)*, 1(1), 1–19.
- Seta, E. P., Suherman, & Farida. (2021). *Model Pembelajaran ELPSA: Pengaruhnya Terhadap Kemampuan Literasi Matematis dan Kecemasan Belajar*. December, 156–168. <https://doi.org/10.23960/mtk/v9i2.pp156-168>
- Wisesa, K. T., & Riajanto, M. L. E. J. (2022). Analisis Kesalahan Siswa Kelas Ix Dalam Menyelesaikan Soal Statistika Kelas Viii Di Masa Pandemi Covid 19. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, 5(2), 599. <https://doi.org/10.22460/jpmi.v5i2.9528>