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Measurement of Mathematical Literacy in Everyday Life Context: A Case Study on High School Students Reviewed by Gender

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ABSTRACT

This research aims to measure the level of mathematical literacy in the context of daily life among high school students, with a focus on differences between male and female students. The research method employed is quantitative with a survey approach. A total of 13 male students and 24 female students from various high schools participated as subjects. The instrument used was a Likert scale questionnaire consisting of 15 statements designed to measure students' perceptions and understanding of mathematical literacy in everyday life. Data analysis was conducted using the paired sample t-test to compare differences in responses between male and female students. The analysis results showed a paired sample t-test value of -0.368, with a significance value (sig) of 0.719. These findings indicate that there is no significant difference between the responses of male and female students regarding mathematical literacy in the context of daily life. Nevertheless, this research provides an important contribution to understanding students' perceptions of mathematical literacy and its implications in the educational context. Further research can delve into the factors influencing students' perceptions of mathematical literacy and broaden the sample scope to obtain a more holistic understanding of the phenomena under investigation.
Keywords: Case study, Everyday Life, Gender, Mathematical Literacy.

ABSTRAK

Penelitian ini bertujuan untuk mengukur tingkat literasi matematika dalam konteks kehidupan sehari-hari di kalangan siswa SMA, dengan fokus pada perbedaan antara siswa laki-laki dan perempuan. Metode penelitian yang digunakan adalah kuantitatif dengan pendekatan survei. Sebanyak 13 siswa laki-laki dan 24 siswa perempuan dari berbagai sekolah SMA menjadi subjek penelitian. Instrumen yang digunakan adalah angket dengan skala Likert yang terdiri dari 15 pernyataan, dirancang untuk mengukur persepsi dan pemahaman siswa terhadap literasi matematika dalam kehidupan sehari-hari. Analisis data dilakukan menggunakan uji paired sampel t-test untuk membandingkan perbedaan dalam tanggapan antara siswa laki-laki dan perempuan. Hasil analisis menunjukkan nilai uji t sebesar -0,368, dengan nilai signifikansi (sig) sebesar 0,719. Temuan ini menunjukkan bahwa tidak terdapat perbedaan signifikan antara tanggapan siswa laki-laki dan perempuan terhadap literasi matematika dalam konteks kehidupan sehari-hari. Meskipun demikian, penelitian ini memberikan kontribusi penting dalam pemahaman tentang persepsi siswa terhadap literasi matematika dan implikasinya dalam konteks pendidikan. Penelitian selanjutnya dapat mendalami faktor-faktor yang memengaruhi persepsi siswa terhadap literasi matematika serta memperluas cakupan sampel untuk mendapatkan pemahaman yang lebih holistik tentang fenomena yang diteliti.
Kata kunci: Studi Kasus, Kehidupan Sehari-hari, Gender, Literasi Matematika.

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Introduction

In everyday life, proficiency in mathematics enables individuals to tackle challenges and problems involving calculations, measurements, and modeling (Fazriansyah, 2023). Within a social context, mathematical understanding allows for the interpretation of statistical data, comprehension of risks and opportunities, and decision-making based on quantifiable information. Economically, mathematical literacy plays a crucial role across various occupational domains. Even in routine tasks such as cooking or measuring building materials, mathematical understanding is necessary to achieve accurate and consistent results. In the academic realm, a grasp of mathematics is highly essential across diverse disciplines. In the natural sciences, mathematics is utilized to analyze experimental data, model natural phenomena, and develop new theories. In the social sciences, mathematics is employed in statistics, economics, and sociology to test hypotheses and comprehend complex patterns. Even in arts and humanities, mathematics can offer fresh insights into understanding existing structures and patterns. Thus, practical understanding of mathematics is an exceedingly significant aspect of everyday life. Mathematical literacy aids individuals in becoming more adept at confronting challenges and problems, while also playing a vital role in social, economic, and academic contexts (Manurung et al., 2023).

Measurement of mathematical literacy levels, especially among high school students, is a crucial aspect in enhancing understanding and application of mathematical concepts in everyday life (Naufal & Amalia, 2022). A robust understanding of mathematics serves as not only a fundamental basis in academic learning but also plays a pivotal role in preparing students to confront challenges and leverage opportunities across various life domains (Nurlaela, 2021).With a solid grasp of mathematics, students can not only tackle various complex problems but also make informed decisions in real-life situations (Setiono et al., 2019). For instance, a profound understanding of mathematical concepts can assist students in managing personal finances, analyzing data, and solving practical everyday problems. Additionally, strong mathematical skills serve as a fundamental cornerstone for careers in diverse fields, including science, technology, engineering, business, and finance. Therefore, efforts to measure and enhance mathematical literacy levels among high school students are not only strategic steps in improving the quality of education but also long-term investments in preparing them to meet the demands and competition of this globalized era (Solehah & Setiawan, 2023).

Mathematical literacy, encompassing students' abilities to formulate, utilize, and interpret mathematics in various contexts, stands as a critical focus in this regard (Zahroh et al., 2020). Mathematics instruction in high schools should encourage students to engage in mathematical manipulations, analyze components in problem-

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solving, and communicate mathematical ideas effectively (Ahmad & Nasution, 2019). Furthermore, the mathematics curriculum in schools also plays a significant role in shaping students' mathematical literacy (Surat, 2019). A good mathematics curriculum should enable students to learn mathematics by tackling problems emerging from contexts beyond mathematics, applying essential mathematical concepts within other fields of study (Fendrik, 2017). Additionally, a good mathematics curriculum should emphasize reasoning and problem-solving modeling processes within the mathematics subject and implement cross-curricular numeracy (Fajriati & Murtiyasa, 2023).

Previous studies conducted in various locations provide comprehensive insights into the levels of mathematical literacy among high school students and the influencing factors. Research has examined mathematical literacy skills in high schools in Bandung, Indonesia, categorizing students into low, moderate, and high mathematical literacy ability groups (Fauzi & Nurlaelah, 2023). Another study focused on adult mathematical literacy and found that high school students with strong mathematical abilities could formulate mathematical situations, apply mathematical reasoning, and interpret mathematical solutions, albeit with errors in reasoning and solution interpretation (Lestari et al., 2022). Furthermore, research in Sleman Regency, Indonesia, revealed that high school students generally have low mathematical literacy skills, particularly in formula and application processes, interpretation processes, and various mathematical content areas (Nurjanah & Saputra, 2023). Moreover, a systematic literature review analyzed students' mathematical literacy based on learning styles and cognitive styles, predominantly conducted in high schools in Java, Indonesia (Rum & Juandi, 2022). A study comparing Indonesian 9th and 12th-grade students' statistical literacy found that most students exhibited non-critical thinking and limited statistical thinking skills (Kurnia et al., 2023).. These case studies provide a clear overview of high school students' mathematical literacy and underscore the importance of developing their problem-solving skills in mathematics.

Moreover, research has been directed towards measuring and evaluating mathematical data analysis literacy, presenting assessment schemes based on curriculum standards, and discussing the use of pencil-and-paper tests. Low levels of mathematical literacy among Indonesian students have been associated with teacher-centered learning, insufficient practice with literacy questions, and difficulties in modeling mathematical problems from real-world scenarios (Bima et al., 2023; Sukmawati et al., 2022). Additionally, (Gradini et al., 2021) found that although they generally could solve mathematical literacy problems with clear information, they struggled with problems involving constraints or assumptions and integrating various representations in real-world situations.

From the presented research findings, several gaps or relevant knowledge voids regarding the measurement of high school students' mathematical literacy in everyday contexts are apparent. Firstly, there is a need to develop more relevant and valid measurement instruments that can accommodate real-world contexts in mathematics assessment. This reflects the challenge of aligning tests with the practical situations students encounter daily. Secondly, the lack of research specifically addressing the measurement of mathematical data analysis literacy underscores the importance of further exploring students' abilities to analyze and interpret data in real-life situations. Furthermore, there is a need for the development of scientific and quantitative models for measuring mathematical literacy to assess students' ability to model mathematical problems. Additionally, research on teacher assessment literacy is also needed to ensure the delivery of quality mathematics education. This analysis indicates that further research is needed to address gaps in measuring high school students' mathematical literacy, strengthen assessment relevance to real life, and enhance teachers' abilities to assess students' mathematical literacy effectively. It is also crucial to ensure that mathematics education provides equal opportunities for all students, including males and females. By exploring the differences in mathematical literacy between both genders, this research can provide insights into whether there are gaps or inequalities that need to be addressed.

The aim of this research is to identify students' abilities in using mathematics to make decisions, solve problems, and communicate in various everyday life contexts. Additionally, the study aims to evaluate the effectiveness of employing relevant and valid mathematical literacy measurement methods in real-world contexts, providing valuable insights for the development of more contextual and applicable mathematics curriculum and instruction for high school students.

Research Methods

The research method employed in this study is quantitative research with a survey approach. The primary objective of the research is to evaluate the effectiveness of employing relevant and valid methods of measuring mathematical literacy in the context of daily life, as well as to provide valuable insights for the development of a more contextual and applicable mathematics curriculum and learning for high school students. The research subjects consist of 37 randomly selected high school students. The research instrument utilized is a questionnaire. Researchers opted for a mathematics literacy questionnaire as it allows for broad and systematic data collection from a representative sample. By employing the questionnaire, researchers can assess the respondents' levels of understanding and mathematical skills, as well as identify patterns and trends in mathematical literacy. The questionnaire comprises 15 statements, to which respondents provide answers using a Likert scale, ranging from

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strongly disagree (score 1), disagree (score 2), neutral (score 3), agree (score 4), to strongly agree (score 5). The questionnaire indicators include: Using mathematics in personal financial planning, confidence in solving everyday problems with mathematics, frequent use of mathematics when shopping to calculate discounts, ability to apply comparison concepts in daily life, active use of mathematics to organize time and schedules, confidence in calculating and understanding relevant geometry concepts, frequent use of mathematics when cooking or measuring food ingredients, understanding probability concepts to make more informed decisions, ability to use mathematics to plan trips or calculate distances, confidence in measuring and evaluating everyday statistical data, ability to use mathematics to plan personal financial budgets, active use of algebra to solve everyday problems, employing mathematical understanding in financial investment planning, frequent use of mathematics to make predictions or estimates, regarding mathematical literacy as highly relevant and useful in daily life.

The research was conducted through several stages, starting from the development of the questionnaire according to the research variable indicators, distribution of the questionnaire to respondents via social media, data tabulation and analysis, to data interpretation and conclusion drawing based on analysis results using descriptive statistical techniques and t-tests. Data analysis was performed using JASP software with the conclusion criteria that if the Sig value < 0.05, then H0 is rejected, indicating a difference in measuring the level of mathematical literacy in the context of daily life among high school students. Thus, this research method is expected to provide a deeper understanding of high school students' mathematical literacy and generate relevant information for the development of mathematics education at the high school level.

Result and Discussions

Data collection was carried out by distributing questionnaires over a period of 5 days to high school students, with a total of 37 respondents, comprising 13 males and 24 females. Participants were asked to respond to questions using a rating scale ranging from strongly agree to strongly disagree, according to their individual perceptions and views. The questionnaire results obtained, as shown in Table 1, formed the main basis for analyzing and interpreting response patterns and preferences from the sample involved in the study.

Based on the descriptive statistical analysis in Table 1, there is a significant difference in measuring the level of mathematical literacy in the context of daily life between male and female students. Specifically, it is observed that the median score of mathematical literacy among female students (68.665) is higher than that of male students (68.000).

This suggests that, overall, female students exhibit a slightly higher level of mathematical literacy compared to male students in the context of daily life. Furthermore, there is a noticeable difference in the means of the two groups, with the mean score of mathematical literacy among female students (70.332) being higher than that of male students (65.538). Coupled with the higher standard deviation in the scores of female students (16.793) compared to male students (10.282), this indicates that the variability in mathematical literacy scores among female students tends to be greater than among male students. Additionally, the total score of mathematical literacy obtained by female students (1687.980) is notably higher than that obtained by male students (851.990). This underscores the greater contribution of female students to mathematical literacy in the context of daily life compared to male students.

Table 1. Descriptive Statistics

		Male	**Female**
Valid		13	24
Missing		11	0
Mode	[a]	69.330	53.330
Median		68.000	68.665
Mean		65.538	70.332
Std. Deviation		10.282	16.793
Variance		105.727	282.001
Range		34.660	57.330
Minimum		46.670	42.670
Maximum		81.330	100.000
Sum		851.990	1687.980

[a] More than one mode exists, only the first is reported

Overall, these findings indicate that there are differences in perceptions and responses between male and female high school students regarding the variables under investigation. Female students tend to provide more varied responses with a wider range of values, while male students exhibit lower levels of variability in their responses. This could serve as a starting point for further research to understand the factors influencing the differences in perceptions and responses between the two gender groups within the context of high school environments.

Table 2. Paired Samples T-Test

Measure 1	**Measure 2**	**t**	**df**	**p**
Male	- Female	-0.368	12	0.719

Note. Student's t-test.

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The analysis results using paired sample t-test in Table 2 show a t-test value of (-0.368) with a significance (sig.) of (0.719). In the context of the null hypothesis (H0) proposed, which states the absence of differences in perception regarding the Measurement of Mathematical Literacy Level in Daily Life Context between males and females among high school students, the results indicate that there is insufficient evidence to reject the null hypothesis. The t-test value approaching zero, coupled with a high significance level (0.719), indicates that the difference between the sample means before and after treatment is not statistically significant.

This finding underscores that in this research context, there is no significant difference in the perceptions of male and female students regarding the measurement of mathematical literacy level in daily life before and after a treatment or intervention. However, it is important to note that these results may also be influenced by various other factors, such as sample size, research design, and measurement methods used. Thus, to gain a deeper understanding of the factors influencing students' perceptions of mathematical literacy in the context of daily life, further research with a more comprehensive and relevant approach may be necessary.

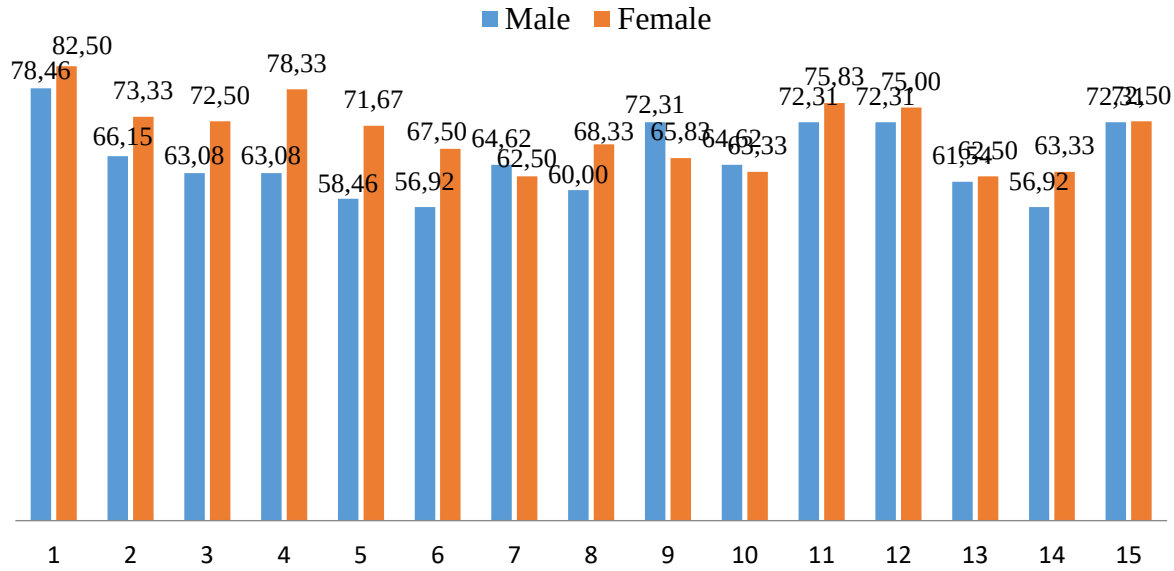

Figure 1. Gender Response Disparities

From Figure 1, it is evident that the average ratings provided by male and female students exhibit variation in responses to the presented indicators. Male students gave the highest average rating for Indicator 1 with a maximum value of 78.46, while the lowest minimum value was observed for Indicators 6 and 14 with a value of 56.92. On the other hand, female students demonstrated the highest average rating for Indicator 1 with a maximum value of 82.50, while the lowest minimum value was found for Indicators 7 and 13 with a value of 62.50. These differences indicate variability in

students' understanding and acceptance of mathematical literacy in the context of everyday life, both among male and female students.

This analysis illustrates that there are differences in perception and understanding between male and female students regarding mathematical literacy in everyday life, as reflected by the variation in ratings for each measured indicator (Xie & Liu, 2023). Although the highest ratings generally revolve around the first indicator, there are discrepancies in the lowest ratings across different indicators between the two gender groups (Sari & Khotimah, 2023). There are no differences in perception between males and females regarding mathematical literacy (Awalyah et al., 2022). This indicates the complexity in interpreting and applying mathematical literacy in everyday contexts, which may be influenced by factors such as educational backgrounds, experiences, and individual preferences. Therefore, these findings provide important initial insights for designing more inclusive and relevant learning strategies for high school students, taking into account individual differences in the understanding and application of mathematical literacy.

Conclusion

Based on the data analysis conducted in the study "Measuring Mathematical Literacy Levels in the Context of Everyday Life: A Case Study on High School Students," a t-test value of -0.368 with a significance (Sig.) of 0.719 was obtained. In the context of the proposed hypothesis, which suggests no difference in perception regarding mathematical literacy in daily life between male and female students, these findings indicate that there is insufficient statistical evidence to reject the null hypothesis. Thus, statistically, it can be concluded that there is no significant difference in students' perceptions between males and females regarding mathematical literacy in the context of daily life. Further research may consider employing more sensitive and valid research methods and instruments to measure students' perceptions and understanding of mathematical literacy, as well as exploring additional factors that may influence perceptions and understanding of mathematics in everyday contexts among males and females. Consequently, more comprehensive and in-depth research findings can significantly contribute to the development of effective and inclusive learning strategies in the context of mathematical literacy among high school students.

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