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Analysis of Mathematical Literacy of Junior High School Students in Lebak-Banten Regency: A Case Study of PISA-Type Problems

Analisis Literasi Matematis Siswa SMP di Kabupaten Lebak-Banten: Studi Kasus Soal Tipe PISA

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Abstract

This study aims to analyze the mathematical literacy of junior high school students in Lebak-Banten Regency, focusing on PISA-type questions. It focuses on the geographical context of the Lebak-Banten Regency, which has not been widely studied before. The results of this study are expected to provide a deeper insight into the mathematical literacy of junior high school students in the Lebak-Banten Regency, provide an understanding of the factors that play a role in mathematical literacy, and provide a foundation for developing more effective learning strategies. This study used a survey method with a quantitative approach involving 667 students from 12 junior high schools in grade VIII who were randomly selected from six junior high schools and six senior high schools in the Lebak-Banten district to be part of the research sample. The schools were then categorized into three levels, namely A, B, and C, based on the 2023 accreditation in Lebak-Banten Regency. The data analysis techniques used were descriptive and inferential statistics (T-test). In addition, the findings in this study: 1) there are differences in the mathematical literacy skills of junior high school students in solving PISA-type problems in Lebak-Banten Regency based on school accreditation, 2) there are no differences in the mathematical literacy skills of junior high school students in solving PISA-type problems in Lebak-Banten Regency between public schools and private schools, 3) there are differences in the mathematical literacy skills of junior high school students in solving PISA-type problems in Lebak-Banten Regency based on student ability levels, 4) there are no differences in the mathematical literacy skills of junior high school students in solving PISA-type problems in Lebak-Banten Regency between male and female students.

Keywords: *Accreditation, Gender, Mathematical Literacy, PISA, School Status*

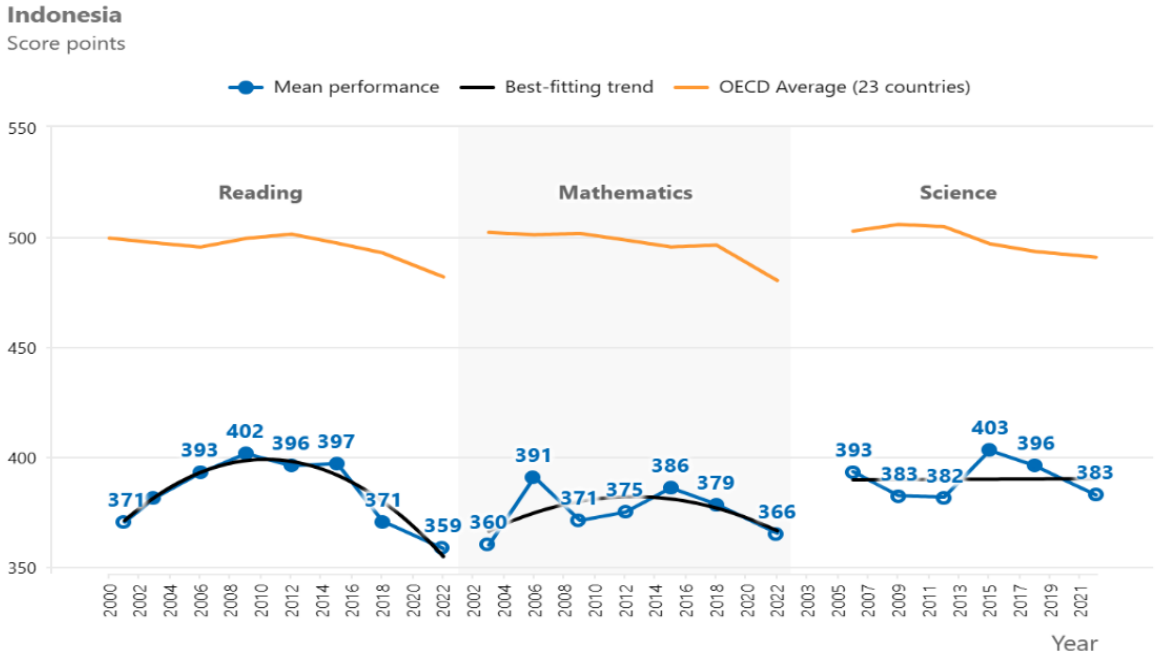
Abstrak

Penelitian ini bertujuan untuk menganalisis literasi matematis siswa SMP di Kabupaten Lebak-Banten dengan fokus pada soal tipe PISA. berfokus pada konteks geografis Kabupaten Lebak-Banten yang belum banyak diteliti sebelumnya. Hasil penelitian ini diharapkan memberikan wawasan yang lebih mendalam tentang literasi matematis siswa SMP di Kabupaten Lebak-Banten, memberikan pemahaman terhadap faktor-faktor yang berperan dalam literasi matematis, dan memberikan landasan untuk pengembangan strategi pembelajaran yang lebih efektif. Penelitian ini mengunakan metode survei dengan pendekatan kuantitatif yang melibatkan 667 siswa dari 12 sekolah SMP kelas VIII yang dilakukan secara acak dari enam sekolah SMPN dan enam sekolah SMPS di Kabupaten Lebak-Banten untuk menjadi bagian dari sampel penelitian. Sekolah kemudian dikategorikan menjadi tiga tingkatan, yaitu A, B, dan C, berdasarkan akreditasi tahun 2023 di Kabupaten Lebak-Banten. Teknik analisis data yang digunakan adalah statistik deskriptif dan inferensial (Uji T). Selain itu, temuan dalam penelitian ini; 1) terdapat perbedaan kemampuan literasi matematis siswa SMP dalam menyelesaikan soal tipe PISA di Kabupaten Lebak-Banten berdasarkan akreditasi sekolah, 2) tidak terdapat perbedaan kemampuan literasi matematis siswa SMP dalam menyelesaikan soal tipe PISA di Kabupaten Lebak-Banten antara sekolah negeri dan sekolah swasta, 3) perbedaan kemampuan literasi matematis siswa SMP dalam menyelesaikan soal tipe PISA di Kabupaten Lebak-Banten berdasarkan tingkat kemampuan siswa, 4) tidak terdapat perbedaan kemampuan literasi matematis siswa SMP dalam menyelesaikan soal tipe PISA di Kabupaten Lebak-Banten antara siswa laki-laki dan Perempuan.

Kata Kunci: Akreditasi, Gender, Kemampuan Literasi Matematis, PISA, Status Sekolah

1. Introduction

Mathematics education in junior secondary schools (SMP) is central to building human resources. Numeracy literacy, which includes the understanding of mathematical concepts and the skills to apply them in solving problems, is a crucial indicator to evaluate the effectiveness of mathematics education. The Program for International Student Assessment (PISA), administered by the Organisation for Economic Co-operation and Development (OECD), is used globally to measure the ability of 15-year-old students in mathematical literacy. PISA provides an in-depth picture of students' readiness to face global challenges, testing students' skills in solving complex problems, thinking critically, and communicating effectively (Pramujiyanti Khotimah et al., 2021). Indonesia first joined PISA in 2001. To assess the ability of 15-year-old students in Indonesia, see Figure 1.



Gambar 1. Tren Kinerja dalam Matematika, Membaca, dan Sains.

The PISA Year 2022 results recorded very significant declines compared to 2018 in math, reading, and science, reaching the lowest levels since measurements began in the early 2000s. Student performance shows a downward trend that requires serious attention from the Indonesian government. The PISA study provides valuable guidance for policymakers and practitioners to improve education quality, equity, and efficiency (OECD, 2023). Factors that cause Indonesia's low achievement in PISA can be identified from several aspects. Students are poorly trained in solving math problems with PISA-like characteristics because the exercises are often routine and at a low level (Farida et al., 2021). Therefore, mathematical literacy in Indonesia requires special attention to improve student achievement.

According to the OECD, mathematical literacy includes an individual's capacity to formulate, use, and interpret mathematical concepts in various contexts. It involves thinking mathematically and applying mathematical concepts, procedures, facts, and tools to explain and predict various phenomena (OECD, 2023). More than just understanding mathematical concepts, mathematical literacy also includes skills in applying them to solve everyday problems (Yulianto & Maryam, 2023). The OECD (2019a) has established seven key indicators of mathematical literacy: the ability to communicate, mathematical modelling, representation,

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reasoning and argument, designing problem-solving strategies, using symbolic and technical language, and utilizing mathematical tools. This enables individuals to understand the role of mathematics in everyday life and make rational decisions as responsible citizens.

According to Muhajir et al. (2020), the assessment of mathematical literacy in the PISA study focuses on three main competencies: reproduction, connection, and reflection. Low-scale questions aim to test reproductive competence through mathematical situations and operations familiar to students. Medium-scale questions test connection skills by requiring students to interpret unfamiliar situations. On the other hand, high-scaled questions are used to measure reflection competence by demanding high-level interpretation in unexpected contexts (Nurwahid & Ashar, 2022).

Table 1. Tingkat Kemampuan Level Soal PISA

No.	Level	Kemampuan Kognitif
1.	Level 1	The ability to apply knowledge to solve both routine and general context challenges.
2.	Level 2	Ability to understand and solve problems using formulas.
3.	Level 3	Ability to perform procedures and select problem-solving strategies.
4.	Level 4	The ability to apply specific methods effectively, select and describe different representations, and relate them to the real world.
5.	Level 5	Ability to design and implement models for complex situations and solve problems.
6.	Level 6	The ability to use reasoning in solving mathematical problems, generalizing, formulating, and communicating the results they have found.

This research evaluates the mathematical literacy skills of junior high school students in the Lebak-Banten Regency. The evaluation was conducted using mathematical literacy questions that refer to the PISA type, divided into three levels: levels 1 and 2 assessing reproduction skills, levels 3 and 4 assessing connection skills, and levels 5 and 6 assessing reflection skills (Setiawan et al., 2014). This study aims to identify domains where students have not reached the national standard. This research provides valuable insights for mathematics teachers. It provides a basis for refining materials that require more attention following the independent curriculum.

Findings in the initial observation and previous research literature on elementary school students in the Lebak-Banten district showed that there were limitations in students' reasoning power related to mathematical literacy, including aspects of number processing, values, and arithmetic operations (Farida et al., 2021). In addition, previous research that focuses on the ability of Higher Order Thinking Skills (HOTS) found that the majority of primary school students in the region have sufficient critical ability categories (42.89%), less creative (39.67%), and sufficient problem-solving (42.78%) (Yulianto and Maryam, 2023). Research by Farida et al. (2021) shows that high-ability students can be involved in all three aspects of the mathematical process: formulating, using, and interpreting. Middle-ability students only fulfil two aspects, namely formulating and using, while low-ability students only fulfil one aspect, namely formulating. This research analyses students' numeracy literacy skills, extending previous research focusing on mathematical literacy and mathematical processes. This study will analyze and describe students' numeracy literacy skills based on PISA questions with levels 1 to 6. This approach enriches previous research, such as Junaedi and Yulianto's (2022) research, which shows that the average initial mathematical literacy skills of elementary school students in the Lebak-Banten Regency are in the low category (23%). The similarity with previous research lies in analyzing mathematical literacy skills in solving HOTS questions. However, a novelty in this

study is brought by analyzing the mathematical literacy of junior high school students in Lebak-Banten Regency through case studies of PISA-type questions. The novelty lies in a more detailed approach to factors such as school accreditation, school status, ability level, and gender in identifying how much students master mathematical literacy. This approach can significantly contribute to understanding the variability of mathematical literacy at the local level with a more specialized context.

State of the Art The current state of this study is that research on mathematical literacy has become a significant focus in education. However, many of these studies are general and have not explicitly explored factors that might influence students' mathematical literacy at the local level, especially in the Lebak-Banten district. By incorporating case studies of PISA-type questions and considering specific factors such as school accreditation, school status, ability level, and gender, this research seeks to provide a more detailed and contextualized picture of junior high school students' mathematical literacy. Several experts in various regions in Indonesia have conducted previous studies related to mathematical literacy.

Although many studies have been conducted on mathematical literacy, there is a research gap, especially in the context of case studies of PISA-type questions at the local level, especially in Lebak-Banten Regency. This study aims to address the gap by focusing the analysis on factors that may influence students' mathematical literacy to provide more in-depth and contextual insights. It is hoped that this research can make an essential contribution to understanding students' mathematical literacy at the local level and, at the same time, serve as a basis for improving mathematics education in the region. Lebak-Banten district was chosen as the focus of the research because it is unique in several aspects of education, such as the level of school accreditation, school status (public and private), students' ability levels, and gender differences.

In the education sector in Kabupaten Lebak-Banten, there are variations in the level of school status, including both public and private schools. Public schools, funded by the government, often face budget constraints, follow the national curriculum and sometimes have limited facilities and infrastructure. On the other hand, private schools depend on student tuition fees, have flexibility in customizing the curriculum and offer more flexible facilities. These differences affect the availability of resources, additional curriculum offerings and class sizes, affecting students' mathematics learning. Understanding this diversity in school status is critical to a deeper understanding of the mathematical literacy research of junior secondary students in this region. This information can also support policymakers and education practitioners in their efforts to improve the quality of learning. Disparities in school status, whether public or private, can have an impact on students' ability levels (Ibrahim, 2021).

Observations during the Campus Teaching Program Batch 5 in public and private junior high schools in Lebak-Banten Regency for five months showed differences between male and female students in learning mathematics. Females tend to be thorough and include steps in their answers, while males are more hasty in giving short answers. This difference was seen during the Cerdas Cermat program, where female students scored the highest. Although the material does not focus on the Assessment of Mathematics Competence (AKM), these results form the basis of initial observations. It is essential to further investigate gender understanding in the context of mathematical literacy. The Campus Teaching Batch 5 program in junior high schools showed that accreditation positively impacted students' mathematical literacy, especially those from A-accredited schools (Junaedi & Yulianto., 2023). This suggests that educational standards through accreditation can significantly improve students' mathematics learning achievement (Anwar &

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Yulianto., 2022). Therefore, the role of school accreditation becomes a critical element in improving the quality of education.

This study explores the differences in junior high school students' numeracy literacy skills when facing PISA-type questions in the Lebak-Banten district. Using a holistic approach, this study considers factors such as school accreditation, status, ability level, and gender. The research objectives include: 1) identifying differences in junior high school students' mathematical literacy skills in responding to PISA-type questions in the Lebak-Banten district based on school accreditation, 2) determining differences in junior high school students' mathematical literacy skills in responding to PISA-type questions in Lebak-Banten district between public schools and private schools, 3) assessing differences in junior high school students' mathematical literacy skills in responding to PISA-type questions in Lebak-Banten district based on students' ability level, 4) analyzing differences in junior high school students' mathematical literacy skills in responding to PISA-type questions in Lebak-Banten district between male and female students. By considering these variables simultaneously, the author again provides in-depth insight into the complex interactions between these factors and their impact on students' mathematical literacy skills involving these aspects simultaneously, and is expected to contribute to the design of more effective and inclusive learning strategies, with the research title "Analysis of Mathematical Literacy of Junior High School Students in Lebak-Banten District: A Case Study of PISA-Type Problems by Considering Accreditation Factors, School Status, Ability Level, and Gender".

2. Literature Review

2.1. Mathematical Literacy Skills

21st-century education, known as the Knowledge Era, highlights the importance of individual abilities in technology, critical thinking, collaboration, innovation, creativity, and broad knowledge (Yuliyani & Setyaningsih, 2022). In this context, literacy encompasses applying knowledge to solve everyday problems with more advanced constructs and continuously improving actual abilities (Yulianto & Maryam, 2023). Originally associated with the ability to read and write, literacy now involves speaking, listening, imagining and perceiving (Siskawati et al., 2021). As part of general literacy, mathematical literacy involves the ability to explain and predict events using mathematical concepts, methods, principles and tools (OECD, 2023). More than just understanding mathematical content, mathematical literacy also involves actively applying mathematical designs, thinking skills, facts and tools to solve problems in real-world situations (Wahyu Utomo et al., 2020). Mathematical literacy understanding emphasizes the practical application of mathematical ideas, in contrast to the emphasis on normative school mathematics content (Sabrina et al., 2013).

Mathematical literacy helps children develop strong reading and writing skills, stimulates curiosity and inspires original ideas (Padmadewi & Artini, 2018). In the context of mathematics education, it is essential to develop mathematical literacy skills as optimally as possible. Students with good mathematical literacy skills are expected to estimate and assess information, solve everyday problems, and communicate ideas clearly (Jumarniati et al., 2021). The mathematical literacy indicators in this study refer to the concepts described by Ayuningtyas (2017), which include identifying mathematical aspects in real situation problems, transforming problems into language or mathematical models, applying mathematical model designs, and interpreting and evaluating mathematical results in the context of real-world problems.

2.2. PISA Type Problem

The OECD, through its project known as PISA, is an international organization that conducts studies on students' mathematical literacy. PISA aims to periodically test the basic skills of 15-year-old students in reading literacy, mathematical literacy and science literacy (Ngongo et al., 2023). The study serves as a tool to measure students' abilities, skills, and readiness for lifelong learning and participation in society. Mathematical literacy is the main focus of the Program for International Student Assessment (PISA) (Pakpahan, 2023). PISA mathematical questions test content, context and competence (OECD, 2023). The content aspect is divided into four mathematical categories related to the problem: quantity, uncertainty and data, change and relationships, and space and shape (Sabrina et al., 2023). In PISA, students' mathematical literacy is categorized into six levels. Levels 1 and 2 represent questions of low difficulty, 3 and 4 represent questions of medium difficulty, and 5 and 6 represent questions of high difficulty (Nurwahidah et al., 2020). The essence of PISA lies in students' mathematical reasoning skills and ability to apply them to solve everyday problems (Yulianto & Maryam, 2023).

2.3. School Accreditation

Accreditation is a form of official recognition from an authorized institution. It is interpreted explicitly as a formal recognition of the organization's ability to carry out its duties in its field (Lestari et al., 2023). In the context of schools, accreditation refers to a systematic and thorough assessment of a school's performance. This process involves internal and external evaluations, aiming to determine the extent to which the school meets the criteria set by the National Accreditation Board for Schools/Madrassas (BANS/M). According to Awaludin (2017), accreditation serves as a measurement of the quality of education in schools, providing a basis for coaching, developing, and improving the quality of education and assessing the level of school eligibility. The accreditation process aims to improve the quality of education so that students can succeed in understanding science, developing skills, and building character. Accreditation criteria include aspects of educator quality, curriculum development, learning processes, school facilities, measurement, assessment, graduate achievement, transparency, governance and financial accountability (Siahaan, 2023). Therefore, accreditation is expected to validate the performance of educational institutions/organizations in four essential components: input, process, output and outcome. Preferably, school accreditation should be implemented continuously, encouraging each school to improve and enhance its quality following established standards. This is considered an ongoing effort to improve the quality of education continuously.

2.4. School Status

Formal education in Indonesia is known by two main types of schools: public schools funded by the government and private schools funded by foundations or non-profit organizations. This difference in status has significant consequences on several aspects, including tuition fees, student quality, teacher quality, student achievement, and school accreditation. Public schools, which receive subsidies from the government, have more affordable costs, while private schools, which receive funding from foundations, have higher costs (Ibrahim, 2021). This difference in education costs affects parents' preferences, who tend to choose public schools to save money. Public schools are also perceived to have better quality students as they are considered academically superior. The quality of teachers is also a consideration, with teachers preferring to teach in public schools because the more significant number of students allows them to achieve their target teaching hours for certification. In addition, differences in student learning outcomes are also observed, with graduation rates in public schools tending to be higher. The school's prestige is also essential, whereas attending a public school is considered more prestigious. However, being a student in a private school is considered easier due to the smaller number of students. Finally, differences in school accreditation are also noted, with private

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schools tending to have higher accreditation status than public schools. This comparison involves several aspects, from cost to student learning outcomes, which can influence parents' and students' choice of school type.

2.4. Ability Level

Capability comes from the word "able", which means having the power or ability to do something, including action, ownership of property, or wealth. In this context, ability refers to a person's ability to do something. According to Maryam (2016), every individual has some mathematical ability. However, some children have mathematical potential far beyond most people's expectations. Differences in math ability are influenced by students' knowledge, experience, and skills (Kurniawati et al., 2022). In this study, math ability is measured through test scores obtained by students. The test results were then grouped into three categories: high-level, medium-level, and low-level. The criteria for this grouping refer to a particular rating scale. The grouping of mathematics ability is determined based on certain score limits; namely, students are categorized as having high mathematics ability if their mathematical literacy skills reach levels 5 and 6, moderate ability if their mathematical literacy skills reach levels 3 and 4, and low ability if their mathematical literacy skills reach levels 1 and 2 (Rahma & Reflina, 2023).

2.5. Gender

Sex, or gender (Trisnawati et al., 2023), impacts student life in the school environment. The word "gender," derived from the Latin "genus," refers to the socially and culturally formed traits and behaviours of men and women. According to Jagtenberg and D'Alton (Syahreza et al., 2021), gender and sex are not the same; gender is concerned explicitly with social meanings associated with biological differences. The internalization of values and assumptions about gender influences self-perceptions and interactions. Differences in learning attitudes between men and women involve more intensive use of learning strategies by women (Jumarniati & Firman, 2021). Although intrinsic abilities are not essentially different, differences in attitudes between men and women affect the implementation of learning strategies (Umaroh & Pujiastuti, 2020). Students with high, medium, and low abilities use different problem-solving strategies (Trisnawati et al., 2023). High-achieving students use creative strategies, while low-achieving students may rely on more extended strategies with sometimes less accurate results (Setiawan et al., 2019). Trisnawati et al. (2007) stated that male and female students have different patterns of solving mathematical problems due to the complexity of mathematical problems that require steps and systematic approaches. In addition, emotional differences, behaviour, and thinking patterns between men and women occur due to differences in mindset, daily activities, and brain volume. The question also arises about whether the way of thinking, learning, and conceptualization process varies according to gender differences.

3. Research Methods

This research applied quantitative methods by using survey methods in the Lebak-Banten Regency. The survey used was cross-sectional, which is a method that collects information from the population at one point in time. Although the data collection period varied, involving a period from one day to more, all information was collected simultaneously. The population that became the focus of the research was junior high school / MTs students in Lebak-Banten Regency, with a total number of students reaching 53,800. Sampling was conducted using the Stratified Random Sampling technique, and the number of samples was determined using the

Isaac and Michael formula. This formula was selected due to its ability to be applied to very large or unlimited samples, making it suitable for research with large student populations.

This study was conducted in Lebak-Banten Regency, involving 8,800 MTs students and 45,000 junior high school students, with a total number of junior high school and MTs students of 53,800 people. The research population included all students in grade VIII of junior high schools in Lebak-Banten Regency in the 2023/2024 academic year, consisting of 8 public and 12 private junior high schools (Kemendikbud, n.d.). To determine the sample size, the Krejcie and Morgan formula (1970) was used, with a minimum sample size for public junior high schools of 346 students and private junior high schools of 321 students. The research subjects were grade VIII students aged 15-16 years, following the age of students who participated in the PISA mathematical literacy survey (15 years). The research was conducted from July 24, 2023, to September 21, 2023. More detailed information about the sample size for each school category in the Lebak-Banten Regency can be seen in Table 2, which shows the calculation of the sample size based on the Isaac and Michael formula used in this study.

Tabel 2. Tabel Penentuan Jumlah Sampel Isaac dan Michael

N	S		
	1%	5%	10%
10	10	10	10
15	15	14	14
20	19	19	19
30	29	28	27
…	…	…	…
50000	**655**	**346**	**269**
75000	658	348	270
∞	663	349	272

In this study, the author should have taken a sample of 655 students from various types of schools. However, the author decided to sample 667 students from 6 public and six private schools, consisting of junior high school students and MTs in Lebak-Banten Regency. The sample selection was conducted using a purposive sampling technique. After that, the schools were grouped into three categories, A, B, and C, based on school accreditation in 2023 in Lebak-Banten Regency. This categorization refers to the criteria set by Ebel and Frisbie (1991), which assesses the feasibility of primary and secondary education programs and units according to the required standards. Accreditations A, B and C indicate that the schools have met the standards to provide good education. After that, two schools from each A, B, and C accreditation category were selected to determine the two classes whose students were used as research samples.

Table 2. Category of School Sample Size in Lebak-Banten Regency

Accreditation	State Junior High School	n	Private Junior High School	n
A	SMPN 1	60	SMPS 1	67
	SMPN 2	60	SMPS 2	67
B	SMPN 3	55	SMPS 3	64
	SMPN 4	62	SMPS 4	40
C	SMPN 5	59	SMPS 5	41
	SMPN 6	50	SMPS 6	42
Subtotal		346		321
Total		667		

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The number of student samples in this study came from public and private schools in the Lebak-Banten Regency. The sample was divided proportionally with a percentage of 50% each. Therefore, the minimum data needed for this survey was 346 students from public schools and 321 from private schools. It is important to note that there are unavoidable gaps in this sample size as it is adjusted to the number of classes in each school. The research instrument used in this study is a test to evaluate the mathematical literacy skills of junior high school students in the Lebak-Banten district. The test was in the form of an essay and had been previously translated. The PISA questions tested were taken directly from the sample PISA questions. Hence, the author only needed to test the content and construct validity on two expert lecturers in mathematics at La Tansa Mashiro University and one Indonesian lecturer before testing. This was done because the questions were already following PISA standards. In total, there were five PISA questions tested with the following details.

Table 3. PISA Question Details

	Domain konten			
	Quantity	**Shape and Space**	**Change and Relationship**	**Uncertainty and Data**
Domain proses:				
Employ	Unit 5A[a]	Unit 1A[d]	Unit 4B[b]	Unit 5B[a]
Formulate	Unit 4A[b]	Unit 3B[c]	Unit 1B[d]	Unit 3A[d]
Interpret	Unit 2A[c]	Unit 4C[b]	Unit 4D[a]	Unit 2B[c]

The time needed to complete the mathematical literacy test is 1 hour and 25 minutes, consisting of 12 questions designed following the PISA 2022 framework. Each question covers the process, content and context domains of the PISA framework. The detailed distribution of each mathematical literacy question domain (PISA) can be found in Table 3. This written test was developed to provide an overview of students' mathematical literacy. Three mathematics education experts validated it. This test instrument has content validity and construct validity. The factor analysis results after the pilot test showed an estimated reliability coefficient of 0.910, indicating that the factor analysis could be continued with a significance value of 0.000 <0.05, indicating that the data obtained were valid. In addition, the reliability results of the mathematical literacy instrument showed a Cronbach's alpha value of 0.656, indicating that the mathematical literacy test can be considered reliable.

The data analyzed in this study used descriptive statistics and inferential statistics techniques. Descriptive statistics were used to provide a detailed description of students' mathematical literacy, especially in the process of formulating, employing, and interpreting. Mathematical literacy scores were classified based on the competency achievement categories of the National Education Standards Agency (2018). Table 4 presents the number of scores, question criteria, result criteria, expert scoring guidelines, and validation criteria to provide further understanding.

Table 4. Scoring for Each PISA Item

Score	Criteria
4	Solve known information, write the solution process accurately, and provide appropriate answers.
3	Details the known information, writes down the solution steps accurately and gives an answer that is not entirely correct.
2	Analyzed the known information, wrote down the steps of the solution that were not

	entirely accurate, and gave an answer that was not entirely correct.
1	Analyzes the information presented in a problem without stating the steps to solve it and does not provide an answer in writing.
0	No ability to analyze or no answer at all.

Inferential statistics were used to evaluate the impact of differences in mathematical literacy skills of junior high school students based on school accreditation, school status, ability level, and gender when solving PISA model mathematics problems: T-test and Two Way ANOVA were used to analyze the differences. Students' mathematical literacy scores were measured through their answers to the PISA test. This data was then processed using Microsoft Office Excel 2011 to calculate the score and percentage of student achievement in answering PISA questions. The data processing results were combined with a description of the process of working on the questions by students to understand the extent of students' understanding of PISA questions and identify errors that may occur in answering these questions.

Table 5. Categories of Mathematical Literacy Ability Completion

Kategori Capaian	Interval Persentase
	Literasi Matematis (X_1)
Baik	$85 < X_1 \leq 100$
Cukup	$50 < X_1 \leq 85$
Kurang	$35 < X_1 \leq 50$
Sangat Kurang	$X_1 \leq 35$

Based on the previous explanation, the hypotheses of this study were proposed to examine the differences in mathematical literacy skills of junior high school students in the Lebak-Banten district. First, the hypothesis states that there are differences in students' mathematical literacy skills based on school accreditation. Second, the hypothesis states differences in students' mathematical literacy skills between public schools and private schools in the Lebak-Banten District. Furthermore, the hypothesis states that differences in students' mathematical literacy skills exist based on the students' ability levels. Finally, the hypothesis states differences in students' mathematical literacy skills between male and female students in the Lebak-Banten District. By formulating these hypotheses, it is hoped that this research can provide a deeper understanding of the factors influencing junior high school students' mathematical literacy skills in dealing with PISA-type questions in the region.

4. Results

The ability of students in the Lebak Banten district to solve mathematical problems on the PISA model is described in detail in Table 6. The explanation involves analysis both overall and by accreditation category, school status, ability level and gender.

Tabel 6. Deskripsi Kemampuan Matematis Siswa SMP di Kabupaten Lebak-Banten

Based on	**Description of Mathematical Ability of Junior High School Students**					
Accreditation	***Gender***	***n***	***Mean***	***Std. deviation***	X_{tinggi}	X_{rendah}
A	Male	109	42,41	12,68	87	15
	Female	145	47,54	13,17	92	28
Overall		254	44,74	10,73	92	15
B	Male	99	57,61	19,17	87	13

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Based on	Description of Mathematical Ability of Junior High School Students					
	Female	122	52,86	14,75	84	15
Overall		221	56,65	18,16	87	13
C	Male	115	44,05	13,15	83	10
	Female	77	37,20	6,83	56	10
Overall		192	39,05	8,62	62	10
Status	***Gender***	***n***	***Mean***	***Std. deviation***	X_{tinggi}	X_{rendah}
Country	Male	138	46,67	11,24	87	13
	Female	208	51,14	16,92	92	15
Overall		346	47,28	12,46	92	13
Swasta	Male	193	46,27	11,72	87	10
	Female	128	45,35	10,91	87	13
Overall		321	46,35	11,73	87	10
Ability	***Gender***	***n***	***Mean***	***Std. deviation***	X_{tinggi}	X_{rendah}
High	Male	32	65,70	16,19	87	32
	Female	42	53,73	4,14	92	37
Jumlah		74	57,36	8,87	92	32
Sedang	Male	93	31,86	3,28	87	23
	Female	139	39,82	11,74	84	25
Jumlah		232	34,51	6,73	87	23
Rendah	Male	217	7,21	1,47	26	10
	Female	144	18,75	8,71	32	10
Jumlah		361	12,40	2,65	32	10

Some prominent findings can be identified in analyzing the mathematical literacy skills of junior high school students in Lebak-Banten district based on certain factors. When viewed from school accreditation, female students tend to have a higher average mathematical ability in schools with A accreditation. In contrast, male students perform better in schools with B accreditation. In schools with C accreditation, male students had higher averages than female students. When viewed from the school status (public/private), female students in public schools showed higher average mathematical ability than male students. The difference between male and female students was insignificant in private schools. In the high-ability category, female students performed better than male students, but male students with high ability had a higher level of variation. Female students had a higher average in the medium ability category, and the difference between males and females was significant. While at low ability, female students still showed a higher average than male students, and the low standard deviation showed low consistency in the mathematical ability of low-ability students. This analysis provides insight into the role of specific factors in influencing the mathematical literacy skills of junior secondary school students in the region.

Table 7. Description of Percentage of Mathematical Literacy Ability of Junior High School Students in Lebak Banten

Accreditation	School Name	Percentage Level						Total	Overall
		1	2	3	4	5	6		
A	SMPN 1	12,78	9,44	6,39	6,67	6,67	1,94	43,89	44,74 (Rendah)
	SMPN 2	5,33	11,33	4,33	7	4,67	2,67	35,33	
	SMPS	13,48	26,81	9,36	10,78	9,5	0	69,93	

Accreditation	School Name	Percentage Level						Total	Overall
		1	2	3	4	5	6		
	1								
	SMPS 2	9,02	10,98	2,75	3,14	2,35	1,57	29,81	
SubTotal		40,61	58,56	22,83	27,59	23,19	6,18	178,96	
B	SMPN 3	18,6	24,21	16,49	14,39	12,63	5,26	91,58	56,65 (Sedang)
	SMPN 4	13,91	10,43	4,35	12,17	1,74	1,16	43,76	
	SMPS 3	10,8	18,16	7,13	8,74	3,22	0	48,05	
	SMPS 4	10,67	4	12	16,27	0,27	0	43,21	
SubTotal		53,98	56,8	39,97	51,57	17,86	6,42	226,6	
C	SMPN 5	11,6	13,83	5,19	10,86	3,58	0	45,06	39,05 (Rendah)
	SMPN 6	8,99	6,67	3,19	4,06	1,16	0	24,07	
	SMPS 5	14	9,67	4,17	10,86	0,33	0	39,03	
	SMPS 6	10,8	18,16	7,13	8,74	3,22	0	48,05	
Subtotal		45,39	48,33	19,68	34,52	8,29	0	156,21	
Total		139,98	163,69	82,48	113,68	49,34	12,6	561,77	46,81 (Rendah)

The results and discussion of this study provide a detailed picture of the mathematical literacy skills of junior high school students in the Lebak-Banten district. The measurement was conducted through a case study of PISA-type questions by considering accreditation factors, school status, ability level, and gender. Overall, the mathematical literacy level of students in this district can be categorized as low (46.81%). The data were collected and analyzed after the students took the survey and PISA-type mathematical literacy test. Prerequisite tests were conducted to check the normality and homogeneity of the data, and the results showed that the significance value was more significant than 0.05. Therefore, hypothesis analysis was conducted using the T-test and Two-way ANOVA.

Table 8. Normality Test for Mathematical Literacy

Based on	Description	*Kolmogorov Smirnov*			*Shapiro Wilk*		
		Statistic	*df*	*Sign.*	*Statistic*	*df*	*Sign.*
Accreditation	A	0,141	253	0,000	0,928	253	0,000
	B	0,192	219	0,000	0,950	219	0,000
	C	0,151	189	0,000	0,977	189	0,000
Status	Negeri	0,092	344	0,000	0,898	344	0,000
	Swasta	0,077	319	0,002	0,823	319	0,002
Ability Level	Tinggi	0,174	71	0,010	0,883	71	0,000
	Sedang	0,159	229	0,000	0,746	229	0,000
	Rendah	0,192	358	0,000	0,758	358	0,000
Gender	Laki-Laki	0,200	329	0,000	0,634	329	0,000
	Perempuan	0,192	334	0,000	0,612	334	0,000

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After testing the normality of the data and finding that the mathematical literacy skills of junior high school students in Lebak Regency had a normal distribution, the next step was to conduct hypothesis testing using the two means equality test (one-sided test, right side) with the Independent Sample T-test. This test compares junior high school students' average mathematical literacy skills in solving PISA-type questions in the Lebak-Banten Regency by considering school accreditation as a comparison variable. The results of the average comparison of mathematical literacy skills can be found in Table 9.

Table 9: Hypothesis Test Results of Students' Mathematical Literacy Ability

Literacy Skills Based on	F	Sign.	Keterangan
Accreditation	6.517	0,001	H_0 rejected
Status	4.783	0,053	H_0 accepted
Ability Level	8.109	0,000	H_0 rejected
Gender	5.853	0,291	H_0 accepted

Consideration of the factors that influence students' mathematical literacy can be seen through the analysis of Table 9 above. First, a significant relationship exists between school accreditation and students' mathematical literacy, as seen from the F value of 6.517 with a significance of 0.001. This indicates that schools with higher accreditation levels tend to have students with better mathematical literacy. However, it should be noted that school status (F=4.783, p=0.053) did not show a significant difference in students' mathematical literacy. Furthermore, students' ability level (F=8.109, p=0.000) showed a strong relationship with mathematical literacy, where students with higher ability generally had better mathematical literacy outcomes. On the other hand, gender did not show a significant difference in students' mathematical literacy, as seen from the value of F=5.853 with a significance of 0.291.

5. Discussion

Hypothesis I analysis was conducted using the Independent Sample T-test using the two means equality test (one-sided test, right side). This test aimed to compare junior high school students' average mathematical literacy skills in solving PISA-type questions in the Lebak-Banten Regency based on school accreditation. The results of the independent sample t-test showed an Fcount value of 6.517 with significance (0.001 <0.05). Therefore, H0 is rejected, indicating a difference in mathematical literacy skills between SMPN and SMPS in solving PISA-type questions in the Lebak-Banten District based on school accreditation. In addition, the results of this hypothesis test show the average difference in mathematical literacy skills in solving PISA-type questions between A, B, and C accredited schools. However, the empirical facts from Table 7 show that the average mathematical literacy skills of A and C accredited schools are lower than those of B accredited schools. Therefore, it can be concluded that school accreditation does not directly guarantee the improvement of mathematical literacy skills in solving PISA-type questions. In other words, there is a positive relationship between mathematical literacy skills and PISA scores (Indartono & Hamidy, 2019; Yilmaz & Hanci, 2015). The mathematical literacy skills of junior high school students in the Lebak-Banten district in solving PISA questions proved to be lower than the average score of Indonesian students sampled in the 2000-2022 PISA period. The average score was still below the average of OECD member countries. Specifically, the average PISA score of category B schools showed higher achievement than the average PISA score of students in Lebak-Banten Regency as a whole.

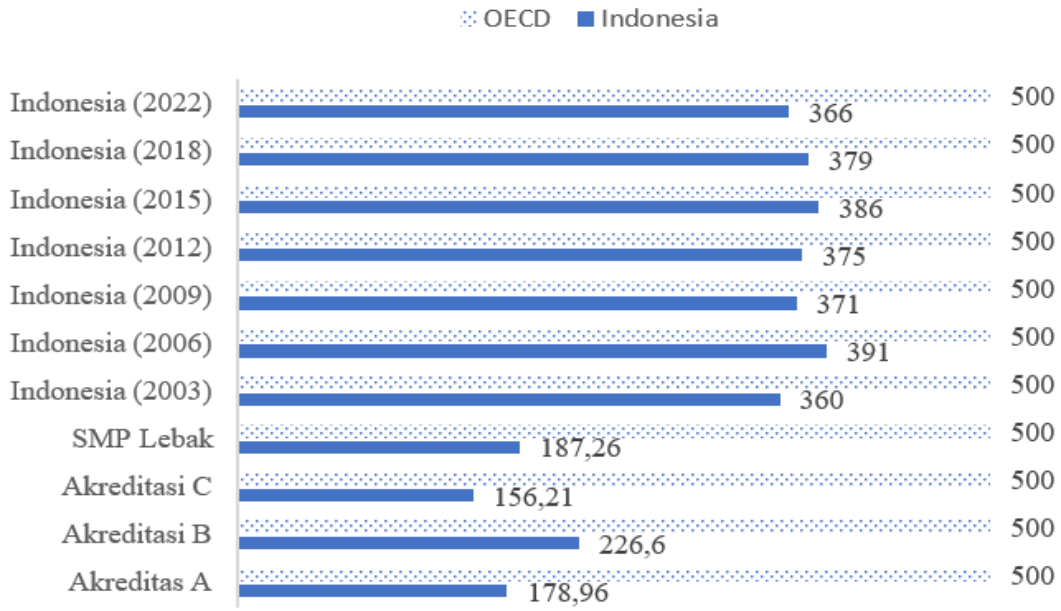

Figure 2: Trend of Mean Student Mathematical Literacy Ability

Based on the data illustrated in Figure 2, it can be seen that students' mathematical literacy skills in the Lebak District area, especially in schools with B accreditation, have increased over time. However, there is still a disparity between the mathematical literacy scores of students in Lebak District, the OECD average, and the Indonesian national average. The implication is that improvement efforts are needed in mathematics education, especially in schools with A and C accreditation, to increase students' mathematical literacy skills to reach national and international standards. Educational policy and curriculum development should consider these findings to formulate appropriate solutions to improve students' mathematical literacy achievement at the local level. Improvement measures should also consider trends in mathematical literacy skills to understand changes and identify areas that need further attention. Overall, the average score of students in the Lebak-Banten district (187.260) is still below the average score of OECD countries (500). The findings of this study indicate that the mathematical literacy of students in the Lebak-Banten Regency can be categorized as low, with students' PISA scores still below the OECD average. This mathematical literacy is strictly related to students' ability to analyze, reason, and effectively communicate the formulation, solution, and interpretation of problems in various situations (Yulianto & Maryam, 2023).

In general, the ability of students in Lebak District, Banten, to analyze, reason, and communicate mathematical concepts still needs to be improved, as highlighted by Yulianto and Maryam (2023). Indonesian students' low mathematical literacy level, including students in the Lebak-Banten district, is influenced by teachers' difficulties in presenting learning that encourages Higher Order Thinking Skills (HOTS) in the classroom (Yulianto et al., 2023). This finding is consistent with Demir's (2018) research, which shows a positive relationship between teachers' ability to stimulate students' cognitive abilities and mathematics abilities. This means that the lower the teacher's ability to teach HOTS, the more impact on students' mathematical literacy. Afifah and Retnawati (2019) also found that teachers' difficulties in teaching HOTS were caused by a lack of understanding of HOTS, which resulted in difficulties in designing HOTS-based learning and assessment.

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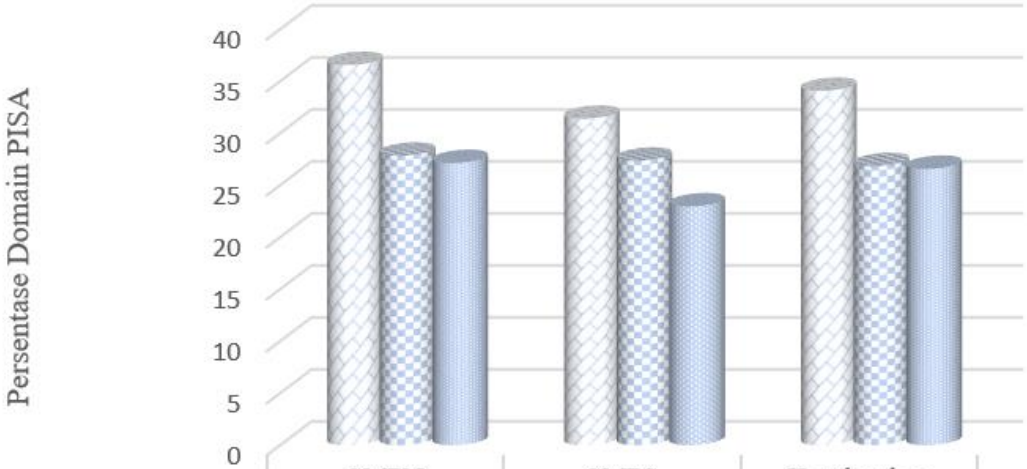
Hypothesis II was analyzed using the two-means equality test, a one-sided test using the Independent Sample T-test method. This test aimed to compare junior high school students' average mathematical literacy skills in solving PISA-type questions in the Lebak-Banten Regency based on school status. The Independent Sample T-test test resulted in an Fcount of 4.783 with a significance level of 0.001 < 0.053. Thus, H0 is accepted, indicating a difference in mathematical literacy skills between SMPN and SMPS in solving PISA-type questions in the Lebak-Banten district based on school status. This hypothesis test also shows no difference in the average results of students' mathematical literacy skills in solving PISA-type questions between public and private schools.

Nevertheless, the empirical facts show that public school students' average mathematical literacy ability is greater than that of private school students. However, the difference between the two is considered too small. Therefore, it can be concluded that school accreditation does not directly ensure an impact on the results of junior high school students' mathematical literacy skills in solving PISA-type questions. The data used in this study includes the results of the analysis of junior high school students' mathematical literacy skills in solving PISA mathematics problems. The analysis involves the process domain in content, context, process, and PISA level.

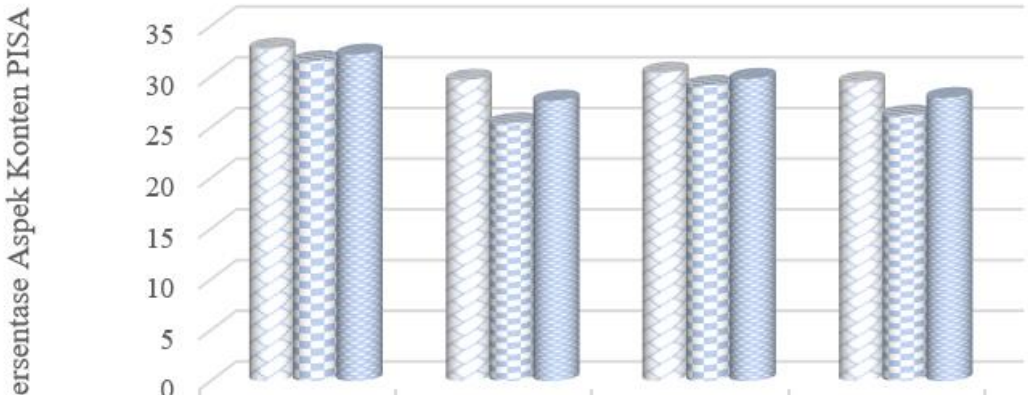
The mathematical literacy skills of grade VIII junior high school students in Lebak District, Banten, were evaluated based on three main aspects: the process, content, and context domains of mathematical literacy skills. The evaluation included three essential components: employ, formulate, and interpret. Overall, the ability to employ, formulate, and interpret students at SMPN and SMPS in Lebak District, Banten, was assessed to be in the low category, with an average score of 34.07, 27.35, and 26.57, respectively. A more detailed analysis of the ability to employ, formulate, and interpret processes can be found in Figure 3.



	SMPN	SMPS	Keseluruhan
Domain Employ	36,56	31,39	34,07
Domain Formulate	27,83	27,35	26,83
Domain Interpret	27,13	22,96	26,57

Figure 3: Percentage of Literacy Skills based on the PISA Process Domain

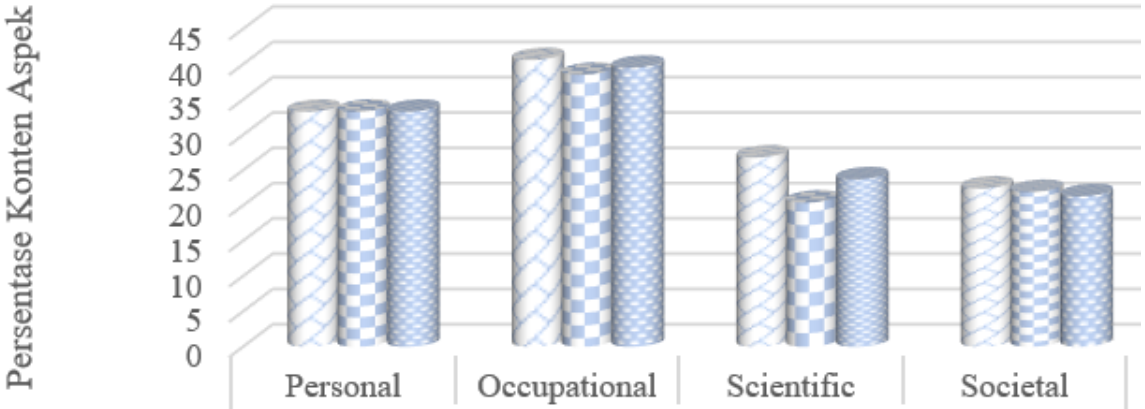
Based on the PISA framework, mathematical literacy content is divided into four main components: quantity, change and relationship, shape and space, and uncertainty and data. Junior high school students' overall mathematical literacy skills in the Lebak-Banten district were generally categorized as low, with an average score of 32.2, 27.6, 29.8, and 27.9, respectively. Students' abilities in each content domain can be illustrated in detail in Figure 4.



	Quantity	Change and Relationship	Shape and Space	Uncertainty and Data
SMPN	32,8	29,7	30,42	29,51
SMPS	31,54	25,42	29,13	26,2
Keseluruhan	32,2	27,64	29,8	27,92

Figure 4: Percentage of Literacy Skills based on PISA Content

The context of mathematical literacy based on the PISA framework is divided into four components: personal, occupational, scientific and societal. Overall, the mathematical literacy skills of students in Lebak Banten were lowest in the scientific and societal components, with an average score of 20.4. The mathematical literacy skills of students in Lebak Banten based on the context domain can be seen in Figure 5 in detail.



	Personal	Occupational	Scientific	Societal
SMPN	33,27	40,6	26,8	22,4
SMPS	33,27	38,5	20,4	21,9
Keseluruhan	33,27	39,5	23,7	21,3

Figure 5: Percentage of Literacy Skills Based on PISA Contexts

Hypothesis III was analyzed using the two-means equality test (one-sided test, right side) with the Independent Sample T-test. The purpose of this test is to compare the average mathematical literacy skills of junior high school students in solving PISA-type problems in Lebak-Banten Regency based on the level of mathematical literacy skills in solving PISA-type

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problems. The results of the Independent Sample T-test showed an Fcount value of 8,109 with a significance of 0.000 (smaller than 0.05). Therefore, H0 is rejected, indicating a difference in mathematical literacy skills between SMPN and SMPS in solving PISA-type questions in the Lebak-Banten Regency based on the level of mathematical literacy skills. In addition, the results of this hypothesis test also show a difference in the average mathematical literacy skills in solving PISA-type questions between A, B, and C accredited schools. However, the empirical facts show that the average results of mathematical literacy skills in solving PISA question types in accredited schools A and C are lower than in accredited schools B. This leads to the conclusion that school accreditation does not significantly impact mathematical literacy skills. From this, it can be concluded that school accreditation does not directly guarantee an increase in the results of mathematical literacy skills in solving PISA question types.

These results show that students are better at answering questions at cognitive level 2 than at cognitive level 1. Similarly, the average score for cognitive level 4 questions is higher than for level 3 questions. This may be due to students' lack of understanding of certain mathematical concepts tested in level 1 and level 3 questions, which may not have been taught to students. Overall, the assessment showed that students tended to score lower on cognitive level 5 and level 6 questions, with higher levels of cognitive complexity. This indicates a significant challenge on questions that require more complex mathematical understanding and problem-solving.

Table 6 shows that the average result of the Mathematical Literacy Test (TKLM) in each school only reached a score of less than 50%. Students achieved scores close to less than 13.64% only at level 2, while at other levels, overall, students only achieved scores of less than 12%. This result shows that the average score of students in each school is fairly low. For certain schools, such as SMPN 2 (A), SMPS 1 (A), SMPN 3 (B), SMPS 3 (B), SMPS 6 (C), and SMPS 5 (C), students had the highest average score at level 2. However, at level 6, all students achieved the lowest average score. The same thing happened in SMPS 4 (B), where students had the highest mean score at level 4 but the lowest mean score at level 6. In contrast, for SMPN 3 (B), SMPN 4 (B), SMPS 1 (A), SMPN 1 (A), SMPN 5 (C), and SMPS 5 (C), students had the highest mean score at level 1. At level 6, students again showed the lowest average score. This finding indicates that questions at level 1 and level 2 are more accessible for students than questions at levels 6. Note Figure 5 below.

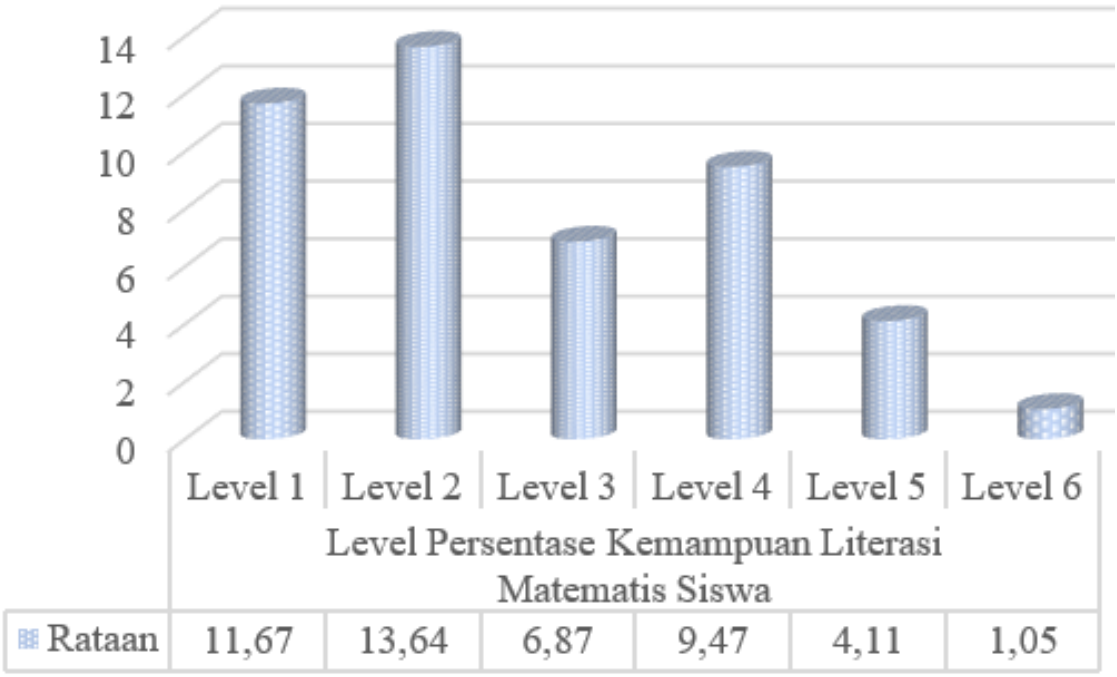

Figure 6: Percentage of Students' Literacy Level

The results of the data analysis show that, overall, the mathematical literacy skills of junior high school students in dealing with PISA questions in the Lebak-Banten district are still inadequate. The students experienced difficulties in dealing with PISA questions due to lack of habit in answering such questions, difficulty in solving the problems, and lack of numeracy skills. These findings align with the views of Yulianto & Maryam (2023) who asserted that students' mathematical abilities involve numeracy skills and the ability to think and reason when solving mathematical problems. The PISA results of students in grade VIII of junior high school in the Lebak district, presented in Figure 6, illustrate students' mathematical literacy based on content, context, process, and PISA level. Figure 6 presents the analysis of these results in more detail.

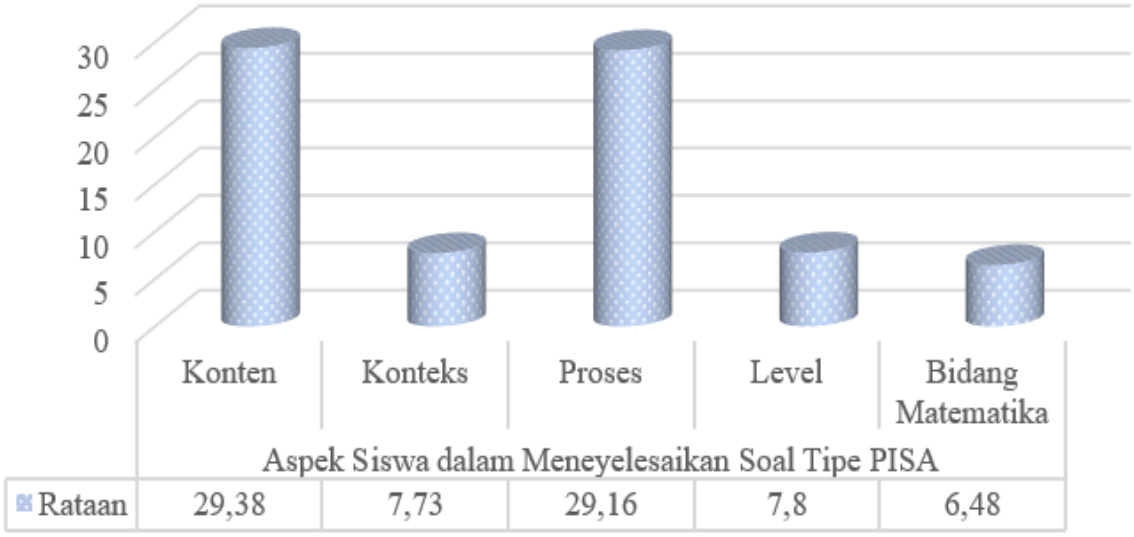

Figure 7. TKLM Based on Content, Context, Process, and PISA Levels

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In the learning process, most junior high school students in Lebak-Banten Regency expressed difficulty in solving PISA-type questions. They said that the material and format of questions like PISA were only known during the exam, and they were not familiar with them. The students hoped that they could practice more regularly and get used to PISA-type questions. The goal is to improve their thinking skills and motivation to learn to increase their enthusiasm for acquiring knowledge.

Based on Figure 7 below, it can be seen that students' ability to deal with PISA content aspects shows results that can be categorized as deficient. Aspects of number theory and probability theory have mean scores of 5.32 and 2.23, which fall into the inferior category. Similarly, the statistics aspect has a score of 6.25. In contrast, algebra and geometry have mean scores of 9.83 and 8.77, respectively, which are also considered deficient. This reflects that students have difficulty understanding and applying the material. Therefore, further attention and efforts are needed to support the improvement of students' abilities in these content aspects so that the results of the PISA exam can be more satisfactory.

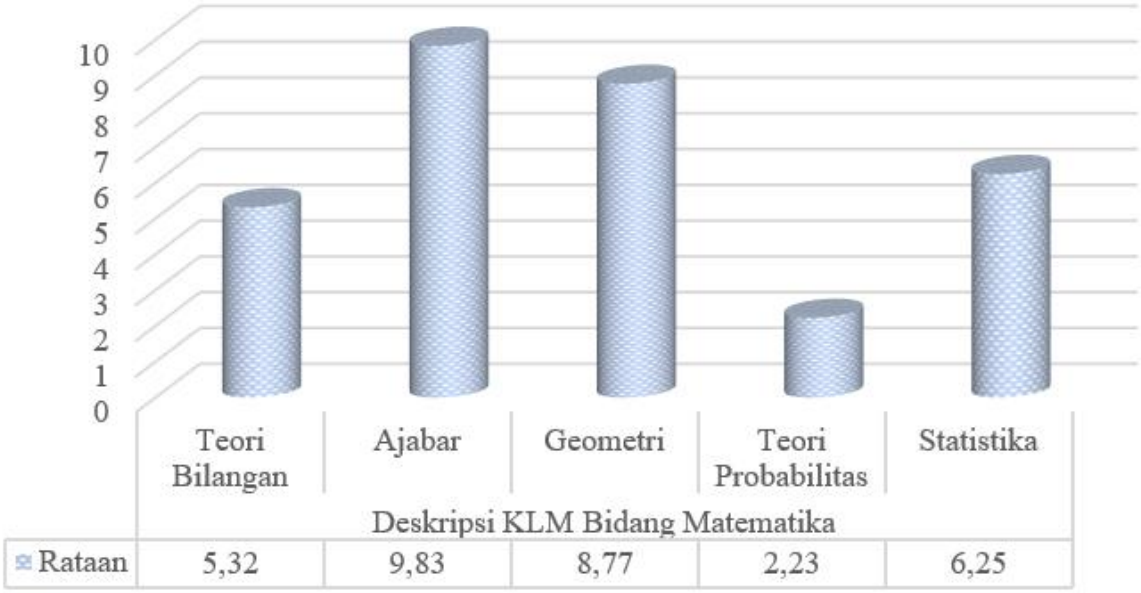

Figure 8. Average Mathematical Literacy Ability of Students in the Mathematics Field

Based on Figure 7 below, it can be seen that students' ability to deal with PISA content aspects shows results that can be categorized as deficient. Aspects of number theory and probability theory have mean scores of 5.32 and 2.23, which fall into the inferior category. Similarly, the statistics aspect has a mean score of 6.25. In contrast, algebra and geometry have mean scores of 9.83 and 8.77, respectively, which are also considered deficient. This reflects that students have difficulty understanding and applying the material. Therefore, further attention and efforts are needed to support the improvement of students' abilities in these content aspects so that the results of the PISA exam can be more satisfactory.

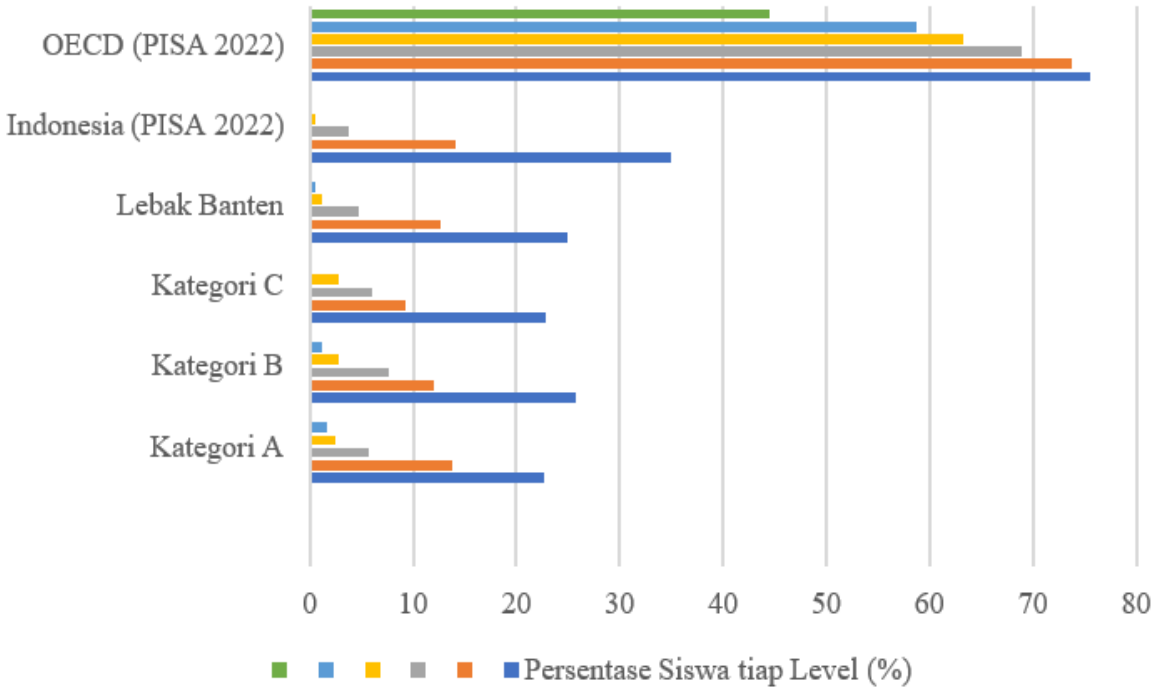

Figure 9. Average Percentage of Students' Ability per Level

Based on the analysis of the percentage table of students' mathematics proficiency levels, it can be observed that students in Category A showed higher proficiency levels compared to Categories B and C, especially at levels 1 and 2. Lebak district, Banten, also showed good proficiency levels, but the percentage of students at levels 3, 4, 5, and 6 decreased significantly. Indonesian students had the highest percentage at levels 1 and 2, but still lower than those in Lebak district and categories A, B and C. Meanwhile, students from OECD countries showed very high proficiency levels, especially at levels 5 and 6. The percentage of students at levels 1 and 2 in OECD countries was deficient, indicating the majority of students were at higher proficiency levels.

In conclusion, this comparison emphasizes the significant differences in students' mathematics proficiency levels between Lebak district, Indonesia, and OECD countries. Pay special attention to improving students' math proficiency in Indonesia, especially at level 3 and beyond. A more detailed analysis showed that 28% of students in East Kalimantan demonstrated mathematical competence at levels 4-6, including higher-order thinking skills such as analysis, evaluation and creation (Setiawan, Dafik, & Lestari, 2014). When viewed by the school category, 24.92% of students with higher-order thinking skills came from category B schools. However, the percentage of students at level 3 from category B was much lower than students from OECD countries in PISA 2022. Meanwhile, few students from category A and C schools reached levels 4-6, indicating a lack of higher-order thinking students in schools with moderate and low US or AKM math scores.

This finding suggests that the participation of students from schools with a high assessment of mathematics competence (AKM) results contributed positively to the percentage of students in the Lebak-Banten district with high mathematical ability. The difference in mathematical literacy between students in Lebak-Banten and Indonesia is due to the factor of school type representation, where schools taken as samples of the Program for International Student Assessment (PISA) research in Indonesia tend to come from schools with low categories

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(Wulandari & Jailani, 2015). Although the achievement of Lebak-Banten students is less optimal than the average Indonesian students sampled by PISA, the PISA scores and the percentage of students at level 2 and above or at level 6 are still below the average students from the Organization for Economic Co-operation and Development (OECD) countries in PISA 2022. In other words, most students in the Lebak-Banten Regency have not been able to apply the mathematical knowledge and skills acquired at school to solve contextual problems. The low ability of Lebak-Banten students to solve mathematical problems of the PISA model illustrates that the mathematical competencies of junior high school students, as described, have not been fully achieved, even though they have included aspects of mathematical literacy. This follows the views of Wardhani Rumiati (2011) and the results of Umbara & Suryadi's research (2019), which shows the lack of teacher understanding of mathematical literacy and its impact on learning and assessment in schools.

Hypothesis IV analysis was conducted using the two-means equality test (one-party, right side) using the Independent Sample T-test. This test aims to compare the average mathematical literacy skills of junior high school students in solving PISA-type problems in Lebak-Banten Regency based on gender (male and female). The results of the Independent Sample T-test showed an Fcount value of 5,853 with a significance of 0.000, which is smaller than the significance level of 0.291. Therefore, H0 is accepted, indicating no significant difference in mathematical literacy skills between male and female junior high school students in Lebak-Banten District. Table 6 shows that public junior high school students have higher mathematical literacy skills than private junior high school students for each gender group.

Furthermore, Table 8 shows that for both public and private school status students, female students' mathematical literacy skills are higher than male students' mathematical literacy skills. However, the statistical calculation concluded that the factors of school status and gender did not significantly affect students' mathematical literacy skills. In other words, there is no significant difference in mathematical literacy skills between public and private junior secondary school students, nor between male and female students. Therefore, further tests were not required in this case.

The findings of this study confirm that gender differences are not significant in influencing students' mathematical literacy. This result contradicts some previous studies, such as Trisnawati et al. (2023) and Anwar Yulianto (2022), which concluded that males have superior mathematical literacy than females. Although findings show a difference in mathematical literacy between female and male students, the difference is insignificant. This is due to the main focus of students' mathematical literacy on individual mathematical ability, as revealed in this study. Diversity in students' mathematical abilities affects mathematical procedural skills and thinking abilities, as a good mastery of mathematics reflects reasoning abilities that align with mathematical structures. The data collected in this study includes the test scores of mathematical literacy skills of male and female students, as explained in Table 6 above, regarding the mathematical abilities of junior high school students in the Lebak-Banten District. The conclusion that can be drawn is that the difference in mathematical literacy between male and female students is not significant, and this confirms that individual mathematical ability is the main focus in explaining the variance in mathematical literacy among students.

Table 10. Description of Conclusions on Students' Mathematical Literacy Abilities by Gender

Reviewed		Findings
Accreditation	**A**	The average mathematical ability of female students tends to be > male, but the difference is not too significant.

	B	The average mathematical ability of male students > female students, and the difference is more significant compared to accreditation group A.
	C	The average mathematical ability of male students > female students, but the difference is insignificant.
School Status	**Public and Private**	There is a difference in the average mathematical ability of female students between the two statuses. Female students in public schools have a higher average ability than private school students.
Ability Level	**High**	The average mathematical ability of male students (65.70) > female (53.73). This shows a significant difference between the mathematical abilities of male and female students at the high ability level, with male students showing a higher average mathematical ability.
	Medium	On average, female students have an average mathematical ability (39.82) > male (31.86). Although this difference is not as significant as the difference at the high ability level, it shows variation between genders at the medium ability level.
	Low	On average, female students have an average mathematical ability (18.75) > male (7.21). This difference indicates that female students perform better at the low ability level.

The description of students' mathematical literacy skills based on gender in Lebak-Banten Regency as a whole based on the category is still lacking, with male average students (48.02) > female (45.87). This indicates that students in the Lebak-Banten Regency have low categorical abilities. Furthermore, the data is based on gender, context, content, process and PISA level. The contexts used in PISA are personal, educational, occupational, public and scientific. The following are the results of students who then calculated the percentage of correct answers.

Table 11. Percentage of Mathematical Literacy Ability Based on Context

Context	Question No.	Mathematical Literacy Skills (%)						Question Average		(%) Total Mean	(%) Average
		A		B		C					
		L	P	L	P	L	P	L (%)	P (%)		
Personal	4c	40,66	35,11	34,28	34,56	30	30,56	35,17	33,22	34,86	33,27
	4d	33,11	36,03	32,22	34,89	30,56	31,56	32,33	33,83	33,23	
	2a	41,37	54,7	37,25	38,67	30	31,39	36,67	41,12	39,9	
	5a	36,82	38,87	30,64	31,03	30	30,24	32,57	33,3	32,93	
occupational	1d	48,5	66,45	30,72	35,48	14,07	11,08	30,17	38,67	37,72	39,50
	2c	25,82	32,1	24,38	22,28	13,15	10,57	20,26	22,51	23,05	
	4b	21,61	18,32	12,24	20,06	10	10	14,62	16,13	15,37	

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Context	Question No.	Mathematical Literacy Skills (%)						Question Average		(%) Total Mean	(%) Average
		A		B		C		L (%)	P (%)		
		L	P	L	P	L	P				
	2d	17,38	26,65	15,02	16,63	10	10,11	14,17	17,76	16,13	
Scientific	4a	16,28	9,89	17,89	22,16	8	8	14,06	13,35	13,74	23,72
	1b	59,87	62,69	45,78	57,46	12,31	9,75	38,47	44,15	43,64	
	3a	17,62	19,72	11,07	16,75	8	8,47	12,39	14,82	13,77	
	5b	13,88	12,56	9,08	9,95	8	8	10,32	10,17	10,25	
Societal	3b	15,28	15,28	15,28	15,28	15,28	15,28	15,28	15,28	15,28	21,30
	2b	58,87	58,87	58,87	58,87	58,87	58,87	58,87	58,87	58,87	
	1c	16,62	16,62	16,62	16,62	16,62	16,62	16,62	16,62	16,62	
	1a	12,88	12,88	12,88	12,88	12,88	12,88	12,88	12,88	12,88	

Based on Table 11, the average percentage of correct answers in the personal context is mathematically the average percentage of male students (4.18) < female students (5.37). In the context of education and work, the average percentage of male students (9.79) < female students (13.76). In the general context, the average percentage of male students (10.81) < female students (12.63), while in the scientific context, the average of male students (22.65) < female students (24.45). The content referred to in PISA is change and relationship, space and shape, quantity, uncertainty and data. The following are the student test results, which are then calculated as the percentage of correct answers.

Table 12. Percentage of Mathematical Literacy Ability Based on Content

Content	No. Soal	Mathematical Literacy Skills (%)						Question Average		(%) Total Mean	(%) Average
		A		B		C		L (%)	P (%)		
		L	P	L	P	L	P				
Change and Relationship	4c	13,41	7,86	7,03	7,31	2,75	3,31	7,92	5,97	6,95	7,53
	4d	5,86	8,78	4,97	7,64	3,31	4,31	5,05	6,58	5,81	
	2a	14,12	27,45	10	11,42	2,75	4,14	9,42	13,87	11,65	
	5a	9,57	11,62	3,39	3,78	2,75	2,99	5,32	6,05	5,68	
Space and	1d	35,3	53,3	17,5	22,3	0,92	0,07	16,9	25,5	21,23	8,63

Content	No. Soal	Mathematical Literacy Skills (%)						Question Average		(%) Total Mean	(%) Average
		A		B		C		L	P		
		L	P	L	P	L	P	(%)	(%)		
Shape		5		7	3			5	2		
	2c	12,67	18,95	11,23	9,13	0	2,58	7,11	9,36	8,23	
	4b	8,46	5,17	2,23	6,91	1,15	3,15	1,47	2,98	2,22	
	2d	4,23	13,5	1,87	3,48	3,15	3,04	1,02	4,61	2,82	
Quantity	4a	48,12	50,94	34,03	45,71	0,56	2	26,72	32,4	29,56	8,56
	1b	5,87	7,97	0,68	5	3,75	3,28	0,64	3,07	1,86	
	3a	2,13	0,81	2,67	1,8	3,75	3,75	1,43	1,58	1,51	
	5b	8,13	3,81	1,69	5	3,75	3,75	0,9	1,69	1,29	
Uncertainty and Data	3b	5,63	1,31	4,19	2,5	6,25	6,25	1,6	0,81	1,21	16,46
	2b	3,5	9,8	1,23	0,38	6,25	6,14	1,29	1,31	0,31	
	1c	12,34	26,29	2,36	12,48	19,93	18,75	12,34	26,29	2,36	
	1a	15,18	19,93	61,96	67,96	67,96	54,96	15,18	19,93	61,96	

There are 3 processes referred to in PISA: employ, formulate, and interpret. The following are student test results which are then calculated for the percentage of correct answers.

Table 13. Percentage of Mathematical Literacy Ability Based on Process

Process	No. Soal	Mathematical Literacy Skills (%)						Question Average		(%) Total Mean	(%) Average
		A		B		C		L	P		
		L	P	L	P	L	P	(%)	(%)		
Employ	4c	10,86	10,03	10,31	5,75	6,31	10,92	8,97	9,95	10,86	34,07
	4d	11,78	7,97	10,64	6,31	7,31	8,05	9,58	8,81	11,78	
	2a	30,45	13	14,42	5,75	7,14	12,42	16,87	14,65	30,45	
	5a	14,62	6,39	6,78	5,75	5,99	8,32	9,05	8,68	14,62	
	1d	56,3	20,57	25,33	3,92	3,07	19,95	28,52	24,23	56,3	
Formulate	2c	21,95	14,23	12,13	3	5,58	10,11	12,36	11,23	21,95	26,83
	4b	8,17	5,23	9,91	4,15	6,15	4,47	5,98	5,22	8,17	
	2d	16,5	4,87	6,48	6,15	6,04	4,02	7,61	5,82	16,5	
	4a	53,94	37,03	48,71	3,56	5	29,72	35,4	32,56	53,94	

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	1b	10,97	3,68	8	6,75	6,28	3,64	6,07	4,86	10,97	
Interpret	3a	3,81	5,67	4,8	6,75	6,75	4,43	4,58	4,51	3,81	26,57
	5b	6,81	4,69	8	6,75	6,75	3,9	4,69	4,29	6,81	
	3b	4,31	7,19	5,5	9,25	9,25	4,6	3,81	4,21	4,31	
	2b	12,8	4,23	3,38	9,25	9,14	4,29	4,31	3,31	12,8	
	1c	29,29	5,36	15,48	22,93	21,75	15,34	29,29	5,36	29,29	
	1a	22,93	64,96	70,96	70,96	57,96	18,18	22,93	64,96	22,93	

The Employ process shows that students have good skills in using mathematics to answer questions and solve problems, especially in subprocess 1d, with a total average of 56.3%. In subprocess 4c, students can also understand and explain mathematical information using various representations, averaging 34.07%. The Formulate process illustrates that students have good abilities in formulating mathematical problems and designing mathematical models, especially in subprocess 4a, with a total average of 53.94%. Students also showed good mathematical literacy skills in subprocess 2c, namely the ability to formulate questions or make appropriate mathematical statements, with a total average of 21.95%. The Interpret process highlights students' ability to interpret mathematical information and evaluate related arguments. Students showed very high mathematical literacy skills in sub-process 1a, with a total average of 70.96%. In contrast, sub-processes 3a and 3b showed good mathematical literacy skills, averaging 26.57% and 4.31%, respectively.

5. Conclusion

The results of the research analysis found that students' mathematical literacy skills in various contexts in the Lebak-Banten District were still low. This finding includes several essential aspects: 1) there are differences in the mathematical literacy skills of junior high school students in solving PISA-type problems in Lebak-Banten district based on school accreditation, 2) there are no differences in the mathematical literacy skills of junior high school students between public schools and private schools, 3) there are differences in the mathematical literacy skills of junior high school students based on student ability levels, 4) there are no differences in the mathematical literacy skills of junior high school students between male and female students.

Recommendations from this study involve efforts to improve the mathematical literacy skills of junior high school students in the Lebak-Banten District through effective learning strategies. Developing a learning program focusing on mathematics's content, process, and context aspects is essential to improve students' mathematical literacy skills. In addition, it is suggested that there should be coaching and training programs for mathematics teachers in junior high schools in the Lebak-Banten district to improve learning methods that support students' mathematical literacy skills.

Innovative learning strategies and increased student involvement are also essential to improve the mathematical literacy skills of junior high school students in the Lebak-Banten district. The learning process in the classroom needs to focus on stimulating students to think, such as integrating knowledge to explain phenomena and solve complex problems, rather than just memorizing knowledge. Teachers, as the primary focus for students, can prepare learning tools such as lesson plans, worksheets, and literacy-based assessments to familiarize students

with explaining and solving complex problems. Finally, suppose students, parents, teachers and schools have made good efforts to improve education. In that case, there needs to be government support through supportive policies. The research results on students' mathematical literacy can be used as a reference and consideration in formulating educational policies.

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