JHM
JOURNAL OF HONAI MATH

Investigation of numeracy proficiency levels among elementary students through the PEMANTIK assessment tool

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Abstract

Mathematics education is critical in nurturing a wide range of cognitive abilities, particularly numeracy skills, which are essential for students' everyday lives. This study aimed to systematically evaluate the numeracy levels of elementary students at Lentera Harapan School (LHS) in Indonesia using the PEMANTIK assessment tool. A cross-sectional design with a phenomenological approach was applied, encompassing 4,279 students from Grades 1 to 6. The assessment tool comprised a numeracy test accessed through PEMANTIK, and the resulting data were analyzed using descriptive statistical techniques to map numeracy levels across different grades. Findings revealed that students in Grade 3 and above faced significant challenges in developing numeracy skills. The study also highlighted LHS's commitment to implementing evidence-based practices and pedagogical strategies to help teachers support students' numeracy skill development.

Keywords: elementary students, Lentera Harapan School, numeracy, PEMANTIK assessment tool

Introduction

Mathematics learning plays a pivotal role in developing a range of skills, particularly numeracy, which is fundamental for students to acquire and utilize in their everyday activities (Hwang & Tu, 2021). Research in various scientific domains underlines the critical role of numeracy skills. In the field of undergraduate nursing, these skills are described as the capacity to execute intricate calculations and assess patient conditions in clinical contexts (Nurumal et al., 2022). This research also indicates that training nursing students in numeracy can minimize medical

errors and improve the efficiency of patient care. Additionally, from the patient's standpoint, a separate study focused on healthcare issues suggests the necessity of evaluating numeracy skills, as they significantly influence students' understanding of health-related information (Omidbakhsh & Ormandjieva, 2016).

Enhancing numeracy skills can substantially elevate students' mathematical proficiency, leading to notable improvements in their academic achievements and future career opportunities (Lakhani, 2021). These skills are fundamental to mathematics learning, allowing students to understand, analyze, and communicate numerical concepts in various situations (Yustitia et al., 2021). The recent two-year pandemic has compelled governments and educators to recognize numeracy as a critical skill for meaningful societal engagement (Kalogeropoulos et al., 2021). Consequently, numeracy skills have gained considerable importance in the job market, contributing to more excellent employment prospects and better job performance (Peters, 2020).

The levels of numeracy skills differ widely among countries, shaped by factors such as shifts in educational systems, cultural backgrounds, and teaching practices (Forgasz & Hall, 2019; Hall & Zmood, 2019; Nortvedt & Wiese, 2020). Recognizing the importance of numeracy skills and their potential benefits, numerous studies have examined various approaches to enhance this competency in mathematics education. Among these approaches are the introduction of the Probing Prompting learning model (Cahyani & Mohammad, 2023), the development of e-books based on local cultural elements (Hidayah et al., 2021), and the design of high-order thinking skills (HOTS) mathematical problems (Rohmah et al., 2022). The findings underscore educators' commitment to exploring a wide range of learning resources and teaching methods to improve numeracy skills among students.

In Indonesia, numeracy skills among students are generally classified as poor (Rakhmawati & Mustadi, 2022). According to the most recent PISA report illustrated in Figure 1, Indonesia scored only 366 points in the mathematics category. This low ranking is partly due to several regions nationwide where students exhibit weak numeracy performance. For example, a study in Aceh indicated that numeracy skills were in the medium category, with a notable deficiency in higher-order thinking abilities (Marhami et al., 2023). Likewise, research in East Java revealed that elementary students had low numeracy levels (Lestari et al., 2022). This trend is observed in many regions throughout Indonesia's central and eastern parts (Suciyati et al., 2022).

The COVID-19 pandemic, which has impacted Indonesia for around two years, has worsened the already concerning state of numeracy skills among students. During this extended crisis, the quality of online learning could have been better (Irfan et al., 2020; Rahiem, 2021), prompting many students to transition to limited face-to-face learning formats (Soesanto & Dirgantoro, 2021). The root causes of these suboptimal conditions include inadequate infrastructure, socioeconomic constraints, and a need for digital literacy among teachers and students. Several studies have identified these obstacles (Hidayati & Rudiyanto, 2021; Prahmana et al., 2021; Soesanto et al., 2022; Solekhah, 2020), all of which contribute to the challenges in enhancing numeracy quality and impede anticipated improvements. These factors highlight that numeracy skills remain a significant issue in various regions of Indonesia, despite

the ongoing efforts by educational stakeholders to address the problem (Cahyani & Mohammad, 2023; Hidayah et al., 2021; Rohmah et al., 2022).
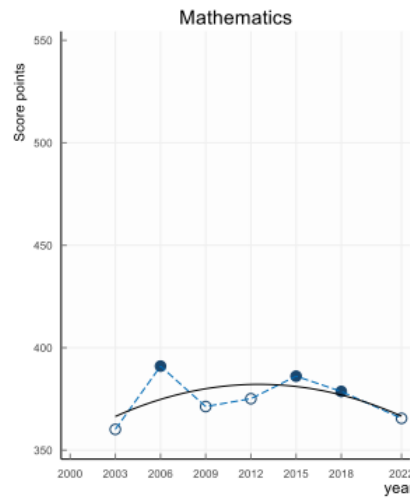

Figure 1. Indonesian PISA score

(Source: https://www.oecd.org/publication/pisa-2022-results/country-notes/indonesia-c2e1ae0e/)

This study examines a specific educational institution in Indonesia, the Lentera Harapan School (LHS), which operates multiple branches across various provinces, catering to students from kindergarten through 12th grade. Figure 2 illustrates the geographical distribution of LHS branches situated on Nias Island, Sumatra, Java, Nusa Tenggara, Sulawesi, the Moluccas, and the Papua Interior. The diverse cultural backgrounds in each LHS branch result in various student characteristics, including differing levels of numeracy skills.

Figure 2. Distribution map of LHS Indonesia

An education report from 2021 revealed that 9 out of 17 elementary school levels in the Lentera Harapan School (LHS) network fell below the minimum competency, representing 52.94% of the total elementary levels. This study is designed to systematically map numeracy achievement among elementary students, considering LHS's unique context and demographics. The study offers a foundation for implementing suitable treatments or interventions based on numeracy levels, necessitating a compatible measurement tool for accurate assessment.

However, more studies need to be explicitly focused on developing assessment tools for measuring elementary students' numeracy skills. While some studies have explored the digital presentation of numeracy tests using different platforms (Aishalya et al., 2022; Gittens, 2015; Suciyati et al., 2022) and proposed various learning strategies for examining numerical comprehension (Ghazali & Ashari, 2020; Iswara et al., 2022), the creation of a comprehensive measurement tool has been lacking.

To fill this gap, the current study introduces a tool called PEMANTIK, an acronym for "Independent Measurement of Literacy and Numeracy." PEMANTIK is a community-led assessment tool designed to enable educators and stakeholders to assess and improve numeracy by creating targeted and measurable learning plans based on PISA numeracy indicators. Essentially, the tool provides a platform that helps literacy and numeracy communities implement interventions tailored to the varying capabilities of students. Given the diversity among students and the versatility of the PEMANTIK tool, this study seeks to systematically map numeracy level achievements, ultimately providing valuable insights for guiding treatment and intervention strategies.

PEMANTIK as An Assessment Tool to Map Numeracy Skills

PEMANTIK is a modern assessment tool designed to map the numeracy skills of students in Indonesia, distinguishing itself due to the limited research into its application. PEMANTIK stands for "Pengukuran Mandiri Literasi dan Numerasi PSPK" (Independent Measurement of Literacy and Numeracy by PSPK), where PSPK refers to "Pusat Studi Pendidikan dan Kebijakan" (Center for Education and Policy Studies), an independent non-profit foundation focused on strengthening education policies for Indonesian children. Utilizing scientific data, PSPK shares educational best practices within Indonesia's academic ecosystem. PEMANTIK is an assessment tool specifically tailored for children aged 6-12, facilitating a comprehensive evaluation of their numeracy skills. This tool aims to serve as a reference for creating learning plans corresponding to each student's capability. As a community-led assessment, PEMANTIK empowers communities to intervene in numeracy education by developing measurable and targeted learning plans that align with PISA numeracy indicators.

PEMANTIK's roots trace back to 2018 when it was adapted from ASER (Annual Status of Education Report - Mathematics Tools), a foundational numeracy measurement instrument initiated by the Pratham-India organization. The adaptation of ASER for Indonesian use was conducted by PSPK, resulting in PEMANTIK 2018. To increase its usability and simplify the assessment process, PEMANTIK 2021 was developed as a technology-assisted assessment. It allows students to engage independently with stimuli in audio, image, and text formats, offering multiple-choice questions or short written responses. This 2021 version was designed by numeracy experts and practitioners, building on the original 2018 framework.

Key changes to the NCTM (National Council of Teachers of Mathematics) framework were implemented in PEMANTIK 2021 to (1) establish PEMANTIK as a community-based rather than a school-based tool, (2) integrate technology for independent assessment, and (3) provide an accessible tool for children, parents, and schools without compromising test quality. PEMANTIK 2021 covers five core content standards for numeracy: (1) Number and

Operations, (2) Algebra, (3) Geometry, (4) Measurement, and (5) Data Analysis and Probability. These content areas form the learning progression matrix for numeracy assessment, detailed in Table 1.

Table 1. The learning progression matrix for 2021 PEMANTIK numeration

	Level 0 (Having quantitative sensitivity and recognizing the characteristics of shapes)	Level 1 (Recognizing numbers, patterns, and classification of shapes)	Level 2 (Addition and subtraction operations, continuing patterns, shapes, and data)	Level 3 (Multiplication and division operations, apply understanding of patterns, structures, and data)	Level 4 (Fraction operation, determined based on patterns, structures, and data)
Number and Operations	Recognizing the quantity of many and few	Recognizing numbers	Be able to perform addition and subtraction of integers	Be able to perform multiplication and division	Be able to perform operations with fractions, decimals, and whole numbers
Algebra	Sorting and classifying objects	Recognizing patterned objects and connecting them to corresponding numbers	Recognizing patterns in geometric and numeric addition	Understanding patterns in geometric and numeric multiplication	Be able to compare two patterns/ relationships and provide justification
Geometry	Recognizing two-dimensional shapes	Classifying and categorizing objects	Recognizing combinations of geometric shapes	Determining whether shapes are congruent or similar	Determining angles, side lengths, perimeter, area, and volume of similar objects
Measurement	Recognizing the quantity of many/few and heavy/light	Determining the appropriate measuring tool to measure an object	Understanding measurement using objects	Be able to perform unit conversions	Using models to determine length, area, volume, or angles accurately
Data Analysis and Probability	Determining probabilities of the most likely, least likely, equally likely, etc	Be able to determine the more likely event to occur	Be able to interpret tally and bar graphs	Be able to determine appropriate data representation	Be able to determine the probability of simple events

Methods

Participants

This study involved a total of 4,279 primary school students, with 49.82% male (N = 2,132) and 50.18% female (N = 2,147), spanning grades 1 through 6. The participants were all students from the Lentera Harapan School (LHS) system, which has branches across multiple regions in Indonesia. The distribution of respondents covered 16 LHS locations across several Indonesian

islands, including Sumatra (with Nias LHS, Medan LHS, Banjar Agung LHS, Jati Agung LHS, and Gunung Agung LHS), Java (Curug LHS, Koja LHS), Sulawesi (Toraja LHS, Tomohon LHS, Palopo LHS, and Sangihe LHS), Nusa Tenggara (Kupang LHS, Labuan Bajo LHS, and Rote LHS), Maluku (Ambon LHS), and Papua (Kampung Harapan LHS).

Additionally, this study provided a comprehensive breakdown of LHS students by grade level in Table 2. The total number of participants was evenly distributed among the different grades, indicating that there were no significant imbalances in student numbers across grades. This even distribution among grade levels suggests a representative sample across the entire primary school range.

Table 2. The total participated students by grade (presented alphabetically)

School Units (LHS)	N	Grade					
		1	2	3	4	5	6
Ambon	369	64	60	62	63	57	63
Banjar Agung	271	42	35	49	50	48	47
Curug	385	83	66	55	63	61	57
Gunung Agung	126	21	25	24	15	21	20
Jati Agung	67	0	6	15	14	16	16
Kampung Harapan	408	73	56	53	71	80	75
Koja	136	20	24	17	25	24	26
Kupang	504	82	86	82	88	82	84
Labuan Bajo	152	27	24	18	27	30	26
Medan	299	48	40	47	49	54	61
Nias	179	28	30	30	32	28	31
Palopo	308	60	52	51	48	57	40
Rote	108	13	10	17	22	21	25
Sangihe	274	50	44	48	50	43	39
Tomohon	340	57	59	48	61	53	62
Toraja	353	56	54	56	63	63	61
Total	4279	724	671	672	741	738	733

Instruments

As previously stated, this study utilized the PEMANTIK assessment tool to map the numeracy skills of LHS students. PEMANTIK consists of five levels, ranging from Level 0 to Level 4, with each level containing five problems that align with crucial mathematics content standards, including Number and Operations, Algebra, Geometry, Measurement, Data Analysis, and Probability (Reys et al., 2007). These levels are designed to gauge various aspects of numeracy proficiency, from basic to advanced.

To further illustrate the demographic distribution of LHS students assessed using the PEMANTIK tool, Table 2 provides data from six islands in Indonesia. The breakdown is as follows:

- Sumatra: 942 students, accounting for 22.01% of the total
- Java: 521 students, representing 12.18% of the total
- Sulawesi: 1,275 students, making up 29.80% of the total

- Nusa Tenggara: 764 students, totaling 17.85% of the total
- Maluku: 369 students, comprising 8.62% of the total
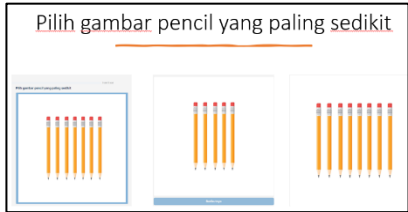- Papua: 408 students, constituting 9.54% of the total

This distribution represents the extensive reach of LHS branches throughout Indonesia, capturing a variety of regions and cultural backgrounds. With students spread across these six islands, this even distribution offers a comprehensive perspective on numeracy skill levels across the LHS network. This broad coverage ensures that the results are representative of the wider LHS student population, allowing for meaningful insights into numeracy skills across diverse geographical areas.

The PEMANTIK assessment tool employs a one-time working system with a sequential approach. When students access the application, they are guided to answer questions in a specific order, starting from Level 0. If a student answers incorrectly at any point, the system closes, preventing further progress. The student's final numeracy level is determined by their last successfully completed level.

For example, if a student answers all five questions in Level 0 correctly, they can advance to Level 1, which also contains five questions. However, if they make a mistake on the second question in Level 1, they are sent back to Level 0 and cannot proceed. This mechanism ensures that the assessment reflects each student's accurate numeracy skill level.

Students who fail to answer all five questions in Level 0 are categorized at this level, indicating basic numeracy skills. Similarly, if a student completes all questions in Levels 0 and 1 but makes a mistake in Level 2, they are categorized at Level 1. This system provides a clear and structured method for assessing numeracy skills, allowing for a straightforward understanding of a student's proficiency.

Table 3. Problem sample in PEMANTIK

Level	Sample Content Standards	Problem Sample
0	Number and Operations	Pilih gambar pencil yang paling sedikit Translate: Select the pencil image with the least quantity?
1	Algebra	Level 1 Angka yang tepat untuk mengisi bendera yang kosong adalah 17 19 15 Translate: The correct number to fill the empty flag is ….

| 2 | Geometry | |
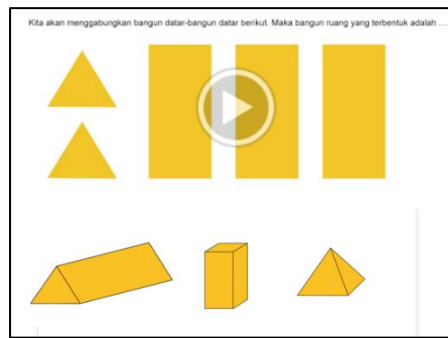
Translate: According to the short clip, if we want to combine all the 2D shapes, the formed 3D shape is …

| 3 | Measurement | |
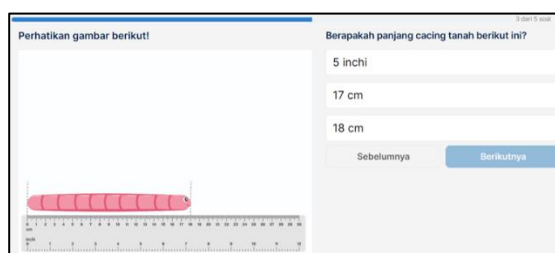
Translate: According to the image, what is the length of the following earthworm?

| 4 | Data Analysis and Probability | |

Translate: According to the table, what is the probability that the selected student is a basketball enthusiast?

Procedure and Data Collection

In the data collection process for this study, a collaborative effort was established with the Head of School (HoS) team. Before conducting briefings for individual school units, a socialization process was initiated by the PEMANTIK assessment tool team to ensure that all parties had a consistent understanding of the tool's use and goals. Figure 3 illustrates the hybrid approach used during this socialization phase, involving both in-person and virtual interactions with the HoS and PEMANTIK teams.

This hybrid model allowed for effective communication and ensured all stakeholders aligned on the study's objectives, implementation methods, and expected outcomes. By engaging with the HoS team in this way, the study aimed to foster a clear and consistent interpretation of the assessment process across the different school units.

The next phase of this study involved the Head of School (HoS) team providing briefings to the principals and homeroom teachers in each selected school unit. During the online briefing, the HoS team explained the numeracy level mapping process, detailed the PEMANTIK assessment tool's interface, and outlined the test rules and school infrastructure requirements. The briefing also emphasized the roles and responsibilities of the school staff during the assessment.

Students took the test in their school's computer laboratory, with homeroom teachers acting as supervisors. The school principal ensured the internet network and school infrastructure were ready before the test. The estimated time to complete the test was between 1 and 1.5 hours, with the test period spanning two weeks due to participation from Grades 1 to 6, limited computer lab capacity, and school holidays.

The test results were then entered into the PEMANTIK team's database, where they were collaboratively processed by the HoS team and the research team. This collaborative approach ensured the data was accurate and reflected the diverse LHS student population. Despite logistical challenges and varying school schedules, it also facilitated a smooth testing process.

Figure 3. Hybrid meeting with HoS and PEMANTIK team

Design and Data Analysis

This case study used a cross-sectional design with a phenomenological approach, indicating that data collection occurred at a single point in time. The phenomenological approach is a research strategy where researchers explore human experiences related to a particular phenomenon, as described by study participants (Creswell, 2014). This study's design and approach were utilized to collect data from students across various islands in Indonesia within a defined timeframe, providing a snapshot of numeracy levels as the studied phenomenon.

The primary data source comprised numeracy test results obtained using the PEMANTIK assessment tool, which were analyzed with descriptive statistics techniques. This approach was chosen to offer a comprehensive understanding of the numeracy levels among elementary school students, supported by numerical information (Creswell, 2014). The use of descriptive statistics allowed for the representation of data in an easily interpretable way, providing

valuable insights into the distribution and characteristics of numeracy skills across different regions.

The findings from this analysis were expected to provide a basis for teacher observers to develop targeted future learning plans and treatment strategies for LHS students. This comprehensive mapping of numeracy levels aimed to facilitate improved educational planning and interventions to address specific needs within the LHS system.

Results and Discussion

Mapping Numeracy Level Based on Mathematics Content Standards

The initial mapping revealed the numeracy levels corresponding to the five mathematics content standards: (1) Numbers and Operations, (2) Algebra, (3) Geometry, (4) Measurement, and (5) Data Analysis and Chance. These content standards represent key areas in the field of mathematics, encompassing foundational concepts to more complex topics.

Table 4 contains numerical data that reflects the outcomes of the numeracy tests taken by the students using the PEMANTIK assessment tool. This table provides insights into student performance across these five content standards, illustrating their proficiency in different areas of mathematics.

By analyzing the results in Table 4, educators and researchers can identify trends and patterns in numeracy skills, such as which standards students excel in and where they face challenges. This information is crucial for developing targeted teaching strategies and interventions to improve numeracy education. Additionally, this data serves as a valuable benchmark for future assessments and progress tracking, ensuring that educational efforts align with the specific needs of the students in the LHS system.

Table 4. Numeracy test scores according to numeracy levels andmathematics content standards

Level	Mathematics Content Standards					Total	Mean	SD
	(1)	**(2)**	**(3)**	**(4)**	**(5)**			
0	4171	3720	4219	4190	3975	20275	4055	210.48
1	3388	3247	2271	3365	2219	14490	2898	598.78
2	1419	1288	1330	1525	1416	6978	1395.6	91.64
3	541	1025	941	1025	791	4323	864.6	204.59
4	250	90	173	310	164	987	197.4	84.69
Total	9769	9370	8934	10415	8565			
Mean	1953.8	1874	1786.8	2083	1713			
SD	1743.41	1544.32	1555.51	1632.27	1475.67			

As detailed in Table 5, the test results reflect the distribution of numeracy levels among LHS students after taking the PEMANTIK assessment. With a multiple-choice format, each correct answer was assigned 1 point, while incorrect answers were worth 0 points, yielding a total maximum score of 4279, corresponding to the total number of respondents.

According to the data, 94.77% of LHS students were at Level 0, with a Mean score of 4055 and a Standard Deviation of 210.48. At Level 1, 67.73% of the students achieved a Mean score of 2898 and a Standard Deviation of 598.78. These results indicate that most students are concentrated at the lower numeracy levels, highlighting the need for additional support to progress further.

On the other hand, a smaller percentage of students reached higher numeracy levels, with 32.61% at Level 2 (Mean = 1395.6, SD = 91.64), 20.21% at Level 3 (Mean = 864.6, SD = 204.59), and only 4.61% at Level 4 (Mean = 197.4, SD = 84.69). These numbers suggest that progressing through the levels becomes increasingly challenging, with fewer students achieving the highest numeracy scores.

In the mathematics content standards context, the Measurement category attained the highest score (M = 2083, SD = 1632.27), indicating that students were more proficient in this area. However, the Data Analysis and Probability standard received the lowest score (M = 1713, SD = 1475.67), suggesting a relative weakness in this content area. The other three standards—Number and Operations (M = 1953.8, SD = 1743.41), Algebra (M = 1874, SD = 1544.32), and Geometry (M = 1786.8, SD = 1555.51)—were intermediate in terms of scores.

A more detailed analysis shows that at Level 0, the Geometry standard had the highest score, while Algebra had the lowest. At Level 1, Number and Operations performed best, while Data Analysis and Probability were weakest. At Levels 2, 3, and 4, the Measurement standard was the top scorer, with the lowest scores varying between Algebra (Levels 2 and 4) and Number and Operations (Level 3).

These results can help educators target specific numeracy content areas requiring more focus and support, particularly for lower-level students. Furthermore, they provide insights into the variability in student performance across the numeracy levels and mathematics content standards, supporting the development of tailored learning strategies and interventions to improve numeracy skills within the LHS network.

Mapping Numeracy Levels Based on School Grade

The mapping results discussed here focus on the performance of primary school students in Grades 1 to 6 who took the PEMANTIK numeracy test. Table 5 comprehensively summarizes the test results, providing numerical information for each grade level and content standard. This table shows how students at different grades performed across the five mathematics content standards: Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability. It provides insights into the overall numeracy skills at each grade level and identifies potential gaps or strengths in specific areas.

Understanding the distribution of scores across different grades and content standards can help educators and researchers identify trends in numeracy development, track student progress, and determine where additional support or intervention might be necessary. By analyzing the specific details within Table 5, stakeholders can better understand the numeracy skill levels of primary school students, enabling them to create targeted learning strategies and improve the overall numeracy education within the LHS network.

Table 5. Numeracy test scores according to numeracy levels and elementary school grades

Content Standard 1: Number and Operations						
Level	**Elementary School Grades**					
	1	**2**	**3**	**4**	**5**	**6**
0	694	652	653	726	725	722
1	458	483	500	624	650	673
2	127	160	184	238	278	432
3	42	52	53	88	112	194
4	11	16	16	44	52	111
Content Standard 2: Algebra						
Level	**Elementary School Grades**					
	1	**2**	**3**	**4**	**5**	**6**
0	541	549	569	669	695	697
1	422	448	473	599	639	666
2	124	160	155	208	255	386
3	78	106	111	161	205	364
4	11	6	5	15	12	41
Content Standard 3: Geometry						
Level	**Elementary School Grades**					
	1	**2**	**3**	**4**	**5**	**6**
0	708	659	662	735	734	721
1	364	376	307	340	392	492
2	126	168	155	204	256	421
3	76	102	97	153	181	332
4	8	8	15	34	40	68
Content Standard 4: Measurement						
Level	**Elementary School Grades**					
	1	**2**	**3**	**4**	**5**	**6**
0	703	654	658	731	729	715
1	446	482	506	623	637	671
2	159	196	194	244	291	441
3	79	108	108	161	207	362
4	19	21	22	55	65	128
Content Standard 5: Data Analysis and Probability						
Level	**Elementary School Grades**					
	1	**2**	**3**	**4**	**5**	**6**
0	659	603	610	687	708	708
1	227	284	313	423	451	521
2	138	179	178	222	278	421
3	62	79	67	121	166	296
4	3	9	6	41	37	68

Table 6 provides a matrix that aligns the PEMANTIK numeracy levels with Indonesia's latest learning curriculum, focusing on the specific learning outcomes derived from the mathematics content standards. This integration is designed to evaluate the extent to which the numeracy assessment results align with the educational benchmarks outlined in the curriculum. The matrix in Table 6 serves as a tool to bridge the gap between numeracy assessment and

curricular expectations. By comparing PEMANTIK's numeracy levels to the learning outcomes, educators and policymakers can identify the expected competencies for each level and ensure that they correspond to the mathematics content standards, including Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability.

With this information, teachers can better tailor their lesson plans to meet the specific learning outcomes and address the areas where students may need additional support. This matrix can also guide curriculum development, ensuring that it is consistent with the results of the numeracy assessment. Ultimately, Table 6 plays a crucial role in validating the effectiveness of the PEMANTIK tool in measuring student performance against the national curriculum and guiding educators in implementing targeted educational strategies.

Table 6. PEMANTIK numerical relevance matrix with Indonesian curriculum learning outcomes

	Level 0	Level 1	Level 2	Level 3	Level 4
Number and operations	all grade	Grades 1 & 2	Grades 3 & 4	Grades 3 & 4	Grades 5 & 6
Algebra	all grade	Grades 1 & 2	Grades 3 & 4	Grades 5 & 6	-
Geometry	all grade	Grades 1 & 2	Grades 3 & 4	Grades 5 & 6	-
Measurement	all grade	Grades 1 & 2	Grades 1 & 2	Grades 3 & 4	Grades 5 & 6
Data Analysis and Probability	all grade	Grades 1 & 2	Grades 3 & 4	Grades 5 & 6	-

The numeracy assessment results from the PEMANTIK tool illustrate the varying degrees of mastery among Lentera Harapan School (LHS) students across different grades and content standards. These findings reveal several critical insights into the state of numeracy skills among elementary school students in Indonesia.

- Grades 1 and 2: At this early stage, most students achieved mastery at Level 1 for various content standards. Specifically, over 50% of students showed proficiency in Numbers and Operations, Algebra, Geometry, and Measurement, with lower mastery rates in Data Analysis and Probability. However, the assessment also indicated that only around 21.96% and 29.21% of Grade 1 and 2 students, respectively, achieved mastery in Measurement at Level 2, suggesting targeted areas for improvement.

- Grades 3 and 4: The results highlighted a concerning trend of declining numeracy skills, with fewer students meeting the achievement standards for Levels 2 and 3. The mastery rates for Numbers and Operations, Algebra, and Geometry were generally below 50%, indicating that a significant number of students are struggling with core mathematics content. Furthermore, only about 7.89% and 11.88% of Grades 3 and 4 students, respectively, achieved mastery in Numbers and Operations at Level 3, while 16.07% and 21.73% attained Level 3 in Measurement.

- Grades 5 and 6: The assessment outcomes for these grades are even more concerning. The mastery rates at Level 4 for Numbers and Operations, Measurement, and other content standards are generally below 20%. For instance, 7.05% of Grade 5 students demonstrated mastery in Numbers and Operations, with 15.14% achieving the same level in Grade 6.

The results showed similar low mastery rates across other content standards, emphasizing the need for substantial interventions to improve numeracy skills.

Furthermore, these findings also suggest several challenges and areas of focus, such as:

- Curriculum Alignment: The curriculum's expected proficiency levels in different content standards may not align with the current capabilities of students. Adjustments might be needed to bridge this gap.
- Teaching Methods and Resources: The declining numeracy skills in higher grades indicate a potential issue with teaching methods, reliance on outdated resources, or lack of engaging teaching strategies. Schools might benefit from adopting more effective pedagogical approaches and providing updated learning materials.
- Socio-economic Factors: The low mastery rates in higher grades could also be influenced by socio-economic factors, impacting students' access to quality education and support systems.

In light of these results, educators and policymakers should consider comprehensive strategies to address the declining numeracy skills among elementary school students. This includes curriculum adjustments, improved teaching methods, better resource allocation, and targeted support for students struggling with numeracy. The study's emphasis on the PEMANTIK assessment tool underscores its potential to offer valuable insights into numeracy skills, guiding future interventions and educational improvements.

Recent research has revealed that elementary school students in Indonesia still have underdeveloped numeracy skills, placing them in the poor category (Rakhmawati & Mustadi, 2022; Sinaga et al., 2023). These studies emphasize the ongoing challenges that students, particularly those in Grade 3 and above, face within the LHS context. An assessment of numeracy levels using the PEMANTIK framework, which aligns with current Indonesian curriculum standards, demonstrated persistent difficulties for Grade 3 and above students in achieving mathematics content benchmarks. Several studies have pointed to various factors contributing to the weak numeracy skills, including a lack of experience with mathematical word problems and problem-solving techniques (Aishalya et al., 2022). Additionally, the development of numeracy skills is hindered by a lack of supporting resources, such as educational media and books (Cahyani & Mohammad, 2023).

Lentera Harapan School (LHS) has encountered challenges related to inadequate teaching resources for numeracy education (Wulandari et al., 2023), especially in remote areas where access to educational materials is limited. Specifically, these regions have faced a shortage of books and electronic resources designed to improve numeracy skills. Due to this constraint, teachers often resorted to using outdated textbooks that focused primarily on rote memorization and routine calculations. However, recent efforts by the Head of School (HoS) team provided a new handbook containing numeracy-focused content, which could serve as a foundational resource for teaching and training students from the academic year 2023/2024 onwards. This development offered a valuable opportunity to examine the impact of using updated educational materials.

In addition to resource limitations, ineffective teaching methods have also played a role in numeracy challenges in Indonesia (Sari et al., 2022). The traditional expository method remained

prevalent, particularly in schools lacking modern infrastructure. Compounding the issue, many students come from families with low to moderate income, and the ongoing economic crisis has further negatively affected their mathematics performance (Dewi, 2022). These conditions made it difficult for teachers to explore and implement a variety of teaching approaches that could improve numeracy skills. To address these issues, LHS needs to adopt best practices and innovative pedagogical strategies to empower teachers and promote more effective numeracy education among students.

Conclusion

The PEMANTIK data on numeracy levels mapping revealed that elementary students at Lentera Harapan School (LHS), particularly those in Grade 3 and above, are predominantly at Levels 0 and 1, indicating significant gaps in their numeracy skills. Several situational factors likely contributed to this issue, including a lack of adequate learning resources for teaching numeracy, the effectiveness of teaching methods, and broader economic influences. This insight provides a foundation for future research aimed at improving numeracy teaching practices at LHS. As previously mentioned, the Head of School recently directed math teachers to use the *Juara* math book, which employs the Concrete-Pictorial-Abstract (CPA) method, in the hopes of enhancing numeracy education. Given this new approach, it is essential to assess the impact of the *Juara* math book on students' numeracy levels. Such research could help identify effective teaching strategies and inform future improvements in numeracy education at LHS, leading to more comprehensive and effective pedagogical approaches.

Acknowledgment

Conflicts of Interest

There is no conflict of interest regarding the publication of this manuscript.

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