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Numeracy Strengthening Strategies For Students Of *Ta`Miriyah* Elementary School Surabaya

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Abstract

This study aims to describe the numeracy strengthening strategies implemented at SD Ta'miriyah Surabaya for students in Grades 1 through 5 over a four-year period (2021–2025). Employing a qualitative descriptive approach, data were collected through reflection of education report cards, teacher interviews, classroom observations, and documentation. The numeracy strengthening strategy encompasses eight sequential stages: competency mapping, assessment result analysis, student grouping based on learning needs, teacher training, mathematics instruction through concept introduction–concept comprehension–skills development, monitoring, post-treatment testing, and evaluation and reflection. Results show a significant improvement in numeracy achievement from 2021 to 2024 across all domains (Number, Algebra, Geometry, and Data and Uncertainty) and all cognitive levels (Knowing, Applying, and Reasoning). The Number domain recorded the highest gain of 31.69 points, while the Algebra domain and Reasoning competency (L3) still require prioritized intervention. This study demonstrates that a systematic, sustained, and teacher-competency-supported numeracy strengthening program can positively impact the quality of mathematics learning in elementary schools.

Keywords: Numeracy Strengthening; Elementary School; Mathematics Instruction; Science Literacy; Merdeka Curriculum.

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INTRODUCTION

In daily life, many activities are related to mathematics. From children to adults, mathematics-related activities include making kites using geometric concepts of flat shapes, buyers and sellers conducting transactions using arithmetic, cooperatives and banking activities applying arithmetic concepts, and geometric and measurement concepts widely used to solve everyday problems. Furniture craftsmen use measurement and geometry to make items such as tables, chairs, and wardrobes. Mountain climbers use Cartesian coordinates to locate climbing points. There are many more everyday activities that make use of mathematics.

Mathematics is a science and body of knowledge concerned with logical learning and thinking that is indispensable for human life and underpins the development of modern technology (Indriani & Imanuel, 2018). Mathematics plays an important role across various disciplines and advances human cognitive capacity. It is viewed both as subject matter to be understood and as a conceptual tool for constructing and reconstructing knowledge, sharpening and training the thinking skills needed to solve problems in life. The ability to solve mathematics-related problems is not limited to computation or the application of mathematical concepts; it also encompasses the ability to access, use, interpret, and connect mathematical information (Anwar, 2018). This ability is known as mathematical literacy, or numeracy. Numeracy means using mathematics confidently and effectively to meet the demands of everyday life.

Numeracy is critically important for individuals in developing rational reasoning and reasoning techniques in daily activities. Numeracy skills enable a person to function effectively in everyday life and contribute meaningfully to society. It also enhances their opportunities in the world of work and builds a secure mathematical foundation that can be developed through lifelong learning (Witono & Hadi, 2025). Numeracy skills are a fundamental and essential life skill that permeates all aspects of our lives (Iasha et al., 2024).

Mathematical literacy, or numeracy, is the ability of an individual to reason mathematically and to formulate, use, and interpret mathematics in order to solve problems across a variety of real-world contexts. Mathematical literacy encompasses concepts, procedures, facts, and tools for describing, explaining, and predicting phenomena (Darmastuti et al., 2024). Mathematical literacy can help individuals understand the role of mathematics in the real world and to make well-grounded decisions based on logical reasoning.

The concept of numeracy is not limited to the application of skills in number operations; it also relates to the mastery of mathematical concepts and mathematical thinking skills in general. Numeracy focuses not only on understanding mathematical concepts but further on the ability to

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apply those concepts. Mathematical-numeracy literacy can be defined as an individual's capacity to use their mathematical knowledge to explain events, solve problems, or make decisions in everyday life. This can help individuals recognize the role of mathematics in real life, enabling them to make the necessary judgments and decisions.

Numeracy is a critical capability that every individual should possess and can be developed from an early age. It can be cultivated within the school learning environment through appropriate strategies, namely by integrating mathematical literacy (numeracy) into instruction and assessment. Based on the foregoing discussion, this study aims to describe the numeracy strengthening strategies implemented at SD Ta'miriyah Surabaya. The findings of this study are expected to serve as material for reflection and as a reference for strengthening numeracy programs in schools.

RESEARCH METHOD

This study employs a qualitative research approach with a descriptive design. Qualitative descriptive research aims to describe and portray existing phenomena, whether natural or human-constructed, with greater attention to characteristics, quality, and interrelationships among activities. Qualitative descriptive research constitutes a series of activities for obtaining data in its natural state, without imposed conditions, with results that place greater emphasis on meaning.

The study was conducted at SD Ta'Miriyah Surabaya, involving students from Grades 1 through 5. The research was carried out over a four-year period from January 2021 to June 2025.

RESULTS AND DISCUSSION

The following presents the results of the numeracy strengthening strategy for students of SD Ta'miriyah Surabaya in Grades 1 through 5.

Reflection and Focus Group Discussion

The researcher and the school management team, comprising the principal, curriculum coordinator, and teachers, conducted a reflection on students' numeracy outcomes based on the education report card, which presents students' numeracy scores, students' learning outcomes in mathematics, and teachers' records regarding student performance in mathematics learning.

Based on the reflection of the education report card, the numeracy score was found to be 1.75, categorized as below the minimum competency level. The numeracy competency results are

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presented in Table 1 below.

Table 1. Numeracy Results from the Education Report Card, 2021

Competency	Score
Competency in the Number Domain	38.23
Competency in the Algebra Domain	39.13
Competency in the Geometry Domain	36.07
Competency in the Data and Uncertainty Domain	46.53
Knowing Competency (L1)	46.46
Applying Competency (L2)	36.81
Reasoning Competency (L3)	36.43

Based on teacher interviews and records regarding students' mathematics learning outcomes, many students still struggled with basic computation skills, including addition, subtraction, multiplication, and division, which caused difficulties in carrying out procedures and determining final results. When solving mathematical problems, students experienced difficulty in identifying solutions due to confusion about which formulas to apply and how to execute the required procedures. One study found that students experienced difficulty in solving word problems; students struggled to understand the problems and determine appropriate solutions, and their computational skills were weak (Enlisia et al., 2020).

Based on these reflection findings, the researcher and the management team concluded that numeracy strengthening beginning from Grade 1 was necessary, so that by the time students reach Grade 5 and participate in the Computer-Based National Assessment (ANBK), which includes a numeracy assessment, their results as reflected in the education report card would be improved.

The researcher designed a numeracy strengthening strategy for students through the following activities: (1) mapping of students' numeracy competencies through an initial test aligned with grade-level targets; (2) analysis of mapping results based on content and cognitive level; (3) student grouping into five categories (upper proficient, proficient, basic, upper intervention, and lower intervention) to support differentiated learning (Indartiningsih et al., 2023); (4) teacher training related to numeracy and preparation of numeracy materials (Indartiningsih et al., 2025); (5) mathematics instruction in the classroom using three stages: concept introduction, concept comprehension, and skills development (Ginanjar, 2019); (6)

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monitoring through classroom observation; (7) a post-treatment numeracy test; and (8) evaluation and reflection.

Teacher Training

Training was provided for teachers on numeracy and how to develop and strengthen students' numeracy. The training content covered the definition of numeracy and its components. Numeracy is the ability of an individual to use their mathematical knowledge to explain events, solve problems, or make decisions in everyday life. The components of numeracy are context, content, and cognitive level.

The context of numeracy encompasses three categories (OECD, 2017): (1) Personal Context, which focuses on the activities of an individual, their family, or group, including food preparation, shopping, games, personal health, transportation, sports, travel, scheduling, and personal finances; (2) Sociocultural Context, which relates to cultural practices such as customs, food, clothing, and social issues at local, national, or global levels, including voting systems, public transportation, government, and national economics; and (3) Scientific Context, which relates to the application of mathematics in the natural world and to science and technology topics, encompassing weather, ecology, medical science, space science, genetics, measurement, and mathematics itself.

The content of numeracy comprises four domains (OECD, 2017): (1) Number, consisting of subdomains of representation, ordering properties, and operations; (2) Geometry and Measurement, consisting of geometric shapes, measurement, and spatial reasoning; (3) Algebra, consisting of equations and inequalities, relations and functions (including number patterns), and ratio and proportion; and (4) Data and Uncertainty, relating to simple data presentation and uncertainty found in students' surroundings.

The cognitive level of numeracy is divided into three levels (OECD, 2017): (1) Knowing, referring to students' basic knowledge of facts, processes, concepts, and procedures; (2) Applying, referring to the ability to apply knowledge in real-world situations to solve problems; and (3) Reasoning, referring to the ability to analyze data, draw conclusions, and extend understanding into new, complex situations.

Mathematics Instruction

Effective mathematics instruction should be implemented in stages so that students not only compute but also understand the meaning of the concepts being learned. One widely used approach is mathematics instruction through three stages (Yuza, 2018): (1) Introduction of Basic

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Mathematical Concepts, referring to the teaching of a new mathematical concept when students have not previously encountered it, serving as a bridge connecting students' concrete cognitive capacities with new abstract concepts; (2) Concept Comprehension, which is the continuation of concept introduction aimed at deepening students' understanding; and (3) Skills Development, which is the continuation of concept introduction and comprehension, aimed at making students more proficient in using various mathematical concepts.

Preparation of Numeracy Materials

The researcher assisted teachers in developing numeracy materials for each grade level, aligned with the learning targets and outcomes at each grade or phase. Numeracy materials consist of mathematical problems covering the strengthening of basic arithmetic operations and problem solving (Suttrisno, et al 2023). The numeracy problems were developed in accordance with the guidelines for AKM (Minimum Competency Assessment) questions and are capable of developing higher-order thinking skills (HOTS), specifically critical and creative thinking (Sagala & Andriani, 2019).

Implementation of Student Numeracy Strengthening

In implementing the numeracy strengthening program for students in Grades 1 through 5, the school management team created a schedule for numeracy classes on Tuesdays and Thursdays. Prior to the classes, students were mapped based on the initial test results to determine baseline numeracy proficiency. Numeracy strengthening was then implemented in each class according to students' groups, beginning with the Number domain (representation, ordering, and arithmetic operations). Instruction followed the mathematics learning stages of concept introduction, concept comprehension, and concept skills development, incorporating concrete and semi-concrete instructional media. A final Numeracy test was administered at the end of each semester.

Numeracy Results

The numeracy results following three years of the Numeracy Strengthening Program can be observed from the education report cards from 2021 to 2024, presented in Table 2 below.

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Table 2. Numeracy Competency from 2021 to 2024

Domain / Cognitive Level	2021	2022	2023	2024
Number Domain	38.23	52.11	66.80	69.92
Algebra Domain	39.13	48.32	59.14	63.23
Geometry Domain	36.07	49.88	61.73	64.37
Data and Uncertainty Domain	46.53	61.20	77.57	74.52
Knowing (L1)	46.46	58.32	67.19	71.46
Applying (L2)	36.81	51.44	63.07	65.91
Reasoning (L3)	36.43	43.34	66.10	66.32

Analysis by Numeracy Domain

Competency in the Number domain showed consistent improvement, from 38.23 in 2021 to 69.92 in 2024 — an increase of 31.69 points, the highest gain compared to other domains. This indicates that students have become increasingly capable of understanding number concepts, arithmetic operations, and relationships between numbers.

Algebra competency achievement improved from 39.13 to 63.23, an increase of 24.10 points. However, this domain still yielded one of the lowest scores in 2024, indicating that students continue to experience difficulty in understanding patterns, relations, and abstract mathematical representations.

Geometry competency increased considerably, from 36.07 to 64.37, an improvement of 28.30 points, indicating enhanced student ability in understanding shapes, space, measurement, and geometric relationships.

The Data and Uncertainty domain recorded the highest achievement throughout the measurement period, increasing from 46.53 in 2021 to 74.52 in 2024. Although a slight decline occurred from 2023 (77.57) to 2024 (74.52), the achievement still demonstrates strong ability in reading, interpreting, and analyzing data.

Analysis by Cognitive Level

The Knowing ability (L1) showed stable improvement, from 46.46 to 71.46 — the highest achievement recorded in 2024 — indicating that the majority of students have become capable of recalling and understanding basic numeracy concepts.

The Applying ability (L2) improved considerably, from 36.81 to 65.91, indicating that students have become increasingly capable of using mathematical concepts to solve contextual

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problems.

The Reasoning ability (L3) recorded the largest overall improvement, from 36.43 to 66.32. The most substantial leap occurred between 2022 and 2023 (from 43.34 to 66.10). However, the improvement from 2023 to 2024 was only 0.22 points, indicating that students' higher-order thinking abilities have begun to plateau and require instructional interventions with greater emphasis on problem solving, logical reasoning, and critical thinking.

Based on the numeracy achievement results for students in Grades 1 through 5, there were significant improvements between the initial mapping results and those recorded following numeracy strengthening. Overall, students' numeracy achievement from 2021 to 2024 demonstrates a highly positive trend. Improvement occurred across all numeracy domains and cognitive levels, signaling an enhancement in the quality of mathematics and numeracy instruction. Nevertheless, competency in the Algebra domain and reasoning ability (L3) still need to remain priority areas for development. In response to these numeracy results, the researcher, management team, and teachers conducted evaluation and reflection sessions and formulated improvement plans for the following semester.

CONCLUSION

The student numeracy strengthening strategy implemented through the stages of competency mapping, assessment result analysis, student grouping based on learning needs, teacher training, mathematics instruction through concept introduction–concept comprehension–skills development, monitoring, post-treatment testing, and evaluation and reflection proved effective in improving students' numeracy abilities. This strategy enables teachers to deliver more targeted learning services aligned with students' ability levels and needs.

The program results indicate a significant improvement in the numeracy achievement of students in Grades 1 through 5 following the numeracy strengthening program. Overall, numeracy achievement from 2021 to 2024 demonstrated an upward trend across all numeracy domains and cognitive levels. These findings indicate that numeracy strengthening implemented in a systematic, sustained manner and supported by enhanced teacher competency is capable of producing a positive impact on the quality of mathematics learning in schools.

Nevertheless, competency in the Algebra domain and higher-order reasoning ability (Level 3) still require special attention as development priorities in the next program cycle. Evaluation and reflection activities involving the school management team and teachers are, accordingly, an important step toward formulating follow-up action plans and continuous improvement aimed at

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enhancing the quality of learning and students' numeracy achievement in subsequent semesters and academic years.

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