

Interpreting TKA Math Results: Analytic Framework for Elementary Students' Ability and Readiness Distribution

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Abstract

This study aimed to describe elementary students' mathematics achievement based on the Mathematics Academic Ability Test (Tes Kemampuan Akademik/TKA) tryout, analyze the distribution of their achievement levels, and evaluate their readiness for future mathematics assessments. A quantitative descriptive research design was employed involving 28 sixth-grade students at SD Negeri Banyumanik 01 Semarang, Indonesia. Data was obtained from a mathematics TKA tryout consisting of 30 items administered in April 2026. The data were analyzed using descriptive statistical techniques, including the calculation of mean, minimum and maximum scores, frequency distributions, percentage distributions, and achievement-level classifications. The results revealed that the students obtained an average score of 58.45, with scores ranging from 36.67 to 90.00. Based on the achievement-level classification, 14.29% of students were categorized as high achievers, 17.86% as fair achievers, 21.43% as moderate achievers, 25.00% as low achievers, and 21.43% as very low achievers. Overall, 46.43% of students were classified in the low and very low achievement categories, indicating that a substantial proportion of students still experienced difficulties in mastering mathematical concepts and problem-solving skills. Although all students completed the assessment, considerable variation in score accuracy was observed. These findings suggest that students' readiness for future mathematics assessments remains at a moderate level. The study highlights the importance of utilizing TKA tryout results as diagnostic data for designing remedial, enrichment, and differentiated instructional strategies to improve students' mathematical understanding and academic performance.

Keywords: Mathematics achievement, TKA tryout, academic readiness, achievement level distribution, elementary school students.

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan capaian belajar matematika siswa sekolah dasar berdasarkan hasil tryout Tes Kemampuan Akademik (TKA), menganalisis distribusi tingkat pencapaian mereka, serta mengevaluasi kesiapan siswa dalam menghadapi asesmen matematika di masa mendatang. Penelitian ini menggunakan desain penelitian deskriptif kuantitatif dengan melibatkan 28 siswa kelas VI SD Negeri Banyumanik 01 Semarang, Indonesia. Data diperoleh dari hasil tryout TKA Matematika yang terdiri atas 30 butir soal dan dilaksanakan pada bulan April 2026. Analisis data dilakukan menggunakan teknik statistik deskriptif yang meliputi perhitungan nilai rata-rata, nilai minimum dan maksimum, distribusi frekuensi, distribusi persentase, serta klasifikasi tingkat pencapaian siswa. Hasil penelitian menunjukkan bahwa siswa memperoleh nilai rata-rata sebesar 58,45 dengan rentang skor antara 36,67 dan 90,00. Berdasarkan klasifikasi tingkat pencapaian, sebanyak 14,29% siswa berada pada kategori tinggi, 17,86% pada kategori cukup, 21,43% pada kategori sedang, 25,00% pada kategori rendah, dan 21,43% pada kategori sangat rendah. Secara keseluruhan, 46,43% siswa berada pada kategori rendah dan sangat rendah, yang menunjukkan bahwa sebagian besar siswa masih mengalami kesulitan dalam penguasaan konsep matematika dan keterampilan pemecahan masalah. Meskipun seluruh siswa menyelesaikan tes yang diberikan, terdapat variasi yang cukup besar dalam ketepatan jawaban yang diperoleh. Temuan ini menunjukkan bahwa kesiapan siswa dalam menghadapi asesmen matematika di masa mendatang masih berada pada tingkat sedang. Oleh karena itu, hasil tryout TKA dapat dimanfaatkan sebagai data diagnostik untuk merancang program remedial, pengayaan, dan pembelajaran terdiferensiasi guna meningkatkan pemahaman matematis serta capaian akademik siswa.

Kata Kunci: Capaian matematika, tryout TKA, kesiapan akademik, distribusi tingkat pencapaian, siswa sekolah dasar.

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Introduction

Mathematics is one of the fundamental subjects in elementary education because it plays an important role in developing students' logical thinking, problem-solving abilities, reasoning skills, and analytical competencies. Strong mathematical competence is essential not only for academic success but also for students' ability to make decisions and solve problems in everyday life. However, numerous studies have reported that students' mathematics achievement remains relatively low and unevenly distributed across ability levels, indicating that many learners continue to experience difficulties in understanding mathematical concepts and applying them to problem-solving situations (Eryani et al. 2024; Kaiser et al. 2002).

Assessment plays a crucial role in the teaching and learning process because it provides information about students' understanding, learning progress, and achievement of instructional objectives. Through assessment, teachers can identify students' strengths and weaknesses and use the results to improve instructional practices (Arikunto 2018; Nana Sudjana 2017). Consequently, assessment should not merely function as a tool for measuring achievement but also as a source of evidence for making instructional decisions and improving learning quality.

One form of assessment commonly implemented in Indonesian schools is the Mathematics Academic Ability Test (Tes Kemampuan Akademik/TKA) tryout. In this study, a TKA tryout refers to a school-administered formative assessment designed to simulate the format and content of the Mathematics Academic Ability Test. Such assessments provide students with opportunities to familiarize themselves with test formats while enabling teachers to evaluate students' learning progress before formal academic assessments. Previous studies have shown that formative assessments and practice tests can improve learning outcomes by providing feedback to both students and teachers regarding learning strengths and areas requiring improvement (Fajriah 2025; Purwanto 2016).

Research on mathematics achievement and academic readiness has received considerable attention. Previous studies have demonstrated that students' mathematics performance is closely related to conceptual understanding, learning readiness, self-efficacy, and opportunities for meaningful learning experiences (Anwaril Hamidy et al. 2023; Retnawati et al. 2018). International perspectives also emphasize that mathematics learning should develop higher-order thinking skills, including reasoning, problem solving, communication, and mathematical representation (Kaiser et al. 2002; National Council of Teachers of Mathematics 2000). Nevertheless, mathematics instruction in many classrooms continues to focus primarily on procedural practice, limiting students' opportunities to develop deeper conceptual understanding.

Although previous studies have investigated mathematics achievement and learning readiness separately, limited research has examined how mathematics tryout results can be utilized simultaneously to describe students' achievement distribution and evaluate their academic readiness. Most existing studies focus either on achievement outcomes or readiness indicators without integrating both dimensions through actual assessment data. As a result, there remains a need for empirical studies that utilize authentic classroom assessment results

to provide a more comprehensive picture of students' mathematics achievement and readiness for future assessments.

This study addresses this gap by analyzing mathematics TKA tryout results obtained from elementary school students. Unlike previous studies that primarily employed surveys or experimental interventions, the present study uses authentic assessment data to examine students' achievement levels and academic readiness. The study contributes to the literature in three ways. First, it provides a detailed description of students' mathematics achievement based on actual tryout results. Second, it analyzes the distribution of students' achievement levels to identify patterns of learning outcomes. Third, it evaluates students' academic readiness based on score distribution, achievement-level classification, and assessment performance. By integrating these dimensions, the study offers evidence-based insights that may support teachers in designing remedial, enrichment, and differentiated instructional strategies.

Based on the background and research gap described above, this study aims to: (1) describe elementary students' mathematics achievement based on the Mathematics Academic Ability Test (TKA) tryout results; (2) analyze the distribution of students' mathematics achievement levels; and (3) evaluate students' readiness for future mathematics assessments. The findings are expected to provide useful information for improving mathematics instruction and promoting data-driven educational decision-making.

Methods

Research Design

This study employed a quantitative descriptive research design to describe students' mathematics achievement, analyze the distribution of their achievement levels, and evaluate their readiness for future mathematics assessments based on the Mathematics Academic Ability Test (Tes Kemampuan Akademik/TKA) tryout results. Descriptive research is appropriate for systematically portraying existing educational phenomena and generating factual information without manipulating variables (Creswell 2014; Sugiyono 2019).

Research Setting and Participants

The study was conducted at SD Negeri Banyumanik 01 Semarang, Central Java, Indonesia, in April 2026. The population consisted of all sixth-grade students who participated in the Mathematics Academic Ability Test (TKA) tryout administered by the school. Because all members of the population participated in the assessment and the population size was relatively small, total sampling was employed. Consequently, the study involved 28 sixth-grade students.

Data Source and Tryout Instrument

The data source consisted of students' mathematics scores obtained from the Mathematics Academic Ability Test (TKA) tryout. In this study, the TKA tryout is defined as a school-administered formative assessment designed to simulate the format and content of the Mathematics Academic Ability Test while providing diagnostic information regarding students' learning achievement and readiness for future mathematics assessments. The tryout instrument consisted of 30 mathematics items covering fundamental elementary mathematics competencies, including number operations, geometry, measurement, data

representation, and mathematical problem-solving. The test employed multiple-choice, multiple true-false, and complex multiple-choice formats. These item types were intended to assess procedural knowledge, conceptual understanding, and mathematical reasoning skills.

Scoring Procedure and Achievement Level Classification

Students' scores were calculated based on the number of correct responses and converted to a 100-point scale using the following formula (1):

$$Score = \left(\frac{\text{Number of Correct Answer}}{30} \right) \times 100 \quad (1)$$

As the tryout consisted of 30 mathematics items, each correct response contributed approximately 3.33 points to the final score. Consequently, several scores appeared in decimal form, such as 36.67, 53.33, 56.67, and 90.00. Higher scores indicated higher levels of mathematics achievement.

To facilitate descriptive interpretation, students' scores were classified into five mathematics achievement levels. The classification was adapted from educational evaluation principles commonly used in Indonesian educational assessment literature (Arikunto 2018; Nana Sudjana 2017). Because no nationally standardized achievement-level classification currently exists for Mathematics Academic Ability Test (TKA) scores, the score intervals were established for descriptive purposes to identify achievement distribution patterns and support instructional decision-making.

Table 1. Classification of Students' Mathematics Achievement Levels

Score Range	Achievement Level
≥ 80	High
66-79	Fair
56-65	Moderate
46-55	Low
< 46	Very Low

The achievement-level classification was adapted from educational evaluation principles proposed by (Arikunto 2018) and (Nana Sudjana 2017) and adjusted for descriptive interpretation purposes. The achievement-level intervals were adapted from descriptive achievement classifications commonly used in Indonesian educational evaluation literature (Arikunto 2018; Nana Sudjana 2017). The categories were not derived from national TKA standards or statistical norm-referenced grouping but were established to facilitate descriptive interpretation of students' mathematics achievement. The classification was used to identify the distribution of students' mathematics achievement and to support the interpretation of students' readiness for future mathematics assessments.

Data Collection

Data were collected using a documentation technique. Students' mathematics tryout scores and related assessment records were obtained from the school's official documentation. The collected data included individual scores, test completion records, and achievement results. To ensure data accuracy, all documented scores were cross-checked against the original assessment records prior to analysis.

Data Analysis

Data were analyzed using descriptive statistical techniques (Nana Sudjana 2017). The analysis was conducted in five stages. First, students' scores were compiled, organized, and verified. Second, descriptive statistics, including the mean, minimum score, and maximum score, were calculated to describe overall mathematics achievement. Third, students were classified into achievement levels according to the criteria presented in Table 1. Fourth, frequency and percentage distributions were calculated to determine the proportion of students within each achievement level. Finally, students' readiness for future mathematics assessments was interpreted based on four indicators: score distribution, achievement-level classification, test completion rate, and answer accuracy. The findings were subsequently interpreted and discussed in relation to previous studies on mathematics achievement, educational assessment, and learning readiness to provide a comprehensive understanding of students' learning conditions and instructional needs.

Results And Discussion

1. Results from the Mathematics TKA Tryout

The Mathematics Academic Ability Test (TKA) tryout was administered on April 8, 2026, and involved 28 sixth-grade students from SD Negeri Banyumanik 01 Semarang. The assessment consisted of 30 mathematics items, and students' scores were converted to a scale ranging from 0 to 100. The results showed considerable variation in students' performance. The average score was 58.45, with a maximum score of 90.00 and a minimum score of 36.67.

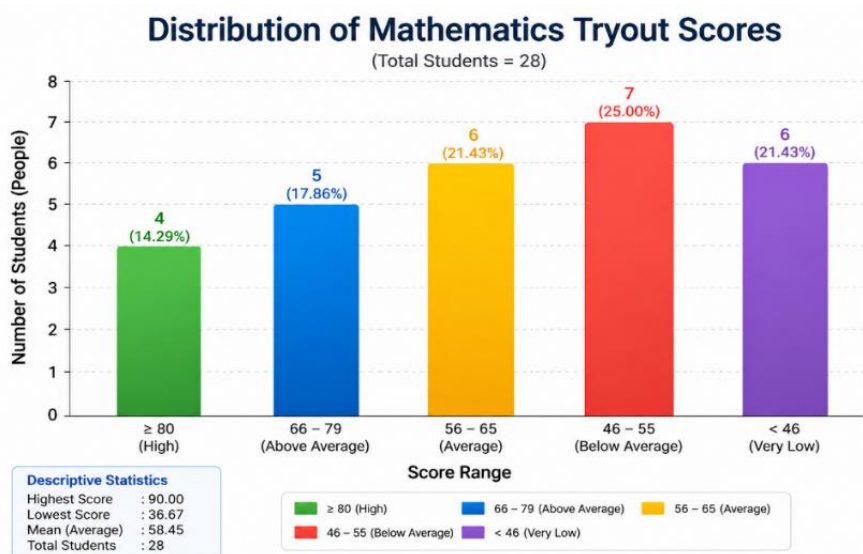


Figure 1. Distribution or Mathematics Tryout Scores

Figure 1 illustrates the distribution of students' mathematics tryout scores. The score distribution indicates that students' achievement was concentrated in the low to moderate range, while only a small proportion of students attained high achievement. This pattern suggests that students demonstrated varying levels of mastery of mathematical concepts and problem-solving skills.

The average score of 58.45 indicates that students' overall mathematics achievement was at a moderate level. However, the substantial gap between the highest score (90.00) and the lowest score (36.67) reflects considerable variation in learning outcomes among students. Such variation suggests that students entered the assessment with different levels of conceptual understanding and mathematical proficiency. From an educational assessment

perspective, differences in achievement distribution often indicate that students have diverse learning needs that require targeted instructional support (Arikunto 2018; Nana Sudjana 2017).

The findings also highlight the importance of conceptual understanding in mathematics learning. According to (National Council of Teachers of Mathematics 2000), effective mathematics instruction should develop problem-solving, reasoning, communication, and representation skills. The moderate average achievement observed in this study suggests that many students may still rely primarily on procedural knowledge rather than demonstrating deeper conceptual understanding. As a result, students may be able to complete mathematical tasks but experience difficulties when applying concepts to unfamiliar or complex problems.

These findings are consistent with previous studies reporting that mathematics achievement is often constrained by instructional approaches that emphasize memorization and repetitive practice rather than conceptual understanding and mathematical reasoning (Eryani et al. 2024; Kaiser et al. 2002). Consequently, the Mathematics TKA tryout serves not only as an assessment of students' current achievement but also as a valuable source of diagnostic information regarding the effectiveness of mathematics instruction.

Another notable finding is that all students completed the assessment, indicating adequate procedural readiness to participate in academic assessments. Nevertheless, substantial differences in score accuracy were observed among students. This finding suggests that although students were able to respond to all items, many still encountered difficulties in selecting correct solutions and applying mathematical concepts accurately. Therefore, assessment readiness should not be interpreted solely in terms of task completion but also in terms of conceptual understanding and answer accuracy.

From an instructional perspective, the results indicate the need for learning strategies that emphasize conceptual understanding, mathematical reasoning, and problem-solving. Teachers may utilize tryout results as diagnostic data to identify specific learning difficulties and design appropriate interventions. Students with lower achievement may benefit from remedial instruction focused on foundational concepts and guided practice, whereas students with higher achievement may be provided with enrichment activities that encourage higher-order thinking and independent problem solving. Thus, Mathematics TKA tryout results can serve as an important basis for data-driven instructional improvement.

2. Distribution of Student' Mathematics Achievement Levels

The classification of students' mathematics achievement levels revealed substantial variation in learning outcomes among the participants. Based on the criteria presented in Table 1, four students (14.29%) were classified in the high achievement level, five students (17.86%) in the fair achievement level, six students (21.43%) in the moderate achievement level, seven students (25.00%) in the low achievement level, and six students (21.43%) in the very low achievement level.

The results indicate that students' achievement was predominantly concentrated in the low to moderate categories. A total of 46.43% of students were classified in the low and very low achievement levels, whereas only 14.29% achieved the high level. This distribution suggests that a considerable proportion of students still experience difficulties in mastering mathematical concepts and applying them effectively to problem-solving tasks.



Figure 2. Distribution of Students' Mathematics Achievement Levels

From an educational assessment perspective, the uneven distribution of achievement levels reflects differences in students' prior knowledge, learning experiences, and mathematical understanding (Arikunto 2018; Nana Sudjana 2017). Ideally, effective mathematics instruction should support the majority of students in achieving at least satisfactory levels of performance. However, the predominance of students in the lower achievement categories indicates that learning outcomes remain uneven across the classroom.

The findings are consistent with previous studies showing that achievement disparities often emerge when instructional practices do not adequately accommodate students' diverse learning needs (Retnawati et al. 2018; Torres 2021). Students with stronger prior knowledge and learning readiness tend to achieve higher scores, whereas students with weaker foundations frequently encounter difficulties in understanding mathematical concepts and solving problems. Consequently, achievement gaps may widen when instructional approaches fail to address differences in students' readiness and learning profiles.

The distribution identified in this study also highlights the importance of differentiated instruction. Students classified in the very low and low achievement levels require remedial learning activities focused on strengthening fundamental mathematical concepts, guided practice, and continuous feedback. Small-group instruction and scaffolded learning experiences may help these students overcome misconceptions and improve conceptual understanding.

Students in the moderate achievement level may benefit from reinforcement activities designed to strengthen mathematical reasoning and problem-solving skills. Providing additional opportunities to engage with contextual and non-routine mathematical problems may support their progression to higher achievement levels. Meanwhile, students in the fair and high achievement levels should be provided with enrichment activities that encourage higher-order thinking, independent problem solving, mathematical investigation, and reasoning. Such activities can help maintain learning motivation while further developing advanced mathematical competencies.

Overall, the distribution of achievement levels demonstrates that students possess diverse learning needs and levels of preparedness. Therefore, mathematics instruction should move beyond uniform teaching practices and adopt differentiated, data-driven approaches informed by assessment results. The Mathematics TKA tryout results can serve as valuable

diagnostic data for planning remedial, reinforcement, and enrichment programs that are aligned with students' achievement levels and learning needs.

3. Students' Readiness for Future Mathematics Assessments

Students' readiness for future mathematics assessments was evaluated based on four indicators: score distribution, achievement-level classification, test completion rate, and answer accuracy. In this study, academic readiness refers to students' preparedness to participate successfully in mathematics assessments as reflected in their achievement and performance indicators.

The findings indicate that all 28 students completed the Mathematics Academic Ability Test (TKA) tryout, demonstrating adequate procedural readiness to participate in academic assessments. Students were able to follow test instructions, complete all items, and engage with the assessment process appropriately. This finding suggests that students possessed sufficient familiarity with assessment procedures and test-taking requirements.

However, readiness should not be interpreted solely in terms of assessment participation and completion. Students' achievement results revealed considerable variation in answer accuracy and mathematical understanding. The average score of 58.45 and the predominance of students in the low to moderate achievement levels indicate that many students still experienced difficulties in applying mathematical concepts and solving problems accurately. Therefore, although students demonstrated procedural readiness, their academic readiness in terms of mathematical competence remained at a moderate level.

The achievement-level distribution provides further evidence of this condition. Nearly half of the students (46.43%) were classified in the low and very low achievement levels, indicating that a substantial proportion of learners require additional instructional support before undertaking future mathematics assessments. These findings suggest that readiness should be viewed as a multidimensional construct that encompasses not only participation in assessment activities but also mastery of the knowledge and skills being assessed.

The results are consistent with previous studies emphasizing that academic readiness is closely associated with conceptual understanding, learning achievement, and opportunities to engage in meaningful learning experiences (Retnawati et al., 2018; Anwaril Hamidy et al., 2023). Students who possess stronger conceptual foundations tend to demonstrate higher achievement and greater confidence when completing assessment tasks, whereas students with weaker foundations often encounter difficulties in problem-solving and mathematical reasoning.

From an instructional perspective, the findings highlight the importance of using assessment results as diagnostic information for improving learning. Students classified in the very low and low achievement levels should receive targeted remedial instruction focusing on foundational mathematical concepts and guided practice. Students in the moderate achievement level may benefit from reinforcement activities aimed at strengthening conceptual understanding and problem-solving skills. Meanwhile, students in the fair and high achievement levels should be provided with enrichment opportunities that encourage higher-order thinking, mathematical reasoning, and independent learning. Overall, the Mathematics TKA tryout results suggest that students' readiness for future mathematics assessments remains at a moderate level. Although all students successfully completed the assessment, the distribution of achievement levels indicates a need for

differentiated instructional support to improve mathematical understanding and enhance future academic performance.

The findings of this study have important implications for elementary mathematics instruction. The achievement-level distribution revealed that 46.43% of the students were classified in the low and very low achievement categories, indicating the need for differentiated instructional approaches that accommodate diverse learning needs. Students with lower achievement require structured remedial programs focusing on foundational mathematical concepts, guided practice, and continuous feedback. Students in the moderate achievement category may benefit from reinforcement activities that strengthen conceptual understanding and problem-solving skills. Meanwhile, students in the fair and high achievement categories should be provided with enrichment activities involving higher-order thinking tasks, mathematical investigations, and independent learning opportunities. Therefore, TKA tryout results can serve as valuable diagnostic data for planning targeted instructional interventions and improving mathematics learning outcomes in elementary schools.

Conclusion

This study examined elementary students' mathematics achievement based on the Mathematics Academic Ability Test (TKA) tryout results, analyzed the distribution of students' achievement levels, and evaluated their readiness for future mathematics assessments. The findings revealed that students achieved an average score of 58.45, with scores ranging from 36.67 to 90.00, indicating substantial variation in mathematics performance among students. Based on the achievement-level classification, 14.29% of students were categorized as high achievers, 17.86% as fair achievers, 21.43% as moderate achievers, 25.00% as low achievers, and 21.43% as very low achievers. Overall, 46.43% of students were classified in the low and very low achievement levels, suggesting that a considerable proportion of students continue to experience difficulties in mastering mathematical concepts and applying them to problem-solving tasks.

Although all students successfully completed the assessment, the achievement distribution indicates that students' readiness for future mathematics assessments remains at a moderate level. The findings demonstrate that assessment readiness should be interpreted not only in terms of test participation and completion but also in relation to students' conceptual understanding, achievement levels, and answer accuracy. The study highlights the value of Mathematics TKA tryout results as diagnostic assessment data for instructional improvement. The achievement-level distribution can assist teachers in identifying students' learning needs and designing appropriate interventions. Remedial instruction is recommended for students in the low and very low achievement levels, reinforcement activities for students in the moderate achievement level, and enrichment programs for students in the fair and high achievement levels. Therefore, the use of assessment data to support differentiated and data-driven instruction is essential for improving students' mathematics achievement and academic readiness.

This study has several limitations. First, the findings were derived from a relatively small sample of 28 sixth-grade students from a single elementary school in Semarang, Indonesia. Consequently, the results should be interpreted with caution and may not fully represent the mathematics achievement and academic readiness of elementary students in other educational contexts. Future research is recommended to involve larger and more

diverse samples from multiple schools and regions to enhance the generalizability of the findings and provide a broader understanding of students' mathematics achievement and readiness for future assessments. Future studies are encouraged to involve larger samples and multiple schools to obtain broader insights into students' mathematics achievement and readiness across different educational contexts.

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