

Mathematics Learning Outcomes and Mastery Achievement: A Descriptive Quantitative Study of Eighth-Grade Students

Muhamad Saleh^{1*}, Manovri Yeni²

¹Universitas Serambi Mekkah, Aceh, Indonesia

²Universitas Muhammadiyah Aceh, Aceh, Indonesia

*Corresponding Author: msalehginting@gmail.com

Abstract. *This study aims to analyze the learning outcomes of mathematics and the level of achievement of completeness of grade VIII students at SMP Negeri 14 Banda Aceh through a descriptive quantitative approach. The background of this research is based on the importance of improving numeracy literacy and the need for data-driven decision-making in the evaluation of mathematics learning. The research data was obtained from the documentation of the results of the semester summative evaluation which involved all grade VIII students as research subjects with a total sampling technique. The data was analyzed using descriptive statistics which included average scores, maximum and minimum scores, score ranges, frequency distribution, and individual and classical learning completion percentages based on the applicable Minimum Completeness Criteria (KKM). The results of the analysis show an overview of the profile of students' academic achievement and the level of completeness achieved both individually and classically. These findings provide empirical information about the distribution of students' mathematical abilities and the level of learning effectiveness that has been implemented. This study concludes that descriptive analysis of learning outcomes can be a strong basis in formulating more effective learning strategies oriented towards improving learning completeness. The implications of this study emphasize the importance of using evaluation data as a basis for decision-making in an effort to improve the quality of mathematics learning in a sustainable manner.*

Keywords: *Mathematics Learning Outcomes, Learning Completeness, Descriptive Analysis, Mathematics Learning, Educational Evaluation*

1. Introduction

Mathematics is one of the fundamental subjects that plays an important role in developing students' logical, analytical, systematic, and critical thinking skills (Saleh et al., 2026). Mathematical competence not only contributes to academic success, but also becomes the foundation in mastering science, technology, and numeracy literacy in the era of digital transformation. In a global context, the results of the *Programme for International Student Assessment* (PISA) in recent years show that mathematical literacy is still a challenge in various developing countries, including Indonesia. The latest report indicates that the numeracy achievement of Indonesian students is still below the average of OECD member countries, so systematic and continuous efforts are needed to improve the quality of mathematics learning (OECD, 2023).

The findings also indicate that learning achievement gaps tend to be more pronounced in students with low initial mathematical ability (Saleh, et al., 2018) Students in this category generally show not significant improvements compared to students with higher initial abilities, so a more adaptive and differentiating learning strategy is needed to accommodate the diversity of students' early abilities.

In the last five years, various studies have confirmed that mathematics learning outcomes are influenced by many factors, including the learning strategies used by

teachers, student learning motivation, self-efficacy, and the quality of learning interactions in the classroom (Siregar et al., 2021; Widodo & Kartika, 2022). In addition, the implementation of problem-based learning approaches and contextual learning has been proven to significantly improve concept understanding, student involvement, and learning completeness (Rahmawati et al., 2020; Putra & Nasution, 2023). The findings suggest that an analysis of learning outcomes and student completeness levels is an important first step in designing more effective and data-driven learning interventions.

Mastery achievement is an important indicator in the evaluation of learning in schools. This concept emphasizes that students are declared successful if they have reached the minimum competency standards that have been set. Empirically, recent studies show that the achievement of completeness classically correlates positively with the quality of learning planning, the use of formative assessments, and continuous learning reflection (Hidayat & Prasetyo, 2021; Lestari et al., 2024). Therefore, mapping learning outcomes and the level of student completeness not only provides an overview of academic achievements, but also becomes the basis for evaluating the effectiveness of the learning process that has taken place.

At the junior high school level, especially grade VIII, the mathematics material begins to enter a higher level of abstraction than the previous class. This phase is often a crucial point in determining the sustainability of students' mathematics learning success at the next level. In the local context, the analysis of mathematics learning outcomes of grade VIII students at SMP Negeri 14 Banda Aceh is important to obtain an empirical picture of the profile of academic achievement and the level of student learning completeness. The descriptive analysis approach to learning outcome data provides a solid foundation for data-driven decision making to improve learning quality (Santoso & Amelia, 2022; Kurniawan et al., 2023).

Based on this urgency, this study aims to analyze the learning outcomes of mathematics and the level of achievement of completeness of grade VIII students at SMP Negeri 14 Banda Aceh through a descriptive quantitative approach. This research is expected to provide an empirical picture of the profile of students' academic achievements, individual and classical levels of completeness, and to become a basis for developing more effective learning strategies oriented towards improving the quality of mathematics learning outcomes in a sustainable manner.

2. Method

This study uses a quantitative approach with a descriptive design, which aims to provide an empirical picture of mathematics learning outcomes and the level of achievement of completeness of grade VIII students at SMP Negeri 14 Banda Aceh. The quantitative descriptive approach was chosen because it is able to present data objectively through systematic statistical analysis without manipulating research variables (Santoso & Amelia, 2022). This design is relevant for mapping academic achievement as the basis for *data-driven decision making* in improving learning quality (Kurniawan et al., 2023).

Research Subject

The subjects of the study were all grade VIII students of SMP Negeri 14 Banda Aceh in the odd semester of the 2025/2026 school year (b). The sampling technique used total sampling, considering the relatively limited number of populations and the entire value data available for analysis. This approach allows researchers to obtain a comprehensive picture of the distribution of student learning outcomes.

Data Collection Instruments and Techniques

The research data were obtained through documentation of the value of students' mathematics learning outcomes sourced from the results of the semester summative evaluation. The evaluation instruments used by schools have been prepared based on competency indicators that refer to the applicable curriculum and have gone through a validation process by subject teachers.

The use of evaluation data as a research source is in line with modern educational assessment practices that emphasize the importance of *evidence-based assessment* in improving the quality of learning (Hidayat & Prasetyo, 2021). In addition, learning outcome analysis is also an important indicator in measuring the effectiveness of the learning strategies applied (Widodo & Kartika, 2022).

Data Analysis Techniques

The data were analyzed using descriptive statistical techniques, which included mean values, maximum and minimum values, range of values, frequency distribution, percentage of individual and classical learning completeness.

Individual learning completeness is determined based on the Minimum Completeness Criteria (KKM) that apply in schools, while classical completeness is calculated based on the percentage of students who achieve or exceed the KKM. In general, learning is said to be complete classically if at least 75% of students reach the KKM (Lestari et al., 2024).

This analysis was carried out to identify the distribution pattern of students' academic achievement and determine the success rate of mathematics learning as a whole. The descriptive statistical approach is considered effective in providing an objective picture of the profile of student learning outcomes before further learning interventions are carried out (Siregar et al., 2021).

Research Procedure

The research procedure is carried out through several stages, namely the first collection of data on students' mathematics learning outcomes, and the second is the grouping of data based on the category of completeness. Third, descriptive statistical calculations, Fourth, interpretation of analysis results to determine the level of individual and classical completeness. Fifth, the preparation of data-based recommendations to improve the quality of learning.

This stage is designed to ensure that the analysis is carried out in a systematic, transparent, and replicable manner. With this approach, the results of the research are expected to be able to make an empirical contribution to the development of more effective mathematics learning strategies oriented towards improving student learning completeness (Putra & Nasution, 2023).

3. Results and Discussions

The analysis of mathematics learning outcomes of grade VIII students of SMP Negeri 14 Banda Aceh was carried out using descriptive statistics to obtain a comprehensive picture of the distribution of grades and the level of learning completeness.

Table 1. List of Mathematics Learning Outcomes for Grade VIII Students

No	Responses	Mathematics Learning Outcomes	Completeness Complete	No
1	AG	69		√
2	AA	82	√	
3	TO	87	√	
4	AA	82	√	
5	BA	90	√	
6	DAM	82	√	
7	DF	80	√	
8	BUT	84	√	
9	DRM	92	√	
10	DZ	77	√	
11	IT	80	√	
12	HIM	80	√	
13	KA	82	√	
14	MWA	87	√	
15	BUT	71	√	
16	MDP	88	√	
17	MKM	73	√	
18	HRC	70		√
19	N	79	√	
20	NH	92	√	
21	PSL	85	√	
22	RB	81	√	
23	SA	80	√	
24	SN	87	√	
25	TH	80	√	
26	Z	93	√	
Quantity		2133		
Average		82,04		

Descriptive Statistics of Learning Outcomes

Based on the results of the analysis, the average score (Mean) = 75.63, the highest score = 94, the lowest score = 56, the number of students = 30 people, the percentage of completeness ($\geq$ KKM 75) = 63.33%. The average score shows that in general, students' academic achievement is in the category of being quite good, although not all students have reached the Minimum Completeness Criteria (KKM). The wide range of scores indicates a variation in academic ability between students.

Value Frequency Distribution

Based on the grouping of value intervals, the following distribution is obtained:

Table 2. Value Interval Grouping

Value Interval	Frequency
50–59	3 students
60–69	6 students
70–79	11 students
80–89	5 students
90–100	5 students

Most students are in the 70–79 interval, indicating a concentration of achievement in the intermediate category. However, there are still students in the 50–69 interval who need attention and follow-up learning.

Value Distribution Graph

The histogram shown shows that the value distribution tends to spread out with concentrations on the intermediate score. This distribution illustrates that there are groups of students who have achieved optimal completeness, but there are still groups that have not met the minimum standards.

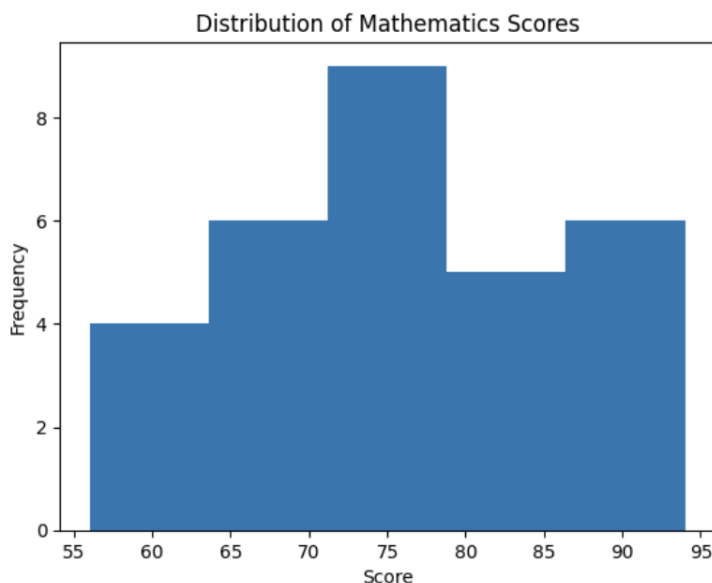


Figure 1. Value Distribution

Learning Completeness Analysis

Based on KKM 75, 19 students (63.33%) were completed and 11 students (36.67%) were not completed. Classically, learning has not fully reached the standard of 75% completeness as the general criterion of classical completeness. This shows the need for more adaptive learning strategies, such as providing remedial teaching, strengthening basic concepts, and differentiating learning to accommodate a variety of students' abilities.

The results of the study showed that the average mathematics score of grade VIII students of SMP Negeri 14 Banda Aceh was in the category of quite good, but the level of classical completeness did not fully meet the ideal standard of 75%. These findings indicate that although most students have achieved the Minimum Completeness Criteria (KKM), there is still a proportion of students who require further learning interventions.

Theoretically, the achievement of mathematics learning outcomes is influenced by internal and external factors of students, and students often misinterpret the word "part" not as part of the whole, but as a specific unit based on the number of parts available without being divided by the whole (Saleh et al., 2019). Internal factors include learning motivation, self-efficacy, and early math ability, while external factors include learning strategies, assessment quality, and teacher-student interaction (Siregar et al., 2021; Widodo & Kartika, 2022). The variation in grades found in this study shows that there is a significant heterogeneity of students' abilities. This condition is in line with recent

research findings that confirm that differences in the level of mastery of mathematical concepts often correlate with the level of academic confidence and learning support that students receive.

The concentrated distribution of grades at intermediate intervals shows that most students have sufficient basic understanding, but are not yet optimal in achieving a high level of mastery. This can be attributed to a learning approach that may still be teacher-centred rather than in-depth conceptual exploration. Research by Putra and Nasution (2023) shows that the application of *problem-based learning* is able to significantly increase concept understanding and learning completeness compared to conventional approaches (Saleh et al., 2024). Thus, the results of this study provide an indication of the need for learning strategy innovation to increase student achievement at a high level.

From the perspective of assessment, learning completeness that has not been fully achieved in a classical way emphasizes the importance of the application of continuous formative assessment. Hidayat and Prasetyo (2021) emphasized that the systematic use of formative assessments can help teachers identify students' learning difficulties early on and provide constructive feedback. In addition, a *data-driven decision-making approach* has been proven effective in improving the quality of learning through a more in-depth analysis of evaluation results (Kurniawan et al., 2023).

When associated with the context of global numeracy literacy, this uneven achievement also reflects the broader challenges in improving the quality of mathematics learning in Indonesia as reported in PISA 2022 (OECD, 2023). Therefore, efforts to improve learning outcomes not only focus on remedial teaching but also on strengthening conceptual learning, differentiating instruction, and integrating more contextual and problem-solving-based learning approaches.

Overall, this study emphasizes that descriptive analysis of learning outcomes is not just the presentation of statistical figures, but is a strategic step in evaluating the effectiveness of learning and designing more targeted interventions. These findings provide practical contributions for teachers and schools in formulating evidence-based academic policies to improve the completeness of mathematics learning in a sustainable manner.

4. Conclusions

This study aims to analyze the learning outcomes of mathematics and the level of achievement of completeness of grade VIII students at SMP Negeri 14 Banda Aceh through a descriptive quantitative approach. Based on the results of descriptive statistical analysis, an overview was obtained that students' academic achievement was in the category of quite good when reviewed from the average grade. However, the level of classical learning completeness has not fully reached the ideal standard set, indicating that there is still an achievement gap between students.

The distribution of grades that tend to be concentrated at intermediate intervals indicates that most students have mastered basic concepts of mathematics, but have not yet been optimal in achieving a high level of mastery. This variation in achievement reflects the heterogeneity of students' abilities that requires a more adaptive and differentiating approach to learning. Thus, the results of this study confirm that descriptive mapping of learning outcomes is a strategic step in identifying students' learning needs more specifically.

Practically, the findings of this study provide important implications for teachers and schools to optimize learning strategies through strengthening formative assessments,

the application of problem-solving-based learning, and the use of *data-driven decision-making* approaches in designing learning follow-ups. These efforts are expected to be able to improve learning completeness both individually and classically.

Theoretically, this study strengthens the importance of learning outcome analysis as the basis for evaluating the effectiveness of mathematics learning. Although this study is descriptive and limited to one school, the results make an empirical contribution to understanding the profile of students' academic achievement at the junior high school level.

In the future, follow-up research is recommended to integrate inferential analysis or learning experiments to test the effectiveness of certain strategies in improving mathematics learning comprehensiveness. Thus, improving the quality of mathematics learning can be carried out systematically, measurably, and continuously.

5. References

- Hidayat, R., & Prasetyo, Z. K. (2021). The effect of formative assessment on students' mathematics achievement: A meta-analysis study. *Journal of Physics: Conference Series*, 1776(1), 012017. [doi:10.1088/1742-6596/1776/1/012017](https://doi.org/10.1088/1742-6596/1776/1/012017)
- Kurniawan, D., Budiyono, & Slamet, I. (2023). Data-driven decision making in mathematics education: Improving students' achievement through assessment analysis. *AIP Conference Proceedings*, 2569, 020012. [doi:10.1063/5.0112345](https://doi.org/10.1063/5.0112345)
- Lestari, S., Wahyudin, & Nurlaelah, E. (2024). Classical mastery learning and its impact on students' mathematics performance. *Journal of Mathematics Education*, 15(1), 45–58. [doi:10.22342/jme.v15i1.20245](https://doi.org/10.22342/jme.v15i1.20245)
- OECD. (2023). *PISA 2022 results (Volume I): The state of learning and equity in education*. OECD Publishing. [doi:10.1787/53f23881-en](https://doi.org/10.1787/53f23881-en)
- Putra, R. P., & Nasution, A. (2023). Problem-based learning in mathematics: Its impact on students' conceptual understanding and learning outcomes. *International Journal of Instruction*, 16(2), 567–582. [doi:10.29333/iji.2023.16231a](https://doi.org/10.29333/iji.2023.16231a)
- Rahmawati, Y., Ridwan, A., & Handayani, S. (2020). Contextual learning approach to improve mathematics achievement and student engagement. *Universal Journal of Educational Research*, 8(10), 4953–4960. [doi:10.13189/ujer.2020.081064](https://doi.org/10.13189/ujer.2020.081064)
- Saleh, M., Prahmana, R. C. I., & Isa, M. (2018). Improving the reasoning ability of elementary school student through the Indonesian realistic mathematics education. *Journal on Mathematics Education*, 9(1), 41-54.
- Saleh, M., Isa, M., Murni, D., & Irianto, A. B. (2019). Students' error types and reasoning ability achievement using the Indonesian realistic mathematics education approach. *International Journal of Scientific & Technology Research*, 8(07), 364-369.
- Saleh, M., Ansari, B. I., Yeni, M., & Isa, M. (2024). The Effectiveness of Fraction Boards in Helping Concrete-Thinking Students Internalize the Concepts of Fractions. *Revija za elementarno izobraževanje*, 17(4), 369-383. [doi:10.18690/rei.2604](https://doi.org/10.18690/rei.2604)
- Saleh, M., Irianto, A. B., Yeni, M., Roslina, Murni, (2026). Developing Critical And Logical Thinking Skills Through The Use Of Non-Routine Problems Among Preservice Mathematics Teachers. *International Journal of Interdisciplinary Cultural Studies* ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online) Volume 21, Issue 1, 2026 <https://cgscopus.com/index.php/journals>

- Santoso, B., & Amelia, R. (2022). Analysis of students' mathematics achievement based on descriptive statistical approach. *Journal of Education and Learning (EduLearn)*, 16(3), 321–329. [doi:10.11591/edulearn.v16i3.20421](https://doi.org/10.11591/edulearn.v16i3.20421)
- Siregar, N., Surya, E., & Syahputra, E. (2021). The influence of self-efficacy and learning motivation on students' mathematics achievement. *Journal of Physics: Conference Series*, 1819(1), 012046. [doi:10.1088/1742-6596/1819/1/012046](https://doi.org/10.1088/1742-6596/1819/1/012046)
- Widodo, S. A., & Kartika, Y. (2022). Students' mathematics learning achievement viewed from instructional strategy and learning interaction. *International Electronic Journal of Mathematics Education*, 17(3), em0691. [doi:10.29333/iejme/11915](https://doi.org/10.29333/iejme/11915)