The Effect of Mastery Learning Approach (MLA) on Filipino Grade 5 Students' Numeracy Achievement

Camela Mae B. Nayre[1], Samantha Mae M. Lumapak[1], Daisy Rey D. Magcanta[1], Rosel I. Marbella[1], Venus E. Mirador[1], Veronica U. Rosario[1], Mharrie Lei E. Toling[1], and Jose Mari M. Calamlam[1]
[1] *Philippine Normal University*
**Corresponding Author: calamlam.jmm@pnu.edu.ph*

Abstract: This study examined the effectiveness of the Mastery Learning Approach (MLA) in enhancing the numeracy achievement of Filipino Grade 5 students. Students were categorized into two groups based on their initial diagnostic test results: "masters," who demonstrated prior proficiency, and "non-masters," who had not yet met the mastery threshold. Using a convergent parallel mixed-methods design, the study combined quantitative data from pretest and posttest scores with qualitative insights from teacher-facilitator journals documenting observed student behaviors. The intervention focused on fraction operations, where "masters" engaged in enrichment activities, while "non-masters" received scaffolded corrective instruction. Quantitative results indicated improvements in both groups, with "non-masters" demonstrating greater gains. These outcomes suggest that MLA is particularly effective for students with lower initial proficiency, while still offering reinforcement and depth for those who had already achieved mastery. Thematic analysis of classroom observations further supported the quantitative findings. "Masters" exhibited enthusiasm, independence, and confidence in problem-solving, while "non-masters" showed persistence, improved accuracy through repetition, and responsiveness to scaffolding. Varied participation preferences and levels of engagement were observed across both groups, highlighting the importance of responsive teaching strategies. The findings affirm the potential of MLA to promote more equitable learning outcomes by supporting both remediation and enrichment. Further research may explore MLA's sustainability and scalability in various educational settings within the Philippine basic education system.

Keywords: Mastery Learning Approach; Numeracy Achievement; Fractional Operations; Mixed-Methods; Elementary Mathematics

1. INTRODUCTION

1.1 Background

Mathematics education in primary school plays a pivotal role in equipping students with the skills necessary for real-life problem-solving and critical thinking. Central to this is numeracy—also referred to as mathematical literacy—which enables learners to apply mathematical concepts in everyday contexts. Developing strong numeracy skills builds students' quantitative reasoning, number sense, and problem-solving abilities, all of which are vital for their participation in academic, professional, and social settings (Fatimah et al., 2024; Geiger et al., 2015).

Despite its importance, international assessments consistently report low performance in mathematics. The Southeast Asia Primary Learning Metrics (SEA-PLM) 2019 revealed that 41% of Filipino Grade 5 students did not meet the minimum proficiency level in mathematical literacy expected at the end of lower primary, only capable of very basic skills like recognizing numbers, counting objects, or adding single digits. Only 17% reached the end-of-primary level, where students should be able to solve real-world problems using the four operations, understand fractions, convert time units, and read

graphs, indicating significant deficits in foundational mathematical skills. National assessments, such as the NAT, echo these findings, particularly in students' struggles with basic operations and word problems in real-life contexts (Tanghal & Tanghal, 2022; Maysarah et al., 2024).

These persistent gaps suggest a need for targeted interventions to help students acquire foundational numeracy skills. One promising strategy is the Mastery Learning Approach (MLA), developed by Bloom (1968), which emphasizes ensuring mastery of prerequisite knowledge before students progress to more advanced topics. MLA provides corrective instruction and repeated assessment for students who have not yet achieved mastery, while offering enrichment activities to those who have (Yemi, 2018; Guskey, 2007). It has been shown to be particularly effective in cumulative subjects like mathematics, where conceptual understanding must build progressively (Ajibade et al., 2022; Hattie, 2008).

However, despite its international recognition, MLA remains underexplored in Philippine elementary education, especially in relation to improving numeracy. Given the documented difficulties Filipino students face in mastering fraction operations—a critical area in developing higher-order math skills—this study investigates the effectiveness of MLA in improving numeracy achievement among Grade 5 students. By comparing the learning gains and observed behaviors of "masters" and "non-masters," the study aims to generate insights into how targeted remediation and enrichment through MLA can address foundational gaps and promote equitable learning outcomes in mathematics.

1.2. Mastery Learning

The Mastery Learning Approach (MLA), introduced by Bloom (1968), is an instructional framework that posits most students can attain high levels of learning if given appropriate time, feedback, and support. In contrast to traditional models that move learners forward regardless of readiness, MLA ensures that students master essential concepts and skills before progressing. This is accomplished through key elements: clearly defined learning objectives, diagnostic assessments, formative feedback, corrective instruction, and enrichment activities (Block, 1971; Guskey, 2007).

MLA is especially impactful in mathematics education, where cumulative knowledge and conceptual understanding are crucial. Foundational gaps in arithmetic and fractions often hinder students from progressing in more advanced math (Bala, 2019). MLA addresses this by allowing individualized pacing and tailoring instruction to each student's needs. Students who achieve mastery advance to enrichment activities, while those who do not receive targeted remediation and additional practice (Zaw & Lwin, 2020). This process fosters not only content mastery but also learner confidence and persistence.

Numerous studies affirm the effectiveness of MLA in improving mathematics achievement. Yemi (2018) reported that students exposed to MLA scored significantly higher than peers under traditional instruction. Similarly, Kruckenberg (2024) demonstrated how continuous formative assessments and feedback led to improved conceptual understanding and performance. Vlădescu (2023) highlighted the value of teacher-monitored learning and personalized feedback, particularly in algebra and geometry. These findings show that MLA supports deep learning and retention while accommodating diverse learning needs.

In classroom settings, MLA enhances student engagement and encourages a growth mindset. It promotes active participation through peer collaboration, guided problem-solving, and game-based learning (Winget & Persky, 2022). Teachers play a pivotal role in analyzing assessment data, adjusting instruction, and ensuring all students progress meaningfully. The approach also reduces stigma for struggling learners by framing remediation as a standard, supportive process rather than a punishment.

Ultimately, MLA provides an inclusive framework for improving mathematics achievement. By combining structured support, timely feedback, and responsive teaching strategies, it creates equitable learning environments where all students—regardless of prior proficiency—can succeed. As such, MLA offers a promising solution for addressing widespread challenges in numeracy, particularly among elementary learners in the Philippines.

1.3. Framework

This study is anchored in the Mastery Learning Theory (MLT) where MLA was adapted to

enhance Filipino Grade 5 students' numeracy achievement, particularly in operations involving fractions. Students first completed a diagnostic test, categorizing them as "masters" (scoring 80–100%) or "non-masters" (scoring below 80%). This classification enabled differentiated instruction: "masters" received enrichment through game-based problem-solving and animated math stories, while "non-masters" underwent corrective instruction through pull-out or pull-in sessions using the Concrete–Representational–Abstract (CRA) sequence (Mursky, 2011).

Team-based learning, labeled "Teamwork Tactics," promoted collaboration and peer-assisted learning aligned with Block's (1971) individualized pacing. Khan Academy was used for ungraded formative assessments, allowing immediate feedback and iterative practice. Students demonstrating mastery progressed to enrichment tasks inspired by Gunbas (2020), while those needing support were given targeted instruction to close foundational gaps.

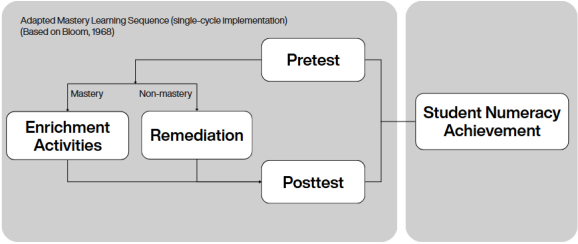

Fig. 1. Framework of the Study

As shown in Figure 1, the study's conceptual framework integrates three key MLA components: diagnostic testing, corrective instruction, and enrichment activities. These elements were designed to foster inclusive and equitable learning experiences while ensuring that both high- and low-performing students made meaningful progress in numeracy. By addressing individual learning needs and supporting both remediation and enrichment, the framework aligns with MLT's goal of ensuring that all students—regardless of their starting point—can achieve mastery (Zaw & Lwin, 2020; Ajibade et al., 2022).

2. METHODOLOGY

2.1. Research Design

This study utilized a convergent parallel mixed-methods design to assess the effectiveness of the Mastery Learning Approach (MLA) on the numeracy achievement of Grade 5 students. Quantitative data were gathered through a pretest-posttest format, while qualitative data were collected through teacher-facilitator journals. This design allowed the researchers to examine both statistical learning gains and observable student behaviors simultaneously, providing a comprehensive view of MLA's impact in a real classroom setting (Creswell, 2015).

2.2. Sample and Locale

A total of 29 Grade 5 students aged 9 to 11 participated in the study, drawn from two schools in Manila. The "masters" group (n = 14) was selected from a laboratory school affiliated with a Teacher Education Institution (TEI), where parents had given standing consent for their children to participate in educational research. These students scored 80% or above in the diagnostic test. The "non-masters" group (n = 15) came from a public elementary school in Tondo, Manila, and scored below 80% on the same diagnostic test. Informed consent letters detailing the study's objectives and procedures were distributed and signed by the parents or guardians of all participants. The schools' respective principals approved the conduct of the intervention.

2.3. Data Collection

The primary quantitative data collection tool was a 9-item open-ended numeracy test assessing students' procedural fluency in fractional operations, including the addition, subtraction, and multiplication of fractions and mixed numbers. The test was administered both before and after the two-week intervention, which consisted of five sessions per school.

Students in the "masters" group participated in enrichment activities, such as game-based problem-solving and visual-context learning tasks. Those in the "non-masters" group received corrective instruction using the Representational–Abstract Phase of the Concrete–Representational–Abstract (CRA)

approach. The Concrete phase was not implemented due to practical limitations, including the students' prior exposure to manipulatives, the lack of available concrete materials, and time constraints. Bar models were used to visually represent fractions, helping students better visualize and understand the concepts before progressing to solving mathematical and real-world problems using numerical and symbolic representations. Teacher-facilitators conducted the sessions and maintained daily journals, documenting students' engagement, observed behaviors, progress, and challenges. These qualitative entries served as complementary data to contextualize test results and capture the depth of learning experiences across student profiles.

2.4. Data Analysis

Quantitative data were analyzed using paired sample t-tests to determine significant score differences between pretest and posttest within each group. An independent sample t-test compared mean gains between "masters" and "non-masters." Both analyses were conducted using Jamovi 2.3.28, with significance levels set at $p < .05$. Effect sizes (η^2) were also computed to assess the practical significance of the findings, following Hattie's (2019) interpretation of desirable effect zones.

For qualitative analysis, teacher journal entries were examined using inductive thematic analysis (Dawadi, 2020). The researchers independently coded the data, identified recurring patterns, and clustered similar observations into themes that described the learning behaviors and classroom dynamics in both groups. Methodological triangulation was then applied to compare and cross-validate findings from the quantitative and qualitative datasets, enhancing the credibility and richness of the results (Asogwa et al., 2023).

3. RESULTS AND DISCUSSION

3.1. Impact of MLA to Numeracy

A paired sample t-test was conducted to evaluate the overall impact of the Mastery Learning Approach (MLA) on students' mathematics scores. As shown in Table 1, the average test score significantly increased from 1.45 (SD = 2.37) before the intervention to 4.28 (SD = 2.68) after, indicating substantial improvement. This gain is further illustrated in Figure 2.

Table 1. Students' Scores Before and After MLA Intervention

	N	Mean	Median	SD	SE
Post	29	4.28	4	2.68	0.499
Pre	29	1.45	0	2.37	0.440

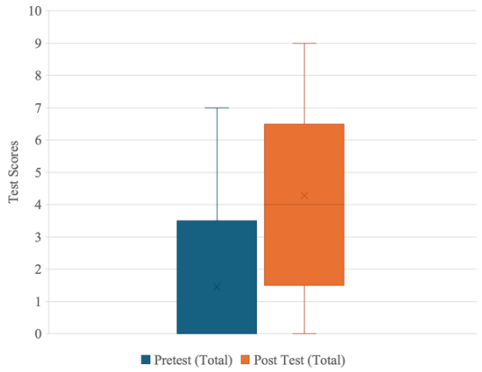

Fig. 2. Box-whisker plot for combined groups

The statistical test confirmed a significant increase, $t(28) = 6.25$, $p < .05$, with a large effect size of $\eta^2 = 1.16$, (Table 2) suggesting that MLA had a considerable positive impact on students' ability to add, subtract, and multiply similar and dissimilar fractions and mixed numbers (Hattie, 2019).

Table 2. Paired-test Results on Students' Scores Before and After MLA Intervention

	t	df	p	η^2
Combined	6.25	28	< 0.001	1.16

Separated data also showed gains for both groups. As shown in Table 3, "masters" improved from 2.93 (SD = 3.50) to 4.71 (SD = 5.50), while "non-masters" increased from 0.07 (SD = 0) to 3.87 (SD = 4.00). These improvements are depicted in Figure 3.

Table 3. Masters' and Non-Masters' Scores Before and After the MLA Intervention

	N	Mean	Median	SD	SE
Post Master	14	4.7143	5.50	2.998	0.801
Pre Master	14	2.9286	3.50	2.731	0.730
Post Non-master	15	3.8667	4	2.386	0.616
Post Non-master	15	0.0667	0	0.258	0.067

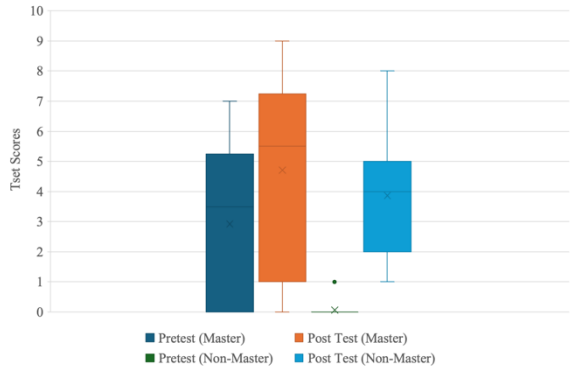

Fig. 3. Box-whisker plot for master and non-master

Both groups demonstrated statistically significant gains: "masters," $t(13) = 3.21$, $p < .05$, $\eta^2 = 0.86$; and "non-masters," $t(14) = 6.14$, $p < .05$, $\eta^2 = 1.59$, both within Hattie's zone of desirable effects (Table 4).

Table 4. Paired-test Results on Masters' and Non-Masters' Scores Before and After MLA Intervention

	t	df	p	η^2
Master Group	3.21	13	0.007	0.858
Non-Master	6.14	14	< .001	1.586

An independent t-test comparing score increases between groups revealed that "non-masters" achieved a significantly greater mean gain of 3.80 (SD = 2.40) versus 1.79 (SD = 2.08) for "masters" (Table 5, Figure 4).

Table 5. Masters' and Non-Masters' Score Increase

	N	Mean	Median	SD	SE
Master	14	1.79	1.00	2.08	0.556
Non-master	15	3.80	3.00	2.40	0.619

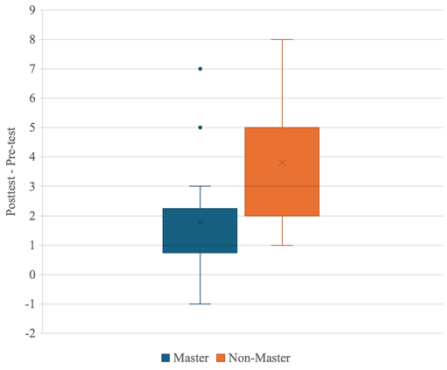

Fig. 4. Box-whisker plot for score increase

The difference was statistically significant, $t(27) = 2.41$, $p < .05$ (Table 6), indicating that MLA was particularly effective for students with lower initial proficiency—likely because they had more room for improvement, as reflected in their pretest scores (Table 3).

Table 6. Independent t-Test Results for Masters' and

	t	df	p
Master – Non-master	2.41	27	0.023

3.2. Behavioral Differences between Masters and Non-Masters

Thematic analysis revealed five key behavioral patterns among students classified as "masters": foundational knowledge and enthusiasm for learning, challenge and peer dynamics in team-based activities, skill mastery, responsive task extension for fast finishers, and confidence in tackling new concepts (Table 7).

Table 7. Observed Behavioral Themes of Masters

Themes	Sample Observation
Foundational Knowledge and Enthusiasm for Learning	"Most students already had a solid grasp of the material. and some of the students were really advanced, solving problems quickly and finishing activities"
Challenge and Peer Dynamics in Team-Based Activities	"Some students really shined and performed well in the game, and it was great to see how much they valued teamwork and supporting each other."

Skill Mastery	"Some students even enjoyed and excited sharing their different techniques or methods on multiplying fractions with the class."
Responsive Task Extension for Fast Finishers	"To keep these quicker students engaged, I gave them more challenging problems from the textbook."
Confidence in Tackling New Concepts	"It was rewarding to see students grasping the new knowledge… students actively participated and engaged."

Students in this group demonstrated prior understanding of fraction operations, particularly in the addition and multiplication of similar fractions. This foundational competence was accompanied by high levels of enthusiasm, with many completing tasks independently and actively participating in discussions. In team-based activities, most students responded positively to the competitive format, although some showed signs of pressure when unable to match the pace of faster peers. To sustain engagement, more advanced learners were observed taking on extended or more complex tasks, while others were provided with opportunities to work at a pace suited to their needs. As instruction progressed, students increasingly exhibited confidence in solving complex problems and often shared alternative solution strategies with the class. When introduced to new topics such as fraction division, this group demonstrated curiosity, active participation, and a willingness to explore beyond previously covered content. These behaviors reflect the alignment between enrichment-based instruction and the needs of learners with higher initial proficiency.

In contrast, seven interrelated behavioral themes emerged among "non-masters": foundational struggles, incremental confidence through scaffolding, persistent effort, challenges with multi-step processes, progress through individualized support and repetition, and varied participation preferences (Table 8).

Table 8. Observed Behavioral Themes of Non-Masters

Themes	Sample Observation
Foundational Struggles	"Student J struggled to solve problems on his own without step-by-step guidance; basic arithmetic challenges affected his progress."
Incremental Confidence Through Scaffolding	"Student J responded well to the scaffolded approach, gradually improving his confidence and problem-solving."
Persistent Effort	"Students J, A and C showed perseverance in working through problems and volunteering to solve on the board."
Challenges with Multi Step Processes	"Students need scaffolding, as they find it difficult to subtract dissimilar fractions."
Confidence in Tackling New Concepts	"It was rewarding to see students grasping the new knowledge… students actively participated and engaged."
Progress Through Individualized Support and Repetition	"The "gradual release of responsibility" model worked well as students first received guided instruction before solving problems independently."
Varied Participation Preferences	"Students like Student A, R, and P were highly engaged in solving problems on the board, while others, such as Student L and C, preferred working in their notebooks but remained active in the process."

Difficulties were commonly observed in basic arithmetic and in executing multi-step procedures such as converting mixed numbers and identifying least common denominators. Over time, increased exposure to scaffolded tasks led to gradual improvements in both accuracy and confidence. Despite initial errors, many students consistently attempted to solve problems, frequently volunteering responses and expressing satisfaction when correct solutions were achieved. Progress was most evident when tasks were broken down, with repeated opportunities for practice and feedback. Learners displayed diverse preferences in how they engaged with content—some preferred solving problems on the board, while others worked independently in notebooks. Levels of engagement also varied; some students remained actively involved throughout lessons, while others required structured guidance to stay focused. Overall, these behavioral patterns underscore the importance of responsive teaching strategies, such as scaffolded tasks, corrective feedback, and varied levels of support within the Mastery Learning Approach, particularly for students with limited prior proficiency in numeracy.

3.3. Discussion

The results of this study indicate that the Mastery Learning Approach (MLA) had a significant positive effect on the numeracy achievement of Filipino Grade 5 students. A notable increase in posttest scores following the intervention suggests that MLA is an effective instructional strategy for enhancing procedural fluency in fractional operations. This finding supports prior research demonstrating the impact of mastery learning on academic performance in mathematics (Ajibade et al., 2022; Bala, 2019; Zaw & Lwin, 2020).

Both "masters" and "non-masters" exhibited significant gains, although the "non-masters" achieved a higher average score increase. This difference is consistent with existing literature, which highlights that students with lower initial proficiency often benefit more from targeted remediation embedded within MLA (Block, 1971; Guskey, 2010). The structured cycle of feedback, corrective instruction, and reassessment provided opportunities for "non-masters" to build foundational skills, contributing to their substantial learning gains. Meanwhile, the "masters" group experienced enrichment that helped reinforce and extend their prior knowledge, although their room for growth was narrower.

The behavioral data further supported the quantitative findings. "Masters" were observed to demonstrate enthusiasm, independence, and skill mastery, frequently applying multiple strategies and engaging confidently with new content. These behaviors reflect the enrichment-oriented design of MLA and align with findings by Vlădescu (2023) and Yemi (2018), who emphasized the value of personalized and challenging tasks in sustaining engagement for high-performing learners.

In contrast, "non-masters" exhibited foundational struggles but showed steady improvement through scaffolded support, individualized guidance, and repeated practice. These students benefited from structured activities and formative feedback that helped reduce cognitive load and improve retention (Gupta & Zheng, 2020; Shabani et al., 2010). Their persistence and growing confidence also align with the concept of productive struggle, which has been linked to deeper understanding in mathematics (DiNapoli, 2019; Rieger et al., 2022).

Overall, the convergence of test results and observed behaviors confirms that MLA supports both remediation and enrichment. Its flexible and student-centered design addresses diverse learning needs and promotes not only academic progress but also positive learning behaviors such as motivation, resilience, and engagement (Guskey, 2015; Ihendinihu, 2020). These findings highlight the potential of MLA as a valuable strategy for improving mathematics instruction in the Philippine basic education context.

4. CONCLUSIONS

This study examined the effectiveness of the Mastery Learning Approach (MLA) in improving the numeracy achievement of Filipino Grade 5 students, specifically in fractional operations. The intervention led to significant score improvements for both "masters" and "non-masters," with the latter group showing greater gains due to their lower starting proficiency. These results affirm MLA's potential to support targeted remediation and enrichment that addresses diverse learner needs.

Observed behaviors complemented the quantitative findings. "Masters" exhibited enthusiasm, confidence, and skill mastery, while "non-masters" demonstrated persistence, responsiveness to scaffolding, and gradual improvement. These patterns indicate that MLA fosters not only academic growth but also positive learning dispositions such as motivation, effort, and engagement.

Despite these promising outcomes, the study was limited by its small sample size, short implementation period, and focus on a single mathematical domain. Future research may explore long-term applications of MLA across multiple topics, grade levels, and larger populations. Additionally, examining the role of teacher training and fidelity of implementation may offer insights into sustainable classroom integration.

Overall, the findings suggest that MLA is a practical, inclusive, and effective instructional approach that can be further refined and scaled to improve numeracy achievement in Philippine basic education.

5. REFERENCES

Ajibade, A. O., Ajibade, V. I., & Badeji-Ajisafe, B. (2022). Effect of mastery learning on lower primary school pupils' numeracy skill acquisition. *Journal of Economic, Social and Educational Issues, 2*(2), 1–8. https://www.ecojesei.com/wp-content/uploads/2022/08/1.-ajibadeetaljeseivol2no2-1-8e.pdf

Asogwa, V. C., Ugwuanyi, C. S., & Ugwuanyi, B. I. (2023). Triangulation in qualitative research: Implications for credibility, dependability and trustworthiness. *Humanities and Social Sciences Communications, 10*(1), 1–11. https://doi.org/10.1057/s41599-023-01700-4

Bala, P. (2019). Effect of mastery learning approach (MLA) on the achievement in mathematics of students with mathematical difficulties. *IOSR Journal of Humanities and Social Science, 24*(5), 29–35.

Block, J. H. (1971). *Mastery learning: Theory and practice*. Holt, Rinehart & Winston.

Bloom, B. S. (1968). *Learning for mastery* (Topical Papers and Reprints No. 1). University of California, Los Angeles.

Creswell, J. W. (2015). *A concise introduction to mixed methods research*. SAGE Publications.

Dawadi, S. (2020). Qualitative data analysis: A practical approach. *International Journal of English and Literature, 11*(3), 21–31.

DiNapoli, J. (2019). Productive struggle in middle school mathematics classrooms. *Mathematics Teacher: Learning and Teaching PK–12, 112*(1), 22–28.

Gupta, M., & Zheng, R. (2020). Cognitive load and mathematics learning: A review. *Educational Psychology Review, 32*(2), 393–418.

Guskey, T. R. (2007). Closing achievement gaps: Revisiting Benjamin S. Bloom's "Learning for Mastery." *Journal of Advanced Academics, 19*(1), 8–31. https://doi.org/10.4219/jaa-2007-706

Guskey, T. R. (2010). Lessons of mastery learning. *Educational Leadership, 68*(2), 52–57.

Guskey, T. R. (2015). On your mark: Challenging the conventions of grading and reporting. *Solution Tree Press*.

Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.

Hattie, J. (2019). *Visible learning for teachers: Maximizing impact on learning*. Routledge.

Ihendinihu, U. I. (2020). Effectiveness of mastery learning strategy on students' achievement in mathematics. *International Journal of Education and Evaluation, 6*(2), 1–11.

Kruckenberg, S. (2024). Building mastery in middle school math: Integrating formative feedback. *Mathematics Teaching in the Middle School, 29*(1), 34–41.

Maysarah, S., Armanto, D., Dewi, I., & Saragih, S. (2024). Analysis of numeracy literacy skills in elementary school students. AXIOM: Jurnal Pendidikan dan Matematika, 13(1), 52–64.

Rieger, G. W., Bullock, J. G., & Birch, D. (2022). Encouraging productive struggle: Effects of effort-based grading on motivation and performance in math. *Educational Psychology, 42*(3), 264–280.

UNICEF Philippines & Department of Education. (2021). *Southeast Asia Primary Learning Metrics (SEA-PLM) 2019: National report of the Philippines*. UNICEF Philippines.

Shabani, J., Khatib, M., & Ebadi, S. (2010). Vygotsky's Zone of Proximal Development: Instructional implications and teachers' professional development. *English Language Teaching, 3*(4), 237–248.

Tanghal, K. R., & Tanghal, R. A. (2022). Diagnosing number sense in Philippine basic education learners. *International Journal of Educational Management, 36*(5), 1023–1039.

Vlădescu, C. (2023). Effects of mastery learning on middle school students' achievement in algebra and geometry. *Journal of Educational Research and Practice, 13*(2), 67–80.

Winget, M., & Persky, A. M. (2022). Mastery learning: A model for competency-based education. *Currents in Pharmacy Teaching and Learning, 14*(4), 362–370. https://doi.org/10.1016/j.cptl.2022.01.014

Yemi, T. M. (2018). Effects of mastery learning on students' achievement in junior secondary school mathematics. *International Journal of Scientific Research in Education, 11*(2), 319–329.

Zaw, H. T., & Lwin, M. T. (2020). Impact of mastery learning on mathematics performance in middle school students. *Asian Journal of Education and Social Studies, 8*(3), 1–10.