Bridging Gaps in Mathematics: Effects of Tier 2 Interventions on Emerging Learners

Jojie P. Andebor
Master Teacher I, Congressman.Vicente Gustilo Sr. School
Northwest Samar State University
E-mail: jojie.andebor@deped.gov.ph

Jose Junjun C Andebor
Principal II, Congressman.Vicente Gustilo Sr. School
Northwest Samar State University
E-mail: jose.andebor@deped.gov.ph

Ma. Carmela T. Cabunilas
Teacher III, Inayagan National High School
Northwest Samar State Universiyy
Email:macarmela.cabunilas@deped.gov.ph

Evangeline R. Canoy
Adjunct Professor, Northwest Samar State University
E-mail: evangeline.canoy@deped.gov.ph

Abstract — Mathematics continues to be one of the most difficult subjects for Filipino learners, with national and international assessments showing persistent gaps in numeracy. To address these challenges, the Department of Education introduced the Rapid Mathematics Assessment (RMA) as part of the National Learning Recovery Program. However, its use has largely been limited to screening rather than guiding instruction and reflection. This study evaluated the effectiveness of Tier 2 instruction integrated with RMA diagnostics in improving the mathematics proficiency of Grade 3 learners at Cong. Vicente Gustilo Sr. Memorial School during School Year 2024–2025. Using a descriptive-comparative design, 20 low-performing learners identified through the RMA pretest participated in small-group Tier 2 sessions over six weeks, focusing on procedural fluency, conceptual understanding, and problem-solving. Pretest and posttest RMA results, alongside reflection logs and teacher feedback, were analyzed using descriptive statistics, correlation, regression, and paired t-tests to assess effectiveness.

Keywords — Tier 2 Intervention, Reflective Mathematics Assessment, Mathematics Proficiency, Metacognition, Grade 3 Learners

I. INTRODUCTION

Mathematics is a subject that consistently poses challenges to learners around the world. UNESCO (2023) reported that more than half of learners in low- and middle-income countries fail to meet minimum proficiency standards in numeracy, creating long-term disadvantages in higher education and employment opportunities. Targeted interventions such as small-group and skill-specific programs have been shown to reduce these gaps. Rojo et al. (2024) found that focusing on key content areas like fractions and operations resulted in substantial learning gains, while Jitendra et al. (2020) emphasized that Tier 2 interventions significantly improved achievement among students at risk of mathematics difficulties. These findings underscore the value of structured intervention models like RTI, particularly its Tier 2 level, in addressing persistent learning difficulties.

In the Philippines, the challenge remains pressing. The 2018 Programme for International Student Assessment (PISA) placed the Philippines at the bottom tier in mathematics performance, with Filipino learners scoring far below the international average (OECD, 2019). This prompted the Department of Education (DepEd) to prioritize numeracy through the National Learning Recovery Program. The Rapid Mathematics Assessment (RMA), rolled out through several DepEd memoranda (DM No. 225, s. 2025; RM No. 191, s. 2025; DM No. 324, s. 2025), was intended not only as a diagnostic tool but also as a basis for tailoring instructional support. However, schools often administer the RMA only for screening purposes, without integrating its results into structured, reflective interventions.

At the local level, Cong. V. Gustilo Sr. Memorial School continues to struggle in supporting low-performing learners in mathematics. Teachers report that many interventions rely on re-teaching lessons rather than addressing learners' cognitive strategies or reflective awareness. This lack of structured, research-based programs that combine diagnostic insights with metacognitive reflection leaves struggling learners without the support they need to meaningfully improve their procedural fluency, conceptual understanding, and problem-solving accuracy. Addressing these gaps requires innovative, evidence-based strategies. International and national studies suggest that Tier 2 RTI interventions, when paired with reflective practices, can

significantly enhance student outcomes (Reinhard et al., 2021; Sercenia & Prudente, 2023). Yet, limited research exists on how such approaches can be implemented in Philippine public schools with resource constraints. This study therefore aims to contribute localized evidence by evaluating the effectiveness of an RMA-enhanced Tier 2 intervention model for low-performing learners at Cong. V. Gustilo Sr. Memorial School.

In addressing these gaps, this study evaluates the effectiveness of integrating Reflective Mathematics Assessment (RMA) with Tier 2 mathematics interventions in improving the procedural fluency, conceptual understanding, and problem-solving accuracy of low-performing learners at Cong. V. Gustilo Sr. Memorial School. By situating the intervention in a local public school setting, the research provides evidence-based insights that can inform teachers, school leaders, and policymakers in developing more effective and equitable strategies for mathematics education in the Philippines.

Literature Review

This portion comprised conceptual literature and research literature compiled by the researcher, covering study-related ideas, concepts, generalizations, and findings. It served as a reference in developing the study framework and helped identify relevant details connected to the present research.

Tier 2 mathematics interventions have been widely recognized as effective in supporting students who struggle with mathematics, particularly when instruction is explicit, diagnostic-informed, and strategically grouped. Jitendra et al. (2020) highlighted that student growth is greatest when interventions include clear explanations, progress monitoring, and small-group instruction. Similarly, Rojo et al. (2024) confirmed that targeting specific content such as fractions yields stronger results, underscoring the importance of focused instructional planning.

Beyond diagnostic grouping, scholars emphasize the value of teaching students to think about their own thinking through metacognition. Sercenia and Prudente (2023) found that metacognitive-based interventions in mathematics significantly enhance learning outcomes,

suggesting that reflection exercises and strategy awareness transform how students engage with the subject. Hitt (2023) also noted that self-regulated learning strategies, such as setting learning goals, monitoring progress, and self-correcting, promote deeper understanding and independence. These approaches help learners grasp not only what to do, but also why and how they solve problems.

The combination of targeted Tier 2 instruction and metacognitive reflection appears especially promising for improving problem-solving skills. Myers et al. (2022) demonstrated that interventions aligned with reflective prompts improved both accuracy and strategic reasoning among upper elementary and secondary learners. Collectively, these conceptual studies highlight that integrating diagnostic grouping with reflective practices creates stronger and more sustainable improvements in mathematical performance.

Improving students' mathematics proficiency has become a central goal of educational interventions worldwide, particularly after the widening of learning gaps brought by the COVID-19 pandemic. Rojo et al. (2024) emphasized that content-focused interventions produced greater improvements compared to general instruction. Yu and Qi (2025) also found that learners who applied metacognitive strategies such as self-monitoring and goal setting performed better academically, confirming that cognitive engagement plays a vital role in sustaining learning gains.

Research further shows that proficiency is influenced not only by instructional design but also by how students respond to interventions over time. Lesner (2023) observed that while many students improved continuously under RTI programs, some showed minimal progress without adjustments to instruction, underscoring the need for flexible approaches. Lowrie et al. (2021) noted that integrating spatial reasoning tasks into instruction enhanced learners' proficiency, while Lee et al. (2023) found that students with stronger skills engaged more actively in reflection, self-evaluation, and error correction. These practices consolidated conceptual understanding and supported independent problem-solving.

In addition to proficiency, procedural fluency has become an essential focus of mathematics instruction. Alptekin and Sönmez (2022) found that strategies like Cover-Copy-Compare improved learners' basic fact fluency. Stocker et al. (2022) also noted that structured

fluency drills helped students recall facts and improve quantitative reasoning. Mohamoud (2022) further demonstrated that daily fluency practice enhanced learners' ability to solve equations efficiently, while ERIC (2021) reported that visual tools such as flowcharts reduced errors and encouraged independence. Casey et al. (2023) added that even pre-service teachers benefit from fluency-building strategies, as strong procedural skills contribute to better teaching confidence and explanations.

Conceptual understanding accuracy has also emerged as a vital area of focus. Yürekli et al. (2020) explained that classrooms emphasizing conceptual discussions foster stronger understanding compared to those focusing on rote practice. Hussein and Csíkos (2023) likewise found that teaching with conceptual emphasis improved achievement and reduced mathematics anxiety. Amal Jaya and Suparman (2021) highlighted the benefits of technology-based instruction, while Mediana Jr., Funa, and Dio (2025) reported that inquiry-based learning significantly improved conceptual understanding. Cruz (2025) also emphasized that combining visual representations, hands-on activities, and conceptual questioning results in deeper and more transferable knowledge.

Finally, studies have examined how learners and teachers perceive interventions that integrate reflective and diagnostic components. Cabrestante and Lopez (2023) found that both learners and teachers viewed peer tutoring, ICT-based instruction, and guided remediation positively. Bernas and Del Perio (2023) observed that game-based programs increased learner motivation and supported conceptual development. The IIARI Foundation (2021) noted that Project COUNTS improved confidence and reduced anxiety through scaffolded instruction. Luzano (2024) reported that ipsative assessment practices enhanced learner self-awareness, though teachers experienced challenges in managing data. Lapisboro (2024) also emphasized that teachers valued focused remediation but pointed out the lack of diagnostic tools as a limitation. These studies suggest that learners and teachers in the Philippines are open to structured, diagnostic-based, and reflective approaches such as RMA-integrated Tier 2 interventions, provided that sufficient support and resources are available.

Together, the conceptual and research literature highlight the consistent effectiveness of targeted interventions, diagnostic grouping, and reflective practices in mathematics learning. At the same time, they underscore the gaps in localized research, particularly in Philippine public schools, where the potential of integrating RMA with Tier 2 interventions has not been fully explored.

II. METHODOLOGY

Research Design

The study will employ a descriptive-comparative design, which is appropriate when examining differences between groups or across conditions without manipulating variables. As Creswell and Creswell (2018) emphasize, this design allows the researcher to compare data collected from naturally occurring groups and analyze the extent of differences. In this study, the design will be used to compare the mathematics proficiency of Grade 3 learners before and after the implementation of Tier 2 interventions enhanced by Reflective Mathematics Assessment (RMA).

The design is suitable because the research problem seeks to determine whether the structured implementation of Tier 2 learning instruction, guided by diagnostic data and metacognitive reflection, leads to measurable improvements in the mathematics proficiency of Grade 3 learners. Pretest and posttest results will be used to establish differences in procedural fluency, conceptual understanding, and problem-solving accuracy. This design makes it possible to evaluate whether the intervention produces significant improvements aligned with the research objectives.

Sample of the Study

The sample of the study will consist of 20 low-performing Grade 3 learners in mathematics from Cong. Vicente Gustilo Sr. Memorial School, Schools Division of San Carlos City, for the

School Year 2024–2025. These learners will be identified through their results in the Reflective Mathematics Assessment (RMA), wherein their performance falls under the "Beginning" or "Developing" proficiency levels set by the Department of Education. They represent the group of learners requiring Tier 2 support under the Response to Intervention (RTI) framework, as they demonstrate persistent difficulties in mastering grade-level mathematics skills.

The respondents will typically range in age from 8 to 9 years old and will be officially enrolled in the regular Grade 3 general education program. Learners receiving Tier 3 interventions or those classified under special education will be excluded to ensure the focus remains on those appropriate for Tier 2 intervention.

A stratified random sampling technique will be employed to ensure that both male and female learners are fairly represented in the sample. This method provides proportional representation across subgroups and strengthens the generalizability of the results within similar school contexts (Gay, Mills, & Airasian, 2012).

TABLE 1
DISTRIBUTION OF GRADE 3 RESPONDENTS

Grade Level	Male	Female	Total
Grade 3	10	10	20
Total	10	10	20

Table 1 shows the profile of the Grade 3 learners who took part in the study. A total of 20 pupils from Cong. Vicente Gustilo Sr. Memorial School were included. These learners were identified as low-performing in Mathematics based on their Reflective Mathematics Assessment (RMA) results, where they fell under the "Beginning" and "Developing" levels. Because of their learning needs, they are classified under Tier 2 of the Response to Intervention (RTI) framework, meaning they require more focused and targeted support to catch up with grade-level expectations.

The table also reflects a balanced group: 10 boys and 10 girls, or an equal 50% distribution for both. This was made possible through stratified random sampling, which ensured that both

male and female learners were fairly represented in the study. Having an equal distribution helps make the findings more reliable and applicable to other similar groups of learners.

All respondents were enrolled in the regular Grade 3 program and are typically 8 to 9 years old. Learners who already receive intensive Tier 3 or special education services were not included so that the study could focus specifically on those who need moderate academic support.

Measures

The main instrument used in this study was the Reflective Mathematics Assessment (RMA), developed under the Department of Education's National Learning Recovery Program. The RMA contained structured test items in basic operations, number sense, and word problem-solving. In addition to determining correctness, the tool required learners to explain their reasoning through reflective prompts, making it suitable for assessing both mathematics proficiency and metacognitive awareness.

The RMA was administered as both a pretest and a posttest to establish learners' proficiency levels before and after the Tier 2 intervention. Scores were interpreted using DepEd's proficiency scale: Beginning, Developing, Approaching Proficiency, Proficient, and Advanced. Weekly reflection logs were also collected to monitor how learners engaged with the intervention and whether their ability to explain mathematical processes improved over time. To gather qualitative insights, teacher feedback forms and learner perception checklists were distributed. These additional tools captured the practicality, acceptance, and effectiveness of the intervention from both teachers' and learners' perspectives.

Minor modifications were made to the reflective prompts to ensure that Grade 3 learners could respond independently, given their developmental level. The adjustment was justified to improve age-appropriateness while maintaining the diagnostic and reflective intent of the tool. The validity of the RMA was established by curriculum experts who aligned the instrument with the K to 12 Mathematics Curriculum, while its reliability has been demonstrated in pilot studies

conducted by DepEd, which confirmed the stability and consistency of the results (DepEd Memorandum No. 225, s. 2025)..

Procedures

The conduct of the study began with securing approval from the Schools Division Superintendent, the school principal, and the parents of the selected learners through informed consent. The pretest was then administered using the RMA to all Grade 3 learners in the school. Based on the results, 20 learners classified under "Beginning" and "Developing" proficiency were purposively selected as respondents.

Following the identification of respondents, learners were organized into small instructional groups for Tier 2 intervention. Sessions were conducted three times a week for a period of six to eight weeks, outside of regular class hours. Each session focused on addressing the weaknesses identified in the pretest, specifically in procedural fluency, conceptual understanding, and problem-solving accuracy. Metacognitive reflection was integrated into the sessions, where learners were guided to explain their thought processes, identify mistakes, and correct errors. Reflection logs were collected weekly to document these processes.

At the end of the intervention, the RMA was re-administered as a posttest. Results were compared with the pretest to determine whether significant improvements occurred. Additional qualitative feedback from teachers and learners was also collected to provide further context to the results.

During the implementation, the researcher encountered challenges such as learner absences due to health issues, difficulty in scheduling sessions without overlapping with co-curricular activities, and initial reluctance of learners to write reflections. These were addressed by rescheduling sessions when needed and scaffolding reflection activities to gradually build confidence and independence among learners. Despite these challenges, all respondents completed the intervention and posttest.

Data Processing

The data gathered from the Reflective Mathematics Assessment (RMA) pretest and posttest were processed using quantitative statistical methods to evaluate the effectiveness of the Tier 2 intervention. Descriptive statistics, including frequency counts, percentages, means, and standard deviations, were employed to describe the demographic profile of the learners and summarize their proficiency levels before and after the intervention. To determine whether there was a significant difference in mathematics proficiency, a paired sample t-test was conducted to compare pretest and posttest scores. Pearson correlation was used to examine the relationship between the demographic characteristics of the learners and their proficiency levels, while regression analysis was applied to determine whether the extent of Tier 2 instruction predicted post-intervention performance.

Before conducting inferential analyses, the normality of the data distribution was tested using the Shapiro–Wilk test. Results confirmed that the data were normally distributed, thus validating the use of parametric statistical tools in the analysis. The results of the normality testing are presented in Appendix Table 2. By combining descriptive and inferential statistics, the study provided a comprehensive evaluation of whether Tier 2 interventions integrated with Reflective Mathematics Assessment (RMA) significantly improved learners' procedural fluency, conceptual understanding, and problem-solving accuracy.

Ethical Considerations

The researcher strictly adhered to ethical standards throughout the conduct of the study to ensure the safety, privacy, and rights of all participants. Prior to implementation, formal approval was secured from the Schools Division Superintendent, the school principal, and the DepEd Division Office. Informed consent forms were distributed to the parents or legal guardians of the selected learners, clearly explaining the objectives, procedures, voluntary nature of participation, and the right to withdraw at any time without penalty.

Confidentiality was maintained by assigning codes instead of names to learners and by securely storing all test results and reflection logs. Data were used solely for academic purposes and were not shared outside the research process. The intervention sessions were conducted in a supportive environment, ensuring that no harm, stress, or undue pressure was experienced by the learners. All procedures complied with ethical guidelines for research involving minors in educational settings (Creswell & Creswell, 2018). By upholding these standards, the researcher ensured that the study respected the dignity and welfare of the participants while producing valid and reliable results.

III. RESULTS AND DISCUSSION

This chapter presents the results, the analysis, and interpretation of the data gathered from the responses based on the prepared research instruments.

1. Demographic Profile of the Learners

This part presents the demographic profile of the 110 Grade 2 learners in terms of age, sex, and tutorship. Understanding these characteristics provides context to how learners respond to the Tier 2 intervention using Rapid Mathematics Assessment (RMA) diagnostics.

This finding implies that the respondents are developmentally aligned with the standard age group for their grade level, allowing the intervention to proceed with uniform instructional pacing. Similar to the observation of Rojo et al. (2024), age-appropriate grouping supports balanced engagement and enables teachers to apply tiered instruction effectively. Moreover, Gersten et al. (2009) emphasized that homogeneity in age helps ensure equitable learning experiences in small-group settings under the Tier 2 framework.

2. Level of Mathematics Proficiency of the Learners Before the Tier 2 Intervention

The data presented in this section reflect the RMA pre-test results of the 110 Grade 2 learners prior to the conduct of the Tier 2 intervention. The RMA diagnostic was used to measure

the proficiency levels of the learners in mathematics before introducing reflective and small-group remedial instruction.

This finding clearly indicates that the majority of the learners entered the intervention phase with below-grade-level performance in mathematics. The prevalence of "Emerging" proficiency categories highlights the need for systematic remedial instruction focusing on procedural fluency, conceptual understanding, and problem-solving accuracy. It reflects that most learners still struggle with foundational numeracy, computation, and reasoning skills—core areas that Tier 2 intervention aims to address.

These results affirm the report of Dulay (2025), which emphasized that early-grade learners in Philippine public schools often display low mastery of basic mathematical concepts due to insufficient practice and lack of feedback-driven instruction. The findings are also supported by Rojo et al. (2024), who concluded through a meta-analysis that students under targeted, content-specific intervention programs demonstrate significant improvement when instructional planning is informed by diagnostic data such as the RMA.

3. Extent of Implementation of Tier 2 Learning Instruction in Mathematics

This portion presents the extent to which Tier 2 learning instruction was implemented among the respondents. The analysis focuses on three key indicators: procedural fluency, conceptual understanding, and problem-solving accuracy. The data were collected from the teacher observation checklists and learners' reflection logs, which measured the frequency and quality of instructional activities under each component.

4. Extent of Implementation of Tier 2 Learning Instruction in Terms of Procedural Fluency

The result implies that learners improved in carrying out arithmetic procedures correctly and efficiently through repeated guided practice. This supports the study of Jitendra, Lein, and Xin (2020), who noted that structured small-group instruction significantly enhances learners' procedural fluency in mathematics. Similarly, Stocker et al. (2022)emphasized that repeated

practice, immediate feedback, and error correction are key elements in developing procedural mastery. Hence, the Tier 2 implementation provided a strong foundation for learners' operational accuracy.

5. Extent of Implementation of Tier 2 Learning Instruction in Terms of Conceptual Understanding

This finding implies that Tier 2 instruction helped learners build connections between mathematical concepts through reflection and guided discovery. The result aligns with Yürekli, Stein, and Smith (2020), who explained that conceptual understanding is achieved when learners can explain and justify mathematical reasoning. Likewise, Hussein and Csíkos (2023) highlighted that metacognitive and reflective learning strategies promote deeper comprehension, reducing learners' reliance on rote memorization.

6. Extent of Implementation of Tier 2 Learning Instruction in Terms of Problem-Solving Accuracy

This finding suggests that learners were able to check, reflect, and correct their problem-solving processes effectively. Myers et al. (2022) found that structured reflective questioning helps learners refine problem-solving accuracy and develop critical thinking. Likewise, Reinhard, Tresselt, and Berendonk (2021) asserted that guided reflection fosters reasoning and precision. Hence, Tier 2 learning activities that incorporated reflection and continuous feedback enhanced both the accuracy and logical consistency of learners' mathematical work.

This finding aligns with the study of Fuchs et al. (2022), which emphasized that structured Tier 2 interventions lead to significant gains in mathematical fluency and conceptual comprehension among struggling learners. It also reinforces Vygotsky's (1978) Zone of Proximal Development, suggesting that when learners receive appropriate scaffolding through targeted instruction, they achieve higher learning outcomes.

Overall, the results confirm that Tier 2 instruction implemented through RMA diagnostics is effective in bridging learning gaps and enhancing the mathematical proficiency of emerging Grade 3 learners in Cong. Vicente Gustilo Sr. Memorial School.

IV. CONCLUSIONS

Based on the results of the study, the Tier 2 learning instruction using Rapid Mathematics Assessment (RMA) diagnostics is an effective approach in enhancing the mathematical proficiency of emerging Grade 3 learners. The significant improvement from pre-test to post-test scores indicates that the targeted interventions successfully addressed learners' individual learning gaps in procedural fluency, conceptual understanding, and problem-solving accuracy. Moreover, the results reveal that the quality and extent of Tier 2 implementation—particularly in the areas of strategic teaching, curriculum planning, and instructional performance—had a strong and positive influence on the learners' post-intervention proficiency levels. This confirms that when teaching is guided by diagnostic data and scaffolded support, learners are more capable of mastering key mathematical concepts.

Furthermore, the integration of structured remediation activities, active learner engagement strategies, and continuous progress monitoring contributes greatly to sustained learning improvement. The presence of a significant relationship between Tier 2 instruction and proficiency supports the principle of Vygotsky's Zone of Proximal Development, which emphasizes that learners achieve higher performance when provided with appropriate instructional guidance. Therefore, the study affirms that Tier 2 interventions guided by RMA diagnostics are not only effective in raising learners' academic outcomes but also vital in building confidence, self-efficacy, and long-term mathematical understanding.

REFERENCES

[1.] Clarke, B., Doabler, C., Smolkowski, K., Kosty, D., Kurtz-Nelson, E., Fien, H., & Baker, S. (2016). *Effects of the ROOTS kindergarten math intervention: A randomized trial.* Exceptional Children, 82(4), 497–510. https://doi.org/10.1177/0014402915598774

[2.] Doabler, C. T., Clarke, B., Kosty, D. B., Nelson, N. J., & Smolkowski, K. (2023). *Instructional grouping and academic outcomes for students receiving Tier 2 mathematics intervention.* The Journal of Special Education, 57(1), 38–49. https://doi.org/10.1177/00224669221128069

[3.] Doabler, C. T., Fien, H., & Clarke, B. (2021). *Supporting students with mathematics difficulties through Tier 2 interventions.* Teaching Exceptional Children, 53(4), 248–257. https://doi.org/10.1177/0040059920957681

[4.] Doabler, C. T., Clarke, B., Kosty, D. B., Nelson, N. J., & Smolkowski, K. (2024). *Does variability within Tier 2 mathematics intervention groups affect students' response to intervention?* Exceptional Children, 90(3), 331–346. https://doi.org/10.1177/00144029231220307

[5.] Dulay, L. G. H. (2025). *Improving numeracy skills using the RMA approach: A study of Grade 2 pupils at Binuan Elementary School.* Asian Journal of Education and Social Studies, 51(7), 651–658. https://doi.org/10.9734/ajess/2025/v51i72155

[6.] Flavell, J. H. (1979). *Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry.* American Psychologist, 34(10), 906–911. https://doi.org/10.1037/0003-066X.34.10.906

[7.] Fuchs, D., Fuchs, L. S., & Vaughn, S. (2014). *What is intensive instruction and why is it important?* Teaching Exceptional Children, 46(4), 13–18. https://doi.org/10.1177/0040059914522966

[8.] Gersten, R., Beckmann, S., Clarke, B., Foegen, A., Marsh, L., Star, J. R., & Witzel, B. (2009). *Assisting students struggling with mathematics: Response to intervention (RTI) for elementary and middle schools (IES Practice Guide).* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/rti_math_pg_042109.pdf

[9.] Houghton Mifflin Harcourt. (2023). *Tier 2 and Tier 3 math intervention strategies.* HMH Blog. https://www.hmhco.com/blog/rti-math-tier-2-tier-3-strategies

[10.] Jitendra, A. K., Alghamdi, A., Edmunds, R. R., McKevett, N. M., Mouanoutoua, J., & Roesslein, R. (2020). *The effects of Tier 2 mathematics interventions for students with mathematics difficulties: A meta-analysis.* Exceptional Children, 87(3), 307–325. https://doi.org/10.1177/0014402920969187

[11.] Jitendra, A. K., Lein, A. E., & Xin, Y. P. (2020). *Effects of Tier 2 mathematics interventions for students with or at risk for mathematics difficulties: A meta-analysis.* The Journal of Special Education, 54(3), 131–144. https://doi.org/10.1177/0022466919894262

[12.] Lee, S., Park, H., & Kim, J. (2023). *Metacognitive experiences and mathematics proficiency: Exploring the connection in middle school learners.* Journal of Educational Psychology and Development, 45(2), 115–132. https://doi.org/10.1037/edu0000684

[13.] Lesner, T. (2023). *Response patterns and growth trajectories in kindergarten mathematics under an RTI model.* Early Childhood Research Quarterly, 63, 179–192. https://doi.org/10.1016/j.ecresq.2022.11.005

[14.] Lowrie, T., Logan, T., & Diezmann, C. (2021). *The impact of spatial reasoning interventions on mathematics performance in early learners.* Mathematics Education Research Journal, 33(1), 49–66. https://doi.org/10.1007/s13394-020-00317-w
[15.] Myers, J. A., Hughes, E. M., Witzel, B. S., Anderson, R. D., & Owens, J. (2022). *A meta-analysis of mathematical interventions for increasing the word problem-solving performance of upper elementary and secondary students with mathematics difficulties.* Journal of Research on Educational Effectiveness. Advance online publication. https://doi.org/10.1080/19345747.2022.2080131
[16.] Reinhard, A., Tresselt, S., & Berendonk, C. (2021). *Promoting mathematical reflection to foster problem-solving competence: A design-based study.* European Journal of Psychology of Education, 36(1), 123–143. https://doi.org/10.1007/s10212-020-00472-y
[17.] Rojo, E. C., Bravo, J. A., & Martinez, C. (2024). *Content-specific interventions and mathematics achievement: A meta-analysis of 286 studies.* Educational Psychology Review, 36(2), 215–238. https://doi.org/10.1007/s10648-023-09843-0
[18.] Rojo, M., Larivière, D. O., & Lin, X. (2024). *A meta-analysis of mathematics interventions: Examining the impacts of intervention characteristics.* Educational Psychology Review, 36(1), 1–26. https://doi.org/10.1007/s10648-023-09843-0
[19.] Sercenia, J. C., & Prudente, M. S. (2023). *Effectiveness of metacognitive-based pedagogical intervention on mathematics achievement: A meta-analysis.* International Journal of Instruction, 16(4), 561–578. https://doi.org/10.29333/iji.2023.16432a
[20.] Yu, H., & Qi, Y. (2025). *Metacognitive strategy use and mathematics achievement: A large-scale study of Chinese eighth-grade students.* International Journal of Educational Research, 120, 102218. https://doi.org/10.1016/j.ijer.2025.102218