Pedagogy Review: An International Journal of Educational Theories, Approaches and Strategies
2025, Vol. 6, No.1, 147 – 158 | ISSN Online: 3028-1040 | ISSN Print: 3028-1059
DOI: https://doi.org/10.62718/vmca.pr-ijetas.6.1.SC-1125-021

Implementation Strategies, Challenges, and Effectiveness of the Rapid Mathematics Assessment (RMA) in Improving Learners' Mathematical Competence: Evidence from the Panganiban District, Schools Division of Catanduanes

Article History:
Received: 25 October 2025
Accepted: 13 December 2025
Published: 22 December 2025

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Abstract

This study examined the implementation strategies, challenges, and effectiveness of the Rapid Mathematics Assessment (RMA) as a formative assessment tool intended to enhance learners' mathematical competence, as facilitated by teachers in the Panganiban District, Schools Division of Catanduanes. Guided by Black and Wiliam's (2023) Formative Assessment Theory and Vygotsky's Constructivist Learning Theory (Kaur & Natarajan, (2022), the study utilized a descriptive-correlational quantitative design to determine how RMA strategies, covering assessment design, frequency, feedback, and instructional integration, relate to perceived effectiveness and encountered challenges. Data were gathered from 71 mathematics teachers across twelve public schools using a validated researcher-made questionnaire. Statistical analyses included weighted mean and Pearson correlation. Results revealed that teachers "highly implemented" the RMA (GWM = 3.62), with assessment design and feedback rated as highest. Despite frequent challenges (GWM = 3.51), such as learner readiness, workload, and time constraints, teachers perceived the RMA as "very effective" (GWM = 3.51) in enhancing mathematical proficiency, conceptual understanding, problem solving, and real-life application. Significant positive correlations were found between implementation strategies and both challenges (r = 0.721) and effectiveness (r = 0.648), but challenges showed no significant correlation with effectiveness (r = 0.053). These findings highlight teachers' resilience and adaptive capacity in sustaining RMA effectiveness despite contextual limitations. The study concludes that effective and consistent implementation of formative assessment strategies directly strengthens mathematical learning outcomes. A strategic intervention plan was developed to improve RMA application through targeted professional development, resource provision, and feedback driven instructional integration.

Keywords: formative assessment, rapid mathematics assessment, feedback, instructional integration, mathematical proficiency, Catanduanes

INTRODUCTION

Formative assessment has emerged as a cornerstone of effective mathematics instruction, serving not merely as a means of evaluating learning but as a pedagogical strategy that fosters deep conceptual understanding, problem solving ability, and mathematical proficiency (Aust et al., 2024; Black & Wiliam, 2023). Over the past decade, scholars have demonstrated that formative assessment practices—such as feedback loops, peer assessment, and diagnostic questioning enhance learner engagement and self-regulation (Panadero et al., 2023; Yao et al., 2022). In mathematics contexts, formative assessment allows teachers to identify misconceptions promptly and adapt instruction to meet learners' diverse needs, resulting in measurable gains in achievement and motivation (Wafubwa & Csíkos, 2022; Chen & Chan, 2021). Empirical syntheses confirm that the success of formative assessment depends on its systematic implementation, the teacher's

ability to interpret assessment data, and alignment with curricular goals (Kippers et al., 2021; Maskos et al., 2025). Moreover, digital and rapid diagnostic tools are increasingly integrated into classroom practice to facilitate continuous feedback and enhance learners' autonomy in mathematical reasoning (Villanueva & Castillo, 2023; Luzano et al., 2024). These developments highlight formative assessment as an indispensable driver of equitable and data informed mathematics education in the 21st century (Panadero et al., 2023; Black & Wiliam, 2023).

Despite these advances, the operationalization of formative and rapid assessment tools remains underexplored in localized and resource constrained settings (Thinwiangthong et al., 2020; Wafubwa & Csíkos, 2022). Teachers continue to face implementation challenges such as limited resources, time constraints, learner readiness, and high workload (Chen & Chan, 2021; Luzano et al., 2024). In the Philippine context, while studies have investigated digital formative assessment practices in mathematics classrooms (Villanueva & Castillo, 2023), empirical research examining structured instruments like the Rapid Mathematics Assessment (RMA) are scarce. Furthermore, relationships between instructional strategies, contextual challenges, and the resulting effectiveness of rapid formative assessment tools remain largely unexamined (Maskos et al., 2025; Yao et al., 2022).

Responding to these research gaps, this study investigated the implementation strategies, challenges, and effectiveness of the Rapid Mathematics Assessment (RMA) as a formative assessment mechanism to enhance mathematical competence among learners in the Panganiban District, Schools Division of Catanduanes. Specifically, it analyzed how RMA practices covering assessment design, frequency, feedback and remediation, and instructional integration affect learners' proficiency, problem solving ability, conceptual understanding, and application in real life contexts. The findings of this conducted study provide empirical grounding for refining formative assessment practices, informing teacher professional development, and guiding local education policy toward improved mathematics learning outcomes.

Statement of the Problem. The study aimed to examine the implementation strategies, challenges, and level of effectiveness of the Rapid Mathematics Assessment (RMA) as a formative assessment tool designed to enhance learners' mathematical competence among teachers in the Panganiban District, Schools Division of Catanduanes. It sought to analyze how the RMA is operationalized in classroom settings, identify the constraints teachers face in its implementation, and determine its impact on the development of learners' mathematical skills. Specifically, this study sought to address the following research questions:

1. What strategies are employed in implementing the Rapid Mathematics Assessment in terms of:
   1.1 Assessment design;
   1.2 Frequency of administration;
   1.3 Feedback and remediation; and
   1.4 Integration with instruction?

2. What challenges are encountered in the implementation of the Rapid Mathematics Assessment in terms of:
   2.1 Availability of resources;
   2.2 Time constraints;
   2.3 Learner readiness; and
   2.4 Teacher workload?

3. What is the level of effectiveness of the Rapid Mathematics Assessment in improving learners' mathematical skills in terms of:
   3.1 Mathematical proficiency;
   3.2 Problem solving ability;
   3.3 Conceptual understanding; and
   3.4 Application of skills in real life contexts?

4. Is there a significant relationship between the strategies employed and the challenges encountered in implementing the Rapid Mathematics Assessment?

5. Is there a significant relationship between the strategies employed and the level of effectiveness of the Rapid Mathematics Assessment?

6. Is there a significant relationship between the challenges encountered and the level of effectiveness of the Rapid Mathematics Assessment?

7. What intervention plan can be developed to enhance the implementation and impact of the Rapid Mathematics Assessment in the Panganiban District?

Scope of the Study. This conducted study focused on examining the implementation strategies, challenges, and effectiveness of the Rapid Mathematics Assessment (RMA) as a formative assessment tool among mathematics teachers in the Panganiban District, Schools Division of Catanduanes, during School Year 2024–2025. It covered aspects of assessment design, frequency, feedback, and instructional integration, as well as constraints such as resources, time, learner readiness, and teacher workload, to determine their relationship with learners' mathematical proficiency, problem solving, conceptual understanding, and real-life skill application.

Theoretical/Conceptual Framework. The Formative Assessment Theory by Black and Wiliam (2023) serves as the cornerstone of this study, emphasizing the pivotal role of continuous, feedback driven evaluation in improving student learning. It conceptualizes assessment as a cyclical process involving the systematic collection of evidence, interpretation of learning progress, and adaptive instructional adjustments to meet learners' needs. Within the Rapid Mathematics Assessment (RMA), this theory guides teachers to utilize diagnostic data in refining pedagogical approaches, addressing learning gaps, and enhancing students' conceptual and procedural understanding. Empirical findings corroborate that formative assessment significantly promotes student engagement, self-regulation, and metacognitive development in mathematics classrooms (Panadero et al., 2023).

Complementing this is Vygotsky's Constructivist Learning Theory, further advanced by Kaur and Natarajan (2022), which situates learning within the domains of social interaction, active participation, and reflective construction of knowledge. It emphasizes that assessment acts as a scaffold for learners' cognitive growth, enabling teachers to identify the Zones of Proximal Development (ZPD) and design targeted interventions that foster self-efficacy, problem solving, and critical thinking (Darling Hammond & Flook, 2021).

Aligned with these theories, the study's Input–Process–Output (IPO) framework presents an integrated model of assessment implementation. Input encompasses the strategies, challenges, and contextual factors influencing the RMA's deployment. Process highlights the mechanisms of administering assessments, analyzing data, providing feedback, and refining instruction for learning improvement. Output represents the measurable outcomes of the RMA—specifically its effectiveness in enhancing mathematical proficiency and the formulation of an intervention plan to strengthen its application. Collectively, this theoretical conceptual alignment provides a holistic lens through which the study evaluates how formative assessment and constructivist principles jointly drive improved teaching practices and sustained mathematical learning outcomes in the Panganiban District.

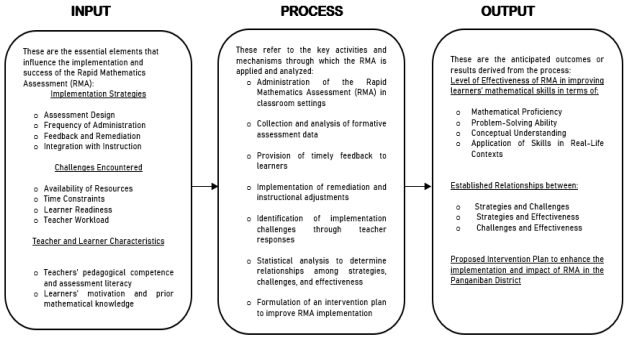

Figure 1
The Conceptual Paradigm of the Study

LITERATURES

The integration of formative assessment in mathematics education has gained increasing global attention as a strategy to enhance learning outcomes and diagnostic teaching practices (Black & Wiliam, 2023; Panadero et al., 2023). Formative assessments, such as the

Rapid Mathematics Assessment (RMA), enable teachers to continuously monitor learners' progress, identify misconceptions, and provide timely feedback that guides instructional improvement (Andrade et al., 2022; Heritage, 2021). Studies demonstrate that such assessments foster students' self-regulated learning and metacognitive awareness, which are essential components of mathematical proficiency (Lee & Toh, 2022; Wylie & Lyon, 2021). Within this framework, the RMA operationalizes the cyclical process of assessment, feedback, and instructional adjustment, aligning with Black and Wiliam's (2023) formative assessment theory that emphasizes evidence-based teaching.

Recent literature underscores the significance of feedback driven practices in improving learner engagement and conceptual understanding in mathematics (Panadero et al., 2023; Cowie & Bell, 2020). Feedback, when effectively implemented, transforms assessment into a tool for learning rather than merely a measure of achievement (Bennett, 2021; Shepard et al., 2020). This aligns with the constructivist view that learning is an active, social process where assessment serves as a scaffold for knowledge construction (Kaur & Natarajan, 2022; Darling Hammond & Flook, 2021). In the context of RMA, this theoretical foundation supports teachers' ability to design interventions that target students' Zones of Proximal Development, fostering deeper comprehension and critical problem-solving skills (Kaur & Natarajan, 2022).

However, effective implementation of formative assessment tools such as RMA is often challenged by contextual and institutional factors. Studies in Southeast Asian contexts reveal that constraints like time limitations, workload pressures, and resource scarcity hinder the full operationalization of formative practices (Tan & Leong, 2022; Verceles et al., 2021). In the Philippines, similar challenges have been documented in the implementation of classroom-based assessments and learning recovery programs (Cordial, 2025a; Cordial, 2025b). Teachers in resource constrained environments struggle to balance administrative duties with the demands of continuous assessment, affecting the consistency and reliability of formative practices (Calleja, 2023; Alonzo, 2021).

Despite these challenges, the use of structured diagnostic tools like RMA demonstrates potential in promoting data driven instruction and equitable learning outcomes (Looney, 2020; Brookhart, 2021). When aligned with feedback mechanisms and instructional integration, RMA can enhance students' mathematical fluency, conceptual depth, and real-world problem-solving capacities (Wylie & Lyon, 2021; Darling Hammond & Flook, 2021). Moreover, as Cordial (2025a, 2025b) emphasize in the domain of disaster resilience, stakeholder engagement and evidence-based strategies are critical in sustaining effective systems—a principle equally applicable to educational interventions such as RMA implementation. Thus, the present study builds upon this theoretical and empirical foundation to examine the strategies, challenges, and effectiveness of the Rapid Mathematics Assessment in improving learners' mathematical skills in the Panganiban District.

METHODS

Research Design. This study employed a quantitative approach utilizing a descriptive-correlational design to examine the implementation strategies, challenges, and effectiveness of the Rapid Mathematics Assessment (RMA) among teachers in the Panganiban District, Schools Division of Catanduanes. The design enabled the identification of prevailing implementation patterns, resource constraints, and their correlation with learners' mathematical proficiency. Findings guided the formulation of a strategic intervention plan to enhance RMA implementation and learning outcomes.

Population, Samples and Sampling Technique. The study encompassed 86 elementary teachers from twelve public schools in the Panganiban District, from which a sample of 71 respondents was determined using Slovin's formula with a 5% margin of error, ensuring an

acceptable balance between accuracy and manageability of data. This method provides a statistically sound estimate of the required sample size for a given population when variability is unknown (Santos, 2020; Taherdoost, 2021). To ensure equitable representation across varied school contexts, purposive sampling was subsequently employed in identifying participants, emphasizing those with direct engagement in the implementation of the Rapid Mathematics Assessment (RMA). Purposive sampling allows the inclusion of individuals possessing specific knowledge or experiences relevant to the research aims, enhancing contextual validity and data richness (Etikan & Bala, 2023; Palinkas et al., 2020). The combination of Slovin's formula and purposive selection minimized sampling bias while maintaining representativeness across the district's heterogeneous teacher population (Creswell & Creswell, 2022).

Table 1
Distribution of Respondents and Corresponding Teacher Population in the Panganiban District

Elementary Schools	Total Teacher Population (N)	Sample Size (n)
Alinawan Elementary School	6	5
Bayhan	3	2
Babaguan	2	2
Burabod	5	4
Cabuyoan	11	9
Cagdarao	6	5
Mabini	6	5
Maculiw	4	3
Panay	4	3
Panganiban Central	20	17
San Miguel	12	10
Tibo	7	6
Total	**86**	**71**

Instrumentation. The study utilized a researcher-developed questionnaire grounded in validated constructs from recent empirical studies to assess strategy implementation, challenges encountered, and RMA effectiveness. Each item was rated using a 4point Likert scale (see Table 2), providing ordinal data suitable for measuring perceptions and attitudes (Boone et al., 2021). The instrument underwent expert validation and pilot testing to establish content and construct validity (Creswell & Creswell, 2022). Internal consistency was confirmed through Cronbach's alpha reliability testing, adhering to contemporary psychometric standards for quantitative research in education (Hair et al., 2021; Taherdoost, 2022).

Table 2
Evaluation and Scoring Scale for Strategy Implementation, Challenges Encountered, and RMA Effectiveness

Assigned Points	Numerical Range	Strategies Employed (Verbal Interpretation)	Challenges Encountered (Verbal Interpretation)	Effectiveness of RMA (Verbal Interpretation)
4	3.25 – 4.00	Highly Implemented (Strongly Agree)	Frequently Encountered (Strongly Agree)	Very Effective (Strongly Agree)
3	2.50 – 3.24	Implemented (Agree)	Occasionally Encountered (Agree)	Effective (Agree)
2	1.75 – 2.49	Less Implemented (Disagree)	Rarely Encountered (Disagree)	Less Effective (Disagree)
1	1.00 – 1.74	Not Implemented (Strongly Disagree)	Not Encountered (Strongly Disagree)	Not Effective (Strongly Disagree)

Data Analysis. Data were analyzed using descriptive and inferential statistics, including weighted mean, Pearson correlation, to identify relationships among RMA implementation, challenges, and effectiveness. These methods ensured accurate interpretation of quantitative data patterns and associations (Field, 2021; Hair et al., 2021). Statistical analysis followed established best practices for educational measurement and correlation research (Cohen et al., 2021).

Ethical Considerations. The study strictly adhered to established ethical standards in educational research to ensure the protection of participants' rights and data integrity. Prior to data collection, approval was sought from the Schools Division Office of Catanduanes and informed consent was obtained from all participating teachers. Respondents were informed about the study's purpose, procedures, voluntary participation, and the right to withdraw at any stage without penalty. Confidentiality and anonymity were maintained by assigning codes instead of names and securing all data in password protected files. Ethical procedures followed the guidelines of the American Educational Research Association (AERA, 2020) and Creswell & Creswell (2022).

RESULTS

The results of this study offer a comprehensive understanding of how the Rapid Mathematics Assessment (RMA) is implemented, the

challenges teachers face, and the perceived effectiveness of the tool in enhancing learners' mathematical skills.

The findings in Table 3 indicate that teachers in the Panganiban District maintained a high level of implementation across all evaluated dimensions, with an overall weighted mean of 3.62, interpreted as "Highly Implemented (Strongly Agree)." Assessment design was rated highest at 3.68, followed by frequency of administration (3.66), feedback and remediation (3.61), and integration with instruction (3.52). These results suggest that teachers consistently applied structured assessment procedures, conducted regular assessments, provided timely feedback, and effectively aligned the RMA with instructional practices, reflecting a systematic approach to formative assessment in classrooms.

Table 3
Summary of Strategies Employed in Implementing the Rapid Mathematics Assessment (RMA)

Variables	Weighted Mean	Verbal Interpretation	Rank
Assessment Design	3.68	Highly Implemented (Strongly Agree)	1
Frequency of Administration	3.66	Highly Implemented (Strongly Agree)	2
Feedback and Remediation	3.61	Highly Implemented (Strongly Agree)	3
Integration with Instruction	3.52	Highly Implemented (Strongly Agree)	4
Overall Weighted Mean	3.62	Highly Implemented (Strongly Agree)	

Transitioning to Table 4, the study revealed that teachers frequently encountered challenges during RMA implementation, with an overall weighted mean of 3.51 ("Frequently Encountered"). Learner readiness ranked highest at 3.60, followed by teacher workload (3.58), time constraints (3.51), and availability of resources (3.35). These findings highlight that while teachers actively implement the RMA, operational obstacles—such as student preparedness, balancing responsibilities, scheduling, and limited resources—persist, emphasizing the need for supportive interventions and resource planning.

Table 4
Summary of Challenges Encountered in the Implementation of the Rapid Mathematics Assessment (RMA)

Variables	Weighted Mean	Verbal Interpretation	Rank
Availability of Resources	3.35	Frequently Encountered (Strongly Agree)	4
Time Constraints	3.51	Frequently Encountered (Strongly Agree)	3
Learner Readiness	3.60	Frequently Encountered (Strongly Agree)	1
Teacher Workload	3.58	Frequently Encountered (Strongly Agree)	2
Overall Weighted Mean	3.51	Frequently Encountered (Strongly Agree)	

Table 5 shows that teachers perceived the RMA as highly effective in enhancing learners' mathematical skills, with an overall weighted mean of 3.51 ("Very Effective"). Application of skills in real life contexts received the highest rating (3.56), followed by mathematical proficiency (3.52), conceptual understanding (3.48), and problem-solving ability (3.49). These results suggest that the RMA strengthens both conceptual mastery and practical application, fostering critical thinking and engagement.

Table 5.
Summary of Perceived Effectiveness of the Rapid Mathematics Assessment (RMA) in Enhancing Learners' Mathematical Skills

Variables	Weighted Mean	Verbal Interpretation	Rank
Mathematical Proficiency	3.52	Very Effective (Strongly Agree)	2
ProblemSolving Ability	3.49	Very Effective (Strongly Agree)	4
Conceptual Understanding	3.48	Very Effective (Strongly Agree)	3
Application of Skills in RealLife Contexts	3.56	Very Effective (Strongly Agree)	1
Overall Weighted Mean	3.51	Very Effective (Strongly Agree)	

The correlation analyses in Tables 6, 7, and 8 provide deeper insight into the interplay between implementation practices, encountered challenges, and the perceived effectiveness of the Rapid Mathematics Assessment (RMA).

Table 6 reveals a strong positive correlation (r = 0.721) between implementation strategies and challenges, indicating that teachers who apply structured and systematic assessment strategies more rigorously are also more likely to encounter operational and logistical difficulties. This underscores the notion that higher fidelity in assessment implementation often brings to light practical constraints such as time management, workload balancing, and resource availability.

Table 6
Correlation between Implementation Strategies and Challenges Encountered in RMA

Variables	Statistical Test	Computed Value	Critical Value @ 0.05	Decision	Interpretation
Implementation Strategies vs. Challenges Encountered	Pearson r	0.721	0.444	Reject H_0	Significant Relationship

Table 7 shows a significant positive correlation (r = 0.648) between implementation strategies and the level of effectiveness, highlighting that teachers who consistently employ well organized assessment procedures, provide timely feedback, and integrate assessments with instruction achieve better outcomes in learners' mathematical skills. This finding demonstrates the critical role of strategic planning, procedural consistency, and instructional alignment in enhancing the formative impact of the RMA, reinforcing that effective implementation directly translates into improved student performance and engagement.

Table 7
Correlation between Implementation Strategies and Level of Effectiveness of RMA

Variables	Statistical Test	Computed Value	Critical Value @ 0.05	Decision	Interpretation
Implementation Strategies vs. Level of Effectiveness	Pearson r	0.648	0.444	Reject H_0	Significant Relationship

In contrast, Table 8 reveals an insignificant correlation (r = 0.053) between challenges encountered and the level of effectiveness. This suggests that, despite facing obstacles such as limited resources, time constraints, or varying learner readiness, teachers are able to adapt and maintain the effectiveness of the RMA through innovative or flexible approaches. It reflects the resilience and problem-solving capabilities of educators, indicating that while challenges are present, they do not inherently compromise the assessment's capacity to improve learners' mathematical proficiency.

Holistically, these results underscore that the quality and consistency of implementation strategies are pivotal for RMA effectiveness, while encountered challenges, though present, do not substantially hinder its impact. Teacher resilience, strategic planning, and professional competence emerge as key factors in maximizing the formative and instructional benefits of the RMA.

Table 8
Correlation between Challenges Encountered and Level of Effectiveness of RMA

Variables	Statistical Test	Computed Value	Critical Value @ 0.05	Decision	Interpretation
Challenges Encountered vs. Level of Effectiveness	Pearson r	0.053	0.444	Reject H_0	Significant Relationship

Strategic Intervention Plan Enhancing Implementation and Effectiveness of the Rapid Mathematics Assessment (RMA) in Panganiban District

Vision. A district where formative assessment practices are strategically implemented to ensure high learner achievement in mathematics, fostering critical thinking, problem solving, and real-life application skills.

Mission. To optimize the implementation and outcomes of the Rapid Mathematics Assessment (RMA) by providing teachers with targeted interventions, resources, and structured support mechanisms, ensuring consistent, effective, and learner-centered assessment practices.

Objectives

1. Strengthen the design and administration of the RMA across all classrooms.

2. Enhance teachers' ability to provide timely and effective feedback and remedial instruction.

3. Address operational challenges including time management, resource limitations, and learner readiness.

4. Amplify the RMA's impact on learners' mathematical skills, problem solving, and real-world application.

5. Promote continuous professional development, collaboration, and capacity building among teachers.

formative assessment enhances mathematical proficiency, metacognitive awareness, and self-regulated learning (Andrade et al., 2022; Wylie and Lyon, 2021; Lee and Toh, 2022). That teachers sustained high fidelity despite heavy workloads, time limitations, and resource constraints reflects trends in Southeast Asian and Philippine contexts (Tan and Leong, 2022; Cordial, 2025a). Thus, sustaining RMA use requires strengthened professional development, resource support, and formalized feedback strategies to optimize instructional

Table 9
Matrix of Proposed Strategic Intervention Plan Enhancing Implementation and Effectiveness of the RMA

Objectives	Key Result Areas	Performance Indicator (PI)	Strategic Interventions	Projects and Activities	Time Frame	Personnel Involved	Resources
1. Strengthen RMA design and administration	Assessment Quality and Consistency	% of assessments aligned with objectives	Standardize assessment procedures; incorporate evidencebased assessment strategies	Conduct workshops on RMA design; create standardized assessment templates	Quarterly	District Mathematics Coordinator, School Heads	Assessment templates, workshop funds, instructional guides
2. Enhance teacher feedback and remediation	Feedback Efficiency	Learner improvement rate postfeedback	Train teachers in timely, actionable feedback; implement structured remedial programs	Feedback and remediation PD sessions; remedial scheduling; peer coaching	Semesterly	Teachers, School Heads	Training modules, feedback tools, instructional guides
3. Address operational challenges	Implementatio n Support	Reduction in reported operational challenges	Provide resource support, optimize assessment schedules, and implement learner readiness interventions	Procure assessment materials; time management planning; readiness workshops	Annual	School Heads, Teachers, District Office	Budget, teaching aids, scheduling software
4. Amplify RMA impact	Learner Performance	Improvement in mathematical proficiency, problemsolving, and reallife application	Align RMA with lesson objectives and reallife contexts; integrate handson learning activities	Lesson planning workshops; applied mathematics projects; formative assessment monitoring	Biannual	Teachers, District Curriculum Coordinator	Curriculum guides, project kits, monitoring tools
5. Promote professional development and collaboration	Teacher Competence and Engagement	Participation in PD programs; collaborative lesson planning sessions	Continuous capacity building, mentoring, and peer review; promote professional learning communities	Regular PD workshops; peer observation; mentoring programs; collaborative planning sessions	Ongoing	School Heads, Teachers, District Office	Training modules, mentorship plans, collaboration platforms

DISCUSSION

The findings indicate that teachers in the Panganiban District consistently implemented the Rapid Mathematics Assessment (RMA) at a high level (GWM = 3.62), with assessment design, frequency, feedback provision, and instructional integration all rated as "Highly Implemented." This systematic implementation aligns with Black and Wiliam's (2023) theory of evidence-based teaching cycles emphasizing continuous assessment, timely feedback, and instructional adjustment. These results corroborate earlier findings that high-quality

The study likewise revealed substantial challenges in RMA implementation (GWM = 3.51), particularly in learner readiness (3.60), workload (3.58), time constraints (3.51), and limited resources (3.35). These findings echo research showing that student preparedness, administrative demands, rigid schedules, and resource scarcity impede consistent formative assessment (Tan and Leong, 2022; Verceles et al., 2021; Cordial, 2025a). Despite these barriers, teachers maintained structured assessment routines that facilitated diagnostic teaching and instructional alignment (Black and Wiliam, 2023; Andrade et al., 2022; Heritage, 2021). To

strengthen long-term RMA effectiveness, schools must address learner preparedness, reconsider workload structures, provide flexible scheduling, and ensure the availability of assessment resources while supporting collaborative and data-driven instructional planning.

Teachers also perceived the RMA as highly effective (GWM = 3.51), especially in fostering real-life application of mathematical skills (3.56). This aligns with literature emphasizing that formative assessments support conceptual understanding, problem-solving, and real-world application (Black and Wiliam, 2023; Panadero et al., 2023; Wylie and Lyon, 2021). Through diagnostic feedback, RMA enables tailored instruction, supporting self-regulated learning and metacognitive development (Andrade et al., 2022; Heritage, 2021; Lee and Toh, 2022). The sustained effectiveness despite high workload and resource limitations demonstrates teachers' instructional adaptability (Tan and Leong, 2022; Cordial, 2025a). Continued professional development, resource provision, and learner-readiness support are necessary to maintain and amplify these benefits.

Correlational analysis further clarified these relationships. A strong positive correlation (r = 0.721) between implementation and challenges indicates that teachers who apply high-fidelity assessment practices experience greater workload and time pressure. This confirms earlier assertions that rigorous formative assessment often exposes structural constraints within schools (Tan and Leong, 2022; Verceles et al., 2021; Cordial, 2025a). Although formative assessments enhance diagnostic teaching and self-regulated learning (Black and Wiliam, 2023; Panadero et al., 2023; Andrade et al., 2022), their success depends on adequate system support. Schools should therefore improve workload management, ensure needed resources, and offer professional development that facilitates efficient assessment integration.

A significant positive relationship (r = 0.648) between RMA implementation and effectiveness reinforces that teachers who consistently design assessments, provide timely feedback, and align instruction achieve greater gains in students' mathematical skills. This aligns with core formative assessment findings (Black and Wiliam, 2023; Panadero et al., 2023; Andrade et al., 2022). However, earlier-noted contextual barriers may undermine long-term implementation (Tan and Leong, 2022; Cordial, 2025a). Schools must therefore support professional development, streamline scheduling, and provide adequate resources to sustain high-quality assessment practice.

Interestingly, the correlation between challenges and effectiveness was insignificant (r = 0.053), demonstrating that constraints such as time, workload, and resources do not markedly diminish RMA's instructional impact. This supports literature showing that teacher resilience, adaptability, and competence mitigate contextual barriers (Tan and Leong, 2022; Cordial, 2025a). When RMA is implemented with structured design, feedback, and alignment, it continues to enhance mathematical proficiency and problem-solving despite operational difficulties (Black and Wiliam, 2023; Andrade et al., 2022; Lee and Toh, 2022). Thus, the quality and consistency of implementation remain more influential than the severity of challenges encountered. Schools should therefore foster professional development, provide flexible resource solutions, and encourage collaborative problem-solving to maximize RMA's formative benefits.

These converging findings inform the development of the Strategic Intervention Plan (SIP). Consistent with global evidence that structured formative assessment improves mathematics outcomes (Black and Wiliam, 2023; Panadero et al., 2023), the SIP focuses on system-level reforms rather than teacher-level remediation. Key interventions include standardizing assessment procedures, intensifying professional development on feedback and remediation, providing resources (addressing the 3.35 GWM), and institutionalizing collaborative lesson planning. These address the administrative burdens

associated with the r = 0.721 correlation while reinforcing the assessment quality linked to the r = 0.648 effectiveness correlation. Sustained monitoring, continuous capacity building, and alignment with curriculum standards will further strengthen engagement and proficiency (Wylie and Lyon, 2021; DarlingHammond and Flook, 2021). This data-driven, system-focused approach supports a culture of evidence-based, equitable mathematics instruction.

Overall, the study presents a paradox: teachers maintain exceptionally high implementation fidelity (GWM = 3.62) that simultaneously generates operational pressures (r = 0.721) while ensuring high instructional impact (r = 0.648). The insignificant role of challenges (r = 0.053) confirms that teacher resilience and structured formative processes remain strong determinants of success. Thus, the SIP is essential not to improve teacher capacity—which is already strong—but to reduce systemic friction so that high-quality formative practice can be sustained and institutionalized across the district.

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