Mathematics Performance and Its Determinants among Intermediate Learners

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ABSTRACT

This study assessed mathematics performance and selected learner-, classroom-, and home-related determinants among 195 intermediate learners at Cogon Elementary School, Dumanjug, Cebu, during School Year 2026–2027. A quantitative descriptive-correlational design was used. Participants comprised 62 Grade 4, 76 Grade 5, and 57 Grade 6 learners. Data came from a respondent information sheet, a researcher-developed competency test, and a five-point questionnaire measuring attitude toward Mathematics, perceived teaching methods and instructional strategies, and parents' support. Frequencies, percentages, mean percentage scores (MPS), means, standard deviations, and Pearson correlations were analyzed at $\alpha = .05$. Every retained competency fell below the 75% proficiency threshold. Grade 4 results were particularly low in contextualized fundamental-operation problems (MPS = 4.84) and MDAS (8.39); Grade 5 performed best in decimal division (68.95), while Grade 6 obtained 41.40 in percentage–rate–base and 32.98 in applied percent problems. Learners generally reported favorable attitudes, supportive instruction, and parental support. Mathematics performance was not significantly related to attitude ($r = .054$, $p = .450$) or parents' support ($r = .063$, $p = .381$), while perceived teaching strategies showed a statistically significant but very weak positive association with performance ($r = .146$, $p = .040$). A multiple linear regression analysis is currently being processed to determine the strongest predictor of performance. Findings informed Mathematics Enhancement Learning Activities (MELA) with instructional time weighted toward the most serious competency gaps.

Keywords: Mathematics Performance; Intermediate Learners; Competency Gaps; Teaching Strategies; Parental Support; Enhancement Learning Activities

Article Highlights

- All eight retained grade-level competencies were below the 75% performance standard.
- Teaching strategies were significantly—but only very weakly—associated with test performance.
- MELA uses data-weighted session allocation: Grade 4 concentrates most time on contextualized operations and MDAS, while Grade 6 is organized entirely around percentage–rate–base logic and its applications.

INTRODUCTION

Mathematics enables learners to reason quantitatively, interpret information, solve practical problems, and participate in increasingly data-driven social and economic life. Yet international evidence continues to show that many learners struggle to transfer procedures to unfamiliar tasks. PISA 2022 reported that 31% of students across OECD countries did not reach baseline mathematics proficiency; in the Philippines, only 16% reached at least Level 2 and the national mean was 355 compared with the OECD mean of 472 (OECD, 2023). Although PISA assesses 15-year-olds, the result signals the importance of strengthening the numerical foundations built during the intermediate elementary years.

The intermediate grades are a consequential transition. Learners move from basic number facts toward multi-step operations, decimals, ratios, proportional reasoning, percentages, and contextualized problem

solving. These competencies are hierarchical: weaknesses in foundational numeracy can constrain later performance in more complex tasks (Xu et al., 2023). Procedural fluency and conceptual understanding must therefore be developed together. When learners can execute an algorithm but cannot represent a situation, select an operation, or evaluate the reasonableness of an answer, performance remains fragile.

The challenge is not solely cognitive. Achievement reflects an interaction of instructional opportunity, learner engagement, family resources, prior knowledge, and the quality of feedback. A decade review of mathematical literacy research similarly identifies interacting learner, school, family, and contextual influences (Kappassova et al., 2025). Socioeconomic conditions can influence access to books, devices, connectivity, study space, and adult assistance (Finch & Finch, 2022; Li, 2025). Parental expectations and involvement can also support achievement, but their effects depend on the form, consistency, and developmental appropriateness of the support (Li et al., 2024). Likewise, supportive teaching can strengthen engagement and reduce avoidance, but favorable perceptions of teaching do not guarantee mastery without adequate task alignment and sustained practice.

This study addressed the problem at Cogon Elementary School in Dumanjug, Cebu. Rather than reporting only quarterly grades, it examined performance at the competency and item levels. The assessment covered multi-digit division, contextualized fundamental operations, MDAS, decimal problem solving, decimal division, equivalent ratios, percentage–rate–base, and applied percent problems. The study also described the learners' home learning context and measured three proposed determinants: attitude toward Mathematics, perceived teaching methods and instructional strategies, and parents' support.

The technical value of the study lies in connecting diagnosis with a usable school response. The resulting Mathematics Enhancement Learning Activities (MELA) were not designed as generic enrichment. Each activity corresponds to a verified competency gap, uses a short pre-check and exit task, and specifies a reteaching decision rule. This evidence-to-action orientation is essential because a positive classroom climate or high self-reported support can coexist with low objective performance.

RELATED LITERATURE AND ANALYTICAL FRAMEWORK

Recent mathematics education research supports three closely connected propositions. First, performance is cumulative. More complex mathematical skills depend on earlier numerical competencies, and persistent foundational gaps can restrict later learning (Xu et al., 2023). Second, conceptual understanding and procedural fluency should be coordinated. Learners need to know how an algorithm works, why it is appropriate, and how to represent the quantities in a problem. Evidence from elementary mathematics instruction indicates that explicit attention to reasoning and representation can make procedures more meaningful and transferable (Keazer & Phaiah, 2023; Sari et al., 2024). Third, error patterns provide actionable information. Incorrect responses are not merely deficits; they reveal whether learners misread relationships, selected the wrong operation, misapplied place value, or lost track of a multi-step sequence (Lin & Riccomini, 2025).

Attitude remains educationally important because confidence, interest, persistence, and perceived usefulness influence learners' willingness to engage. However, attitude and achievement are not interchangeable. Positive beliefs may support sustained effort but cannot substitute for instruction, prerequisite knowledge, or practice. Similarly, the home environment may enable learning through encouragement, materials, routines, and communication with teachers. Its influence is likely to be indirect and shaped by income, parental education, available time, and the accessibility of school tasks.

The study's analytical pathway treats home context as descriptive background, the three perception constructs as potential correlates, competency scores as objective outcomes, and MELA as the response to observed gaps. The pathway is consistent with self-efficacy principles, sociocultural scaffolding, and constructivist learning: learners benefit from achievable success, guided participation, visual and concrete representations, collaborative explanation, and the gradual removal of support. These principles inform intervention design but do not convert the correlational study into a causal test.

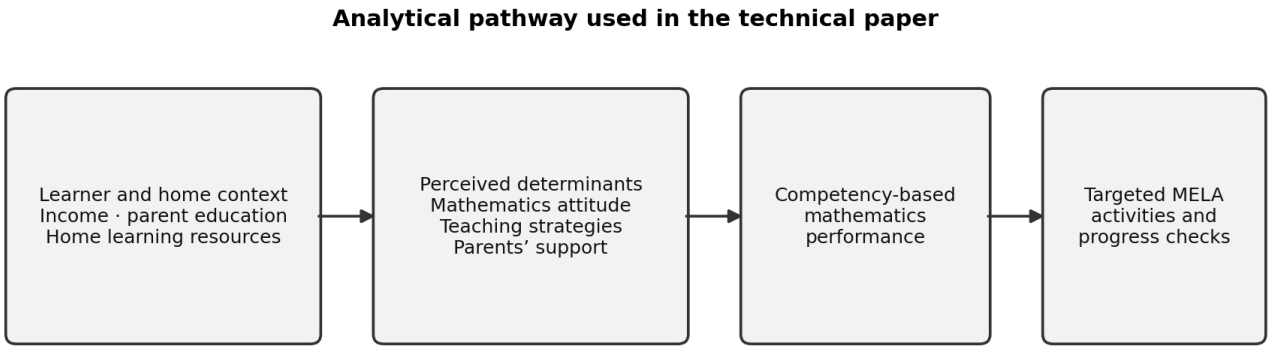


Figure 1. Analytical pathway connecting context, perceived determinants, performance, and the proposed instructional response.

The framework deliberately separates perception measures from performance measures. Learners may strongly agree that instruction is clear or that parents are supportive while still making frequent errors on specific tasks. Conversely, a small correlation does not mean the construct is unimportant; it means that linear covariation within this sample was limited. Interpretation therefore requires triangulation of the performance profile, item-level errors, descriptive context, and association tests.

Purpose and Methodology

The study aimed to assess the mathematics performance and selected determinants of intermediate learners and use the findings to construct grade-level enhancement activities. Specifically, it sought to: (1) describe parents' combined monthly income, parents' educational attainment, and learning resources at home; (2) determine performance in eight retained least-learned competencies across Grades 4–6; (3) describe learners' agreement regarding attitude, teaching methods and instructional strategies, and parents' support; (4) test the bivariate relationships of the three perception constructs with mathematics performance and examine their joint and relative contributions through multiple linear regression; and (5) develop competency-based learning activities.

Research design

A quantitative descriptive-correlational design was employed, with supplementary multiple linear regression. Descriptive analysis profiled the home learning context, competency scores, and perception ratings. Correlational analysis estimated the direction, magnitude, and significance of the relationships between mathematics performance and each perception construct. The multiple regression component is intended to examine the joint and relative contributions of attitude, perceived teaching methods and instructional strategies, and parents' support. No treatment was imposed, no learner was assigned to an experimental condition, and no causal inference was made.

Locale and participants

The study was conducted at Cogon Elementary School, Dumanjug District, Cebu, during School Year 2026–2027. The participants were 195 intermediate learners: 62 in Grade 4, 76 in Grade 5, and 57 in Grade 6. The manuscript treated the enrolled intermediate learners as the study group. Grade representation was 31.79%, 38.97%, and 29.23%, respectively.

Instruments

Three instruments were used. A respondent information sheet recorded parents' combined income, the

educational attainment of the mother and father, and home learning resources. A researcher-developed performance test measured the retained grade-level competencies. Grade 4 and Grade 5 each answered 15 items distributed across three competencies; Grade 6 answered 10 retained items across two competencies. Correct responses received one point and incorrect or blank responses received zero. A researcher-adapted five-point questionnaire measured attitude toward Mathematics, perceived teaching methods and instructional strategies, and parents' support. Experts reviewed the instruments for relevance, clarity, developmental appropriateness, and alignment.

The perception scale ranged from 5 (Strongly Agree) to 1 (Strongly Disagree). Means of 4.20–5.00 were interpreted as Strongly Agree, 3.40–4.19 as Agree, 2.60–3.39 as Neutral, 1.80–2.59 as Disagree, and 1.00–1.79 as Strongly Disagree. The questionnaire results are interpreted as agreement scores; internal-consistency coefficients were not available in the dataset used for this paper and should be established in subsequent administrations.

Ethical Procedures

The researcher obtained school-system permission, coordinated administration with the school head and class advisers, explained the study and confidentiality protections, and observed informed consent and learner assent procedures appropriate for minors. Standard directions were used, and procedural questions were clarified without coaching answers.

Data Treatment and Sample Profile

Frequencies and percentages summarized the home profile. Multiple-response percentages for home resources used the grade-level or overall sample as denominator and were not expected to total 100%. Competency mean percentage score was computed as total correct responses divided by the product of the number of learners and number of items, multiplied by 100. The Department of Education (2015) performance descriptors used in the manuscript classified 90–100% as Outstanding, 85–89% as Very Satisfactory, 80–84% as Satisfactory, 75–79% as Fairly Satisfactory, and below 75% as Did Not Meet Expectations.

Means and standard deviations summarized perception items, while construct composite means summarized overall agreement. Pearson's product–moment correlation tested the relationship between percentage performance and each construct at $\alpha = .05$. Direction, magnitude, and statistical significance were interpreted separately. Because grade-level tests contained different content and lengths, raw scores were converted to percentages before the pooled correlations were computed.

A multiple linear regression analysis is currently being processed to determine the strongest predictor of performance among attitude toward Mathematics, perceived teaching methods and instructional strategies, and parents' support. Model reporting will include the overall F test, R^2 and adjusted R^2, unstandardized and standardized coefficients, and diagnostic checks for linearity, residual normality, homoscedasticity, independence, influential observations, and multicollinearity.

Table 1. Distribution of participants and performance-test structure

Grade	n	%	Competencies assessed	Items
4	62	31.79	Multi-digit division; contextualized operations; MDAS	15
5	76	38.97	Decimal problems; decimal division; equivalent ratios	15

Grade	n	%	Competencies assessed	Items
6	57	29.23	Percentage–rate–base; applied percent problems	10
Total	195	100.00	Eight retained competencies	40 grade-specific items

The assessment design was diagnostic rather than vertically equated. Consequently, grade-level MPS values indicate mastery of the competencies tested at each level; they should not be interpreted as direct evidence that one grade is globally stronger than another. Item and competency results are most useful for identifying the content, representations, and procedures requiring reteaching.

Analytical scope and data quality

- Reported frequencies, percentages, MPS values, composite means, and bivariate correlations were cross-checked against the final tables used in this paper.
- Grade 6 integer operations were not included because complete item-level results for that competency were not available in the final dataset used for analysis.
- The multiple regression analysis is in process; therefore, the current results section presents the completed descriptive and bivariate findings.
- The study remains single-school and cross-sectional and relies on a researcher-developed performance test and self-report questionnaire; findings are therefore interpreted within this school context.

Results

Home learning context

The participants largely came from households with constrained financial resources. Of 195 learners, 118 (60.51%) reported combined monthly parental income of ₱10,957 or below, and 53 (27.18%) reported ₱10,958–₱21,914. Only four households (2.05%) were in the two highest brackets combined. These data do not establish that income caused low performance, but they indicate that intervention materials should not depend on paid tutoring, continuous internet access, or specialized equipment.

High school graduate was the largest attainment category for both mothers (n = 50) and fathers (n = 64). Thirty-nine mothers and 49 fathers were college graduates; only three mothers and five fathers had postgraduate education. This diversity supports parent materials that use plain language, worked examples, and clear prompts rather than requiring adults to reconstruct formal methods independently.

Table 2. Selected indicators of the home learning context (N = 195)

Indicator	f	%	Instructional implication
Income ≤ ₱10,957	118	60.51	Prioritize no-cost and printable tasks
Income ₱10,958–₱21,914	53	27.18	Avoid resource-intensive homework
Mother: high school graduate	50	25.64	Use plain-language parent guides
Father: high school graduate	64	32.82	Provide one worked example per task
Smartphone available	130	66.67	Offer optional mobile—not mobile-only—extensions
Internet connection	104	53.33	Keep an offline equivalent for every activity

Textbooks	88	45.13	Supply school-created reference sheets
Notebook/practice sheets	105	53.85	Provide reusable practice formats
Quiet study area	46	23.59	Schedule supported practice at school
Dictionary	20	10.26	Preteach vocabulary in word problems

Smartphones were the most common resource (66.67%), followed by calculators (54.87%), notebooks or practice sheets (53.85%), and internet access (53.33%). However, only 45.13% reported textbooks, 37.95% a study table, and 23.59% a quiet study area. The pattern suggests partial digital access but uneven conditions for sustained independent study. A smartphone can extend access, yet shared devices, data costs, and distractions may limit its instructional value. MELA therefore includes printed and face-to-face options, with mobile resources treated as optional reinforcement.

Competency-Level Mathematics Performance

All eight retained competencies were below the 75% threshold. Grade 4 displayed the most severe gaps: multi-digit division reached an MPS of 20.00, contextualized fundamental-operation problems 4.84, and MDAS 8.39. Grade 5 obtained 48.42 in decimal problem solving, 68.95 in decimal division, and 59.21 in equivalent ratios. Grade 6 obtained 41.40 in percentage–rate–base and 32.98 in applied percent problems.

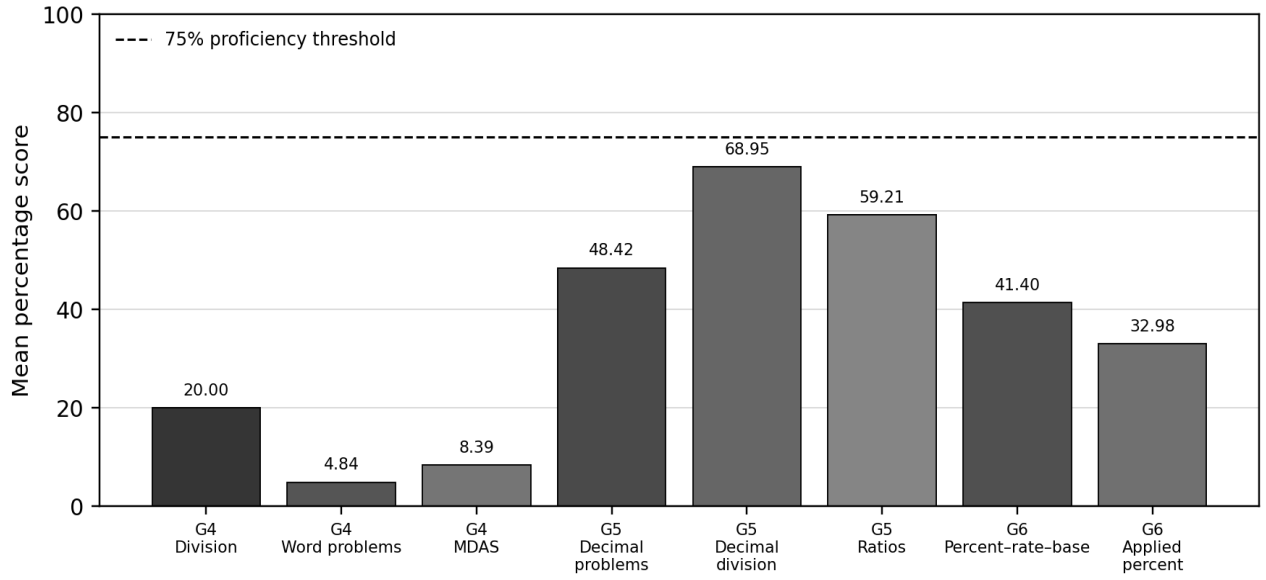


Figure 2. Mean percentage scores by retained competency. The dashed line marks the 75% standard.

Table 3. Competency performance and immediate instructional priority

Grade	Competency	MPS	Description	Priority response
4	Multi-digit division	20.00	DNME	Represent division; connect model to algorithm
4	Contextualized operations and money	4.84	DNME	Given–Asked–Operation–Equation–Answer

4	MDAS	8.39	DNME	Sequence operations; analyze first-error step
5	Decimal multi-operation problems	48.42	DNME	Estimate, choose operations, verify answers
5	Decimal division	68.95	DNME	Strengthen place value and inverse checks
5	Equivalent ratios	59.21	DNME	Use ratio tables and scale factors
6	Percentage, rate, and base	41.40	DNME	Link bar models, proportions, and equations
6	Applied percent problems	32.98	DNME	Identify original amount, change, and rate

Note. DNME = Did Not Meet Expectations. The results are criterion-referenced to the competencies assessed; they are not vertically scaled across grades.

Item-Level Diagnostic Findings

Grade 4

Only 9 of 62 Grade 4 learners answered 672 ÷ 16 correctly (14.52%), and performance across the five division items ranged from 14.52% to 22.58%. The narrow, uniformly low range points to a general difficulty rather than an isolated item. In contextualized operations, no learner correctly solved the task requiring the cost of two notebooks and three pencils followed by change from ₱200. The other items ranged from 3.23% to 9.68%. These results suggest difficulty translating text into an operation sequence, maintaining intermediate values, and monitoring whether the final answer fits the context.

MDAS performance was similarly weak. One item involving grouped addition followed by division reached 24.19%, but two expressions were answered correctly by only one learner each (1.61%). Reteaching should begin with expression structure and verbal reasoning—what must be done first and why—before increasing procedural speed. Worked-example comparison and first-error analysis are more diagnostic than repeated worksheets containing the same format.

Grade 5

Grade 5 performance was stronger but remained below standard. In decimal problem solving, a one-step equal-sharing item reached 77.63%, whereas a multi-step school-purchase problem requiring total cost and change reached only 18.42%. This contrast indicates that operation sequencing and integration, rather than decimal computation alone, created the larger barrier. Decimal-division items ranged from 61.84% to 75.00%, supporting focused consolidation through place-value models, estimation, and multiplication checks. Equivalent-ratio items ranged from 55.26% to 64.47%, suggesting an emerging but incomplete understanding of multiplicative relationships.

Grade 6

Grade 6 learners answered between 29.82% and 49.12% of the percentage–rate–base items correctly. Applied percent problems showed the sharpest item contrast: commission reached 56.14%, discount 54.39%, and percent decrease 45.61%, but percent increase received no correct response and simple interest only 8.77%. The zero response on percent increase is a high-priority signal. Learners must distinguish the amount of change from the original amount used as the denominator, while interest tasks require explicit identification of principal, rate, and time.

Cross-grade interpretation

Across grades, tasks became markedly harder when they required learners to coordinate language, representation, operation selection, and multiple steps. This pattern is consistent with the hierarchical nature of mathematical competence (Xu et al., 2023) and with research emphasizing proportional reasoning and representational flexibility (Sari et al., 2024). The findings justify an instructional sequence of concrete or visual representation, teacher think-aloud, guided practice, collaborative explanation, independent application, and immediate error-specific feedback.

Learners' Perceptions of Determinants

Learners generally expressed favorable views of Mathematics and their learning supports. Attitude composite means were 4.09 for Grade 4, 3.70 for Grade 5, and 3.74 for Grade 6, all interpreted as Agree. Grade 4 strongly agreed that they participated actively (M = 4.37), completed assignments on time (M = 4.44), and could improve their skills (M = 4.27). Grade 5 was neutral on studying Mathematics without being told (M = 3.36), while all other grade-level attitude means remained in the Agree range.

Perceived teaching methods and instructional strategies received the highest composite ratings: 4.44 in Grade 4 and 4.37 in Grade 5 (Strongly Agree), and 3.96 in Grade 6 (Agree). Clarity of explanation was the highest item in Grades 4 and 5 (4.81 and 4.67). Across all three grades, the item on lessons being engaging and interesting was the lowest or among the lowest (3.95, 3.92, and 3.63). The result identifies engagement as a practical improvement target without negating learners' broadly positive assessment of teacher support.

Parents' support was rated Strongly Agree in Grade 4 (4.45) and Agree in Grades 5 (4.18) and 6 (3.99). Encouragement and assignment reminders were consistently high. Parent–teacher communication was lowest in Grades 4 and 5 (3.98 and 3.66), while direct help with Mathematics was lowest in Grade 6 (3.75). This pattern is plausible as content becomes more specialized. Home support should therefore emphasize encouragement, routines, progress communication, and accessible worked examples rather than assuming that every adult can directly teach grade-level procedures.

Table 4. Composite perception ratings by grade level

Construct	Grade 4	Interpretation	Grade 5	Interpretation	Grade 6	Interpretation
Attitude toward Mathematics	4.09	Agree	3.70	Agree	3.74	Agree
Teaching methods and strategies	4.44	Strongly Agree	4.37	Strongly Agree	3.96	Agree
Parents' support	4.45	Strongly Agree	4.18	Agree	3.99	Agree

The contrast between favorable perceptions and low MPS values is central to the study. Agreement ratings describe learners' experiences and beliefs, not mastery. Social desirability, broad wording, restricted score variation, or a mismatch between perceived support and the specific demands of the test may partly explain the divergence. For decision-making, objective task performance and observed solution processes should therefore accompany perception surveys.

Relationships between Performance and Perceived Determinants

Pearson correlations showed that attitude toward Mathematics had a negligible positive and non-significant relationship with performance ($r = .054$, $p = .450$). Parents' support was also negligibly and non-

significantly related to performance (r = .063, p = .381). Perceived teaching strategies had a statistically significant but very weak positive association (r = .146, p = .040). The coefficient corresponds to approximately 2.1% shared variance when considered alone ($r^2 \approx .021$); statistical significance therefore should not be confused with practical strength.

Table 5. Bivariate relationships with mathematics performance (N = 195)

Perceived determinant	r	p	Decision at α = .05	Magnitude
Attitude toward Mathematics	.054	.450	Do not reject H_0	Negligible positive
Teaching methods and instructional strategies	.146	.040	Reject H_0	Very weak positive
Parents' support	.063	.381	Do not reject H_0	Negligible positive

The non-significant attitude result does not establish that attitude is irrelevant. It indicates only that learners with higher questionnaire scores did not consistently obtain higher test percentages in this sample. Attitude may operate through persistence, time on task, anxiety, or prior achievement and may require a more sensitive or multidimensional measure. Likewise, parental support may vary in quality: encouragement, monitoring, direct tutoring, and resource provision are different behaviors and may relate differently to performance.

The weak teaching-strategy coefficient is compatible with the view that instruction matters but is one element in a larger learning system. A learner's current score reflects accumulated prior learning, opportunity to practice, test alignment, language comprehension, attendance, feedback, and home conditions. The result justifies instructional improvement while cautioning against labeling teaching strategy as a strong predictor or sole cause.

DISCUSSION

Persistent Gaps in Foundational and Applied Competencies

No retained competency reached the 75% threshold. Grade 4 showed its most severe gaps in contextualized operations and money (MPS = 4.84) and MDAS (8.39), compared with 20.00 in multi-digit division. Accordingly, six of eight Grade 4 core sessions are assigned to contextualized operations and MDAS, with two sessions for division reinforcement. This emphasis reflects the hierarchical nature of mathematics learning, in which unresolved operational gaps can constrain later proportional reasoning (Xu et al., 2023).

Grade 5 remained below standard but showed a clearer priority order: decimal multi-operation problems (MPS = 48.42), equivalent ratios (59.21), and decimal division (68.95). Its six-session module therefore assigns three sessions to integrated decimal problem solving, two to ratios, and one to decimal-division consolidation.

Grade 6 difficulties converged on percentage–rate–base logic: the core competency averaged 41.40 and applied percent problems 32.98. All eight Grade 6 sessions therefore use the same part–base–rate structure—three sessions for conceptual foundations and five for discount, increase/decrease, commission, and simple interest—so applications remain anchored to the correct reference base (Sari et al., 2024).

From Favorable Perceptions to Demonstrable Learning

The perception results were positive, yet objective proficiency was low. This is not necessarily contradictory. A learner can feel encouraged, like a teacher's explanations, and still lack prerequisite knowledge or sufficient deliberate practice. Broad agreement items may also be less sensitive than an item-

level test. The finding supports a balanced evidence system: perception surveys can describe climate and support, but mastery decisions should use validated tasks, work samples, error patterns, and repeated progress checks.

The weak positive teaching-strategy correlation is statistically credible but practically small. Its value lies less in prediction than in direction: better perceived instructional practice accompanies slightly better performance. The result supports refining instruction around the observed errors—explicit modeling, multiple representations, guided-to-independent practice, feedback, and retrieval—while recognizing that prior achievement and contextual factors remain substantial.

The non-significant parental-support relationship should also be interpreted carefully. Support may protect motivation and attendance without immediately appearing in a short competency test. Moreover, direct homework help is only one form of involvement. For households with limited time, schooling, connectivity, or study space, feasible support may consist of setting a routine, asking the learner to explain a worked example, checking completion, and communicating with the teacher. Li et al. (2024) found that parental expectations can relate to achievement through involvement, underscoring the importance of mechanism and context.

Equity, Instruction, and School-Level Implications

The home profile gives the intervention an equity constraint. More than three fifths of respondents were in the lowest income bracket, nearly half lacked textbooks, about half lacked reported internet access, and fewer than one fourth had a quiet study area. These conditions do not determine ability, but they influence when, where, and with what resources learners can practice. A technically sound intervention must therefore work with pencil, paper, locally available objects, and teacher-guided time. Digital resources may supplement instruction, but a mobile-only design would exclude a substantial portion of learners.

The data also suggest that vocabulary and mathematical language deserve explicit attention. Only 10.26% reported a dictionary, and the largest performance declines appeared in word problems. Teachers can reduce avoidable language barriers by preteaching relational terms, highlighting units, converting statements into diagrams, and asking learners to restate the problem before computing. This does not simplify the mathematics; it makes the structure visible.

Instruction should be vertically coordinated. Grade-level teams need a shared map of prerequisite skills and common error codes. For example, division errors may be labeled as fact recall, place value, quotient estimation, regrouping, or checking; percent errors may be labeled as wrong base, rate conversion, operation choice, or failure to interpret the result. Every two weeks, teams can examine which error dominates and select the next representation or worked example accordingly.

Progress monitoring should be brief but consequential. A five-item pre-check establishes the immediate starting point. After an activity, a parallel five-item exit task determines whether a learner has reached at least 75%. Learners below the threshold receive a short reteaching cycle using a different representation, not simply the same worksheet. After six to eight weeks, a parallel assessment can estimate improvement. This design turns assessment into a feedback loop rather than an endpoint.

The study also has implications for professional learning. Teachers would benefit from collaborative item analysis, lesson study around high-error tasks, and moderated scoring of written solutions. The goal is to examine learners' reasoning, not to attribute low scores to effort alone. School leaders can support this process by protecting collaborative time, supplying reproducible materials, and monitoring whether intervention decisions actually follow the evidence.

For families, communication should be short, specific, and nonjudgmental. A weekly note can name one skill, show one worked example, and suggest one question an adult can ask: "How did you know which operation to use?" This approach respects different educational backgrounds while inviting meaningful

involvement. Parent feedback should focus on clarity, feasibility, and access rather than asking families to judge instructional effectiveness without evidence.

Finally, the term determinant should be used cautiously. In this cross-sectional study, attitude, perceived instruction, and parents' support are measured correlates, not established causes. Future research should use a validated instrument, longitudinal progress data, multilevel sampling, and experimental or quasi-experimental evaluation of MELA before making causal or predictive claims.

Mathematics Enhancement Learning Activities (MELA)

MELA weights instructional time according to the observed competency gaps. Grade 4 receives eight core sessions: three for contextualized operations and money, three for MDAS, and two for multi-digit division. Grade 5 receives six: three for decimal multi-operation problems, two for equivalent ratios, and one for decimal division. Grade 6 receives eight sessions entirely organized around percentage–rate–base logic, with three foundation sessions and five application sessions. Each session is designed for 50–60 minutes and can use low-cost printed materials, with optional mobile extensions when access permits.

Table 6. Grade-level MELA implementation matrix

Grade	Activity / allocation	Priority competency and MPS	Core learning process	Evidence/decision rule
4	Fair-Share Division Lab 2 sessions	Multi-digit division MPS = 20.00	Model equal groups; connect representation to algorithm; verify by multiplication	5-item exit task; reteach below 75%
4	Barangay Market Problem Trail 3 sessions	Contextualized operations and money MPS = 4.84	Use Given–Asked–Operation–Equation–Answer organizer across multi-step money	Contextualized solution, explanation, and reasonableness check

			problems	
4	Operation-Order Detective 3 sessions	MDAS MPS = 8.39	Use grouping symbols, left-to-right priority, and first-error analysis in worked examples	Correct 4 of 5 expressions and explain the first step
5	Decimal Market Mission 3 sessions	Decimal multi-operation problems MPS = 48.42	Estimate; map the operation sequence; compute; verify the answer in context	Problem organizer and reasonableness check
5	Place-Value Shift Lab 1 session	Decimal division MPS = 68.95	Consolidate place value and verify quotients by multiplication or estimation	Correct 4 of 5 quotients
5	Ratio Table Relay 2	Equivalent ratios MPS =	Use ratio tables and	Correct 4 of 5 missing

	sessions	59.21	double number lines; identify and explain scale factors	terms
6	Percent Logic Foundations 3 sessions	Percentage–rate–base logic MPS = 41.40	Represent part, base/whole, and rate using hundred grids, bar models, ratio tables, and equations	Identify the given and unknown quantities and solve 4 of 5
6	Percent Logic Applications 5 sessions	Percentage–rate–base logic in applications MPS = 32.98	Apply the same part–base–rate structure to discount, increase/decrease, commission, and simple interest	Correct reference base, rate, operation, and solution in 4 of 5

Implementation cycle

- Diagnose: administer a five-item pre-check and identify the dominant error pattern.
- Model: demonstrate the concept with a concrete, visual, or contextual representation and verbalize the reasoning.
- Guide: solve matched examples with prompts that gradually fade as learners gain control.
- Apply: use a locally meaningful problem requiring explanation, not answer production alone.
- Check: administer a parallel five-item exit task; 75% is the movement threshold.

- Reteach or extend: use a different representation for learners below threshold; provide transfer tasks for those at or above it.
- Review: grade-level teams analyze results every two weeks and conduct a parallel post-assessment after six to eight weeks.

Monitoring indicators

Implementation should track scheduled-session completion, attendance, pre-check and exit-task scores, dominant error codes, the percentage reaching 75%, and the six- to eight-week parallel assessment. Grade-level teams should review progress every two weeks and may redirect a reteaching session toward the lowest-performing error type while preserving Grade 6's common percentage–rate–base structure. Adaptations for language, accessibility, time, and resources should be logged.

CONCLUSIONS, RECOMMENDATIONS, AND LIMITATIONS

The study documented substantial mathematics learning gaps among intermediate learners at Cogon Elementary School. All eight retained competencies were below the 75% threshold. The most serious Grade 4 gaps were contextualized operations and MDAS, while Grade 6 difficulties converged on percentage–rate–base reasoning and its applications. Learners nevertheless reported generally favorable attitudes, supportive teaching, and parental support. These positive perceptions did not automatically correspond to mastery.

Among the three perception constructs, only teaching methods and instructional strategies had a statistically significant relationship with mathematics performance, and the association was very weak. Attitude and parents' support were not significantly related to test scores. The findings support instructional refinement but do not justify causal language or a claim that one variable predicts performance strongly.

Recommendations

- Implement MELA for six to eight weeks, using the common pre-check, exit-task, reteaching, and post-assessment cycle.
- Allocate MELA time by observed need: Grade 4—three sessions each for contextualized operations and MDAS and two for division; Grade 5—three for decimal multi-operation problems, two for ratios, and one for decimal division; Grade 6—all eight sessions around percentage–rate–base logic from foundations to applications.
- Use printed, low-cost materials as the default and provide digital extensions only when an offline equivalent exists.
- Strengthen parent–teacher communication through brief progress notes, plain-language worked examples, and feasible home routines.
- Complete the multiple linear regression analysis using the cleaned learner-level dataset and report the strongest adjusted contribution only after model assumptions and diagnostics have been satisfied.
- Evaluate MELA with a pretest–posttest design and, where feasible, a comparison group before attributing gains to the intervention.

Limitations

The study involved one school and a cross-sectional correlational design. The researcher-developed grade-specific tests were converted to percentages but were not vertically equated, while perception measures were self-reported and lacked internal-consistency coefficients in the available dataset. Pooled correlations may also reflect grade-level differences and restricted variance. Multiple linear regression is still being processed, so the strongest predictor is not yet identified. These limitations restrict generalization and preclude causal inference.

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