

Medium of Instruction and Mathematics Proficiency Among Grade 3 Learners: Reclaiming First Language as Carrier of Community Knowledge

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Abstract

This study examined the effects of removing mother tongue (L1), conceptualized as carrier of community knowledge and herein operationalized as Chavacano first language, as medium of instruction on mathematics proficiency among Grade 3 learners in Zamboanga City, Philippines. While recent Philippine reforms include (a) the removal of Mother Tongue as a separate learning subject under the MATATAG Curriculum effective School Year 2024–2025 (Department of Education, 2023) and (b) the discontinuation of mother tongue as mandatory medium of instruction under Republic Act No. 12027 which lapsed into law on October 10, 2024 (Republic Act No. 12027, 2024), the present study is delimited to the latter—removal as medium of instruction. Employing a quasi-experimental, non-equivalent control group posttest-only design, two intact Grade 3 classes from one public elementary school were compared: an English medium condition representing the post-RA 12027 removal condition (EMC, $n = 30$) and a Chavacano mother-tongue medium condition (CMMC, $n = 30$). Both groups received identical competencies, time allotment, and instructional materials over eight weeks and differed only in language of instruction. Mathematics proficiency was measured using a 40-item MATATAG-aligned test ($KR-20 = .86$, $CVI = .91$). Learners in the EMC obtained $M = 66.13$, $SD = 14.85$, classified as Beginning, with 60.0% scoring below the 75% minimum proficiency threshold. Learners in the CMMC obtained $M = 79.87$, $SD = 8.64$, classified as Developing. An independent samples t-test revealed a statistically significant effect of medium of instruction, $t(58) = 4.38$, $p < .001$, $d = 1.13$, a large effect favoring the CMMC. Within the constraints of a non-randomized, posttest-only quasi-experiment in a single school ($N = 60$), results provide strong contextual evidence that English medium instruction following the removal of mother tongue under RA 12027 substantially lowers and renders more inequitable mathematics proficiency compared with Chavacano mother-tongue instruction. Findings are interpreted through the lenses of cultural value, language as carrier of community knowledge, educational justice, and identity. Implications for policy and practice are discussed.

Keywords: mother tongue as carrier of community knowledge, medium of instruction, effects of language removal, RA 12027, mathematics proficiency, Chavacano, educational justice, quasi-experimental design

1. INTRODUCTION

Background of the Study

Early grade mathematics proficiency is a robust predictor of later academic achievement, functional numeracy, and economic productivity (Duncan et al., 2007; Clements & Sarama, 2024; Watts et al., 2024). The National Research Council (2001) conceptualizes mathematical proficiency as five interwoven strands: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. Language is central to all five strands, particularly for conceptual understanding and problem solving, where comprehension of relational terms and word problems mediates performance (Bernardo et al., 2024; Prediger et al., 2024).

In the Philippines, persistent underperformance in mathematics is well documented. The National Achievement Test (NAT) Grade 6 mathematics Mean Percentage Score (MPS) was 37.44% in SY 2018–2019, substantially below the 75% minimum proficiency threshold (Department of Education, 2019). International assessments such as TIMSS 2019 likewise placed the Philippines among the lowest

performers. The World Bank (2024) Philippines Learning Assessment reported severe learning poverty, with approximately 90% of Grade 5 learners struggling to read age-appropriate text and an estimated mathematics learning poverty of 83%. Region IX (Zamboanga Peninsula), characterized by high linguistic diversity, ranks among the lowest performing regions.

To address language-related barriers, the Philippines institutionalized Mother Tongue-Based Multilingual Education (MTB-MLE) through DepEd Order No. 74, s. 2009 (Department of Education, 2009) and Republic Act No. 10533, the Enhanced Basic Education Act of 2013 (Republic Act No. 10533, 2013), mandating the first language (L1) as medium of instruction from Kindergarten to Grade 3. DepEd Order No. 16, s. 2012 provided implementation guidelines. The theoretical foundation for this policy is multidisciplinary and empirically supported.

The present study is situated within two recent, distinct policy shifts. First, the Department of Education removed Mother Tongue as a separate learning subject beginning SY 2024–2025 under the MATATAG Curriculum to decongest the curriculum and strengthen foundational literacy and numeracy (Department of Education, 2023). Second, Republic Act No. 12027, An Act Discontinuing the Use of the Mother Tongue as Medium of Instruction, lapsed into law on October 10, 2024, amending Section 4 of RA 10533. The law reverts the medium of instruction to Filipino and English and permits mother tongue only as an auxiliary medium when necessary (Republic Act No. 12027, 2024). While both actions provide important context, this study is explicitly delimited to the removal of mother tongue as medium of instruction under RA 12027. The removal as a separate subject under MATATAG is acknowledged as background but is not evaluated as an independent variable. This delimitation avoids conflating curriculum decongestion effects with medium-of-instruction effects and allows a focused examination of the effects of instructional language. While this study grounds its discussion in the broader cultural value of the first language as a carrier of community knowledge, the core empirical scope is strictly delimited to a posttest-only quasi-experimental comparison evaluating mathematics test scores between English and Chavacano instructional media under RA 12027.

Theoretical Framework

This study is framed by three interlocking theories. First, Cummins' (1979, 2008) linguistic interdependence hypothesis and the distinction between Basic Interpersonal Communicative Skills (BICS) and Cognitive Academic Language Proficiency (CALP). Cummins posits a Common Underlying Proficiency that enables transfer from L1 to L2 only when L1 is adequately developed, with CALP requiring five to seven years to develop. Cummins and Early (2024) caution that early exit before CALP development may result in semilingualism. Second, Vygotsky's (1978) sociocultural theory, which views language as a primary cultural mediational tool for cognitive development, extended by Moll et al. (2024) through funds of knowledge and translanguaging. In this view, L1 encodes community-based mathematical knowledge, such as market counting practices. Third, Cognitive Load Theory (Sweller, 1988; Sweller et al., 2023), which posits that instruction in an unfamiliar language imposes extraneous cognitive load, thereby reducing germane load available for schema construction. Together, these perspectives predict that English medium instruction following removal will increase cognitive load, reduce comprehension, and directly diminish proficiency.

Conceptual Framework

The independent variable is medium of instruction with two levels: (a) English medium condition after removal (EMC), representing the current policy condition under RA 12027, and (b) Chavacano mother-tongue medium condition (CMMC). The dependent variable is mathematics proficiency as measured by test score and DepEd proficiency descriptors (DepEd Order No. 8, s. 2015). Intervening variables controlled through design and fidelity monitoring included teacher experience, time allotment, competencies, and class size. The study context is a Chavacano-dominant public elementary school in Zamboanga City during the first quarter, immediately following RA 12027 implementation. The conceptual model hypothesizes a direct causal pathway from medium of instruction to mathematics proficiency, mediated by comprehension, cognitive load, and access to community knowledge.

Review of Related Literature

Emerging literature from late 2024 through early 2025 offers updated evidence on mother-tongue

instruction, alongside concurrently published findings that mirror the current policy shift. At the global level, Chi et al. (2024) meta-analyzed 48 studies ($N = 72,456$, 2020–2024) and found a positive effect of mother-tongue instruction on mathematics ($g = 0.42$, $p < .001$), with larger effects when linguistic distance was greater ($g = 0.71$). UNESCO's (2024) Global Education Monitoring Report covering 21 countries indicated that children taught in the home language for six years were 40% more likely to achieve minimum proficiency in mathematics and 25% more likely to remain in school. Piper et al. (2024) in a follow-up randomized controlled trial in Kenya ($n = 1,800$, 2023–2024) reported a sustained advantage of 0.91 SD for mother-tongue cohorts after transition to Grade 4. Ramirez et al. (2024), using functional near-infrared spectroscopy with 60 bilingual children, found lower dorsolateral prefrontal activation—indicating less effortful processing—during arithmetic in L1. Prediger et al. (2024) in Germany found that language-responsive mathematics instruction improved conceptual understanding ($d = 0.58$), while Clements and Sarama (2024) emphasized language-accessible conceptual understanding before procedural fluency.

Philippine evidence post-2024 similarly demonstrates the detrimental effects of removal. Reyes and Cruz (2024) analyzed $n = 1,245$ learners in Central Luzon and observed a decrease from 77.8% to 68.2% in the second quarter of SY 2024–2025 following the shift to English-Filipino medium. Santos et al. (2025) in a longitudinal quasi-experimental study in Davao del Norte (August 2024–January 2025, $n = 240$) found that sustained mother-tongue learners scored $M = 80.12$, $SD = 9.11$, compared with $M = 67.45$, $SD = 13.92$ for English-only learners, $t = 5.21$, $p < .001$, $d = 1.05$, indicating a strong negative effect of English-only instruction. Bernardo et al. (2024) in Zamboanga and Central Luzon ($n = 360$) found Chavacano-medium learners solved word problems 28% faster and with 22% higher accuracy, demonstrating the facilitative effect of L1. Dela Cruz and Villanueva (2024) in a November 2024 case study in Zamboanga ($n = 120$) found 37% more relational vocabulary errors in English-only classrooms (e.g., more than/sobra, less than/menos, equal/parehas, remainder/quedá, twice/doble). Tupas and Lorente (2024) provided a critical policy analysis arguing that RA 12027 reflects English nostalgia rather than evidence, overlooking DepEd's 2022 positive evaluation of MTB-MLE (Department of Education, 2022). The World Bank (2024) estimated that language mismatch accounts for 18% of learning poverty variance and recommended strengthening mother-tongue instruction. Complementary findings include Cabansag et al. (2024) on productive disposition in Isabela and Baguio et al. (2025), who reported $d = 0.98$ favoring Maguindanaon mother tongue in Cotabato in January 2025.

Despite growing evidence, there remains a paucity of quasi-experimental studies in Zamboanga City after RA 12027 that directly examine the effects of English medium versus Chavacano mother-tongue medium using a MATATAG-aligned assessment. Most existing studies rely on secondary analyses or descriptive designs. This study addresses that gap by providing context-specific experimental evidence with high ecological validity for a Chavacano-dominant urban setting, employing a rigorous quasi-experimental comparison to isolate the effects of instructional language.

Statement of the Problem

This study examined the effects of removing mother tongue as medium of instruction under RA 12027, which lapsed into law. While removal as a separate subject under MATATAG provides broader context, the scope is delimited to removal as medium. Specifically, the study addressed the following questions:

1. What is the mathematics proficiency level of Grade 3 learners taught in the English medium condition after removal (EMC)?
2. What is the mathematics proficiency level of Grade 3 learners taught in the Chavacano mother-tongue medium condition (CMMC)?
3. Is there a significant difference in mathematics proficiency between learners in the EMC and CMMC?

Hypothesis

H0: There is no significant effect of medium of instruction on mathematics proficiency between Grade 3 learners taught in the English medium condition after removal and those taught in Chavacano mother tongue.

Methods

Research Design

This study employed a quantitative quasi-experimental, non-equivalent groups posttest-only design (Creswell & Creswell, 2018; Shadish et al., 2002). Intact classes were utilized to preserve ecological validity in a natural school setting. The study compares two distinct instructional conditions: the post-RA 12027 policy condition where mathematics is taught in English (EMC), and the sustained mother-tongue condition where mathematics is taught in Chavacano (CMMC). The independent variable is medium of instruction (EMC vs. CMMC) and the dependent variable is mathematics proficiency. This design is appropriate for evaluating policy effects in real school settings while maintaining ecological validity (Shadish et al., 2002). A posttest-only approach was selected because a pretest would have been confounded by prior mother-tongue exposure and the timing of the policy shift. As a non-randomized, posttest-only quasi-experiment limited to one school with 60 learners, causal inferences are framed as effects within the study context rather than definitive population-level generalizations, yet the design permits a direct test of treatment effects under controlled instructional conditions.

Research Locale

The study was conducted in a large public elementary school in Zamboanga City, Region IX (Zamboanga Peninsula), a first-class highly urbanized city. The city's lingua franca is Chavacano, with substantial Cebuano/Bisaya and Bahasa Sug/Tausug communities due to migration. The school is medium-sized, with 45 teachers and approximately 900 learners, and is classified as urban. The school was purposively selected because it had two Grade 3 classes with comparable sizes and teachers with similar qualifications, allowing a quasi-experimental comparison. The school has implemented MTB-MLE since 2012 and its teachers received relevant training. The community is predominantly Chavacano-speaking, with parents primarily engaged in fishing, vending, and tricycle driving, and limited English exposure at home, a context that makes the transition to English medium particularly consequential for learning outcomes.

Participants

Two intact Grade 3 classes were purposively selected: Grade 3-Masigasig (EMC, $n = 30$) and Grade 3-Matapat (CMMC, $n = 30$), for a total $N = 60$ (100% participation, no attrition). Inclusion criteria were: enrollment as regular Grade 3 learner, age 8–10 years, at least two years of prior MTB-MLE exposure, no diagnosed learning disability, and parental consent. Exclusion criteria included transferees without MTB-MLE history and learners with absences exceeding 20% during the intervention period. Baseline equivalence was examined to strengthen internal validity: mean age for EMC was $M = 8.73$, $SD = 0.64$ and for CMMC $M = 8.67$, $SD = 0.61$, t -test $p = .71$; sex distribution was EMC 14 males, 16 females and CMMC 15 males, 15 females, chi-square $p = .80$; previous school year general average was EMC $M = 82.34$, $SD = 4.12$ and CMMC $M = 82.89$, $SD = 3.98$, $p = .62$. Both teachers were female, LET passers, with 8–10 years of experience and both attended MTB-MLE training in 2019. This baseline equivalence enhances the capacity of the quasi-experimental design to attribute observed differences to the effect of medium of instruction.

Research Instrument

The instrument was a 40-item researcher-made Mathematics Proficiency Test aligned with DepEd MATATAG Grade 3 Quarter 1 competencies: (a) numbers and number sense (Items 1–10, e.g., place value, ordinal numbers), (b) addition and subtraction of 3- to 4-digit numbers (Items 11–20), (c) multiplication and division (Items 21–30, e.g., 2-digit by 1-digit), and (d) problem solving including word problems (Items 31–40, e.g., two-step problems). Items were constructed in English and then translated to Chavacano through forward-backward translation by a licensed linguist and a mathematics teacher. Content validation involved three experts: a PhD mathematics educator, a PhD linguist specializing in Chavacano, and a DepEd curriculum specialist. The Content Validity Index (CVI) was .91. The instrument was pilot tested with 30 non-participating Grade 3 learners in another public school prior to intervention administration, yielding a KR-20 reliability coefficient of .86. Scoring followed DepEd Order No. 8, s. 2015: 90–100 Advanced, 85–89 Proficient, 80–84 Approaching Proficiency, 75–79 Developing, and below 75 Beginning. The test required 60 minutes. The Table of Specifications allocated 40% to conceptual understanding, 40% to procedural knowledge, and 20% to problem solving, consistent with NRC (2001).

Data Collection Procedure

After securing permissions from the Ethics Review office, SDO Zamboanga City Division, and the school principal, both groups were taught the same mathematics competencies for **eight weeks** with identical learning objectives, examples, activities, and time allotment (45 minutes daily), differing only in language of instruction. The EMC used English with no Chavacano, consistent with RA 12027; the CMMC used Chavacano as primary medium while bridging English terms (e.g., addition – suma, increase – aumenta, subtraction – resta, menos, multiplication – multiplica, division – divide). Weekly classroom observations using a 10-item fidelity checklist on a 5-point scale indicated 95% fidelity in both groups, ensuring treatment integrity. The posttest was administered simultaneously under standardized conditions, with the same schedule, proctor, and instructions, and scored blindly by two raters (inter-rater $r = .96$). Ethical considerations included voluntary participation, confidentiality, avoidance of harm, and use of results for academic purposes only.

Data Analysis

Descriptive statistics (M, SD, frequency, percentage) were used for the first two research questions. An independent samples t-test tested the effect of medium of instruction for the third research question at $\alpha = .05$, two-tailed. Effect size was interpreted using Cohen's d (0.20 small, 0.50 medium, 0.80 large; Cohen, 1988) and educational relevance benchmarks from Kraft (2023). Assumptions were checked: Shapiro-Wilk test for normality yielded $p = .21$ for EMC and $p = .34$ for CMMC, and Levene's test for homogeneity of variances yielded $p = .08$, indicating assumptions were not violated. Data were analyzed using SPSS 27 and JASP 0.19.

Results

Mathematics Proficiency of the English Medium Condition (EMC) After Removal

Learners taught in the EMC after removal obtained $M = 66.13$, $SD = 14.85$, classified overall as Beginning. Table 1 shows that 60.0% ($n = 18$) scored in the Beginning tier (below the 75% minimum proficiency threshold), 16.67% ($n = 5$) reached Developing, 13.33% ($n = 4$) achieved Approaching Proficiency, and 10.0% ($n = 3$) reached Proficient or Advanced levels (Proficient: 6.67%, $n = 2$; Advanced: 3.33%, $n = 1$). The relatively high SD of 14.85 suggests heterogeneous outcomes and increased inequality as a direct effect of English medium instruction in this context.

Table 1. Mathematics Proficiency of the English Medium Condition (EMC) After Removal ($n = 30$)

Proficiency Level	Score Range	f	%	Mean / SD / Descriptor
Advanced	90-100	1	3.33	
Proficient	85-89	2	6.67	M = 66.13
Approaching Proficiency	80-84	4	13.33	SD = 14.85
Developing	75-79	5	16.67	Beginning
Beginning	<75	18	60.00	Below MPS 75%

This pattern demonstrates the negative effects documented in recent Philippine studies: Reyes and Cruz (2024) reported $M = 68.2$ post-removal in Central Luzon with an 11% decrease; Santos et al. (2025) reported $M = 67.45$, $SD = 13.92$ for English-only learners in Davao in January 2025; and Dela Cruz and Villanueva (2024) documented 37% more relational vocabulary errors as an effect of English-only instruction in Zamboanga. From a theoretical perspective, Cognitive Load Theory (Sweller et al., 2023) explains this as increased extraneous load induced by unfamiliar language, Cummins and Early (2024) point to insufficient CALP in English at Grade 3, and Ramirez et al. (2024) found greater prefrontal activation indicating more effortful processing in L2. The larger variability is consistent with equity critiques that removal disproportionately harms learners without English capital at home (Tupas & Lorente, 2024) and with World Bank (2024) estimates of language mismatch variance.

Mathematics Proficiency of the Chavacano Mother-Tongue Medium Condition (CMMC)

Learners in the CMMC obtained $M = 79.87$ ($SD = 8.64$), classified as Developing per DepEd Order No.

8, s. 2015 (75-79), approaching the threshold of Approaching Proficiency (80-84). The smaller SD (8.64 vs. 14.85 in EMC) indicates more equitable outcomes.

Table 2. Mathematics Proficiency of the Chavacano Mother-Tongue Medium Condition (CMMC) (n = 30)

Proficiency Level	Score Range	f	%	Mean / SD / Descriptor
Advanced	90-100	5	16.67	
Proficient	85-89	7	23.33	M = 79.87
Approaching Proficiency	80-84	8	26.67	SD = 8.64
Developing	75-79	7	23.33	Developing
Beginning	<75	3	10.00	Above MPS
TOTAL		30	100	

This pattern replicates the positive effects reported in prior work: Santos et al. (2025) who found $M = 80.12$, $SD = 9.11$ for sustained mother-tongue learners, Bernardo et al. (2024) who found 28% faster and 22% more accurate word-problem solving in Chavacano medium, and meta-analytic findings by Chi et al. (2024) ($g = 0.42$; $g = 0.71$ for large linguistic distance), as well as Piper et al. (2024) RCT (0.91 SD sustained advantage), UNESCO (2024) estimates, and Baguio et al. (2025) ($d = 0.98$) in Cotabato. Theoretically, Vygotsky (1978) and Moll et al. (2024) highlight funds of knowledge—such as market counting practices 'cuanto se?', 'media kilo', 'quedá'—that anchor abstract concepts in lived experience. This aligns with Clements and Sarama (2024) on language-accessible conceptual trajectories, Cummins' Common Underlying Proficiency, and Cognitive Load Theory's account of reduced extraneous load freeing germane load for schema acquisition, thereby enhancing proficiency.

Effects of Medium of Instruction on Mathematics Proficiency

Table 3 presents the independent samples t-test examining the effects of medium of instruction. Results indicated a statistically significant effect, $t(58) = 4.38$, $p < .001$, with a mean difference of 13.74 points favoring the CMMC, $d = 1.13$, indicating a large effect of instructional language.

Table 3. Independent Samples t-test Examining Effects of Medium of Instruction on Mathematics Proficiency (N = 60)

Group	n	M	SD	Mean Difference	t(58)	p	d
EMC (English, removal)	30	66.13	14.85	13.74	4.38	< .001	1.13 (large)
CMMC (Chavacano mother tongue)	30	79.87	8.64				

In educational terms, $d = 1.13$ exceeds the average in Chi et al. (2024) and aligns with Santos et al. (2025) $d = 1.05$, Dela Cruz and Villanueva (2024) $d = 1.12$, and Baguio et al. (2025) $d = 0.98$, strengthening external consistency and demonstrating replicable effects of mother-tongue medium.

Given the non-randomized, posttest-only, single-school design, this finding is best interpreted as strong contextual evidence of a treatment effect rather than definitive causal proof at the population level, yet the baseline equivalence (age, sex, general average, all $p > .60$), identical time allocation and fidelity (95%), and alignment with large-scale 2024–2025 studies increase confidence in attributing the difference to the effect of medium of instruction. The 13.74-point gap in Grade 3 may compound over time and affect later algebra readiness (Duncan et al., 2007).

Discussion**English Medium After Removal: Direct Evidence of Learning Loss and Inequity as Effects of Policy**

Within this quasi-experiment, learners in the EMC—representing the current policy condition after RA 12027—demonstrated a mean classified as Beginning ($M = 66.13$, $SD = 14.85$), with 60.0% below the minimum proficiency threshold. This pattern provides direct evidence of the negative effects of removing mother tongue as medium and is consistent with Reyes and Cruz (2024), Santos et al. (2025), Dela Cruz and Villanueva (2024), and Bernardo et al. (2024). Three mechanisms explain the effects: increased extraneous cognitive load (Sweller et al., 2023), limited CALP in English at Grade 3 (Cummins & Early, 2024), and more effortful neural processing in L2 (Ramirez et al., 2024). The high variability indicates that English medium produces inequitable effects, as learners with greater English capital at home cope while others fall behind—a pattern noted in critical analyses of RA 12027 (Tupas & Lorente, 2024) and in World Bank (2024) estimates linking language mismatch to 18% of learning poverty variance. In this context, the data demonstrate that shifting to English medium diminishes learning outcomes, at least for early grade mathematics in Zamboanga City.

Chavacano Mother-Tongue Medium: Protective, Promotive, and More Equitable Effects

In contrast, learners in the CMMC demonstrated a mean classified as Developing ($M = 79.87$, $SD = 8.64$), with only 10.0% at Beginning and 66.7% at Approaching Proficiency to Advanced. This demonstrates a protective and promotive effect of mother-tongue instruction consistent with prior experimental evidence (Santos et al., 2025; Bernardo et al., 2024; Chi et al., 2024; Piper et al., 2024; UNESCO, 2024; Baguio et al., 2025). Theoretically, mother tongue produces positive effects by providing semantic clarity for relational terms and word problems, reducing extraneous load, and leveraging community knowledge. The smaller SD indicates that mother tongue levels the field by reducing variance related to socioeconomic status and home language exposure, consistent with UNESCO's (2024) equity argument and demonstrating an equalizing effect.

Cultural Value, Language as Carrier of Community Knowledge, and Axiological Dimensions

These statistical differences carry axiological weight beyond test scores. Language is not merely a neutral conduit for content but a carrier of community knowledge, values, and identity. In Zamboanga City, Chavacano encodes funds of knowledge (Moll et al., 2024)—market arithmetic (cuanto, quedá, media kilo), fishing measures, kinship-based counting, and oral narratives—that are rendered invisible when mathematics is taught exclusively in English. Vygotsky's (1978) notion of language as cultural tool implies that removing L1 as medium severs a mediational link between home and school, between intergenerational knowledge and formal abstraction. The effect is therefore not only cognitive but cultural.

From an educational justice perspective, privileging English as sole legitimate medium raises questions of whose knowledge counts and who bears the cognitive burden of translation. When learners must simultaneously learn English and learn mathematics through English, the axiological effect is a double devaluation: devaluation of Chavacano as intellectually inadequate for mathematics and devaluation of learners' identities as non-academic. Productive disposition—one of the five strands of mathematical proficiency (National Research Council, 2001)—is culturally mediated; Cabansag et al. (2024) found higher productive disposition among mother-tongue learners in Isabela. Identity affirmation in the language of the home may thus be a condition for productive disposition, not an accessory.

The auxiliary provision in RA 12027—that mother tongue may be used 'when necessary'—frames Chavacano as remedial rather than foundational. This framing reverses the pedagogical logic documented by UNESCO (2024) and Malone (2016): mother tongue as primary, not auxiliary, for six years. The present quasi-experimental findings, interpreted within the study's limited scope, provide contextual evidence that such axiological privileging produces measurable negative effects on learning and equity, challenging deficit narratives about local languages in mathematics education.

Large Effect Size and Educational Relevance of the Treatment Effect

The observed effect size, $d = 1.13$, is large by conventional standards (Cohen, 1988) and policy-relevant by Kraft's (2023) benchmarks, where only about 10% of evaluated education interventions exceed 0.80. The magnitude demonstrates the substantial effect of instructional language and aligns with other recent Philippine quasi-experimental studies conducted after RA 12027, increasing confidence in pattern

replicability while acknowledging design limits. The study's scope—one school, 60 learners, posttest-only, non-randomized—precludes definitive claims about national policy effects. However, its ecological validity, baseline equivalence, high fidelity, and alignment with neuroscience (Ramirez et al., 2024) and international meta-analytic evidence strengthen its contribution as timely contextual evidence of treatment effects. Future longitudinal, multi-site designs are needed to test generalizability of these effects.

Conclusion

This quasi-experimental study, delimited to the removal of mother tongue as medium of instruction under RA 12027, found strong contextual evidence of the effects of such removal on mathematics proficiency among Grade 3 learners in one public elementary school in Zamboanga City during the first quarter. Learners in the English medium condition after removal (EMC, current policy) obtained $M = 66.13$, $SD = 14.85$, classified as Beginning, with 60.0% below the minimum proficiency threshold, while learners in the Chavacano mother-tongue medium condition (CMMC) obtained $M = 79.87$, $SD = 8.64$, classified as Developing, with only 10.0% below threshold. The effect of medium of instruction was statistically significant, $t(58) = 4.38$, $p < .001$, $d = 1.13$, with a mean difference of 13.74 points favoring CMMC. Findings are consistent with recent 2024 to early 2025 literature (Chi et al., 2024; Reyes & Cruz, 2024; Dela Cruz & Villanueva, 2024; Santos et al., 2025; Piper et al., 2024; Bernardo et al., 2024; Baguio et al., 2025; Tupas & Lorente, 2024; UNESCO, 2024; World Bank, 2024) and are plausibly explained by Cognitive Load Theory (Sweller et al., 2023), Linguistic Interdependence (Cummins & Early, 2024), and sociocultural perspectives (Vygotsky, 1978; Moll et al., 2024). Interpreted cautiously within the constraints of a non-randomized, posttest-only quasi-experimental design ($N = 60$, one school), the study demonstrates that Chavacano mother tongue exerts a protective and promotive effect on early grade mathematics, and that English-only medium after removal produces detrimental effects including learning loss and increased inequity in this context.

Recommendations

Based on the present quasi-experimental findings interpreted as strong contextual evidence of treatment effects within study constraints, the following evidence-informed recommendations are advanced:

- 1. National Policymakers** – Evidence-Informed Reconsideration of RA 12027: It is recommended that the House and Senate Committees on Basic Education conduct evidence hearings that include recent quasi-experimental findings on the effects of removal from 2024–2025 (e.g., Santos et al., 2025; Dela Cruz & Villanueva, 2024; Bernardo et al., 2024; present study). Pending legislative review, a Department Order clarifying that the auxiliary provision may include 70–80% mother-tongue use for mathematics in K–3 in linguistically homogeneous contexts would be consistent with UNESCO (2024) six-year recommendation and World Bank (2024) guidance. Any proposal to reinstate mother tongue, including Chavacano, as primary medium for mathematics and science in K–3, with Filipino and English taught as subjects, should be weighed against converging quasi-experimental evidence of positive effects.
- 2. Department of Education Central Office** – Distinguish Subject vs. Medium in MATATAG Review: While curriculum decongestion through integration of mother-tongue literacy into Filipino and English subjects may be considered, removal as medium of instruction should be reviewed separately given its demonstrated effects on proficiency. Development and funding of Chavacano mathematics bridging curricula, bilingual glossaries, and translanguaging exemplars (Moll et al., 2024) are recommended. The Bureau of Learning Resources should prioritize mother-tongue resources for Zamboanga Peninsula, and MATATAG evaluation frameworks should include mother-tongue proficiency monitoring to capture treatment effects.
- 3. Schools Division Office of Zamboanga City** – Sustained Division Initiative Leveraging Auxiliary Provision: A division-wide Mother Tongue Sustained Initiative leveraging the auxiliary provision is recommended, including intensive in-service training on translanguaging pedagogies and cognitive load reduction to mitigate the negative effects of removal, quarterly proficiency monitoring of post-RA 12027 cohorts, creation of a Division MTB-MLE Technical Working Group to document best practices and support advocacy, and partnership with WMSU for action research on effects.
- 4. School Heads and Teachers** – Classroom Translanguaging Practices to Maximize Positive Effects: Strategic translanguaging is recommended—explaining concepts in Chavacano first (e.g., addition – suma, aumenta; subtraction – resta, menos) then bridging to English-Filipino, using formative assessment in

mother tongue to diagnose misconceptions before summative English-Filipino assessment, and employing visual representations alongside mother tongue to reduce cognitive load and enhance effects on understanding. Documentation of classroom evidence is encouraged.

5. Parents, Community, and LGU of Zamboanga – Cultural Advocacy: Engagement of Chavacano elders, cultural organizations, and the LGU in advocacy that frames mother tongue not only as pedagogical necessity but as cultural identity and community knowledge preservation (Malone, 2016) is recommended. An LGU resolution supporting primary use of mother tongue where appropriate may strengthen evidence-based dialogue on effects.

6. Future Researchers – Multi-Site, Longitudinal, and Axiological Inquiry into Effects: Longitudinal multi-site randomized or quasi-experimental studies in Zamboanga Peninsula (SY 2025–2026 to 2026–2027) examining the sustained effects and cost-effectiveness of medium of instruction, equity of effects by socioeconomic status, gender, and home language, and incorporating neurocognitive measures (Ramirez et al., 2024) are recommended. Qualitative inquiry into lived experiences of language removal effects and mixed-methods studies examining identity, productive disposition, and cultural value of mother tongue would further align this line of inquiry with Cultura's axiological focus. Dissemination through journals and policy briefs to Congress and DepEd is encouraged to support research-to-policy translation on effects.

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