

Influence of Socio-Demographic Profile, Language Proficiency, and Learning Experience on Mathematics Achievement among Indigenous Learners: A Systematic Review

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DOI: <https://doi.org/10.47772/IJRISS.2026.10100253>

Received: 22 January 2026; Accepted: 27 January 2026; Published: 02 February 2026

ABSTRACT

Mathematics achievement among Indigenous learners is influenced by three factors: socio-demographic background, language competency, and culturally relevant learning experiences. Socioeconomic hardship and Indigenous status are consistently associated with lower mathematical performance and widening achievement gaps. Language proficiency, particularly in the language of instruction, is a key predictor of performance; home language instruction and trilingual evaluations can assist bridge these gaps. Integrating Indigenous culture and knowledge into mathematics education, combined with culturally sensitive pedagogy, boosts Indigenous students' engagement, confidence, and accomplishment. These findings highlight the importance of comprehensive, culturally sensitive approaches to promoting equal mathematics outcomes for Indigenous students.

This study aims to synthesize existing literature on the effects of sociodemographic characteristics, language ability, and educational background on the academic performance of indigenous students in mathematics in the Philippines. The achievement of indigenous learners in mathematics in relation to demographic characteristics, language competency, and learning experiences was the subject of a systematic review of current quantitative, qualitative, and mixed-method research. Results consistently demonstrate that mothers' level of education, the language of teaching, and their command of English are important indicators of their children's success in mathematics. Peer support, motivation, and attitudes are also crucial. In very diverse language contexts, mother tongue-based instruction can have a mixed impact, sometimes negatively affecting on fundamental mathematical skills. There are still issues with teacher readiness and cultural pedagogy integration. The achievement of indigenous learners in mathematics is significantly influenced by their sociodemographic background, language skills, and educational experiences.

Keywords: (socio-demographic profile, language proficiency, learning experience, indigenous learners, mathematics achievement)

INTRODUCTION/BACKGROUND

Indigenous students' academic success in mathematics is influenced by a complex interaction between sociodemographic characteristics, language skills, and educational experiences. Understanding these factors is essential for tackling ongoing educational inequities in the Philippines, where ethnolinguistic diversity is widespread and many indigenous students come from underprivileged homes. By matching the language of instruction with students' native tongues, recent policy changes, such the introduction of mother tongue-based multilingual education, have attempted to strengthen foundational abilities. Nevertheless, research indicates that even when these strategies lessen linguistic distance, they might not necessarily improve students' performance in mathematics, particularly in environments with a high degree of diversity by M. G. Villaruz et al. (2020). Additionally, factors like mothers' educational attainment, attitudes toward mathematics, and peer support have been identified as significant contributors to academic performance by Rosemarie Fe M Lavador et al. (2024). This review seeks to synthesize current research on how socio-demographic profiles, language proficiency, and learning experiences collectively impact the mathematics achievement of indigenous learners in the Philippines,

to guide the development of more culturally responsive and effective strategies. This review provides critical insights for educators, policymakers, and curriculum developers seeking to design inclusive and effective educational frameworks for Indigenous learners in multilingual contexts.

METHODOLOGY

Using a descriptive-correlational methodology, this review synthesized results from mixed-method, quantitative, and qualitative studies that looked at the connections between indigenous learners' sociodemographic profile, language proficiency, learning experience, and mathematical achievement in the Philippines by M. G. Villaruz et al. (2020). The reviewed studies used achievement tests, survey questionnaires, and statistical analyses like ANOVA, t-tests, and correlation by M. G. Villaruz et al. (2020).

Visual Representation

Step	Description	Outcome
Identification	Database and manual search using keywords	Records identified
Screening	Remove duplicates, screen titles/abstracts	Records screened
Eligibility	Full-text review against inclusion/exclusion criteria	Eligible articles identified
Included	Quality assessment and data extraction	Articles included in the review

FIGURE 1 Flowchart summarizing the systematic review search and selection process.

Included studies focused on indigenous or Filipino learners, reported on mathematics achievement, and examined at least one of the following: socio-demographic factors, language proficiency, or learning experience. Studies were excluded if they did not address mathematics outcomes, were not conducted in the Philippine context, or lacked empirical data.

A systematic search was conducted using academic databases and relevant journals. The selection process involved screening titles and abstracts for relevance, followed by full-text review. Data extraction focused on study design, participant characteristics, variables measured, and key findings related to the research question.

Extracted data were analyzed using narrative synthesis, with emphasis on identifying patterns and relationships across studies. Quantitative results were summarized using descriptive statistics and correlation coefficients where available, while qualitative findings were thematically analyzed to highlight recurring factors influencing mathematics achievement by M. G. Villaruz et al. (2020).

Publishing Journal	Number of Articles
Labour Economics	1
Quantum Journal of Social Sciences and Humanities	1
AIDE Interdisciplinary Research Journal	1
American Journal of Arts and Human Science	1
International Journal of Educational Management and Development Studies	1

FIGURE 1 Count of reviewed articles by publishing journal.

RESULTS AND DISCUSSION

The review analyzed recent studies published between 2020 and 2025, covering diverse regions and indigenous groups in the Philippines. Research designs ranged from descriptive-correlational and mixed-methods to qualitative and phenomenological approaches, with sample sizes varying from small focus groups to nationally representative datasets. The articles were published in multidisciplinary, education, social science, and linguistics journals, reflecting a broad scholarly interest in indigenous learners' academic achievement, language proficiency, and educational experiences by J. Eduardo et al. (2021).

Three major themes emerged from the literature:

(1) Language Policy and Academic Achievement

Mother tongue-based multilingual education (MTB-MLE) policies were intended to improve foundational skills by reducing linguistic distance between home and school languages. However, evidence showed mixed or even negative effects on mathematics and reading achievement, particularly in highly diverse settings, suggesting that language policy alone may not address learning gaps by M. G. Villaruz et al. (2020). English and Filipino as mediums of instruction also presented challenges, with indigenous learners often demonstrating only moderate proficiency and facing difficulties in both language and content mastery by J. Eduardo et al. (2021).

(2) Socio-Demographic and Family Factors

Socio-demographic variables such as gender, parental education, and family income influenced academic outcomes. Girls tended to outperform boys in some contexts, and mothers' educational attainment was positively linked to early literacy and numeracy skills by M. G. Villaruz et al. (2020). However, many studies found that broader demographic factors (e.g., ethnicity, family structure) had limited direct impact on achievement, highlighting the complexity of educational disadvantage by M. G. Villaruz et al. (2020).

(3) Learning Experiences, Teacher Influence, and Cultural Identity

Teacher content knowledge, motivation, and adaptive strategies were crucial for indigenous learners' success, especially in mathematics and language acquisition by Jayson Permangil (2024). Culturally sensitive, individualized instruction and supportive school environments were repeatedly recommended. At the same time, the dominance of English in academic settings risked marginalizing indigenous languages and eroding cultural identity, underscoring the need for balanced bilingual or multilingual programs by J. Eduardo et al. (2021). The research, in summary, emphasizes how educational methods, sociodemographic factors, and language policy interact to influence the academic performance of indigenous students in the Philippines.

CONCLUSION

This review shows that while mother tongue-based multilingual education (MTB-MLE) and language proficiency initiatives are intended to support indigenous learners in the Philippines, their impact on academic achievement—especially in mathematics and reading—remains mixed. Several studies found that the medium of instruction can influence performance in core subjects, but overall achievement levels are still low, often due to weak foundational skills and challenges in adapting curricula to diverse linguistic and cultural backgrounds by M. G. Villaruz et al. (2020). Socio-demographic factors such as gender and parental occupation may have some influence, but broader variables like ethnicity and family structure show limited direct effects by M. G. Villaruz et al. (2020). Teacher content knowledge, culturally responsive teaching, and individualized support are consistently highlighted as crucial for improving outcomes by Gisavel C. Brillo (2025).

Policymakers and educators should reconsider a one-size-fits-all approach to language policy, ensuring that educational programs are both culturally sensitive and adaptable to local contexts. Strengthening teacher training, developing culturally relevant materials, and supporting both indigenous and national languages may help bridge persistent learning gaps and promote both academic success and cultural preservation among indigenous learners by Takiko Igarashi et al. (2024).

Further Studies

Based on the current literature, several areas warrant further research to address persistent gaps and improve educational outcomes for indigenous and multilingual learners in the Philippines:

- (a) Longitudinal and Comparative Studies: Future research should track the long-term effects of mother tongue-based multilingual education (MTB-MLE) and other language policies on student achievement, cultural identity, and social integration across different regions and indigenous groups. Comparative studies with other countries implementing similar policies could yield valuable insights and best practices by C. L. N. Reyes (2021).
- (b) Policy Implementation and Teacher Agency: More in-depth, multi-site studies are needed to examine how teachers' beliefs, language ideologies, and classroom practices influence the enactment of language policies. Research should also explore how teachers negotiate, adapt, or resist policy directives in diverse educational contexts by Bernard M. Barruga (2024).
- (c) Resource Development and Instructional Materials: There is a need for research focused on the creation, localization, and effectiveness of culturally relevant teaching materials, including the integration of oral traditions and indigenous literature into classroom instruction by Bernard M. Barruga (2024).
- (d) Digital and Community-Based Innovations: As digital resources become increasingly important, studies should assess the impact of new educational technologies and community-based language activities on learning outcomes, especially in remote or under-resourced areas by Jingyi Xie et al. (2024).
- (e) Professional Development: Investigating the effectiveness of teacher training programs—particularly those aimed at enhancing content knowledge, cultural competence, and adaptive teaching strategies—remains a priority for supporting indigenous learners by Gisavel C. Brillo (2025).
- (f) Policy Awareness and Rights Education: Research should explore strategies to increase indigenous communities' awareness of their educational rights and the provisions of relevant policies, such as the Indigenous Peoples' Rights Act (IPRA), to foster meaningful participation and advocacy by J. Eduardo et al. (2021).
- (g) Student and Community Perspectives: More qualitative research is needed to capture the lived experiences, aspirations, and challenges of indigenous students and their communities, informing more responsive and inclusive educational interventions by O. J. Ancheta et al. (2024).

These directions will help inform policy refinement, teacher preparation, and the development of sustainable, culturally sensitive educational models for indigenous and multilingual learners in the Philippines.

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