

## Language Mismatch and Student Academic Achievement: Evidence from Southeast Asian Mainland

Duong Duc Anh<sup>ab\*</sup>

<sup>a</sup> Graduate School of International Cooperation Studies, Kobe, Japan

<sup>b</sup> Department of Foreign Languages, Vinh city, Vietnam

\*Corresponding author: 232i406i@gsuite.kobe-u.ac.jp

<b>Article information</b>	
<b>Abstract</b>	<p>Language mismatch in academic assessment — the mismatch between the student's home language and the test language — is a common situation that that may act as a barrier to educational equity in multilingual, multiethnic societies. Extensive literature has shown that language mismatch is associated with poorer academic performance, particularly among young immigrant students, though factors such as language proficiency and exposure to the second language can ameliorate this influence. However, the issue of language mismatch in mainland Southeast Asia appears to garner limited attention despite this region's rich linguistic diversity and various ethnicities. This study addresses this gap by examining the association between language mismatch and academic achievement among primary (Grade 5) and secondary (age 15) students in mainland Southeast Asia, specifically Vietnam, Laos, Cambodia, Myanmar, and Malaysia (SEA-PLM 2019), and Vietnam, Cambodia, Thailand, and Malaysia (PISA cycles 2018 and 2022). Using ordinary least squares regression with school-fixed effects and controlling for individual and familial confounders, this study estimates the net association between language mismatch and test scores in reading, writing, mathematics, and science. The findings show that language mismatch is associated with lower scholastic achievement, with larger gaps found in linguistically demanding subjects like reading and writing. Notably, Malaysia (the only country in the sample with a formally multilingual primary education policy), exhibit larger gaps between matched and mismatched groups than those with monolingual education systems. This pattern does not imply that multilingual education is inherently disadvantageous; rather, it likely reflects the abrupt transition in the medium of instruction between primary and secondary levels in Malaysia, which might place additional linguistic burdens on language-mismatched students. In addition, the negative associations between language mismatch and student achievement are more evident among</p>

	primary students, and the gaps appear smaller among secondary-level students in the PISA dataset compared with primary-level students in SEA-PLM, though this pattern should be interpreted cautiously given that the two datasets test entirely different student cohorts.
<b>Keywords</b>	Language mismatch, multilingual education, monolingual education, language policies.
<b>APA citation:</b>	Anh, D. D. (2026). Language mismatch and student academic achievement: Evidence from Southeast Asian mainland. <i>PASAA</i> , 72, 330–356.

## 1. Introduction

Language mismatch in academic assessment is defined as the misalignment between the language spoken at home by students and the language of the assessment. It is widely observed that students from linguistically mismatched groups, such as local minorities or immigrants, are often documented as underperforming compared with their peers who speak the language of instruction at home. In an analysis of the influence of the misalignment between student home languages and their test scores, studies often found that language mismatch correlates with lower academic achievement (Jerrim, 2012; Kennedy & Park, 1994; Lopez-Agudo et al., 2021; Van Laere et al., 2014; Yang Choy, 2016). Language mismatch occurs at a global scale, especially in the Western countries with substantial immigrant populations and in many post-colonial nations, such as those in Southeast Asia, where a foreign or national language is used for instruction instead of local vernaculars.

Nonetheless, the true impact of the language mismatch on student achievement is often masked by a number of confounders, for example, factors such as socioeconomic conditions, limited access to educational resources, and rampant inefficiencies in the education system that students from minority backgrounds receive at schools. Furthermore, the literature paints a picture showing a mixed result of this linguistic influence. While many studies have pointed out a negative association (Jerrim, 2012; Kennedy & Park, 1994; Lopez-Agudo et al., 2021; Van Laere et al., 2014; Yang Choy, 2016), others find that the achievement gap narrows over time or bilingualism can even be advantageous in some situations (Ardasheva et al., 2012; Dolson, 1985; Kennedy & Park, 1994; So & Chan, 1984). Theories like Cummins' Common Underlying Proficiency (CUP) (Cummins, 1979) and the basic interpersonal communicative skills and cognitive academic language proficiency framework (BICS/CALP) (Cummins, 2016) have been referenced to elucidate these varied outcomes, indicating that the link between language mismatch and student achievement is complex and mediated by the proficiency level and exposure duration to a second language.

This complexity poses a significant concern that failing to disentangle the specific effect of language mismatch on student achievement from influences of socioeconomic backgrounds and other factors, education policies and interventions might be misdirected. In the learning process,

students from linguistically mismatched backgrounds have to face several challenges at once. First, they are required to master the language of instruction. At the same time, they must use the language of instruction to understand the lesson content (Van Laere et al., 2014). This unique cognitive challenge has apparently received scant attention from extant literature. While these dynamics are well-studied in Western countries with immigrant populations, the SEAM countries examined in this study — Vietnam, Laos, Cambodia, Myanmar, and Malaysia (SEA-PLM 2019), and Vietnam, Cambodia, Thailand, and Malaysia<sup>1</sup> (PISA 2018/2022) — remain underexplored despite its rich linguistic diversity, post-colonial legacies, and varied education policies (e.g., monolingual vs. multilingual systems). These characteristics make SEAM a critical context for understanding how language mismatch affects academic outcomes across diverse settings. To address the limited research on language mismatch in SEAM, this study describes and compares the association between language mismatch and academic achievement at the primary level (using SEA-PLM 2019) and the secondary level (using PISA 2018/2022), examining whether patterns differ across educational stages and countries in the region. Specifically, it seeks to answer the question, “What is the association between language mismatch — defined as a discrepancy between a student's home language and the language of the assessment — and academic achievement in reading, writing, mathematics, and science among Grade 5 students (SEA-PLM 2019) and 15-year-old students (PISA 2018/2022) in mainland Southeast Asian countries, after controlling for individual and familial background factors?”

## 2. Literature Review

Language mismatch often occurs among students from immigrant or minority backgrounds, including Asian and Hispanic students in America, as well as local small indigenous groups in various countries. In some countries with colonial past, where a foreign language is used as a medium of instruction, almost all students from local ethnic groups in these countries who speak different vernaculars from the language of the former colonial administration are considered to be language-mismatched individuals. Thus, language mismatch may not necessarily be involved with some small groups of minorities and immigrants. The distinction between mismatched and matched language typically parallels the comparison between bilinguals and monolinguals. However, this principle is not universally applicable, as numerous instances exist where two groups of (multi)bilinguals are compared against one another. The distinction resides in the preference of one group to converse in their heritage language at home, whereas the other does not.

It has been observed that students who speak different languages at home, such as those from minority groups and migrant communities, often perform worse than linguistically matched ones (Jerrim, 2012; Kennedy & Park, 1994; Lopez-Agudo et al., 2021; Van Laere et al., 2014;

---

<sup>1</sup> Although Malaysia is not strictly a mainland Southeast Asian country, it is included here due to its participation in both SEA-PLM and PISA and its relevance to multilingual education policy in the region.

Yang Choy, 2016). In this study, academic achievement is operationalized as standardized test scores across multiple subjects. For primary students, it is measured through SEA-PLM 2019 scores in reading, writing, and mathematics. SEA-PLM (Southeast Asia Primary Learning Metrics) is a regional assessment developed by SEAMEO to measure Grade 5 student learning outcomes across Southeast Asian countries, covering reading, writing, mathematics, and global citizenship literacy (SEAMEO, 2019). For secondary students, academic achievement is represented by PISA (Programme for International Student Assessment) scores in reading, science, and mathematics. PISA, administered by the OECD every three years, assesses the competencies of 15-year-old students in applying knowledge to real-world situations (OECD, 2024). Both assessments are large-scale, internationally benchmarked evaluations with established validity and reliability procedures, and both use anonymized, publicly available datasets.

A lower performance is often the result of poor socioeconomic background (Thanh et al., 2024), low motivation (Poon, 2019), and an inefficient education system (Mustafa, 2023). Language minority students typically come from impoverished and rural backgrounds. In comparison to their affluent counterparts, low-income students frequently encounter diminished educational opportunities, heightened educational inequity, and restricted access to high-quality learning resources (Thanh et al., 2024). Deficiencies in the educational system, including inadequate teaching staff, insufficient infrastructure, and ineffective curriculum and assessment, lead to unsatisfactory academic outcomes (Mustafa, 2023). In addition, monolingual education systems are frequently regarded as ineffective, resulting in functional illiteracy (Draper, 2019). Language minority students tend to suffer most since they often matriculate in these low-quality schools.

One aspect that appears to have received comparatively little attention in the literature is the language mismatch itself. Previous studies often focus on immigrants or students from lower economic backgrounds, which may obscure the influence of language mismatch within the broader context of socioeconomic conditions and the impact of educational institutions on language minority students. This highlights the need for dissecting specific influences that linguistic differences might have on language minority students. Learning a new language frequently demands time, financial investment, and deliberate effort. Consequently, these factors may negatively influence language-mismatched students. Language minority students often face a “double challenge” (Van Laere et al., 2014). Not only do they have to master a new language, which is the medium of instruction at school, but they must also rely on this language to acquire new knowledge and skills (Van Laere et al., 2014). Many people, including educators, feel that this initial failure precipitated a series of low academic performances later on (Van Laere et al., 2014).

In this context, empirical evidence consistently links language mismatch to lower academic performance across subjects. Kennedy and Park (1994) applied ordinary least squares (OLS) regression analysis on a sample of nearly 2,000 Mexican American students and more than 1,000 Asian American 8th graders. After adjusting for socioeconomic conditions, student efforts, and many other psychological variables, the authors found that for American students who have Asian

backgrounds, non-English home languages were negatively associated with standardized reading test scores. A similar result was obtained from an analysis of Australian student performance in PISA 2000 by Cresswell (2004). After controlling for individual-level factors, such as gender, homework time, and engagement in reading, as well as familial factors like socioeconomic backgrounds and cultural possession at home, the OLS regression showed that students with English as their home language were linked to 24 points higher in reading than their mismatched peers. The gap between language minority students and language majority students tends to be persistent. Mancilla-Martinez and Lesaux (2011) conducted a longitudinal study to assess the relationship between early home language use (age 4.5 years) and vocabulary acquisition (ages 4.5 to 12 years) among Hispanic students. They found that although early exposure to English in a household setting helped some young Hispanic students excel over their peers who used comparatively more Spanish at home, when they were 12 years old, the gaps diminished. Nevertheless, all Hispanic student achievement was behind that of their English-native-speaking counterparts.

Jain (2017) used panel data from the Decadal Census of India from 1951 to 1991 to analyze the influence of official languages on educational outcomes. The author discovered that linguistically mismatched districts, where the medium of instruction in schools was different from the student mother tongue, had approximately 20 percent poorer literacy and graduation rates. Arguing that linguistic difficulties may have a spillover effect on other cognitively demanding subjects, such as science, Van Laere et al. (2014) used hierarchical/multilevel (HLM) regression to quantify the influence of language mismatch on performance in science amongst over 1,700 fourth graders in the Flanders (Belgium) region. HLM is frequently used to analyze grouped or clustered data, with an assumption that random effects are uncorrelated with regressors—which is a stronger assumption than that of cross-sectional fixed effects. At the student level, the authors found that language-mismatched students were linked with a lower performance. The authors suggested that misalignment in languages may pose challenges to students due to the nature of decontextualized terms, which are commonly used in cognitively demanding tasks.

Not only science, but also mathematics was found to be correlated with lower attainment due to language mismatch. Lopez-Agudo et al. (2021) used datasets from five cycles of PISA for Spain. Results showed that 15-year-old students who did not take the test in their home language achieved worse performance in reading (0.24 standard deviations) and mathematics (0.06 standard deviations). Similarly, Jerrim et al. (2022) conducted a similar analysis in Wales and saw that students who took the test in Welsh obtained lower scores (around 0.3 standard deviations) in reading, mathematics, and science. Both studies employed home languages as an instrumental variable for test languages. Note that Wales and Spain administered PISA in different official languages, for example, Catalan, Galician, and Spanish in Spain, and Welsh and English in Wales. The authors argued that some students were not completely free to choose the language they preferred to take the test in, resulting in their lower performances.

However, the observed association of language mismatch and student achievement is not uniformly negative. So and Chan (1984) saw that a majority of language-mismatched students

came from socioeconomically disadvantaged backgrounds; thus, they may not have the proper educational amenities to thrive at schools. These authors used the interaction terms of socioeconomic condition and language mismatch and found that although English monolingual 10th-graders outperformed English-dominant bilinguals, the reverse was true for students at higher socioeconomic status. Similarly, a positive correlation was observed in a study by Dolson (1985), in which the author found that Hispanic 6th graders from additive bilingual homes performed better than those from subtractive bilingual households. However, these studies tend to focus on bilinguals only by comparing the difference between Hispanics who preferred communicating in English at home and those who stayed with Spanish. Results in the study of So and Chan (1984), in contrast, showed that regardless of socioeconomic level, native speakers outperformed Hispanic bilinguals.

Language proficiency and exposure may mediate the influence of language mismatch. Yang Choy (2016) used a dataset consisting of more than 8000 observations of primary students in the period 1998-99 to identify the link between math and reading test scores and language spoken at home. The author used OLS regression while controlling for other factors such as student characteristics, home and community factors, and school properties. This study found that while the gap between bilingual students and monolingual ones was noticeable in kindergarten, it was closed for mathematics in the 1st grade and reading by 5th grade. By grade 8, being bilingual appears to be advantageous, with a small positive correlation with around 0.05 standard deviation for math and reading. Ardasheva et al. (2012) wondered if proficiency was a decisive factor and carried out an HLM regression to analyze 20,000 middle school students, who were categorized into three groups: 500 former (fluent) English learners, 558 English language learners, and 12,470 native English speakers. The results showed that former English learners surpassed the English language learners and native English speakers in both reading and mathematics.

A common theoretical framework – which has been often cited by the previous literature to understand this inconsistent correlation between language mismatch and student achievement – was laid by Cummins with his Common Underlying Proficiency theory (CUP) (Cummins, 1979) and the BICS/CALP framework (Cummins, 2016), which stands for basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP). The CUP posits that there is a common underlying proficiency by which skills and knowledge in one language can be transferable to another language. A child's competence in L2 partly depends on the level that he or she has achieved in L1 at the onset of extensive exposure to L2. If L1 skills are not well-developed, a premature and intensive L2 exposure can hinder the continued growth of L1, which subsequently limits the development of L2. Following this, two thresholds were proposed by the author. The lower threshold refers to the minimum level of competence in one or both languages that, if a child failed to pass, might result in detrimental academic attainment. In contrast, passing a higher threshold, a child can enjoy cognitive benefits of bilingualism, such as enhanced academic achievement. This theory may explain why negative correlations still persisted even when bilinguals were in 11th and 12th grade in the study of So and Chan (1984) or in 8th grade in the research of Kennedy and Park (1994).

The BICS/CALP framework proposed by Cummins in 1979 and further developed in subsequent years detailed the constructs of language proficiency by delineating the duration required to reach these thresholds. BICS denotes daily, context-embedded conversational fluency in L2, which individuals often acquire rapidly, typically within 1 to 2 years of exposure. On the contrary, CALP stresses the intricate, decontextualized, and cognitively demanding linguistic skills that are necessary to thrive at schools. It involves an extensive array of grammatical structures and rich abstract lexical resources across different subjects. To attain CALP, it usually requires 5 to 7 years of immersion (Cummins, 2016, 2021). The low achievement of 4th-grade students in science subjects in the study of Van Laere et al. (2014) perhaps was ascribed to their inadequacy in CALP. These patterns are broadly consistent with the predictions of the BICS/CALP framework: the larger language mismatch gaps in reading and science — subjects that rely heavily on decontextualized academic language — align with the greater demands of CALP, whereas the relatively smaller gaps in mathematics are consistent with the more limited language demands of that subject. Furthermore, the comparatively smaller association observed at the secondary level in the PISA datasets (relative to the primary level in SEA-PLM) may be interpreted in light of the extended time typically required to develop full academic language proficiency.

Language mismatch is especially common in the Southeast Asian mainland (Cambodia, Laos, Myanmar, Thailand, Vietnam, and Malaysia). Despite a sheer large number of languages spoken by numerous ethnic minorities, the indigenous vernaculars have been marginalized by the former colonial administrations that favored European languages and, subsequently, by governments of these countries when they have universally enforced one language policy to promote national unification and identity (Bradley, 2019; Draper, 2019; Kosonen, 2019; Nguyen & Nguyen, 2019).

A brief overview of each country's language context is essential for interpreting the findings of this study. In Vietnam, Vietnamese is both the national language and the sole medium of instruction from the beginning of schooling; ethnic minority students (such as H'Mong and Tay speakers) are therefore language-mismatched (Nguyen & Nguyen, 2019). Laos adopts Lao as the exclusive medium of instruction, with ethnic languages not permitted as a medium of instruction in schools; the policy focuses on rapid acquisition of Lao by minority students (Meyers, 2019). Cambodia uses Khmer as the primary medium of instruction, although limited pilot multilingual education programmes exist for selected ethnic minorities (Kosonen, 2019). Myanmar officially uses Burmese as the sole language of instruction across most of the country, with recognized minorities such as Shan and Karen speakers facing language mismatch (Bradley, 2019).

Malaysia is distinctive in maintaining a formally multilingual primary education system with streams in Malay, Mandarin, and Tamil, although many students from non-Malay home-language backgrounds experience mismatch when the medium of assessment shifts at the secondary level (Gill & Shaari, 2019). Thailand uses Thai as the sole medium of instruction, with southern Malay-speaking communities and hill tribe minorities being notably language-mismatched (Draper, 2019).

Extant literature regarding the correlation of language mismatch and student achievement has predominantly concentrated on European, Canadian, and American contexts centering around immigrants. Whereas cross-country studies in the Southeast Asian mainland (SEAM) appeared to garner comparatively scant attention from scholars. This research addresses this critical gap by using the datasets from SEA-PLM 2019 and PISA (cycle 2018, and 2022) to comparatively examine the linkage between language mismatch and academic achievement.

Another contribution of this research lies in the fact that while the previous studies did not perform initial screening of students based on their linguistic proficiency, both PISA and SEA-PLM have been carried out on the principle that linguistic difficulties should not be a problem for students (OECD, 2024; Unicef & Seameo, 2019). In particular, to make sure that students are proficient enough to take the test, the PISA organizer states that a student is ineligible to participate in the test if he or she meets all three of the following criteria. First, the student is not a native speaker of the test language. Second, the student has limited proficiency in the assessment language. Third, the student receives less than one year of instruction in the assessment language (OECD, 2024). Similarly, the significance of the language of assessment is emphasized in the SEA-PLM technical report, which asserts that student achievement levels can only be accurately recorded if the test is administered in a language familiar to the pupils. Deficiencies in linguistic competencies may undermine the reliability of the evaluation and fail to appropriately gauge student abilities (Unicef & Seameo, 2019). Thus, a study focusing on the linguistic aspect will have a practical implication for organizers of both tests. Noted that whilst SEA-PLM examines primary students (at grade 5), PISA tests students when they are at grade 9 or 10. From the previous literature, it is plausible that younger students would be more likely to suffer from the disadvantages of language mismatch; however, it is unclear that as they progress to higher grades, this negative influence (if there is) would persist. Therefore, it is expected findings from this research may help to elucidate this situation in SEAM.

### **3. Methodology**

#### **3.1. Data source**

This study draws on two large-scale international assessment datasets: SEA-PLM 2019 and PISA (cycles 2018 and 2022). PISA 2018 and 2022 data are analyzed separately (see Table 7) rather than pooled. This approach allows direct comparison of coefficients across cycles and accommodates the fact that Cambodia participated only in the 2022 cycle. No year or cycle fixed effects are included because the cycles are not pooled.

Regarding the SEA-PLM, for each country, around 5,000 to 6,000 students at grade 5 participated in the assessment. SEA-PLM sampling follows two stages. In the first stage, schools are chosen by a process in which the likelihood of selection is proportionate to the number of registered students. A minimum of 150 schools will be sampled from each participating nation. The SEA-PLM 2019 dataset used in this study covers five countries: Vietnam, Laos, Cambodia, Myanmar, and Malaysia, with a combined sample of approximately 25,000–30,000 Grade 5

students. The PISA datasets (2018 and 2022) cover four SEAM countries: Vietnam, Cambodia, Thailand, and Malaysia, each with approximately 6,000 fifteen-year-old students per cycle.

The key independent variable, language mismatch, is coded as a binary dummy variable. A value of 1 is assigned when a student reports speaking a home language different from the language of the assessment; a value of 0 is assigned when the home language matches the assessment language. This information is drawn from student background questionnaires administered as part of both SEA-PLM and PISA.

Both SEA-PLM and PISA datasets are anonymized and publicly available, with no personally identifiable information retained. No additional ethical approval was required for the use of these secondary datasets. The validity and reliability of both assessments are well-established through rigorous technical procedures, including multi-stage stratified sampling, item response theory scaling, and international quality control processes (OECD, 2024; Unicef & Seameo, 2019).

### 3.2. Empirical framework

To estimate the association between language mismatch and academic achievement, this study employs Ordinary Least Squares (OLS) regression with school-fixed effects. OLS regression is appropriate here because the outcome variable — standardised test scores — is continuous, and the method allows for the estimation of the net association between language mismatch and achievement after controlling for observed confounders (Kennedy & Park, 1994; Van Laere et al., 2014). School-fixed effects are applied to account for unobserved between-school variations — such as school quality, location, and resource availability — that may otherwise confound the estimates. The model is specified in the following way.

$$Score_{ij} = \alpha + \beta Language\_Mismatch_i + X_i\gamma + \delta_j + \varepsilon_{ij}, \quad (1)$$

The  $Score_{ij}$  is the standardized score for student  $i$  in school  $j$ . It refers to reading, writing, and mathematics scores (SEA-PLM) or reading, mathematics, and science scores (PISA) of students.  $Language\_Mismatch_i$  is a dummy variable that indicates the mismatch between the student home language and the test language. A value of 1 indicates the student speaks home language that is different from the language of the test, a value of 0 refers to alignment between the two.

The reported test scores in the SEA-PLM and PISA datasets are already standardized according to the official scaling procedures of SEAMEO and PISA, respectively (SEAMEO, 2019; OECD, 2024). In this study, the regression coefficients on the language mismatch variable are interpreted in standard deviation units of these standardized scores.

$X_i$  are individual and household characteristics. Slight differences in the set of control variables reflect the distinct background questionnaires used in SEA-PLM and PISA. For SEA-PLM dataset, these include gender, class retention, student ages, the number of books at home,

parental education and socioeconomic background. For PISA, these include gender, class retention, working part-time, immigration status, and socioeconomic background.

Control variables were selected based on prior literature identifying key confounders of the language mismatch–achievement relationship. Gender and class retention are included as individual-level controls, as boys and girls differ systematically in reading and mathematics performance, and repeating a grade is associated with lower attainment (Fischbach et al., 2013). Socioeconomic background, parental education, and home resources are included as familial-level controls, given well-established links between family socioeconomic status and academic outcomes (Thanh et al., 2024).

$\delta_j$  is school fixed effect, and  $\varepsilon_{ij}$  captures unobserved factors for student test scores. In addition, to assure that the results are representative for the whole population of students at grade 5th, the official sampling weight of each student was then used in the regression.

The coefficient  $\beta$  on the `Language_Mismatch` variable represents the estimated difference in standardised test scores between language-mismatched and language-matched students, expressed in standard deviations (SDs), after controlling for all covariates and school-fixed effects. A negative and statistically significant  $\beta$  indicates that language-mismatched students perform worse on average. Effect sizes are interpreted following the convention of Cohen (1988), where 0.2 SDs is considered small, 0.5 SDs medium, and 0.8 SDs large. Additionally, official student sampling weights provided by SEA-PLM and PISA are applied in all regressions to ensure that estimates are representative of the national student populations.

It should be noted that both SEA-PLM and PISA are cross-sectional datasets, meaning they capture a snapshot of student performance at a single point in time. As such, this study cannot follow the same students over time, and any comparisons between primary (SEA-PLM) and secondary (PISA) level findings are descriptive in nature and should not be interpreted as tracking student development longitudinally.

#### 4. Results

This section presents the regression results in two parts. The first part reports findings from the SEA-PLM 2019 dataset for Grade 5 students across Vietnam, Laos, Cambodia, Myanmar, and Malaysia. The second part reports findings from the PISA 2018/2022 dataset for 15-year-old students in Vietnam, Cambodia, Thailand, and Malaysia, with a closer examination of Malaysia's multilingual context.

Before presenting the full cross-country results, Table 1 first demonstrates the robustness of the regression specification using Myanmar as an illustrative example, reporting reading scores only. Myanmar is selected here because it has one of the largest and most clearly defined language-minority populations in the SEA-PLM dataset (the Shan group), making it a useful case to show how the coefficient of language mismatch remains stable as controls are progressively added. Once the preferred specification — column 3, including school-fixed effects, individual controls, and familial controls — is established, it is then applied uniformly across all five countries and all three subjects in Table 2.

Column 1 includes only school fixed effects; other student characteristics (gender, class retention, and age) and their family background (socioeconomic condition, parental education, and home resources) are not controlled. Columns 2 and 3 progressively incorporate these control variables at the individual and familial levels, respectively. Student academic performance often differs drastically from school to school and region to region; thus, school fixed effects are applied in all three columns to eliminate the between-school variations. Across all specifications, the language mismatch coefficients remain statistically significant at the 1% level and exhibit minimal variation, ranging from -0.212 in column 1 to -0.180 in column 3.

**Table 1**

*A summary of Myanmar results in SEA-PLM 2019*

Reading scores	(1)	(2)	(3) baseline
Language mismatch	-0.212*** [0.057]	-0.195*** [0.055]	-0.180*** [0.052]
Student's characteristics (Gender, class retention, age)	No	Yes	Yes
Family's background (socioeconomic condition, parental education, number of books at home)	No	No	Yes
School's fixed effect	Yes	Yes	Yes
No. Observation	5,492	5,492	5,492
No. Schools	202	202	202
R2	0.366	0.407	0.434

Notes: This table reports the impact of language mismatch on student test scores. Triple asterisks (\*\*\*), double asterisks (\*\*), and a single asterisk (\*) denote that the coefficient is statistically significant at the 0.1%, 1%, and 5% levels, respectively. (X) denotes that the criteria are inapplicable. Source: Authors' estimation using data from the SEA-PLM 2019.

The inclusion of individual controls (age, gender, and class retention) in column 2 reduced the magnitude of the language mismatch coefficient from -0.212 (SE = 0.057) to -0.195 (SE = 0.055), and further to -0.180 (SE = 0.052) in column 3 with familial controls. This suggests that these variables partially account for the negative association between language mismatch and reading scores, likely by reducing confounding effects. This echoes prior research findings, which showed that in most nations, boys have consistently excelled over girls in mathematics and science, whereas the opposite is true in reading (Bijou & Liouaeddine, 2018; Gevrek et al., 2020; González de San Román & de la Rica, 2012). At the same time, students who repeat class tend to obtain lower test scores (Fischbach et al., 2013). The coefficient of language mismatch exhibits minimal variation upon the introduction of familial controls, implying that additional control variables in the regression are unlikely to significantly alter the coefficients of language mismatch. The

stability of the language mismatch coefficient across specifications, combined with the inclusion of individual and familial controls and school fixed effects, suggests that the estimate in column 3 (-0.180, SE = 0.052) may reflect a less biased association, though unmeasured confounders prevent a definitive causal interpretation.

Having established the preferred regression specification in Table 1, Table 2 applies this specification — school-fixed effects with full individual and familial controls — to all three subjects (reading, writing, and mathematics) across all five SEA-PLM 2019 countries simultaneously. This allows for a systematic cross-country comparison of the language mismatch effect at the primary level.

**Table 2**

*A summary of all country results in SEA-PLM 2019*

Country	Variable	Reading	Writing	Mathematics
Vietnam	Base Score	337.486 (22.426)	337.486 (22.426)	342.307 (23.929)
	Language mismatch	-0.078 [0.078]	-0.147* [0.078]	-0.208*** [0.078]
Laos	Base Score	276.510 (20.735)	285.700 (30.748)	280.393 (20.549)
	Language mismatch	-0.099*** [0.035]	-0.077** [0.036]	-0.099*** [0.032]
Myanmar	Base Score	292.390 (20.232)	298.842 (20.485)	288.512 (17.551)
	Language mismatch	-0.180*** [0.052]	-0.158** [0.053]	-0.027 [0.059]
Cambodia	Base Score	290.786 (21.807)	285.483 (27.095)	290.026 (20.663)
	Language mismatch	-0.221*** [0.060]	-0.286*** [0.067]	-0.240*** [0.061]
Malaysia	Base Score	320.063 (23.355)	318.029 (18.766)	315.792 (21.491)
	Language mismatch	-0.389*** [0.043]	-0.229*** [0.045]	-0.231*** [0.039]

Notes: Values in parentheses () represent standard errors for the base scores – the mean scores of the standardized test scores for all students. Values in brackets [] refer to standard deviation of language mismatch coefficients. Triple asterisks (\*\*\*), double asterisks (\*\*), and a single asterisk (\*) denote that the coefficient is statistically significant at the 0.1%, 1%, and 5% levels, respectively. Source: Authors' estimation using data from the SEA-PLM 2019.

As can be observed, language mismatch was associated with a lower academic performance in almost all subjects across four countries examined in the SEAM. Vietnam exhibits the highest mean scores across all domains. It is important to note that the language-mismatched group in each country is not homogeneous. In Vietnam, mismatched students include speakers of indigenous languages such as H'Mong, Muong, and Tay. In Laos, the primary mismatched group is H'Mong speakers. In Cambodia, mismatched students include English-speaking and other minority groups. In Myanmar, the Shan ethnic group represents the largest mismatched population. In Malaysia, mismatched students include Tamil, Mandarin, and English speakers who are assessed in Malay. Understanding this diversity is essential for interpreting the decomposed results in Table 3.

So far, the results only show the overall “composite” value of language mismatch coefficients. Because this group consists of students speaking local vernaculars and those speaking international languages, the language influences may differ according to types of languages. For students speaking indigenous vernaculars, their languages may or may not have written forms, and the language support in L1 - in terms of teaching staff and studying material - for them is usually limited (Kirkpatrick & Liddicoat, 2019; Nguyen & Nguyen, 2019). In many cases, they are forced to study in L2 or their national language from the beginning of their schooling. This kind of monolingual education often leads to poor educational outcomes among language minority students (Kirkpatrick & Liddicoat, 2019) or L1 replacement by L2 (Nguyen & Nguyen, 2019).

**Table 3**

*Decomposition of the language mismatch coefficients in SEA-PLM 2019 by country*

Country	Minority Group	Reading	Writing	Mathematics
Vietnam	H'Mong, Muong, Tay...	-0.157* [0.088]	-0.178* [0.093]	-0.151* [0.091]
Laos	H'mong group	-0.234*** [0.059]	-0.281*** [0.059]	-0.167*** [0.053]
Cambodia	English-speaking group	-0.254*** [0.095]	-0.274*** [0.092]	-0.346*** [0.100]
Myanmar	Shan group	-0.338*** [0.085]	-0.150* [0.081]	-0.149* [0.088]

Notes: This table reports the correlation of language mismatch with student test scores. Values in brackets [] represent standard errors. Triple asterisks (\*\*\*), double asterisks (\*\*), and a single asterisk (\*) denote that the coefficient is statistically significant at the 0.1%, 1%, and 5% levels, respectively. Source: Authors' estimation using data from the SEA-PLM 2019.

Note that Malaysia is excluded from Table 3 because the SEA-PLM 2019 dataset for Malaysia does not provide explicit disaggregation of language-mismatched students into distinct linguistic subgroups, making a meaningful decomposition of the language mismatch coefficient by home language group impossible for this dataset. Malaysia's composite language mismatch

results are already reported in Table 2, and a more detailed decomposition by home language group is conducted separately using the PISA 2022 dataset in Tables 4–6, which provides richer language background variables.

Across all five SEAM countries examined in SEA-PLM 2019, language mismatch was consistently associated with lower academic performance. Cambodia exhibited the largest coefficients overall (up to -0.346 SDs in mathematics), suggesting that language-mismatched students face particularly severe disadvantages in that context. Laos showed consistent negative associations across all three subjects. Myanmar's Shan-speaking students showed notably larger gaps in reading than in mathematics. The variation across countries likely reflects differences in the size of minority populations, the degree of linguistic distance between home and school languages, and the availability of mother-tongue-based support in early education.

Since neither Laos nor Myanmar participates in PISA, it is unfortunately not possible to determine from this study whether these primary-level gaps persist, narrow, or widen as students progress to secondary education. Expanding PISA participation to include Laos and Myanmar in future cycles would be a critical step toward understanding the longitudinal trajectory of language mismatch effects in these two countries.

It is now necessary to examine the situation for older students in the PISA dataset to see whether the influence of language mismatch persist when students progress to higher level of education. A similar check was performed on the changes in the coefficients of language mismatch according to different identification strategies. Table 4 presents the results of language mismatch coefficients for reading scores in Malaysia across three model specifications, demonstrating the robustness of the estimates as control variables are progressively introduced. Malaysia is examined first here because, as the only country in the SEAM region with a formally multilingual education system, it requires a more careful examination of specification sensitivity before extending the analysis to other subjects and countries. Column 1 includes individual-level controls and school-fixed effects only; Column 2 replaces the composite ESCS index with its subcomponents (highest parental education and home possession); Column 3 uses the composite ESCS variable directly.

**Table 4**

*The coefficients of language mismatch for reading across different model specifications in Malaysia*

Reading	(1)	(2)	(3) baseline
Language mismatch	-0.298*** [0.0291]	-0.292*** [0.0277]	-0.285*** [0.0285]
Individual-level controls (gender, class retention, work for payment, immigration status)	Yes	Yes	Yes
ESCS (socio-economic status)	No	No	Yes

Highest parental education	No	Yes	No
Home possession	No	Yes	No
School fixed effects	Yes	Yes	Yes
No. of Observations	7,031	7,031	7,031
No. of Schools	199	199	199
R-squared	0.408	0.460	0.433

Notes: This table reports the correlation of language mismatch with student test scores. Triple asterisks (\*\*\*), double asterisks (\*\*), and a single asterisk (\*) denote that the coefficient is statistically significant at the 0.1%, 1%, and 5% levels, respectively. Source: Authors' estimation using data from the PISA 2022.

The initial column did not account for socioeconomic status (ESCS) but rather focused on individual-level factors and employed school-fixed effects. In columns 2, the ESCS is omitted; the regression utilizes its subcomponents (highest parental education and home ownership) to account for familial characteristics. Column 3 excluded the subcomponents of ESCS while incorporating the composite variable ESCS for comparative analysis.

Note that ESCS in PISA is a composite variable derived from three primary factors: parental occupation, parental education, and home ownership. Column 2 shows that when ESCS is excluded while incorporating the highest parental education and home ownership, the language mismatch coefficient is  $-0.292$  SDs ( $SE = [0.0291]$ ,  $p < 0.001$ ), which minimally diverges from the value  $-0.298$  SDs ( $SE = [0.028]$ ,  $p < 0.001$ ) obtained when these two subcomponents are omitted and ESCS is included in the regression (column 3). The consistent results indicate the robustness and validity of the regression analysis. Once individual-level variables were included, the coefficients of language mismatch exhibited relative stability. In other words, it indicates that the results obtained appeared to have a certain degree of causality.

Table 5 extends the analysis from Table 4 by applying the same preferred specification to science and mathematics, completing the full subject profile for Malaysian secondary students. While Table 4 focused solely on reading to establish the robustness of the specification, Table 5 presents the final estimates across all three PISA subjects.

The regression specification from Table 4, column 3 — incorporating school fixed effects, individual controls (gender, age, class retention, and immigration status), and familial controls (socioeconomic status) — was applied to analyze the relationship between language mismatch and science and mathematics test scores for Malaysian students in the PISA 2022 dataset. Table 5 presents the estimated regression coefficients, which indicate the extent of language mismatch effects in these subjects. As can be observed, language mismatch was associated with a reduction of  $0.285$  SDs in reading ( $SE = 0.028$ ,  $p < 0.001$ ) and  $0.165$  SDs ( $SE = 0.029$ ,  $p < 0.001$ ) in science. As for mathematics, the result was not statistically significant.

**Table 5***A summary of Malaysia's results in PISA 2022*

Subject Mean (Sta.dev)	Reading	Science	Mathematics
Language mismatch	-0.285*** [0.028]	-0.165*** [0.029]	0.012 [0.029]
Individual-level controls (gender, class retention, work for payment, immigration status)	Yes	Yes	Yes
Familial-level controls (ESCS: a composite variable from home possession and parental education)	Yes	Yes	Yes
School's fixed effect	Yes	Yes	Yes
No. Observation	7031	7031	7031
No. Schools	199	199	199
R2	0.433	0.429	0.451

Notes: This table reports the correlation of language mismatch with student test scores. Triple asterisks (\*\*\*), double asterisks (\*\*), and a single asterisk (\*) denote that the coefficient is statistically significant at the 0.1%, 1%, and 5% levels, respectively. Source: Authors' estimation using data from the PISA 2022.

Table 6 shows the decomposition of the correlation of language mismatch and academic achievement for students speaking different home languages. Compared with those speaking Malay and taking the test in Malay, students from Tamil-speaking households achieved significantly lower scores in every subject, down 0.693 SDs in reading ( $SE = 0.052$ ,  $p < 0.001$ ), 0.563 SD in science ( $SE = 0.051$ ,  $p < 0.001$ ), and 0.325 SDs in mathematics ( $SE = 0.050$ ,  $p < 0.001$ ). A sizeable gap was observed in reading and science within Mandarin-speaking students who sat the exam in Malay, with 0.520 SDs reduced in reading and 0.230 SDs decreased in science. Similarly, compared with students from English-speaking households, Tamil- and Mandarin-speaking students performed behind by a large margin.

**Table 6**

*Decomposition of the correlation between language mismatch and test scores in Malaysia, PISA cycle 2022*

Mean (Std.Dev)	Home language	N	Reading	Science	Mathematics	Reference group
Test language (Malay)	English	106	-0.028 [0.086]	-0.098 [0.087]	-0.003 [0.082]	Students who speak Malay at home and take the test in Malay (4,541)
	Tamil	276	-0.693*** [0.052]	-0.563*** [0.051]	-0.325*** [0.050]	
	Mandarin	462	-0.520*** [0.045]	-0.230*** [0.047]	0.178*** [0.048]	
	Other language	499	-0.123*** [0.046]	-0.086** [0.043]	-0.085** [0.040]	
Test language (English)	Malay	130	-0.115 [0.099]	-0.126 [0.112]	-0.360*** [0.111]	Students who speak English at home and take the test in English (167)
	Tamil	69	-0.527*** [0.116]	-0.527*** [0.116]	-0.603*** [0.127]	
	Mandarin	714	-0.427*** [0.084]	-0.257** [0.100]	-0.109 [0.102]	
	Other languages	67	-0.129 [0.126]	-0.215 [0.140]	-0.091 [0.145]	
Individual-level controls			Yes	Yes	Yes	
Familial-level controls (ESCS)			Yes	Yes	Yes	
School's fixed effect			Yes	Yes	Yes	
No. Observation			7031	7031	7031	
No. Schools			199	199	199	

Notes: This table reports the correlation of language mismatch with student test scores. Triple asterisks (\*\*\*), double asterisks (\*\*), and a single asterisk (\*) denote that the coefficient is statistically significant at the 0.1%, 1%, and 5% levels, respectively. Source: Authors' estimation using data from the PISA 2022.

Table 7 shows the correlation of language mismatch with student test scores in two cycles of PISA. Cambodia first joined PISA in 2022; therefore, no data are available for this country in 2018.

**Table 7***Results of regression coefficients for language mismatch in PISA cycle 2022, 2018*

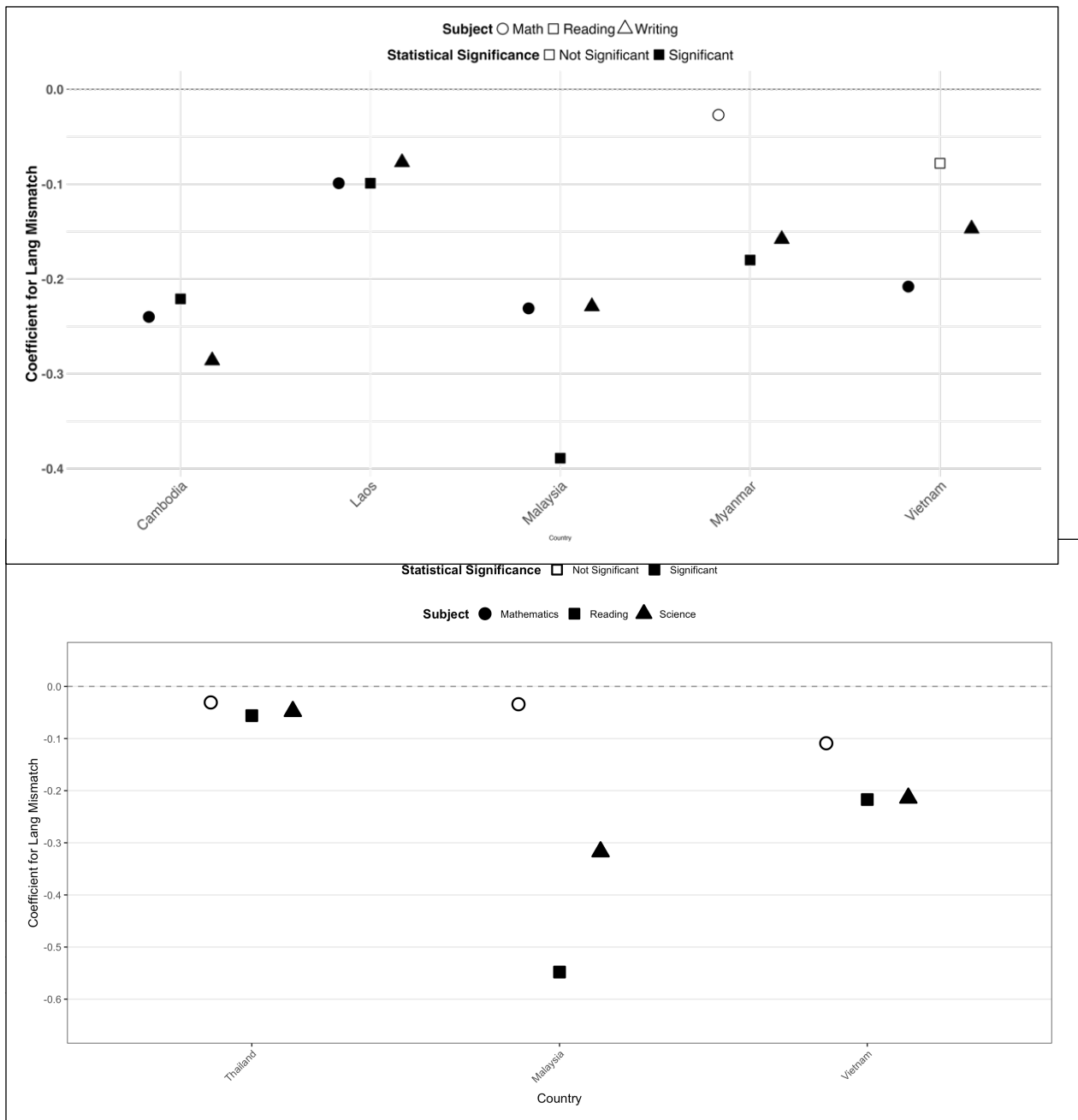
Country	Subjects	PISA2022	PISA2018
Vietnam	Reading	-0.020 [0.055]	-0.217***[0.073]
	Science	0.025 [0.059]	-0.214***[0.075]
	Mathematics	-0.012 [0.054]	-0.109 [0.077]
Cambodia	Reading	-0.201* [0.088]	x
	Science	0.030 [0.084]	x
	Mathematics	0.049 [0.084]	x
Thailand	Reading	0.028 [0.027]	-0.056**[0.023]
	Science	0.023 [0.027]	-0.0477**[0.023]
	Mathematics	0.011 [0.026]	-0.0307 [0.023]
Malaysia	Reading	-0.285*** [0.028]	-0.548***[0.034]
	Science	-0.165*** [0.029]	-0.317***[0.035]
	Mathematics	0.012 [0.029]	-0.0341[0.035]

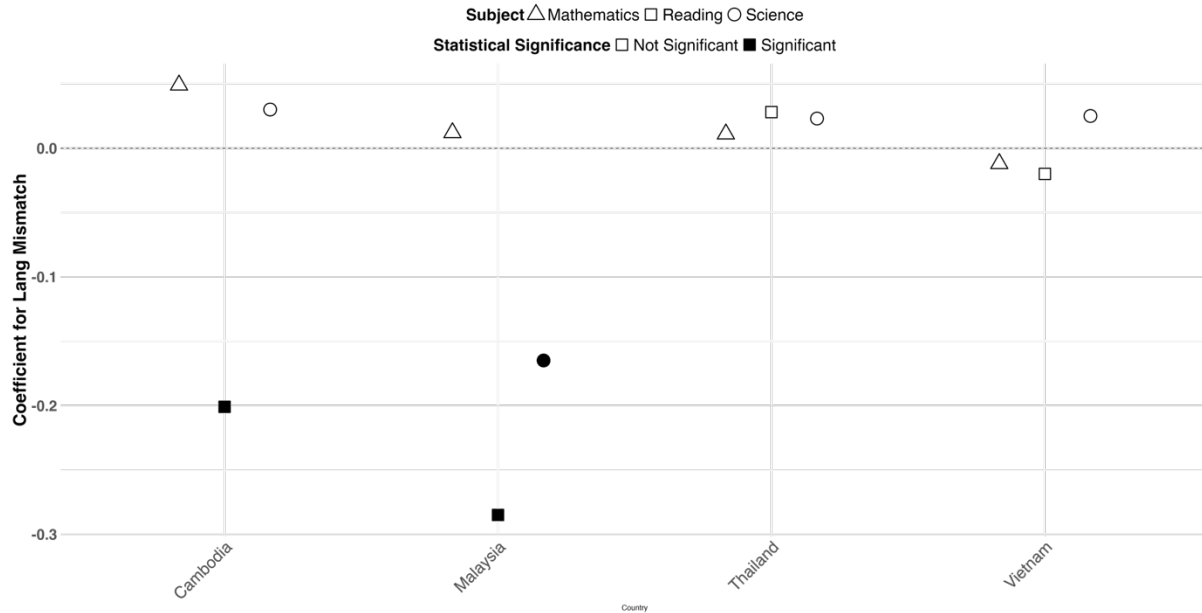
Notes: This table reports the correlation of language mismatch with student test scores. Triple asterisks (\*\*\*), double asterisks (\*\*), and a single asterisk (\*) denote that the coefficient is statistically significant at the 0.1%, 1%, and 5% levels, respectively. Source: Authors' estimation using data from the PISA 2022, 2018.

To summarize the main results of this study, figure 1, 2 and 3 subsequently show the regression coefficients for language mismatch among students at primary and secondary schools in 2018, 2019 and 2022.

**Figure 1**

*Results of regression coefficients for language mismatch among students at grade 5 in SEA-PLM 2019*





## 5. Discussion

This discussion is structured around two analytical goals. The first goal is to examine the pattern of the association between language mismatch and academic achievement at the primary level across all five SEA-PLM countries (Vietnam, Laos, Cambodia, Myanmar, and Malaysia). The second goal is to compare the strength of this association among 15-year-old students in the PISA 2018/2022 datasets with the pattern observed at the primary level. Because SEA-PLM and PISA are cross-sectional and test entirely different cohorts of students, any observed differences between the two datasets should be interpreted as descriptive comparisons rather than evidence of change over time for the same individuals. Since Laos and Myanmar do not participate in PISA, and Cambodia and Thailand are only present in one dataset, only Vietnam and Malaysia appear in both SEA-PLM and PISA, making them the only countries for which a cross-level comparison is possible. For this reason, Vietnam and Malaysia receive comparatively more attention in the discussion that follows. This does not diminish the significance of findings from Laos, Cambodia, and Myanmar, which are discussed in full for the primary level and contribute equally to understanding language mismatch effects in the region.

At the primary level (Grade 5), language mismatch is associated with lower academic achievement across the SEA-PLM 2019 countries. The association tends to be stronger in reading and writing than in mathematics. This pattern is consistent with previous studies that have documented negative associations between language mismatch and student performance (Jerrim, 2012; Jerrim et al., 2022; Kennedy & Park, 1994; Lopez-Agudo et al., 2021; Van Laere et al., 2014; Yang Choy, 2016).

Among the remaining SEA-PLM countries, the findings for Laos, Cambodia, and Myanmar warrant particular attention. In Laos, language mismatch is associated with lower performance across all three subjects. This result aligns with the country's strict monolingual policy, which uses Lao as the sole medium of instruction and does not permit ethnic languages in

schools (Meyers, 2019). Despite having the highest proportion of minority-language speakers in the region (approximately 47% of the population), Laos has maintained a policy focused on rapid acquisition of Lao by minority students without incorporating mother-tongue-based approaches (Meyers, 2019). As a result, groups such as H'Mong and Khmu speakers experience a noticeable language mismatch burden from the beginning of formal schooling, with no L1 support available to bridge the gap (Meyers, 2019). The negative coefficients observed for these groups in the SEA-PLM data could be therefore expected.

In Myanmar, language mismatch is also associated with lower scores, particularly in reading. The education system uses Burmese as the main medium of instruction and assessment, with limited bilingual programmes constrained by resource shortages (Bradley, 2019). Approximately 34% of the population speaks a language other than Burmese as their mother tongue, spread across 134 recognized ethnic groups and 111 distinct languages. The Shan group, examined in this study, is among the most populous minorities and shows notable gaps in the SEA-PLM data. Although a trilingual education policy was under development at the time of the SEA-PLM 2019 assessment, its implementation has been limited.

The Cambodia result also deserves particular attention. Cambodia has a comparatively smaller minority language population (approximately 3% of the total population) and has introduced pilot multilingual education programmes. However, these programmes follow a transitional early-exit model, in which the student's first language is used only until the end of Grade 3, after which Khmer becomes the exclusive language of instruction (Kosonen, 2019). Many larger non-dominant language groups, including Cham, Chinese, and Vietnamese communities, are excluded from these programmes and receive no formal L1 support. Furthermore, the English-speaking group in the Cambodian SEA-PLM data shows particularly large negative associations. This group likely consists of urban or internationally connected households whose children are assessed in Khmer — a language that may not be their primary medium of daily communication. This profile may explain the unexpectedly large gaps observed for this group in Cambodia.

For students around 15 years old in the PISA dataset, there are mixed results across different countries. The association between language mismatch and achievement is not statistically significant in Vietnam and Thailand in 2022, while a sizeable association remains in Cambodia and especially in Malaysia. The comparatively larger association observed in Malaysia does not imply that multilingual education is inherently disadvantageous. Rather, it likely reflects the abrupt transition in the medium of instruction and assessment from mother-tongue-based primary schooling (Malay, Mandarin, or Tamil streams) to predominantly Malay- or English-medium secondary schooling and testing.

These patterns are broadly consistent with Cummins' BICS/CALP framework (Cummins, 2016), which distinguishes between everyday conversational fluency and the more demanding cognitive academic language proficiency required for school success. The stronger association in reading and writing (subjects that rely heavily on decontextualized academic language) compared with mathematics is in line with this perspective. However, because the study does not directly

measure language proficiency or length of exposure, these interpretations remain suggestive rather than conclusive.

The results also highlight important policy differences across the region. In countries with strictly monolingual education systems, language mismatch appears to be more pronounced at the primary level. In Malaysia, the only country with a formally multilingual primary education policy, the association remains substantial even at the secondary level, possibly due to the shift in assessment language after primary school. These findings underscore the complex interplay between language policy, medium of instruction, and academic assessment in multilingual contexts and point to the need for careful consideration of assessment practices in large-scale international studies such as PISA and SEA-PLM.

## 6. Conclusion

In conclusion, this study was implemented to analyze the association of language mismatch with student academic performance. It employed two sets of data from SEA-PLM 2019, which tested students in 5th grade, and PISA cycle 2018, 2022, which was administered to students at 15 years old in mainland Southeast Asia. By applying a regression with school fixed effects, this study found that among 5th graders, language mismatch is associated with lower test scores. The association was more apparent in reading and writing than in mathematics. Among 15-year-old students, the association is not statistically significant in some countries. The association is comparatively larger in Malaysia, the only country in the sample with a formally multilingual primary education policy.

This study helps to enrich the literature concerning the association of language mismatch and student achievement, especially as it sheds light on the situation in the Southeast Asian mainland. In addition, it contributes to the literature on bilingualism and language mismatch by providing descriptive cross-sectional evidence that the association appears weaker among 15-year-old students in the PISA datasets than among Grade 5 students in SEA-PLM.

The larger achievement gaps observed in Malaysia, the only country with a formally multilingual education system in this study, suggest that multilingual policies alone do not eliminate language mismatch disadvantages and may introduce additional complexity in assessment contexts. However, caution is warranted in interpreting this finding, as Malaysia's unique policy context and student demographics differ substantially from the monolingual systems in other SEAM countries.

The findings of this study carry theoretical, methodological, and practical implications. This study has several theoretical, methodological, and practical implications. At the theoretical level, the observed patterns are largely consistent with Cummins' BICS/CALP framework in the SEAM context. The consistently larger language mismatch gaps observed in reading and writing — subjects that demand decontextualized, academically demanding language competence — compared with the relatively smaller gaps in mathematics align with the CALP deficit hypothesis, in which language-mismatched students have acquired sufficient everyday communicative fluency (BICS) but not yet the deeper academic language proficiency (CALP) required for literacy-

intensive subjects (Cummins, 2016). The comparatively smaller association observed at the secondary level in PISA is broadly aligned with Cummins' projected 5 to 7 years of immersion required to attain CALP. The finding that Malaysia — the only formally multilingual country in the dataset — exhibits larger language mismatch gaps than monolingual systems further suggests that multilingual policy frameworks do not automatically reduce language mismatch disadvantages; rather, abrupt transitions in the medium of instruction between educational levels may create additional linguistic demands.

At the methodological level, this study demonstrates the value of applying school-fixed effects in large-scale assessment data to isolate the net association between language mismatch and achievement from between-school confounders. Future studies should consider incorporating language proficiency as an explicit mediating variable, rather than relying solely on the binary home language indicator used here, as the degree of mismatch — rather than its mere presence — is likely a more precise predictor of achievement outcomes. Longitudinal designs that follow the same students from primary to secondary school would be particularly valuable for disentangling whether the smaller gaps observed at the secondary level reflect genuine CALP acquisition over time or a selection effect driven by higher dropout rates among language-mismatched students before they reach secondary school. Additionally, expanding PISA participation to include Laos and Myanmar would greatly strengthen cross-level comparisons in the SEAM region.

One practical implication of this study is that large-scale assessments such as PISA and SEA-PLM could consider providing additional language options or linguistically adapted versions to reduce the confounding effect of language mismatch on measured achievement. For education policymakers in SEAM, the findings suggest that simply adopting a multilingual education policy at the primary level is insufficient if that policy is not sustained through the secondary level; the case of Malaysia suggests that an abrupt shift in the medium of instruction and assessment between primary and secondary levels may create additional challenges for some language-mismatched students.

## **7. Limitations and future research**

This study has several limitations that should be acknowledged. First, both SEA-PLM and PISA are cross-sectional datasets, which means causal inferences cannot be drawn from the observed associations. The study cannot rule out the possibility that unmeasured confounders — such as school quality, teacher language competency, or community language use — explain part of the estimated language mismatch effects. Second, language mismatch is measured using self-reported home language and the language of the assessment. This binary indicator may not fully capture students' actual language proficiency, the degree of linguistic distance between languages, or their complete multilingual repertoires and language use patterns in daily life. Third, the comparability of SEA-PLM and PISA findings is limited by differences in the age groups tested, subject domains covered, and assessment scales used. Direct numerical comparisons between the two datasets should be interpreted with caution.

Several directions for future research are suggested. Longitudinal studies tracking the same students from primary through secondary school would allow a more definitive assessment of whether language mismatch gaps close over time. Future studies should also examine the role of mother-tongue-based instruction programs in reducing language mismatch disadvantages, particularly in countries such as Vietnam and Myanmar where policy reforms are ongoing. Finally, extending this analysis to maritime Southeast Asian nations such as the Philippines and Indonesia — which have similarly complex multilingual contexts — would contribute to a more comprehensive regional picture.

## 8. About the Author

Mr. Duong Duc Anh is currently studying at the Department of Economic Development and Policy at Graduate School of International Cooperation Studies, Kobe University. He was formerly a teacher of English at a local university in Vietnam. He is interested in educational economics, and linguistics.

## 9. Acknowledgement

This research was supported by The Project for Human Resource Development Scholarship. The author is a recipient of this grant aid while conducting this research.

## 10. Declaration of AI Use

The author used Grok AI only as a language editor, paraphraser, and to improve the clarity and academic tone of the English text only during the preparation of this manuscript. All suggestions generated by AI were reviewed and edited thoroughly by the author. The content, analysis, interpretations and conclusions of this manuscript are the sole responsibility of the author. The use of AI tools was in accordance with PASAA's Scope of AI Use in Manuscripts policy and the journal's standards of academic quality, originality and ethical integrity.

## 11. References

- Ardasheva, Y., Tretter, T. R., & Kinny, M. (2012). English Language Learners and Academic Achievement: Revisiting the Threshold Hypothesis. *Language Learning*, 62(3), 769-812. <https://doi.org/https://doi.org/10.1111/j.1467-9922.2011.00652.x>
- Bijou, M., & Liouaeddine, M. (2018). Gender and Students' Achievements: Evidence from PISA 2015. *World Journal of Education*, 8(4), 24-35. <https://doi.org/https://doi.org/10.5430/wje.v8n4p24>
- Bradley, D. (2019). Minority language learning in mainland Southeast Asia. In *The Routledge international handbook of language education policy in Asia* (pp. 14-28). Routledge. <https://doi.org/https://doi.org/10.4324/9781315666235-2>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd Edition ed.). Routledge. <https://doi.org/10.4324/9780203771587>

- Cresswell, J. (2004). Immigrant status and home language background implications for Australian student performance in PISA 2000. <http://www.ozpisa.acer.edu.au/documents/PISA2000Immigrants.pdf>
- Cummins, J. (1979). Linguistic Interdependence and the Educational Development of Bilingual Children. *Review of Educational Research*, 49(2), 222-251. <https://doi.org/10.2307/1169960>
- Cummins, J. (2016). BICS and CALP: Empirical and Theoretical Status of the Distinction. In B. V. Street & S. May (Eds.), *Literacies and Language Education* (pp. 1-13). Springer International Publishing. [https://doi.org/10.1007/978-3-319-02321-2\\_6-1](https://doi.org/10.1007/978-3-319-02321-2_6-1)
- Cummins, J. (2021). *Rethinking the Education of Multilingual Learners: A Critical Analysis of Theoretical Concepts*. Multilingual Matters & Channel View Publications. <https://doi.org/10.2307/jj.22730517>
- Dolson, D. P. (1985). The effects of Spanish home language use on the scholastic performance of Hispanic pupils. *Journal of Multilingual and Multicultural Development*, 6(2), 135-155. <https://doi.org/10.1080/01434632.1985.9994192>
- Draper, J. (2019). Language education policy in Thailand. In A. Kirkpatrick & A. J. Liddicoat (Eds.), *The Routledge International Handbook of Language Education Policy in Asia* (1st Edition ed.). Routledge. <https://doi.org/https://doi.org/10.4324/9781315666235-16>
- Fischbach, A., Keller, U., Preckel, F., & Brunner, M. (2013). PISA proficiency scores predict educational outcomes. *Learning and Individual Differences*, 24, 63-72. <https://doi.org/https://doi.org/10.1016/j.lindif.2012.10.012>
- Gevrek, Z. E., Gevrek, D., & Neumeier, C. (2020). Explaining the gender gaps in mathematics achievement and attitudes: The role of societal gender equality. *Economics of Education Review*, 76, 101978. <https://doi.org/https://doi.org/10.1016/j.econedurev.2020.101978>
- Gill, S. K., & Shaari, A. H. (2019). Malaysia's complex language policy journey via Bahasa Melayu and English. In A. Kirkpatrick & A. J. Liddicoat (Eds.), *The Routledge International Handbook of Language Education Policy in Asia* (1st Edition ed.). Routledge. <https://doi.org/https://doi.org/10.4324/9781315666235-18>
- González de San Román, A., & de la Rica, S. (2012). *Gender Gaps in PISA Test Scores: The Impact of Social Norms and the Mother's Transmission of Role Attitudes*. <https://ideas.repec.org/p/iza/izadps/dp6338.html>
- Jain, T. (2017). Common Tongue: The Impact of Language on Educational Outcomes. *The Journal of Economic History*, 77(2), 473-510. <http://www.jstor.org/stable/26348367>
- Jerrim, J. (2012). The Socio-Economic Gradient in Teenagers' Reading Skills: How Does England Compare with Other Countries? *Fiscal Studies*, 33(2), 159-184. <https://doi.org/https://doi.org/10.1111/j.1475-5890.2012.00157.x>
- Jerrim, J., Lopez-Agudo, L. A., & Marcenaro-Gutierrez, O. D. (2022). The impact of test language on PISA scores. New evidence from Wales. *British Educational Research Journal*, 48(3), 420-445. <https://doi.org/https://doi.org/10.1002/berj.3774>

- Kennedy, E., & Park, H.-S. (1994). Home Language as a Predictor of Academic Achievement: A Comparative Study of Mexican- and Asian-American Youth [Reports - Research; Journal Articles]. *Journal of Research and Development in Education*, 27(3), 188-194.
- Kirkpatrick, A., & Liddicoat, A. J. (2019). *The Routledge International Handbook of Language Education Policy in Asia* (1st Edition ed.). Routledge.  
<https://doi.org/10.4324/9781315666235>
- Kosonen, K. (2019). Language education policy in Cambodia. In A. Kirkpatrick & A. J. Liddicoat (Eds.), *The Routledge International Handbook of Language Education Policy in Asia* (1st Edition ed.). Routledge. <https://doi.org/10.4324/9781315666235-15>
- Lopez-Agudo, L. A., González-Betancor, S. M., & Marcenaro-Gutierrez, O. D. (2021). Language at home and academic performance: The case of Spain. *Economic Analysis and Policy*, 69, 16-33. <https://doi.org/https://doi.org/10.1016/j.eap.2020.11.003>
- Mancilla-Martinez, J., & Lesaux, N. K. (2011). Early home language use and later vocabulary development. *Journal of Educational Psychology*, 103(3), 535-546.  
<https://doi.org/10.1037/a0023655>
- Meyers, C. (2019). Lao language policy. In A. Kirkpatrick & A. J. Liddicoat (Eds.), *The Routledge International Handbook of Language Education Policy in Asia* (1st Edition ed.). Routledge. <https://doi.org/10.4324/9781315666235-14>
- Mustafa, A. N. (2023). Reflection on the Latest PISA Results of Indonesia. *International Journal of Advanced Research*, 11(05), 1223-1228. <https://doi.org/10.21474/IJAR01/16988>
- Nguyen, X. N. C. M., & Nguyen, V. H. (2019). Language education policy in Vietnam. In A. Kirkpatrick & A. J. Liddicoat (Eds.), *The Routledge International Handbook of Language Education Policy in Asia* (1st Edition ed.). Routledge.  
<https://doi.org/10.4324/9781315666235-13>
- OECD. (2024). *PISA 2022 Technical Report* (PISA, Issue. <https://doi.org/10.1787/01820d6d-en>)
- Poon, A. Y. K. (2019). Language education policy in Hong Kong. In A. Kirkpatrick & A. J. Liddicoat (Eds.), *The Routledge International Handbook of Language Education Policy in Asia* (1st Edition ed.). Routledge. <https://doi.org/10.4324/9781315666235-5>
- So, A. Y., & Chan, K. S. (1984). What Matters? The Relative Impact of Language Background And Socioeconomic Status on Reading Achievement. *NABE Journal*, 8(3), 27-41.  
<https://doi.org/10.1080/08855072.1984.10668472>
- Thanh, P. T., Tram, N. H. M., & Tung, L. T. (2024). Educational inequality during the COVID-19 pandemic in Vietnam: Implications for disadvantaged children. *Children and Youth Services Review*, 156, 107339.  
<https://doi.org/https://doi.org/10.1016/j.childyouth.2023.107339>
- Unicef, & Seameo. (2019). *SEA-PLM 2019 Technical Standards*.  
<https://www.seaplm.org/PUBLICATIONS/technical%20documentation/sea-plm%202019%20technical%20standards.pdf>

- Van Laere, E., Aesaert, K., & van Braak, J. (2014). The Role of Students' Home Language in Science Achievement: A multilevel approach. *International Journal of Science Education*, 36(16), 2772-2794. <https://doi.org/10.1080/09500693.2014.936327>
- Yang Choy, Y. (2016). *Does Bilingualism Improve Academic Performance? Estimating the Relationship Between Foreign Languages Spoken at Home and Student Test Scores* [Georgetown University]. [hdl.handle.net/10822/1040847](https://hdl.handle.net/10822/1040847)