

Igarashi, Takiko; Suryadarma, Daniel; Yadav, Pooja

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LINGUISTIC DIVERSITY, SCHOOL LANGUAGE OF INSTRUCTION POLICY, AND LEARNING OUTCOMES ACROSS ASIA AND THE PACIFIC

Takiko Igarashi, Daniel Suryadarma, and
Pooja Yadav

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Takiko Igarashi is a project consultant and Daniel Suryadarma is a research fellow, both at the Asian Development Bank Institute, Tokyo, Japan. Pooja Yadav is a master's student at International University of Japan.

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Please contact the authors for information about this paper.

Email: tigarashi@adbi.org

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Asian Development Bank Institute
Kasumigaseki Building, 8th Floor
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

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Abstract

Children appear to learn better when taught in their mother tongue. This finding gives rise to an argument that mother tongue-based multilingual education could effectively improve learning outcomes in low- and middle-income countries. However, the challenges of implementing an effective multilingual education could prove prohibitive in countries with a high language diversity. Before embarking on the process of introducing multilingual education, policymakers should consider whether a correlation between language diversity and learning outcomes exists, and also, whether a particular language of instruction policy, monolingual or multilingual, correlates with learning outcomes. We construct a data set on the language of instruction policy across Asia and the Pacific and combine it with international assessment results. We find no evidence that countries with a richer linguistic diversity, controlling for income level, have significantly different learning levels. We also find evidence that learning outcomes are higher in countries with a monolingual education policy after controlling for income level and language diversity. Our findings imply that policymakers must seriously consider the potential challenges and benefits of a multilingual education policy before implementing it.

Keywords: linguistic diversity, language of instruction, learning, Asia and the Pacific

JEL Classification: I21, I28, Z13

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1. INTRODUCTION

Three thousand six hundred languages, or over 50% of all living languages in the world, are spoken in Asia and the Pacific (Eberhard, Simons, and Fennig 2019).¹ The Language Diversity Index (LDI) shows the average likelihood that two individuals drawn from the population randomly will have different native languages.² The average LDI in Asia and the Pacific is 0.47, ranging from 0.22 in East Asia to 0.40 in West and Central Asia, 0.45 in the Pacific, 0.64 in Southeast Asia, and 0.66 in South Asia. At the country level, Papua New Guinea has the highest LDI at 0.98, while the Republic of Korea has the lowest at 0.008.

Countries adopt one or a few official languages for laws, government, businesses, media, and social services. Singapore recognizes four official languages, the largest in the Asia and Pacific region, while many others use one or two official languages. The official language is instrumental in facilitating communication among various ethnolinguistic groups. The official language policy may also help unite citizens with diverse ethnic and linguistic backgrounds (World Bank 2021). The choice of official languages may also provide economic gains. Lu (2022) estimates that without the nationwide use of Mandarin in the People's Republic of China (PRC), real GDP per worker would have been 3.9% lower and regional inequality 1.5% higher.

Along with the decision to adopt single or multiple official languages, countries also determine the official language of instruction (LoI) in the public formal basic education system. International organizations and experts argue that a multilingual LoI policy would improve learning, especially the mastery of foundational skills. In considering whether a country should adopt a multilingual LoI, there are two fundamental questions for policymakers: is there a correlation between the number of languages spoken or linguistic diversity in a country with the country's education quality as proxied by students' learning outcomes? Does a particular LoI policy, monolingual or multilingual, correlate with learning outcomes?

We contribute to the policy discussion by empirically addressing the two questions above. We create a data set containing the number of languages spoken in a country and the official LoI policy for 51 countries in Asia and the Pacific. We then merge the data set with the Harmonized Learning Outcomes (HLO) database (Angrist et al. 2021) and the Linguistic Diversity Index data (Eberhard, Simons, and Fennig 2019).³

¹ In Asia and the Pacific, the average (median) number of languages is 88 (31). The number also varies by region. The average number of languages per country in East Asia is 49, while it is 93 in the Pacific, 108 in South Asia, 141 in Southeast Asia, and 33 in Central and West Asia. One out of every five countries possess over a hundred different languages. At the extreme end, Papua New Guinea and Indonesia are home to more than 700 languages.

² The following explanation is from UNESCO (2009): the LDI's highest possible value, 1, indicates total diversity (that is, no two people have the same mother tongue) while the lowest possible value, 0, indicates no diversity at all (that is, everyone has the same mother tongue). The computation of the diversity index is based on the population speaking each language as a proportion of the total population.

³ The HLO database covers the period 2000–2017 on an annual basis. It is an unbalanced panel data set of countries. On average, a country is observed four times. The minimum is one, and the maximum is 10. For each country, we compute the average score by subject (mathematics, reading, and science) and level (primary and secondary) across the whole period. Out of 47 countries in our data set, we could merge between 33 and 38 countries with the HLO database. In our sample, the mean (standard deviation) of the learning outcomes is: 490 (83) for mathematics, 425 (86) for reading, and 481 (74) for science.

The next section describes the language of instruction policy across Asia and the Pacific and the potential costs and benefits of multilingual education. Section 3 discusses the results of our analysis, and Section 4 concludes.

2. SCHOOL LANGUAGE OF INSTRUCTION POLICY IN A HETEROGENEOUS SOCIETY

Some countries do not officially declare the official instructional languages but use the most dominant languages as the de facto official Lol. There are several factors that affect the choice of Lol. Treffgarne (1981) and Jeffery and Beuningen (2019) list three interrelated considerations: whether the language reflects the identity of the nation, whether the language contributes to the preservation of authentic cultural heritage, and whether the language facilitates adjustment and modernization. Treffgarne (1981) also argues that the role of language has often been underestimated, though it is an efficient and equalizing means to expand education access and improve learning. The World Bank (2021) argues that while effective LOI policies are central to improving learning, the choice of Lol does not often consider which language is the most effective for children to learn.

Based on our scan across 51 countries in Asia and the Pacific, 37 countries adopt a monolingual education system, meaning that public schools use one language of instruction.⁴ The selected Lol is either local or international, such as English. Fourteen countries adopt multilingual education, referred to using two or more languages as the medium of instruction. Of those, nine countries use a bilingual Lol, and five have three or more Lols.⁵ Examples from each group are Tonga and Sri Lanka (bilingual), Uzbekistan and the Philippines (three or more), Bhutan, Mongolia, and Singapore (single).⁶ In particular, the Philippines has adopted mother tongue-based multilingual education since 2013, which has introduced 19 languages as official Lols, the largest number of Lols used in basic education across the region.

As the previous paragraph shows, over 70% of Asia and the Pacific countries choose a monolingual public education system despite the wealth of language diversity. The implication is that for children, especially those living in countries with significantly high language diversity, the chance that the Lol is the same as their mother tongue is relatively small. Globally, close to 40% of children in low- and middle-income countries do not learn in their mother tongue, and the proportion is 30% in South Asia and 37% in East Asia and the Pacific (UNESCO 2016).

Pinnock (2009) writes that if planned and resourced well, multilingual education can have a significant and positive impact on the access to, and quality of, education. UNESCO (2016) points out that children should be taught in a language they understand, and the World Bank (2021) states that children taught using their mother

⁴ The Asian Development Bank regional member countries are used as a basis: <https://www.adb.org/who-we-are/about#members>, with Micronesia and the Democratic People's Republic of Korea.

⁵ The actual implementation in the classroom varies by country. The policy is one of the following: (i) students are taught in one language in some grades and transition to a different language after reaching a certain grade; (ii) students are taught in one language for some subjects and another language in other subjects; or (iii) one language is used as the Lol in all subjects, but there are language subjects where students are taught those languages.

⁶ In the Philippines, students are taught in one out of 19 chosen mother tongues from kindergarten to grade 3, then Filipino and English are gradually used as Lol in grades 4–6, with Filipino and English being the only Lol from grade 7 (Enhanced Basic Education Act of 2013).

tongue would attain higher learning levels than those who learn in a different language. Also, there is the notion that the choice of Lol is more important for ethnic minority children. Teaching them in their mother tongue, at least for the first few years of formal schooling, would reduce the gap between ethnic minorities and the majority group.

Furthermore, UNICEF (2020) recommends that mother tongue-based multilingual education should be promoted before starting schooling. There is evidence that the average score in reading, writing, and mathematics measured by the Southeast Asia Primary Learning Metrics (SEA-PLM) is higher for early-grade students who speak the language of the test at home more frequently than for those who do not (UNICEF 2020). The Education Commission (2016) suggests that the introduction of mother tongue-based or bilingual instruction is one of the most cost-effective interventions, especially in the lower-middle-income country context.

Despite the recommendations from international organizations, shifting the Lol policy away from monolingual is rarely done in Asia. In two recent papers, Soh, Del Carpio, and Wang (2021) find that the performance of Malaysian students declined after the Lol of English was introduced in secondary schools to replace Malaysian.⁷ Available evidence shows significant logistical and substantive challenges in such a shift (Bender et al. 2005). These include four aspects: multilingual surroundings, problems with interpretation, deficiencies of informative instructional materials, and obedience to the central mission of multilingual education (Cabansag 2016). Another issue pertains to the unavailability of reading materials and insufficient teacher training, especially among those not well versed in the chosen mother tongues (Monje et al. 2021). A lack of proper vocabulary for technical terms is also a significant hindrance (Lartec et al. 2014; Metila, Pradilla, and Williams 2016). Furthermore, parental resistance has been reported in some countries as they are concerned that children's labor market prospects could be more limited if they are taught in minor languages instead of national or international languages (ACDP Secretariat 2014; Chimbutane and Reinikka 2023).

Countries with a high language diversity also face the problem of choosing the language(s) that will be a part of the Lol. The Philippines, which officially recognizes more than 180 languages in the country's population census, shifted from Filipino- and English-based bilingual instruction to offering 19 mother tongues as official Lols in kindergarten⁸ and Grades 1–3 in 2013. However, choosing which mother tongue to use is complicated, especially at the school level. Identifying the children's mother tongue is complex in Asia and the Pacific, a region without clearly delineated language borders and multiple variations of native languages. For instance, a local variation of a native language may not be well recognized and accepted by residents in neighboring areas though they are recognized as the same language in the education policy.

Also, a child's mother tongue often reflects the parents' belief regarding ethnic heritage language or identity, potentially leading to undermining the child's true language skills (Kosonen 2017). Before formal schooling starts, children are likely to be highly exposed to languages other than those chosen mother tongues used in primary schools through preschool programs offered in nonmother tongues or interactions with children and adults with other ethnolinguistic backgrounds in the same neighborhoods. There

⁷ In an example from Africa, Laitin, Ramachandran, and Walter (2019) evaluate a small pilot done by an NGO in Cameroon, and report a large and positive impact of learning in a local language in the initial years, but minimal long-term effects. But this is not a national Lol policy.

⁸ The public compulsory basic education in the Philippines consists of one-year kindergarten, six-year elementary, and six-year secondary levels.

may be challenges that language policies are disconnected between early-childhood education and development programs and basic education.

Even if the challenges above could be overcome, deciding which mother tongue to use is complicated in a classroom where the students have different mother tongues, which is common in many areas in the Asia and the Pacific region where people from different ethnicities cohabit. Children with a mother tongue different from the one chosen as the LoI would still need to learn a new language when developing foundational reading skills. It is unclear how the multilingual policy would benefit these students in such a case.

Finally, there are concerns over human resources. It is uncertain how teachers, who may not understand the official LoI chosen in the school, could learn it fast enough to teach using it. The policy may then require an accompanying teacher recruitment campaign and training programs. For all these reasons, a shift from a monolingual to a multilingual education system is likely to involve a long and uncertain adjustment process for teachers, students, and parents, which would be more pronounced in highly diverse areas.

3. THE CORRELATION BETWEEN LANGUAGE OF INSTRUCTION POLICY AND LEARNING OUTCOMES

As a first step to answer the two questions, we examine whether a country's linguistic conditions are related to its choice between mono- and multilingual systems. Figure 1 plots countries based on their LDI and the number of living languages, indicating whether they have adopted single- or multiple-LoI systems. Firstly, language varieties and linguistic diversity are positively but weakly related, except for several countries with over 200 native languages. Secondly, when controlling for a country's income level and population size, there is no statistically significant relationship between a country's linguistic condition and adopting a monolingual or multilingual LoI policy. These observations suggest that a country's LoI policy is independent of its linguistic conditions, such as varieties of native languages or linguistic diversity, and is instead driven by other factors.

We then address the first question about the correlation between a country's linguistic diversity and learning outcomes. A regression model where average student test scores in mathematics, reading, and science at the country level serve as dependent variables, and the linguistic condition, such as the number of spoken languages and the LDI, is the main independent variable, is estimated. We control for the school level tested (primary or secondary) and the income level of the country, using the World Bank categories of low-, lower-middle-, upper-middle-, and high-income countries.⁹ The income level of the country serves as a proxy for its economic development and institutional capability.

⁹ Two low-income countries are combined with lower-middle-income countries due to the lack of variations in these two countries.

Figure 1: The Number of Living Languages and Linguistic Diversity Index across Countries in Asia and the Pacific

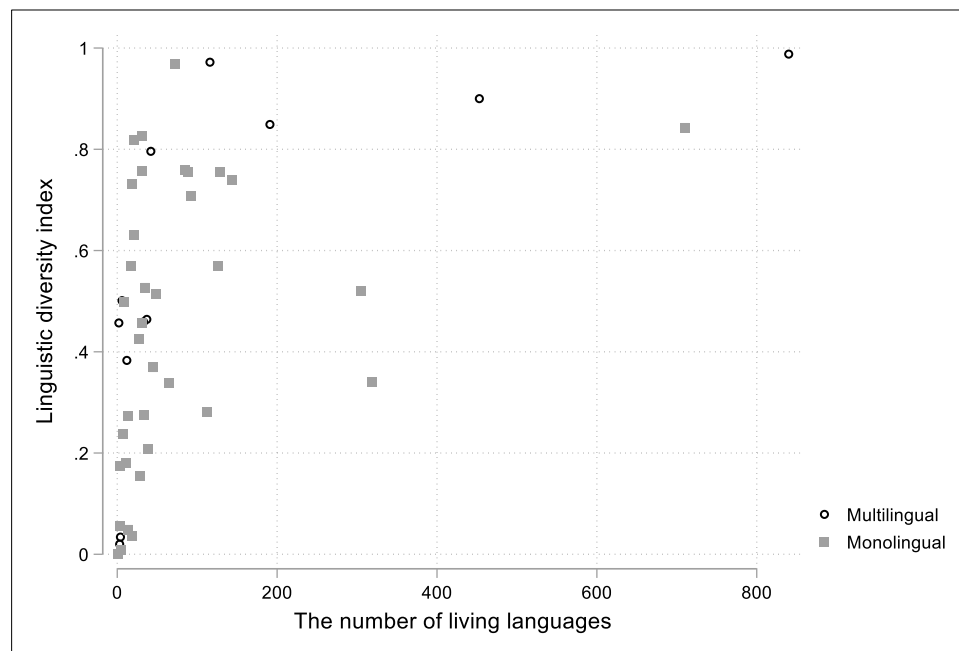


Table 1 shows the results. There are negative and statistically insignificant correlations between LDI and learning outcomes (Columns 1, 3, and 5 of Table 1). Relative to the mean learning outcomes, the estimated coefficients are very small and insignificant. We do not observe significant correlations either when we estimate the model separately for female and male students (Appendix Table 1). For robustness, we use the number of spoken languages to replace the LDI (columns 2, 4, and 6 of Table 1). The findings are qualitatively identical. Overall, there is no evidence that countries with richer linguistic diversity and variations, controlling for a country's income level and a school's level, have significantly different learning outcomes.

We then address whether a particular Lol policy, monolingual or multilingual, correlates with learning outcomes. To answer this, we augment the model by adding an independent binary variable that indicates whether a country uses a monolingual Lol policy. The estimated coefficient is the difference in estimated learning outcomes between a country that adopts a monolingual policy and a similar country in terms of income level that adopts a multilingual policy.

Table 2 presents the results. We find that countries with a monolingual policy score about 38.1 points higher in reading (statistically significant at 10%), or about 0.43 standard deviations, 70.9 points higher in mathematics, or about 0.91 standard deviations, and 81.0 points higher in science, or about 1.16 standard deviations, than countries implementing a multilingual policy (columns 1, 3, and 5) when countries' linguistic diversity and variation is controlled. The higher scores pertain to both female and male students' scores in mathematics and science (columns 3, 4, 5, and 6 of Appendix Table 2). For reading, we see a similarly positive and large correlation, but it is not statistically significant when estimated for female and male students separately (columns 1 and 2 of Appendix Table 2). The estimated coefficients for monolingual education are far more substantial and robust in mathematics and science than in reading. This indicates that academic achievement in mathematics and science may be

particularly vulnerable to a policy shift between monolingual and multilingual systems, and these differences are economically very significant.

Table 1: Linguistic Diversity and Learning Outcomes

	Average Reading Score		Average Mathematics Score		Average Science Score	
	(1)	(2)	(3)	(4)	(5)	(6)
Log (linguistic diversity index)	-0.869 (7.919)		-7.940 (6.746)		-3.886 (6.264)	
Log (number of spoken languages)		6.687 (6.146)		-5.338 (6.255)		-1.932 (5.877)
Country income level (ref: high income)						
Low income or lower middle income (Yes=1)	-164.305*** (20.904)	-172.768*** (21.126)	-147.549*** (20.881)	-149.170*** (21.542)	-135.241*** (19.390)	-137.066*** (19.935)
Upper middle income (Yes=1)	-95.441*** (22.910)	-98.682*** (22.535)	-87.336*** (17.837)	-90.313*** (17.639)	-81.391*** (16.857)	-82.912*** (16.725)
School level tested (ref: secondary)						
Primary level (Yes=1)	17.357 (18.207)	21.585 (18.353)	0.292 (15.294)	0.843 (15.437)	-10.222 (14.328)	-10.082 (14.392)
Constant	521.607*** (20.196)	498.574*** (27.680)	549.644*** (18.217)	581.506*** (24.987)	547.322*** (16.950)	560.721*** (23.514)
Number of observations	45	45	37	37	36	36
R-squared	0.640	0.650	0.697	0.691	0.681	0.678

Notes: *** 1% significance; ** 5% significance; * 10% significance; estimation method is ordinary least squares; standard errors in parentheses.

Table 2: Monolingual Language of Instruction Policy and Learning Outcomes

	Average Reading Score		Average Mathematics Score		Average Science Score	
	(1)	(2)	(3)	(4)	(5)	(6)
Monolingual (Yes=1)	38.057* (22.311)	35.143 (22.022)	70.936*** (23.115)	74.198*** (22.915)	81.029*** (24.943)	81.756*** (24.893)
Log (linguistic diversity index)	-2.511 (7.796)		-5.897 (6.039)		-1.793 (5.515)	
Log (number of spoken languages)		5.750 (6.059)		-5.898 (5.497)		-0.561 (5.141)
Country income level (ref: high income)						
Low income or lower middle income (Yes=1)	-148.848*** (22.342)	-158.463*** (22.585)	-119.254*** (20.742)	-116.166*** (21.491)	-102.167*** (19.775)	-103.179*** (20.212)
Upper middle income (Yes=1)	-90.982*** (22.534)	-94.747*** (22.249)	-83.745*** (15.914)	-84.846*** (15.583)	-82.949*** (14.746)	-83.837*** (14.584)
School level tested (ref: secondary)						
Primary (Yes=1)	17.813 (17.790)	21.477 (18.008)	-5.315 (13.731)	-5.216 (13.686)	-13.180 (12.560)	-13.115 (12.581)
Constant	480.941*** (30.946)	466.631*** (33.739)	485.037*** (26.570)	511.992*** (30.700)	471.477*** (27.653)	475.837*** (32.988)
Number of observations	45	45	37	37	36	36
R-squared	0.665	0.671	0.768	0.769	0.764	0.764

Notes: *** 1% significance; ** 5% significance; * 10% significance; estimation method is ordinary least squares; standard errors in parentheses.

4. CONCLUSION AND POLICY IMPLICATIONS

Our empirical results do not lend full support to the arguments for a multilingual Lol policy, using a sample of the countries in the Asia and the Pacific region. First, most countries adopt a monolingual Lol policy, and we show that a country's choice of a monolingual or multilingual system does not appear to be related to its linguistic diversity and variety. Second, we find no correlation between a country's linguistic diversity or varieties and its education quality as proxied by students' learning outcomes. Third, when countries' linguistic diversity and income levels are held constant, countries that implement monolingual education show substantially higher student performance, especially in mathematics and science.

It is widely recognized that most developing countries experience a learning crisis, where the majority of students complete five or more years of schooling without acquiring foundational numeracy or reading skills (Le Nestour, Moscoviz, and Sandefur 2022; World Bank et al. 2022). This shows that the capability to provide good-quality education to foster students' academic achievement remains limited in these countries. In such a low-capability situation, the chance of satisfactorily executing an education program that uses two or more languages is likely to be very low.

Having said the above, our results are correlational rather than causal. A more rigorous evaluation is needed, using a real policy reform or a carefully designed pilot with a reasonably large sample over medium- to long-term periods. Also, other methodological limitations are noted. First, due to data unavailability, we are unable to focus on ethnic minorities, the group that may benefit more from a multilingual policy, especially if the linguistic diversity within the group is low. Second, the data only allow us to examine average scores. It is important for future research to examine the association between Lol policy and learning inequality. Third, there are variations in multilingual education. This study focuses on the choice of Lol in primary and secondary education. There is also a monolingual school system in which children receive preschool programs in multiple languages in preparation for monolingual school systems.

Our analysis suggests several policy implications. First, policymakers must seriously consider the potential implementation obstacles and the chance of success before attempting to implement a multilingual education policy. There are benefits for children when taught in the most familiar languages, but this depends on whether they are given equal access to good-quality education across different languages. The net benefit may be significantly lower when essential educational input is chronically insufficient or not evenly available for certain languages.

Second, linguistic conditions differ across regions and countries. The number of spoken languages and linguistic diversity are positively but only moderately related. For instance, some countries have over a hundred native languages though their linguistic diversity is low, and others have fewer languages with very high linguistic diversity. A critical aspect for policymakers is how different linguistic groups coexist within a country. Furthermore, the choice of Lol used in schools should be responsive to children's skills across possible languages on entry into primary education. Depending on local contexts, children have developed oral proficiency in the lingua franca, besides their self-reported mother tongues, by the time they start primary school, especially in highly diverse areas. The priority in education policies should be to ensure that all children develop foundational skills.

Third, other kinds of reforms may be more effective and have a greater chance of improving learning outcomes as linguistic conditions do not appear to be related to student performances. In implementing a reform as foundational as changing the LoI, countries should be prepared to commit for the long term, which would require thorough preparation to minimize the negative impacts on children. Such reform may lower learning outcomes during the first few years following implementation, while its long-term impacts are yet to be proven.

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APPENDIX

Appendix Table 1: Linguistic Diversity and Student Learning Outcomes, by Sex

	Average Reading Score		Average Mathematics Score		Average Science Score	
	Female Students	Male Students	Female Students	Male Students	Female Students	Male Students
	(1)	(2)	(3)	(4)	(5)	(6)
Log (linguistic diversity index)	1.793 (8.235)	0.305 (7.948)	-8.604 (6.668)	-6.795 (6.501)	-4.221 (6.509)	-3.570 (6.034)
Low income and lower middle income (Yes=1)	-170.786*** (21.744)	-164.872*** (20.985)	-150.886*** (20.641)	-145.738*** (20.123)	-139.368*** (20.146)	-131.180*** (18.676)
Upper middle income (Yes=1)	-100.872*** (23.468)	-92.290*** (22.650)	-85.608*** (17.944)	-77.990*** (17.494)	-86.346*** (17.514)	-76.327*** (16.236)
Primary (Yes=1)	24.686 (18.727)	9.250 (18.074)	-4.957 (15.252)	-0.978 (14.869)	-10.598 (14.886)	-9.671 (13.800)
Constant	510.965*** (20.828)	538.752*** (20.101)	552.700*** (18.044)	550.409*** (17.591)	548.274*** (17.611)	546.165*** (16.326)
Number of observations	43	43	36	36	36	36
R-squared	0.641	0.654	0.715	0.703	0.681	0.681

Notes: *** 1% significance; ** 5% significance; * 10% significance; estimation method is ordinary least squares; standard errors in parentheses.

Appendix Table 2: Monolingual Language of Instruction Policy and Learning Outcomes, by Sex

	Average Reading Score		Average Mathematics Score		Average Science Score	
	Female Students	Male Students	Female Students	Male Students	Female Students	Male Students
	(1)	(2)	(3)	(4)	(5)	(6)
Monolingual (Yes=1)	36.734 (22.826)	38.174 (23.646)	64.489** (27.697)	71.950** (27.936)	77.797*** (24.051)	84.930*** (25.835)
Log (linguistic diversity index)	-1.525 (7.869)	-0.109 (8.152)	-5.130 (6.124)	-6.746 (6.177)	-1.561 (5.317)	-2.027 (5.712)
Low income and lower middle income (Yes=1)	-148.487*** (22.942)	-153.759*** (23.766)	-119.416*** (21.959)	-121.519*** (22.148)	-99.426*** (19.068)	-104.703*** (20.482)
Upper middle income (Yes=1)	-87.870*** (22.360)	-96.280*** (23.163)	-79.230*** (16.374)	-86.991*** (16.515)	-77.823*** (14.218)	-87.979*** (15.273)
Primary (Yes=1)	10.366 (17.721)	25.845 (18.357)	-3.332 (13.947)	-7.584 (14.067)	-12.511 (12.111)	-13.699 (13.009)
Constant	498.851*** (31.664)	469.500*** (32.801)	490.046*** (30.707)	485.354*** (30.972)	473.345*** (26.664)	468.777*** (28.642)
Number of observations	43	43	36	36	36	36
R-squared	0.676	0.665	0.748	0.767	0.764	0.765

Notes: *** 1% significance; ** 5% significance; * 10% significance; estimation method is ordinary least squares; standard errors in parentheses.