



All Children Reading—Philippines

Reading achievement in the Philippines: The role of language complexity

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List of Acronyms and Abbreviations

cwpm	correct words per minute
EGRA	Early Grade Reading Assessment
L	language
LOI	language of instruction
MTB-MLE	mother tongue-based multilingual education
ORF	oral reading fluency
RTI	RTI International
USAID	United States Agency for International Development

1 Overview

The following manuscript was prepared as a deliverable under the All Children Reading–Philippines project. In lieu of a traditional research report, we are submitting for approval this manuscript, which we intend to submit to an academic journal for publication. Prior clearance will be received from USAID/Philippines and the Department of Education before submission.

2 Manuscript

Reading achievement in the Philippines: The role of language complexity

Highlights

- Though there is a pattern suggesting higher reading achievement in L2 and L3 for learners whose mother tongues are less complex or more similar to the L2 (Filipino), language complexity is not a consistently significant as a predictor of reading achievement in the Philippines.

Abstract

This study looks at the impact of first language (L1, or “mother tongue”) complexity on reading achievement in the Philippines using Grade 3 Early Grade Reading Assessment (EGRA) data collected in 2013 and 2019. EGRA data were collected from 232 schools in 2013, when students learned to read in the national languages of Filipino and English. These data on English and Filipino performance were collected again in the same schools in 2019, when students would have, according to policy, learned to read first in their mother tongue.

The Philippines transitioned to mother tongue-based multilingual education (MTB-MLE) in 2012 after examining evidence from positive pilot experiences in the country. But there are many factors that may influence a child’s ability to acquire foundational reading skills besides the language of instruction. One rarely considered factor is the complexity of L1 and the role this may play in the time it takes to acquire foundational reading skills in L1 and, subsequently, L2 and L3. This study aims to fill that gap by presenting results of regression analyses undertaken on both the 2013 and the 2019 data sets through the lens of the complexity of the mother tongue and its impact on reading outcomes in Filipino and English.

Overall, there appears to be an association between reading achievement and language complexity (lower L2 and L3 reading achievement for students with a more complex L1). This analysis found language complexity to be a significant predictor of reading outcome, even when socioeconomic status and regional variation was controlled for, but it was not consistent across years, complexity groups, or L2 and L3 languages. No significant differences in reading achievement by language complexity were found in 2013 (when children learned to read in L2 and L3, not L1). The differences were more consistent in 2019. First, significantly lower achievement in English among those students with the most complex L1 compared to those with the least complex L1. In addition, significantly lower reading achievement in Filipino among all students, regardless of the complexity of their L1, in comparison to the achievement of those with the least complex L1 or control language. These differences suggest that there may be an L1 complexity threshold that must be reached before reading acquisition in L2 and L3 is negatively impacted. Consequently, language complexity should be a consideration when designing curricula and instruction and in interpreting assessment results. All children should be capable of learning to read regardless of L1 complexity, but it may require significantly more effort and more complex strategies to teach them.

Given that the findings were not consistently significant, All Filipino children can learn to read (or fail to learn) despite the complexity of their L1. Linear regression results show that there

are other factors more strongly associated with reading achievement, including student gender and socioeconomic status. Differences in education achievement must first and foremost be addressed by ensuring an equitable opportunity to learn for all, through access to quality instructional materials, effective teaching methods, and support for literacy development across homes, schools, and the community.

Keywords: reading, mother tongue, language complexity

3 Introduction

3.1 Problem statement

The evidence is clear: children are better able to acquire basic reading skills when they are taught to read in a familiar language (August & Shanahan, 2006; Evans & Mendez Acosta, 2020). Once they have mastered foundational reading skills in a familiar language (their mother tongue, or L1), they can transfer these skills to learning how to read in other languages (L2, L3)—ideally, at the same time as they acquire receptive and oral language proficiency in the L2. The Philippines provides an opportunity to analyze the transfer of reading skills from L1 to L2 and L3 from a unique perspective. We look at L2 and L3 Early Grade Reading Assessment (EGRA) outcomes at two points in time—in 2013 and 2019—before and after a national policy shift to mother tongue-based multilingual education (MTB-MLE). In 2013, Grade 3 students completed lower primary under the pre-MTB-MLE curriculum, which used only English and Filipino as the languages of instruction. In 2019, the Grade 3 students experienced the first three grades (and possibly kindergarten) under the MTB-MLE curriculum, which mandated students' L1 as the first language of literacy.

In 2019, Pouezevara, Pressley, and Cummiskey presented students' reading skills in Filipino (L2) and English (L3) at the end of Grade 3 in 2019 and compared the findings to those reported in 2013 (Pouezevara, DeStefano, & Cummiskey, 2013). The 2019 report noted a decrease in average Filipino and English reading fluency from 2013 to 2019 and a substantial increase in the proportion of zero scores (representing students who could not correctly read a single word of a short, grade-level reading passage). The actual reasons for the decline could not be deduced from the data, which were collected as a snapshot diagnostic of performance at two points in time (Gove & Wetterberg, 2011) rather than as an evaluation. However, the authors list possible reasons for the decline, including the reduction in instructional time for Filipino and English literacy; inconsistent implementation of the MTB-MLE policy; mismatch between the language of instruction and the learners' L1; lack of teaching and learning materials; and the otherwise low quality of reading instruction.

Besides these possibilities, the 2019 study team considered another reason for the declines, particularly evident by regional analysis: the orthographic complexity of first languages. The complexity of each mother tongue on its own might mean it takes more time to acquire the basic level of proficiency necessary to be able to transfer skills to learning to read in L2 and L3. Further, the relative “distance” between the characteristics of the mother tongue (different orthographical rules, for example) and those of the L2 and L3 might also explain why it would take longer to achieve the same level of proficiency under MTB-MLE.

This study attempts to determine whether or not the complexity of the L1 should be a factor in interpreting reading achievement in multilingual contexts, as well as in planning early grade reading teaching and learning materials and curricula in settings with complex languages. In addition, more specifically, we hope to reach a better understanding of the decline in average reading scores in L2 and L3 in the Philippines. Looking at L1 language complexity¹ as one factor in predicting L2 and L3 reading outcomes will help determine

¹ In this study, language “complexity” is defined in terms of factors that may make learning to read more difficult. This includes phonological, orthographical, and morphological characteristics and how different these are from the target L2 and L3 languages. This is discussed in greater detail below.

whether the ability to acquire L2 and L3 literacy is affected by the complexity of the mother tongue.

3.2 MTB-MLE in the Philippines

The Philippines is one of the most linguistically diverse countries in the world, with between 110 and 180 distinct languages, depending on how one defines a language, with no single language group accounting for more than 50% of the population (McEachern, 2013). The country has a long and complex history of language policy shifts that aim to recognize and respect the reality of linguistic diversity while addressing the need for a unifying national language. Executive Order 134 of 1937 established for the first time the notion of one national language, Pilipino, based on Tagalog, a Philippine language native to Manila and surrounding areas. Now known as “Filipino,” the 1987 Philippine Constitution defined the national language as one that should be enriched by other languages. Despite this ambition, Filipino’s structure and lexicon remain almost identical to Tagalog (Gonzalez, 1998; McFarland, 2004). Filipinos use the two words interchangeably or vacillate between using “Tagalog” to refer to the language as spoken in its native region, and “Filipino” in the context of its wider use across the country (McEachern, 2013). In basic education, “Tagalog” is the term used to designate one possible language of instruction under MTB-MLE and the subject of early language and literacy instruction in those schools. “Filipino” is a subject area introduced as a second language to all children in Grade 2 and becomes the language of instruction in select subjects in upper primary and beyond.

Although the establishment of a national language aimed to unify the country, there has also been increasing pressure to be fluent in English, the language perceived as necessary for international educational and economic opportunity. Former President Benigno Aquino was quoted as saying, “We should become trilingual as a country: learn English well and connect to the world; learn Filipino well and connect to our country; retain your mother tongue and connect to your heritage” (Villaneza, Ilaga, & Go, 2012). The current MTB-MLE curriculum introduced in 2012 (Republic of the Philippines Department of Education, 2012) and signed into law in 2013 (Republic of the Philippines, 2013) operationalizes this vision by requiring children’s mother tongues, or “languages understood by the learner” (p. 3) as media of instruction starting in kindergarten, with gradual introduction of Filipino and English in Grades 2 and 3 as subject areas of oral language and literacy development. The law allows for a transition period between Grades 4 and 6 when “Filipino and English shall be gradually introduced as languages of instruction until such a time when these two languages can become the primary languages of instruction at secondary level” (p. 3). However, in practice, teachers switch to English and Filipino as languages of instruction in Grade 4. Prior to 2012, the Philippines used an immersive bilingual language policy model, which used Filipino and English exclusively (depending on subject area) as media of instruction across all grades and including literacy development.

Several benefits from, as well as challenges to, implementation of MTB-MLE in the Philippines have been documented by researchers. Most challenges arise from the linguistic diversity of the country coupled with strong central government control of content and curriculum. On the positive side, Philippine researchers found mother-tongue instruction beneficial for teachers and students, because lessons can be explained more easily using students’ L1, resulting in deeper understanding; students participate more; and communication between students, teachers, and peers improves; there may be a positive effect on higher order thinking skills as well (Harden, Sowa, & Punjabi, 2020). On the other hand, inadequate teacher training in the pedagogy of reading in these languages, or a mismatch between teachers’ language fluency and the language of instruction they are assigned to, have been considered barriers to successful implementation (Alberto, Gabinete, & Rañola, 2016; De Los Reyes, 2018; Lartec, Belisario, & Bendanillo, 2014; Pouzevara, Pressley, & Cummiskey, 2019). These challenges may be compounded by the fact that some languages still lack adequate—in quality and quantity—teaching and learning materials, particularly subjects like mathematics and science that, traditionally, have been

taught in English (Alberto, Gabinete, & Rañola, 2016; Metila, Pradilla, & Williams, 2016; Medilo, Jr., 2016; Eslit, 2017; Estremera, 2017; Harden, Sowa, & Punjabi, 2020). The cumulative effect is that only a handful of languages can be supported adequately with early learning resources and teacher training, and matching students to a classroom and teacher that use “the language understood by the learner” is not always guaranteed. Due to these multiple influences, measurements of the effect of MTB-MLE on student learning outcomes often conclude that certain home- or classroom-level factors are associated with higher literacy outcomes some of the time, but as factors, they are not consistently significant across the country or at different times (Pouzevara, Pressley, & Cumiskey, 2019; Education Development Center, 2017).

Complexity exists at multiple levels in the Philippines; there is the complexity of implementing a nationwide MTB-MLE program in a language-diverse country; linguistic complexity, described in the next section; and sociolinguistic complexity. The latter refers to the way language is present and used in society and in the lives of children every day. Multiple languages exist side by side in a given community and are used interchangeably by the population; some, however, are spoken but rarely written, and others lack a print media history. These are sociolinguistic factors that may put some languages at a disadvantage when it comes to inclusion in education planning and materials. Dialectal variation also can become a challenge when a language evolves geographic variations; different words for the same objects have developed in several languages in this study. Having an entirely different word may not affect learning to read on its own, but it creates a challenging situation for curriculum and materials developers, teachers, and educational assessments or any other materials that would otherwise be mass produced. Authorities would have to ensure that the words that appear in tests and texts, as much as possible, would be words that are understood in all the dialects of the language. Naturally, larger, more urban and prestigious dialects may take precedence and put other, smaller languages or dialects at a disadvantage.

Attitudes among parents and teachers also affect the uptake and effective teaching of the mother tongue. This is the case in many countries (see Bunyi, 2008, for one example), but in the Philippines, languages have a perceived hierarchy of importance, resulting in some resistance to multilingual education (Belvis & Morauda-Gutierrez, 2019) and a bias toward learning English, the language considered necessary for economic success (Burton, 2013; Medilo, Jr, 2016; Parba, 2018; Schell, 2018). This study attempts to isolate only the effect of linguistic complexity.

The role of linguistic complexity in reading achievement

Students learning to read in a language familiar to them (often, the mother tongue) are able to use context and their knowledge of the language to decode new words (Adams, 1990; Cummins, 2007). If a student first gains academic and cognitive competencies in the language heard and spoken from birth, this language will be the easiest to learn how to read. However, “the language in which literacy skills are acquired first, *regardless of language status* (L1 or L2), helps literacy acquisition in other languages” (Kim & Piper, 2018, emphasis added). This principle is important in the context of the Philippines, where even under MTB-MLE, some children from minority language communities may be placed in schools where the language of instruction does not match the language spoken at home. Children must have time to sufficiently master the first language of literacy; “early-exit” programs (programs that do not spend sufficient time to allow students to master bedrock reading skills in L1) may lead to underachievement because students do not have time to develop sufficient cognitive, linguistic, and academic skills prior to the switch (Boateng, 2019, p. 2). In a recent study undertaken in Uganda (Brunette et al., 2019), language complexity was found to be a stronger predictor of L1 reading achievement than either socioeconomic factors or implementation fidelity.

Literacy acquisition can be influenced by orthographical (spelling), phonological (pronunciation), morphological (units of meaning), and sociolinguistic (exposure to literacy

day-to-day) language complexity. The most basic theory of reading acquisition states that for alphabetic languages students must learn to associate sounds, or phonemes, with the corresponding written symbol—the grapheme. Learning letter-sound correspondence and the ability to manipulate sounds in words has been shown to be a strong predictor of later reading achievement (Dubeck & Gove, 2015). Some orthographies are easier to learn than others (Borleffs, Maassen, Lyytinen, & Zwarts, 2019), particularly depending on the degree of “transparency,” meaning whether there is a consistent one-to-one relationship between letters and sounds. There is considerable evidence that the rules of transparent orthographies are acquired more easily than those of opaque ones (Borleffs et al., 2019). As summarized in the EGRA Toolkit (RTI International, 2016): “a child learning to read in a consistent, transparent orthography of a language with relatively low phoneme inventory, simple syllable structures, and short average word lengths will be at an advantage for mastering the letter-sound mappings and decoding skills more rapidly than a child learning to read in a language with an opaque orthography, many irregularities, many phonemes, complex syllable structures, and long average word lengths” (p. 22).

Learning letter-sound correspondence is highly dependent on one’s mastery of the oral language and its phonology (sound inventory), which is acquired in ones’ home language well before literacy learning begins (Milledge & Blythe, 2019). Reading is the process of mapping phonological and semantic knowledge onto the orthographic forms of words (Frost, 1998). Learning grapheme-phoneme correspondence can be made more complex by a given language’s rules for graphemic parsing (determining whether a sound is represented by a letter or a letter cluster) and its phonotactic regularity (the likelihood a sequence of sounds will occur). Common sound sequences are learned more quickly (Storkel, 2001). Consequently, this knowledge helps children identify new or unfamiliar words and add new words to their lexicon more quickly, because they are based on known phonological patterns. Coady and Aslin (2004) explain “the more similar a new word is to other words already in the lexicon, the more readily it will be learned. Presumably, then, learning will be facilitated for those words that contain the more frequent sounds and sound combinations” (p. 207). Storkel (2001) also noted that older children have been found to be more sensitive to larger units of sound (like diphones). This may have implications for instructional sequencing of literacy tasks, particularly for non-native languages for which the phonology is not learned from birth.

Other properties of a language that may influence how hard or easy it is to learn include morphological complexity and word length. Morphemes are the smallest unit of meaning of a word, for example, word roots, prefixes, and suffixes. Being able to read a root word will facilitate reading words based on the same root (Elbro & Arnbak, 1996), thus morphological awareness is also correlated with word reading ability in some languages and continues to be an important skill for reading development in upper grades after basic decoding has been acquired (Borleffs et al., 2019). Brunette et al. (2019) noted that the average length of words may affect reading outcomes and is an important factor in interpreting the traditional measurement of reading fluency in the form of correct words per minute (cwpm).

Agglutination (when affixes attach to root words) in a language can affect word length (Abadzi, 2012), and all Philippine languages are agglutinative. However, both small and large amounts of morphology can attach to a root word; therefore this characteristic alone does not necessarily result in longer word length, particularly for early reading materials. Agglutination has more of an effect in higher-level written materials (like bible translations, newspaper articles), whereas the most common scenario in readings for the lower primary grades would be a two-syllable verbal root, and one or two affixes consisting of a single syllable each. As a result, in readings for the lower primary grades, most verbs are going to be three or four syllables long, whether in a morphologically “less-complex” language like Cebuano or a morphologically “more-complex” language like Bikol or Waray (Lobel & Pouezevara, 2020).

4 Methodology

4.1 Data collection

This study involved secondary analysis of two existing data sets from identical studies carried out by RTI International in the Philippines in the same schools, 7 years apart. The sample for the first study in 2013 was a stratified three-stage sample of divisions, schools, and then Grade 3 students. The country was divided into six "super-regions" roughly corresponding to the major island groups and population centers—North Luzon, South Luzon, Metro Manila, Visayas, Mindanao, and the Autonomous Region in Muslim Mindanao.² Ten divisions were selected per super-region from the government's official information system using systematic random sampling, with probability proportional to Grade 1 enrollment. A total of 56 divisions were included, from which 241 schools were randomly sampled (40 schools per super-region). On the day of data collection, field assessors randomly sampled 10 Grade 3 students from each school with equal probability selection, stratified by gender such that 5 boys and 5 girls were selected with equal probability. A total of 2,463 students were assessed in 2013. In 2019, assessors returned to the same schools and randomly selected students on the day of data collection. Only nine schools were different from the 2013 sample due to school closures or other issues and these schools were excluded from this analysis. The final 2019 sample included 2,385 students. Data collection in both instances took place over approximately two weeks at the same time of the year (the end of February) by RTI-trained assessors made up of local education authorities and professional survey researchers.

In both 2013 and 2019, all participating children completed one English assessment and one Filipino assessment administered according to standard EGRA protocols (RTI, 2016). Tasks for both languages consisted of the following: listening comprehension, letter-sound identification (for English only in 2019), nonword reading, short story reading with comprehension questions based on the story, and sentence dictation. In 2019, children read the same story read in 2013 and a new story of similar difficulty. The order of administration of the language assessments alternated, as did the order of administration of the two stories in 2019.

The measures included in our analyses were oral reading fluency (ORF) and zero scores for oral reading, reading comprehension, and ability to read 20 cwpm or more, as described in **Table 1**. Other data collection instruments included a learner context interview, which asked students questions about preschool attendance and other family and home characteristics.

² Between the two surveys, the region boundary and name changed to Bangsamoro Autonomous Region in Muslim Mindanao. For convenience only, we continue to use the geographic label that matches the 2013 data set and report.

Table 1: Summary of EGRA measures used in this analysis

Subtask and unit of measure	What is measured	How measured
Oral reading fluency (cwpm)	The ability to read connected text	Number of words read correctly in a short story by a single student in 1 minute; length of passages was tailored by language to a length considered readable in 1 minute
Oral reading fluency (zero score)	Dichotomous: student read at least one word correctly or not	Binary score based on each student's ability to read at least one word in Filipino and English
Reading comprehension (percentage correct)	The ability to comprehend reading passages associated with a timed reading assessment	Percentage of questions answered correctly (based on how far the student had read in the passage)

4.2 Defining language complexity categories

Before we can discuss the role of language complexity in predicting reading outcomes, it is important to first understand the differences in orthographic complexity among the languages in our study and determine whether they can reasonably be grouped into complexity categories. To establish a value for complexity for each language and language complexity groupings, the study team reviewed phonological, orthographical, morphological, and sociolinguistic factors that influence reading acquisition and scored for each language (Lobel & Pouezevara, 2020).

In determining the phonological complexity of each language, both absolute and relative factors were considered, including the number of vowels and consonants, the number of phonemes (vowels and consonants), and the number of word-internal consonant clusters in the core vocabulary of each language. Other aspects of phonology considered included phonemic word stress, occurrence of phonemic long vowels independent of word stress, whether consonant gemination is allowed, the maximum number of phonemes per syllable in the native vocabulary, whether voice register exists in the language, and the degree to which phonotactic alternations are found in the language.

Orthographical factors included were the number of graphemes used, the degree of irregularity in the orthography, the number of non-transparent graphemes, and the number of digraphs found in the orthography. Morphological factors included whether or not each language had an imperative mood and/or a subjunctive mood, the total number of verb moods in the language, the degree of morphological irregularity, the degree of morphophonemic alternations, and the total degree of affix complexity. Finally, sociolinguistic factors included availability of newspapers and/or magazines in the language; commercial availability of non-religious books; and whether a Bible or Qur'an translation was available in the language.

The aforementioned factors were scored individually and then languages were placed into one of three groups based on the degree of complexity of the language. Complexity Group 1 consisted only of Tagalog, which served as the control. The rationale for this was that, according to the curriculum, the second language of literacy instruction was Filipino, so the study team surmised that students whose first language of literacy was closest to Filipino in complexity would be at an advantage. Tagalog is fundamentally the same language as

Filipino (see 1.2 above), so children who began kindergarten in a school that used Tagalog as the language of instruction had up to twice as much instructional exposure to the L2. Complexity Group 2 included Central Bikol, Sinugbuanong Binisaya (Cebuano), Hiligaynon (Ilonggo), Bahasa Sug (Tausug), and Waray. The most complex languages were placed in complexity Group 3 and included Magindanawn, Kapampangan, Ilokano, and Mëranaw.³ The complexity groups and languages in each group are shown in **Table 2**.⁴

Table 2: Language complexity categories

Complexity group	Languages in each group
Group 1	Tagalog
Group 2	Central Bikol, Sinugbuanong Binisaya, Hiligaynon, Bahasa Sug, Waray
Group 3	Ilokano, Kapampangan, Magindanawn, Mëranaw

4.3 Methods of analysis

Simple demographic checks comparing the student population in 2013 and 2019 were completed to ensure there were no major shifts in the student population that could impact the results. **Table 3** below summarizes this basic demographic information collected from 2013 and 2019. We found no drastic shifts in the demographic composition of the student population regarding gender and the proportion of the pupils speaking a particular language at home,⁵ with two exceptions. First, the proportion of children who reported speaking Bikol at home decreased from 33.3% to 5.4%, and children who reported speaking Sinugbuanong Binisaya at home increased from 8.2% to 24.1%. The reason for the shift likely had to do with inconsistencies in the terminologies that individuals used to refer to their own home language and consequently the way the language was encoded during data collection. Since both of these languages are in the same complexity grouping (Group 2), this should not impact the results. There was also a small but significant decline in the average age of the students—from 9.3 in 2013 to 8.6 in 2019, and, consequently, the number of students who were overage for grade decreased, and the number who had attended kindergarten increased. These shifts were likely due to a change in policy toward automatic promotion and an emphasis on universal access to kindergarten as part of the kindergarten to Grade 12 reforms (Republic of the Philippines, 2013).

³ There were initially 4 groups, with Mëranaw in Complexity Group 4, but that category was subsequently combined with Complexity Group 3 due to sample size limitations. The study authors recognize that many alternative language names and spellings exist, and those published here do not reflect any preference by RTI or USAID.

⁴ Three languages—Ivatan, Sambal, and Pangasinan—were excluded from the analysis due to the low number of schools in the sample.

⁵ It should be noted that there was also an option for the students to report “other” for the language spoken at home. In 2013, 22% of the learners reported “other,” in 2019 18% selected this option. Four percent responded that they did not know in 2013; in 2019 7% responded that way. Additional languages were also included as response options in the survey, but those have been omitted from our analyses.

Table 3. Demographics of the study population in 2013 and 2019

	2013 n = 2267	2019 n = 2214
Average age (years)	9.3 [±.1]	8.6 [±.1]
	Percent [Confidence Interval]	
Percentage of girls	46.8 [±1.3]	48.2 [±1.1]
Proportion of students who said they speak this language at home		
Tagalog/Filipino	38.3 [±6.0]	43.9 [±6.9]
Central Bikol	33.3 [±8.4]	5.4 [±4.7]
Cebuano/Sinugbuanong Binisaya	8.2 [±6.1]	24.1 [±6.1]
Hiligaynon	2.6 [±1.8]	5.3 [±3.8]
Ilokano	6.7 [±4.3]	9.3 [±4.3]
Tausug	—	3 [±2.3]
Waray	2.6 [±3.5]	3.9 [±3.5]
Magindanawn	1.8 [±1.5]	.9 [±.9]
Kapampangan	1.6 [±2.2]	1.5 [±2.3]
Mëranaw	2.2 [±1.5]	2.1 [±1.5]

The next step was to conduct exploratory analyses on the school-reported language of instruction (LOI) and student-reported home language. School LOI data were only collected in 2019 since all schools were instructing in Filipino when data were collected in 2013. Since the same schools were visited in both years, the school LOI reported in 2019 was applied to the 2013 data for the same schools to make a simple comparison across years (the assumption being that school LOI was established based on the predominant language of the community, which was not expected to have changed significantly in this period of time).

After grouping the school data based on the complexity categorizations, the team conducted basic weighted analysis and generated cumulative distributions by language complexity category and year. Linear and logistic regression models were used to control for factors known to impact reading ability at the individual student level and that we had data for— including gender, socioeconomic status, and availability of reading materials in the home. The models also controlled for 2013 outcomes.

After analyzing the data from both years, it became clear that the relationship between language complexity and L2 and L3 achievement would not be expected to exist in 2013 due to the lack of the MTB-MLE policy at that time. Reviewing the output by language complexity grouping for 2019 only, a pattern became apparent. Using the 2019-only data, regression models were finalized, and a relationship emerged. Discussion of these findings is included in the section below.

5 Findings

5.1 ORF scores by complexity group

After determining the existence of sufficient variation in orthographic complexity and grouping the languages by complexity level, the analysis turned to the differences in reading achievement by complexity level.

Table 4 shows ORF scores (cwpm) in L2 (Filipino) and L3 (English) in 2013 and 2019 by L1 language complexity grouping.

Table 4: English and Filipino ORF score (cwpm) by language complexity group, 2013 and 2019

	English		Filipino	
	2013	2019	2013	2019
Group 1 (least complex)	70.2	63.7	75.0	70.4
Group 2	67.3	55.4	67.0	57.3*
Group 3 (most complex)	65.9	49.0*	66.4	54.8*

* = significantly different from control (Group 1)

In 2013, English and Filipino average ORF scores were lower for the more complex languages (Groups 2 and 3) than for Group 1 (control). But the differences ranging from 2.9 fewer words read correctly (67.3 cwpm) for complexity Group 2 and 8.3 (65.9 cwpm) for complexity Group 3 for English were small and statistically insignificant compared to the average of 70.2 cwpm for Group 1. For Filipino in 2013, the variation was larger than that found in English but still not significant—complexity Group 2 read, on average, 8.6 fewer words and complexity Group 3 read 7 fewer words compared to Group 1 (which read, on average, 75.0 cwpm in Filipino). As mentioned earlier, in 2013, Grade 3 children had not been taught to read in their mother tongue, so the effect of complexity is largely speculative and may indicate a baseline difference attributable to other factors.

In 2019, after implementation of the MTB-MLE mandate, Grade 3 learners had L1 instruction since Grade 1, and the pattern of higher complexity L1 groups' showing lower achievement in both English and Filipino was more pronounced. The difference between Group 3 students, who read on average 49.0 cwpm in English and Group 1, who read 63.7 cwpm, was 14.7 cwpm. This difference was statistically significant. Group 2 read, on average, 55.4 cwpm in English. In Filipino in 2019, Group 3 read 54.8 cwpm, Group 2 read 57.3 cwpm, and Group 1 read 70.4 cwpm. Scores in both Group 2 and Group 3 were significantly lower than those in Group 1, but they were not considerably different from each other.

English and Filipino ORF scores declined from 2013 to 2019 across language complexity groups, but it decreased the most for Group 3. For English, in Group 1, it declined by 6.5 cwpm (from 70.2 to 63.7), for Group 3 it declined by 16.9 cwpm (from 65.9 to 49.0). In Filipino, Group 1 declined by 4.6 cwpm (from 75.0 to 70.4), while Group 3 declined by 11.6 cwpm (from 66.4 to 54.8).

Table 5 shows the results of the linear regression analysis, which looked at ORF scores in English and Filipino only in 2019,⁶ controlling for student demographics, including gender, socioeconomic status, school absenteeism, student age for grade, the presence of a Filipino/English reading textbook in the home, and teachers' assigning homework in

⁶ 2013 was dropped from this analysis due to the small variability in ORF scores by language complexity grouping.

Filipino/English.⁷ The numbers in each column indicate how many correct words per minute more or fewer than Tagalog (Group 1) a student read if they had the attribute of the row. For example, girls in language complexity Group 2 read on average 16.37 cwpm more than boys in the same language complexity group, controlling for all other factors listed (boys and girls would have the same attributes from this list).

Table 5: Linear regression: ORF scores by language complexity controlling for student demographics, English and Filipino, 2019

Characteristic	Filipino	English
Language complexity (compared to complexity Group 1)		
Group 2	-8.40**	-2.40
Group 3	-9.35**	-8.17*
Girls (compared to boys)	16.37***	15.06***
Student's socioeconomic status (compared to low)		
Mid-low	7.28**	9.17**
Mid-high	11.58***	15.38***
High	21.97***	28.92***
Student was absent from school in the past week	-5.53**	-5.46**
Student is overage for grade	—	-9.76**
Has Filipino reading textbook at home	3.50	—
Has English reading textbook at home	8.07***	10.44***
Teacher assigns reading homework in Filipino	4.54*	—
Teacher assigns reading homework in English	5.07*	5.75**

* p-value <0.05; ** p-values<0.01; *** p-value<0.001

Controlling for demographic factors, a smaller decline was seen when comparing ORF scores for complexity Groups 2 and 3 to the control in both English and Filipino than was found when comparing averages. Both Group 2 and Group 3 showed a statistically significant reduction in Filipino ORF scores, but the scores did not differ meaningfully from one another (i.e., a difference of one word per minute between Group 2 and Group 3 was not discernable in practice). Students in complexity Group 2 read 8.4 fewer words compared to Group 1, and those in Group 3 read 9.35 fewer words compared to the control. It should be noted that this difference was greater than the impact of being absent from school in the past week (which was associated with a 5.53 decrease in ORF score).

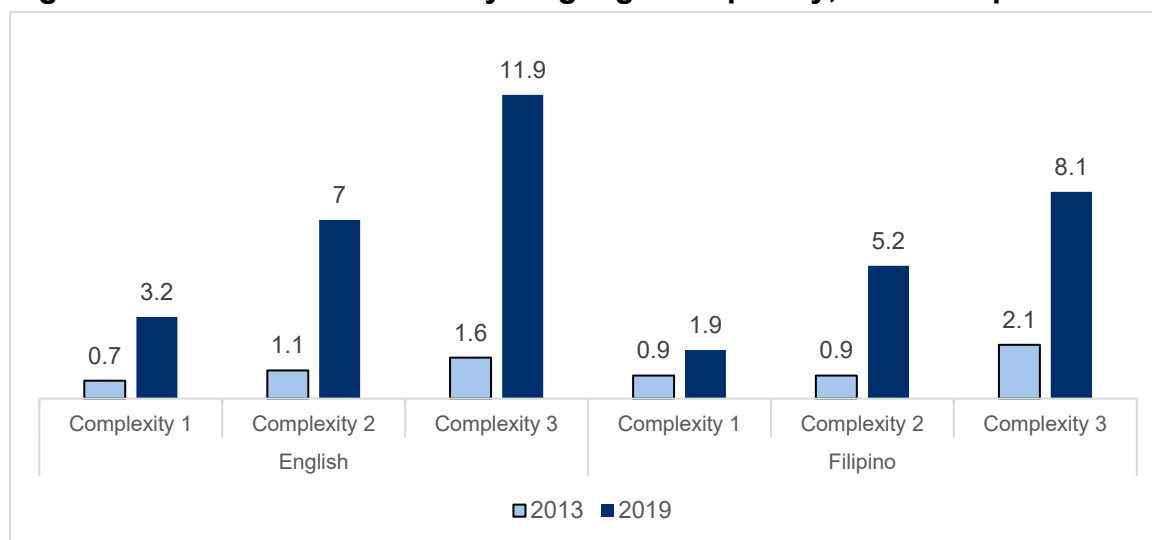
In English, only Group 3 complexity was significantly lower than the control; Group 3 learners read 8.17 fewer words compared to Group 1/control. The decrease associated with language complexity for Group 3 was higher than the decrease associated with being absent from school the past week and comparable to the decrease associated with being overage for grade.

⁷ Variables that were dropped from the model due to lack of variation include student repetition, preschool attendance, someone reads to child at home, and language spoken at home.

5.2 ORF zero scores by language group

Correct words per minute tell us something about the ease with which a student reads a given passage, but performance from one passage to another can vary for the same student depending on vocabulary or particularities of word choice in that passage. Therefore, another useful way to verify patterns in reading achievement is to look at the proportion of learners who could not read a single word of the passage at all. These students are attributed a “zero score” on the ORF measure. Although the declines in oral reading fluency could be considered to be in the normal range of variation, it is more difficult to explain the increase in zero scores, but it appears that something about the switch to MTB-MLE is leaving a considerable amount of children behind—even if this is only a short-term phenomenon as the system makes this major transition. ORF zero scores by language complexity grouping in 2013 and 2019 are shown in **Figure 1**.

Figure 1. ORF zero scores by language complexity, 2013 compared to 2019



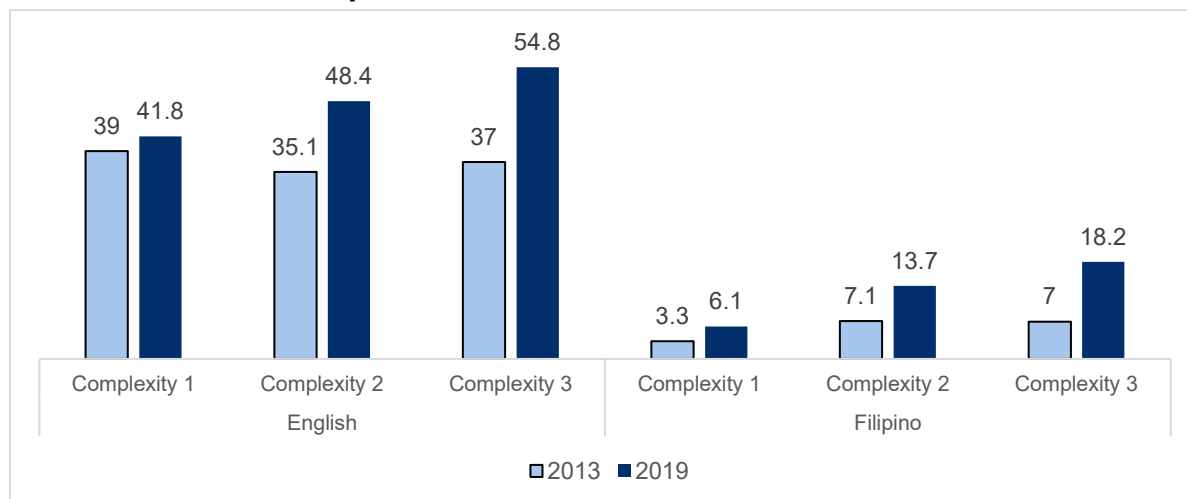
Analysis by zero scores in ORF yields a similar finding to the ORF analysis: no meaningful differences by complexity in the proportion of zero scores in both English and Filipino in 2013 (light bars above), but increasing percentages of zero scores by complexity group in 2019 (dark bars). In 2013, the differences in ORF zero scores in English ranged from 0.7% in Group 1, 1.1% in Group 2, to 1.6% in Group 3—less than one percentage point difference across the categories (no statistically significant differences). In 2019, ORF zero scores ranged from 3.2% in the control Group 1 to 7% in complexity Group 2 and 11.9% in complexity Group 3—a range of 8.7 percentage points (the difference between Group 1 and Group 3 was statistically significant). A similar pattern was found for ORF zero scores in Filipino, which ranged from 0.9 to 2.1 by complexity level in 2013 and from 1.9 to 8.1 by complexity level in 2019. In 2019, 1.9% of Tagalog mother-tongue students could not read a single word of the Filipino reading passage, but that was the case for 5.2% of students in complexity Group 2 and 8.1% of learners in complexity Group 3 (the difference between Group 1 and Group 3 was statistically significant).

5.3 Reading comprehension scores by language group

Figure 2 shows reading comprehension zero scores by language complexity group in 2013 and 2019 for both English and Filipino. A zero score was attributed to a student who failed to answer even one comprehension question correctly. Similar to oral reading fluency and ORF zero scores, there was little difference in reading comprehension zero scores by complexity group in 2013. For English, in 2013, 39% of control/Group 1 students scored zero compared to 35% in Group 2 and 37% in Group 3 (no statistically significant differences). In 2019 there was greater variation with 41.8% of learners scoring zero in reading comprehension in

English in the control/Group 1, 48.4% in Group 2, and 54.8% in Group 3 (none of these differences was statistically significant). In Filipino in 2013, 3.3% of control learners scored zero in reading comprehension compared to 7.1% of Group 2 learners and 7 % of Group 3 learners. In 2019, complexity Group 2 learners were almost 3 times more likely to score zero in reading comprehension compared to Group 1 learners—6.1% compared to 18.2% (the differences between Group 1 and both Group 2 and Group 3 were all statistically significant).

Figure 2. Reading comprehension zero scores by language complexity, 2013 compared to 2019



6 Discussion

6.1 The effect of language complexity on reading scores

This study was the first of its kind to look at L1 language complexity as a predictor of L2 and L3 reading achievement in the Philippines. Using data on L2 and L3 reading achievement collected from Grade 3 learners in the Philippines before and after implementation of a shift to mother tongue reading instruction, this study set out to provide insight into the effect of language complexity in acquiring foundational reading skills in L2 and L3. After in-depth analysis, L1 orthographies were scored and classified into one of three language complexity groups. Analysis found significant differences by orthographic complexity group in reading achievement (as measured by oral reading fluency, ORF zero scores, and reading comprehension in both Filipino and English) in 2019 but not 2013.

Overall, although there appears to be an association between reading achievement and language complexity (lower L2 and L3 reading achievement for students with more complex L1), this analysis found language complexity to, in some instances, be a significant predictor of reading outcome, even when socioeconomic status and regional variation was controlled for, but it was not consistent across years, complexity groups, or L2 and L3.

As mentioned above, additional complexity is introduced in the implementation of MTB-MLE at scale in and of itself. The complex properties of some of the languages of the Philippines and the sociolinguistic characteristics of the populations speaking these languages add to the complexity of providing reading instruction and realizing gains in reading achievement. Although several sociolinguistic factors were included in the language categorization, these were very general and did not take into account, for example, the extent to which a given student was exposed to a literate environment, to parents or a teacher supportive of learning in the mother tongue, or to teaching and learning resources in a consistent orthography.

To better understand these results beyond simple linguistic properties of the languages, the discussion looks at findings over time and for English and Filipino separately.

Finding: No significant differences in 2013

No significant differences in reading achievement by language complexity were found in 2013, which is unsurprising. Since children were not learning to read in L1 in 2013, the orthographic complexity of their L1 would not have come into play as they were learning to read in L2 and L3. It is possible that something unique to the phonology or oral language development may impede L2 or L3 language acquisition and subsequent mastery of letter-sound knowledge, but this is only speculative. Although we did see a pattern where Group 1 (Tagalog) had the highest average ORF score and lowest proportion of zero scores, this difference was not statistically significant. Therefore, the data suggest that students in all language groups, regardless of complexity, can learn to read Filipino and English to the same extent (under the particular set of circumstances that were present in 2013).

Finding: Lower achievement found for Groups 2 and 3 in 2019 relative to Filipino

Because Tagalog and Filipino are largely the same language (see above), Tagalog on its own does not actually have a lower level of complexity than some of the Group 2 languages. However, it remains a non-native language for which children need to acquire some basic oral fluency before applying the mechanics of reading successfully. Group 2 languages are much more similar to Tagalog in phonology and orthographic depth than are those of Group 3. Therefore, the pattern of lower achievement for the most complex category supports the notion that complexity has an influence on how quickly ORF is acquired in L2. It should be noted, however, that the difference observed was not large—only 2.5 cwpm.

Finding: Lower achievement found for Group 3 only in 2019 relative to English

As we have described, languages are objectively complex in their own right, but they are also more or less alike compared to the L2 and L3 to which the student is applying L1 competency. Unlike the situation described above, where Groups 2 and 3 were different from each other, but still bore resemblance to Group 1 (being from the same language family), all languages were equally “different” from English. In 2019, the data showed significantly lower reading achievement only for the most complex languages grouped together as Group 3. This difference was also very large, at more than 14 cwpm. This suggests that there might be some complexity threshold that must be reached to negatively impact L3 (in this case) reading acquisition.

Summary

The differences noted in 2019—significant differences between Group 1 and Group 3 in English and between Group 1 and Groups 2 and 3 in Filipino—suggest that orthographic complexity negatively impacted reading achievement, but it may not have been a uniform or linear relationship.

The lack of variation in reading achievement by orthographic complexity group in 2013, prior to the introduction of MTB-MLE, contrasted to the significant variation found in 2019, could indicate that the introduction of MTB-MLE potentially increased inequities in reading acquisition and achievement for those learning to read in complex languages. This is on top of the other factors associated with inequity (including gender and socioeconomic status) that already existed for many learners.

Based on the key findings discussed above, although there seems to be an association overall and language complexity contributed to lower reading achievement in some instances, it appears that all Filipino children can learn to read (or fail to learn) despite the nature of their L1. L1 did not have a consistently negative association with reading outcomes, and it was not as strong as other factors (including gender and socioeconomic status) that we believe can all be overcome to ensure all students learn to read.

6.2 Limitations

The data were not collected in 2013 or 2019 to be disaggregated or analyzed by school LOI or language complexity. In fact, data on school LOI were not recorded in 2013 and had to be extrapolated from the 2019 data. This study would have been stronger had we assessed students in their L1 at both points in time. It is important to note that although we did find variation in orthographic complexity distinctive enough to group languages into one of three complexity categories, Philippine languages did not demonstrate the high level of variation in complexity found in other contexts (as found in Brunette et al., 2019, for example, which compared Ugandan languages). The languages included in this analysis were all of Austronesian origin (Lobel & Pouezevara, 2020) and had similar properties, like the degree of agglutination. However, the average word length in the reading passage used in the assessment, varied only by two to three words across the languages. One language, Mëranaw, although more complex than others according to our definition, had an insufficient sample size to be analyzed on its own, and, therefore, was merged into the closest category to it. The language most different from any other Philippine language—Chavacano, a creole of Spanish origin—was not included at all because there were no sampled schools from the dataset using that LOI. A more nuanced categorization of languages might have yielded different results.

As described, in the introductory section, the language context in the Philippines makes implementation of MTB-MLE challenging, and these factors cannot be completely isolated from the inherent properties of the languages. For example, children might not have been in a classroom that used an LOI that matched their home language, or changing and often contested orthographies of the languages could mean that schools were teaching reading using an orthography that did not match the one used to assign the category for this report. Finally, languages are inherently linked to geographies and other factors that may be associated with educational inequality, and though some factors could be controlled for (e.g., socioeconomic status and urban or rural location) it was not possible to control for all.

7 Conclusions

The existence of EGRA data collected from the same schools before and after the implementation of the MTB-MLE policy enabled us to study the impact of L1 complexity on reading achievement in L2 and L3.

We have discussed many limitations in this study, one of which was isolating linguistic complexity from other complex and dynamic influences on students—particularly the complexity of translating a major national policy reform into changes in classroom practice. Overall declines in reading achievement found between 2013 and 2019 might have simply resulted from the increased complexity in implementing a multilingual program and “growing pains” as the system transitioned from bilingual instruction to L1 instruction before the requisite pieces were in place—including teachers well versed and trained to teach in L1 and accompanying teaching and learning materials.

Significant differences in L2 and L3 reading achievement by language complexity group were found in 2019 (lower achievement among students with the most complex L1) greater than the effect of absenteeism and about the same as being overage (for English); these could contribute to existing inequities in access to quality learning and achievement. That being said, the properties of a language have very little agency on their own; how they are deliberately translated into instructional practice for each language is key. Therefore, the quality of teaching and learning and characteristics of the home environment are more likely to be the most important factors for learning in any language. The study findings point to the inequalities in education achievement that must be addressed by ensuring equal opportunity to learn for all, through access to quality instructional materials; teaching methods; and support for literacy development across homes, schools, and the community.

A better understanding of other drivers of inequalities in learning outcomes, including the consideration of language complexity, is an important first step to addressing the challenge of inequity. Each mother tongue needs and deserves a unique and well thought out instructional approach and materials that take into consideration phonology, orthography, and morphology, among other properties, as well as the particular history, culture, and sociolinguistic properties of the language in society. Equally important is design of a unique bridging strategy for to learning to read in L2 and L3 for each language.

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