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Examining the secondary effects of mother-tongue literacy instruction in Kenya: Impacts on student learning in English, Kiswahili, and mathematics

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ABSTRACT

Limited rigorous evidence is available from sub-Saharan Africa regarding whether children who learn to read in their mother tongue will have higher learning outcomes in other subjects. A randomised controlled trial of mother-tongue literacy instruction, the Primary Math and Reading (PRIMR) Initiative, was implemented in Kenya from 2013 to 2014. We compared the impacts of the PRIMR mother-tongue treatment group in two languages with those of another group that did not use mother tongue, but utilised the same instructional components. Results showed that assignment to the mother-tongue group had no additional benefits for English or Kiswahili learning outcomes beyond the non-mother-tongue group, and that the mother-tongue group had somewhat lower mathematics outcomes. Classroom observational analysis showed that assignment to the mother-tongue group had only small impacts on the usage of mother tongue in other subjects. Advocates for mother-tongue programmes must consider such results alongside local implementation resistance in programme design.

1. Introduction

Across the developing world, countries face challenges in improving learning outcomes. Several of the targets for the new Sustainable Development Goals focus on education quality, or more specifically, literacy and numeracy (United Nations, 2015). Yet, there is little consensus as to *how* countries can achieve these goals, given limited human and financial resources.

The issue of language of instruction is central to the debate around improving instructional quality and student achievement in multilingual countries. Researchers conducting theory-based studies in the United States and other developed countries have built a body of evidence demonstrating that children learn to read most easily in their mother tongue, and that skills they acquire while learning to read in that language transfer to learning to read in other languages, at least to some extent (Cummins, 1979; Melby-Lervåg and Lervåg, 2011). A small but growing body of research from the Global South suggests that mother-tongue literacy outcomes can be improved at medium scale (Piper et al., 2016; Taylor and von Fintel, 2016). However, in sub-Saharan Africa, there are disconnects among theory-based recommendations, policy, and practice (Clegg and Simpson, 2016). Even when a government's official policy mandates initial literacy instruction in a mother tongue, as it does in Kenya, such mandates are often disregarded at the local level (Piper and Miksic, 2011; Trudell and Piper, 2014). One of the main reasons that stakeholders resist the implementation of mother-tongue instruction is their fear that it will somehow harm students' acquisition of English and other subjects seen as more valuable and prestigious for students (Jones, 2012; Trudell, 2007).

This study, drawing on data from the Primary Mathematics and Reading (PRIMR) Initiative in Kenya, aims to provide rigorous evidence as to whether mother-tongue instruction has effects on student learning beyond first-language literacy. Specifically, we examine the outcomes of students participating in two versions of PRIMR – the base programme and a version including mother-tongue literacy instruction – on assessments of English, Kiswahili, and mathematics skills. Showing that mother-tongue literacy instruction is helpful, or at least not harmful, to student performance in other valued subjects may be the crucial element in building support among stakeholders for broader mother-tongue instruction, in alignment with current literacy acquisition research and theory.

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2. Background and context

2.1. Theoretical benefits of mother-tongue instruction

In previous published work that was based on PRIMR data, we showed that mother-tongue literacy instruction can be effective, even in settings where community support for mother-tongue instruction is weak (Piper et al., 2016d).

A critical aspect to building support from community members – as opposed to researchers or policy makers – for mother tongue is showing that this instruction will not result in poorer outcomes in other critical subjects seen as central to student success. One study using national data from more than 9000 South African schools, including some that had changed their early grade language policies between 2007 and 2011, found that children who were taught in their mother tongue in the first three grades of primary school did *better* on an English exam in grades 4, 5 and 6 than children who were taught in English in the early grades (Taylor and von Fintel, 2016). However, very little causal evidence is available from sub-Saharan Africa that helps to make this case, as few programmes have experimentally tested this approach at scale and against a high-quality, non-mother-tongue alternative intervention.

There are two ways in which mother-tongue instruction could be helpful in learning other subjects. First, mother tongue could be used directly for teaching mathematics or science, for example. Using a familiar grammatical structure and vocabulary likely would enhance student understanding of new material. Incorporating mother-tongue instruction into courses often taught in a second or third language could be particularly useful where students' knowledge of the language of instruction is very low (Clegg and Simpson, 2016). Second, skills learned in mother-tongue literacy classes may indirectly lead to improved outcomes in English and other language courses through the transfer of specific literacy skills across languages. For example, once students learn that letters have associated sounds in the mother tongue, they can apply the same principle when learning additional languages. Cummins's interdependence hypothesis (1979, 2001) argues that the 'common underlying proficiency' developed while learning to read in one language is beneficial in the learning of subsequent languages (Cummins, 2007, 232).

A great deal of research has been conducted on the transfer of literacy skills from one language to another among multilingual children, largely in the United States, Canada and other developed countries (August and Shanahan, 2006; Ball, 2010). Studies have found correlations between English and Spanish phonological awareness skills in kindergarten (Atwill et al., 2007; Atwill et al., 2010) and preschool (Dickinson et al., 2004) in the United States, as well as between French and English phonological awareness among kindergarten-aged children in Quebec (Chiang and Rvachew, 2007). There is evidence of skill transfer across different types of languages and alphabets – English and Chinese (Ke and Xiao, 2015; Shum et al., 2016; Siu and Ho, 2015; Yeung and Chan, 2013), and English and Korean (Wang et al., 2009), for example. In a meta-analysis of 47 studies, Melby-Lervåg and Lervåg (2011) found a correlation between decoding skills in children's first and second languages ($r = 0.54$, 95% confidence interval [0.41, 0.65]) as well as a correlation between phonological awareness in the first oral language (L1) and decoding skills in the second language (L2) ($r = 0.44$, 95% confidence interval [0.27, 0.59]).

In a study with relevance to the Kenyan context, De Sousa et al. (2010) examined language skill transfer among 60 South African second graders, including 30 native Zulu-speaking children who were learning English. The latter group were not literate in Zulu. However, several aspects of phonological awareness, including rime detection, letter sound awareness, and syllable segmentation were correlated with English spelling, using both real words and non-words. In another study of 60 third graders in South Africa, De Sousa et al. (2011) found a relationship between spelling in English and Afrikaans, using a test of words and non-words. Other work from outside the developed world has drawn attention to the additional complexity of language transfer issues in multilingual environments. For example, Mishra and Stainthorp (2007), in a study of phonological awareness and word reading in India, noted that these relationships may differ when the first language a student learns to read is not the same as the first oral language. In the complex linguistic environments of Kenya and other sub-Saharan African countries, such situations are common.

Some researchers have critiqued correlational studies which purport to demonstrate transfer, as most do not explain the directionality of any observed effect and cannot discount the possibility of an alternative common cause (Goodrich et al., 2013). In an experimental study, Goodrich et al. (2013) found that phonological awareness was correlated across languages. However, when they examined the relationship between initial skills and growth over the course of the intervention, the authors found only moderate support for cross-language skill transfer. In contrast, in a three-year longitudinal study of native Inuktitut-speaking children learning in English or French in Canada, Usborne et al. (2009) found further evidence for transfer, as well as for the directionality of that transfer from the mother tongue to the second language. Similarly, in Malawi, Shin et al. (2015) found that over the course of a year, the English reading and writing scores of students in grades 2 and 3 were predicted by their Chichewa literacy skills.

The Kenyan setting has recently produced relatively surprising findings related to the interactions between mother tongue and English language outcomes. Learning outcomes in English and a Nilotic language in Kenya were higher than outcomes in English and a Nilotic language just over the border in Uganda, although the Kenyan system did not follow the mother-tongue policy, while the Ugandan system did (Piper and Miksic, 2011). Longitudinal bilingual research from Kenya has shown that the directionality of the language transfer in Kenya is not in line with the assumptions of this previous research (Kim and Piper, 2017). Instead of the expected Kiswahili-to-English language transfer, this research suggests that in the language-complex Kenyan environment, some skills actually transfer from English to Kiswahili in grade 1. Therefore, the hypotheses made by proponents of mother-tongue literacy instruction may not hold in the Kenyan setting.

There are few studies from developing countries that examine the impact of numeracy programmes in early primary school (Piper et al., 2016a), and even fewer that examine the impact of a mother-tongue programme on learning outcomes in mathematics. A notable exception in Cambodia (Lee et al., 2015) examined the effects of a bilingual programme on learning outcomes in Khmer (the second language) and on mathematics on a set of bilingual schools compared with other schools that taught only in Khmer. Early Grade Reading Assessment (EGRA) results showed no statistically significant impacts on literacy in Khmer, but other assessments revealed impacts on learning in mathematics. The study did not indicate whether the treatment groups used random selection and random assignment, and the treatment group was in a relatively small number of 50 schools, yet this is the strongest evidence available in the published literature that a bilingual or mother-tongue programme can have an impact on other subjects.

2.2. Practical challenges of implementing mother-tongue literacy instruction

Although the research discussed above clearly shows a link between literacy skills in mother tongue and in subsequent languages, there remains significant resistance to mother-tongue literacy instruction in practice in much of sub-Saharan Africa. Transfer theory is often not well understood by parents and teachers, and their preference remains immersion in the language of broader communication (Bunyi, 2005). The continued focus on former colonial languages in the region – English, French and Portuguese – as the languages of examinations and higher