Distributional Effects of Life-wide Learning - Evidence from a Field Experiment in Rwanda

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A growing concern among the global community committed to education is that while enrollment and attendance has improved in developing countries, students are not getting the reading, writing, and literacy skills foundational to education. According to UNESCO (2017), more than 617 million children and adolescents are not achieving minimum proficiency levels (MPLs) in reading and mathematics, regardless of enrollment and attendance in schools. Repeated attempts to affect student learning exclusively through schools via curriculum design, school accountability, or teacher training have largely failed (Ganiman & Murnane, 2016; Kim, Boyle, Zulkowski & Nakamura, 2016; Kremer, Brannen, & Glennerster, 2013; Pritchett, 2013).

In order to enhance school experiences with wider community activities, Save the Children adopted an educational approach they termed 'Life-wide learning' (LWL) (Friedlander, Dowd, Borisova, & Guajardo, 2012). LWL posits that children are capable of learning not just during school hours, but outside of school as well, and seeks to involve parents, siblings, community members, as well as traditional school staff to improve children's cognitive growth and learning (Friedlander et al., 2012). In this paper, I use secondary data from a Literacy Boost randomized control trial (RCT) in Rwanda that incorporates the LWL framework. The experiment had two treatment arms: a school-only (SO) intervention that provided reading materials to students in school, and pedagogical training to teachers to improve students' reading outcomes; and an LWL intervention, in which students, in addition to SO activities, engaged in reading awareness workshops, were paired with reading buddies, attended reading clubs, borrowed books from book banks in school and the community, and created reading materials during workshops to take home. Their parents were engaged in reading awareness workshops. These treatment arms can be compared against a control group that did not receive any treatment.[1]

I hypothesize that estimating mean program impact or average treatment effect may mask important effects along the distribution of the outcome. There is ambiguity in theory on what the distributional effects may look like. For example, those at the lower end of the distribution of reading outcomes may, according to the regression to the mean argument, make more marginal gains when exposed to Literacy Boost. On the other hand, we may see Mathew effects, if those already at the top of the distribution of outcomes benefit more from the interventions because they have skills that interact positively with the intervention. In this paper, I explore these distributional differences to understand who benefits from both in and out-of-school reading improvement techniques provided to teachers, parents, and community members. I exploit the non-normal distribution of the outcome constructs (Oral Comprehension, Reading Fluency, and Reading Comprehension) to understand how students at different quantiles of the distribution for outcomes respond to treatment.

I leverage data collected from the original RCT from Literacy Boost. Students were eligible for inclusion in the study sample if they were enrolled in P.1 in the 2013 school year. A random sample of students from P.1 was assessed on reading in each of the 85 schools at baseline and endline. 1668 students out of 2041 were measured at endline. From the reading assessments, three composite scores for Oral

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[1] Intent-to-treat analysis conducted by Friedlander and Goldenberg (2016) suggests that students in LWL and SO groups performed better on reading constructs compared to students in the control group.
[2] Oral comprehension and Reading comprehension scores are sum total of the standardized scores in the Kinyarwanda Productive Vocabulary and Listening Comprehension, and Kinyarwanda Reading

Comprehension, Reading Comprehension, and Reading Fluency were created.[2] All outcomes have high inter-rater agreement and high Cronbach's alpha. The data are skewed right for Text Comprehension, and skewed left for the Reading Fluency construct.

I estimate unconditional quantile treatment effects (QTE), which only depend on the distribution of Y as opposed to the joint distribution of dependent and (observed and unobserved) independent variables (Firpo, Fortin, and Lemiuex, 2009). Since we know that the treatment is randomized, and, therefore, independent from potential outcomes and covariates, a simple comparison of the distribution of Y has a causal interpretation. Moreover, unconditional QTE do not rely on functional form assumptions. I first estimate unconditional QTE using no covariates. However, we do know that students who can read at baseline may have limited room to improve their reading skills. In order to control for this, and to improve the precision of my estimates, I estimate a second set of models controlling for baseline scores. Essentially, I minimize a sum of asymmetrically weighted absolute residuals for three functions: first, to compare LWL and control, second, to compare SO and control, and third, to compare LWL and SO.

Preliminary results show that the effects of being in the LWL group differ across the distribution of outcomes. For example, the intent-to-treat effect size of the LWL intervention compared to control group on Text Comprehension is 0.30 (Friedlander & Goldenberg, 2016). However, we see that across the distribution those at the 10^{th} percentile do not gain from the intervention at all, but there is a positive and significant impact of approximately 0.60 of a standard deviation on Text Comprehension at the 20^{th} and 30^{th} percentile of the distribution. The effects begin to diminish at we go up the quantiles. It seems students who started out with fewer skills may be making greater gains.

Most applied policy work is concerned with mean effects but as I have shown, the distribution of the dependent variable may be incompletely revealed by an exploration of mean effects. In the case of Literacy Boost, from a policy perspective, it is important to know if the program helped those who are already doing well on reading outcomes or did the gains come from those most in need, underserved, or struggling readers. The program can then be tailored to meet the needs of different types of readers.

[2] Oral comprehension and Reading comprehension scores are sum total of the standardized scores in the Kinyarwanda Productive Vocabulary and Listening Comprehension, and Kinyarwanda Reading Comprehension and Cloze subsections of the reading assessment, respectively. Reading Fluency is the sum total of the standardized words correct per minute of each passage in the assessment.

References

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