

# Making the Grade: Understanding What Works for Teaching Literacy in Rural Uganda

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The paper evaluates a primary literacy programme in rural Northern Uganda for Primary 1-Primary 3 pupils using a randomized experiment. The paper compares two methods for implementing the early primary literacy programme: a programme as implemented by the organisation that created it (Mango Tree) vs. a reduced-cost version of the programme that was implemented directly through government using Coordinating Centre Tutors. The literacy programme combines multiple educational components including a mother-tongue-first instructional approach, a revised curriculum, locally appropriate teaching materials, teacher support and training, and parent engagement. The reduced-cost programme version is studied in order to help shed light on issues of scalability and cost-effectiveness. It is implemented at significantly lower cost, by conducting teacher training and monitoring through Coordinating Centre Tutors – government employees charged with training and supporting primary school teachers in Uganda. Results from this study suggest it is one of the most successful primary education interventions ever studied, with an increase in learning in treatment schools by 1.3 standard deviations in reading in Leblango, the local language, among pupils.

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## **Introduction**

### *Problem Statement*

The Lango Sub-region of Northern Uganda faces a wide range of challenges in education. The pupil teacher ratio for primary schools is 59:1 but certainly higher in lower primary classes. The pupil to classroom ratio is 91:1. The dropout rate is around 30 percent and pupil and teacher absenteeism is rampant. An SNV report calculated that on any given day 35 percent of the teachers are absent. These challenges have led to an adult literacy rate of just 65 percent. The sub-region is home mainly to the Langi, a tribe who speak Leblango, but reading (at the start of the study) was uniformly taught in English.

These challenges have been aggravated by the devastating civil war led by the Lord's Resistance Army from 1987 to 2007. Whole communities fled their homes and spent years in internally displaced peoples (IDP) camps, stagnating all areas of social development in the sub-region including education. Schools were abandoned, ransacked and were falling into disrepair when the Mango Tree project first began.

### *Key Challenge: Improving Literacy Acquisition*

Despite successful nationwide drives to get Ugandan children to attend school, assessment data of pupil performance reveals that many pupils are not mastering the basic skills of reading. An assessment of early grade reading conducted by RTI in 2009 at the start of Mango Tree's project showed that over 80 percent of P2 pupils in the Lango Sub-region were non-readers, meaning that they could not read a single letter of a paragraph; another assessment from November 2010 found that nearly 100 percent of P1 pupils were unable to recognize and read a single letter.

Psychology research shows that English-language literacy skills develop more quickly when pupils are taught initially in their mother tongue, rather than beginning by attempting to read and write English (Pinnock 2009a, Pinnock 2009b, Gove and Cvelich 2011). However, reading is uniformly taught in English in the Lango Sub-region, and not in the pupils' mother tongue, Leblango.

### *Intervention: The Literacy Laboratory Project*

The aim of this paper is to provide the most recent results on the evaluation of the Mango Tree's Literacy Programme, an innovative approach developed by Mango Tree Educational Enterprises Uganda, which seeks to address these challenges by emphasizing mother-tongue-first literacy education. The programme focuses on P1-P3 students, and includes Lango-language instructional materials and intensive teacher training and support. The programme's approach is based on well-established educational research and is being rigorously evaluated using a randomized controlled trial (RCT) approach. The RCT framework

overcomes problems of confounding and reverse causality by randomly assigning the treatments in question. This ensures that the measured effect of the programme is solely due to the programme itself and not other factors. The RCT design assure the gain of additional insights by evaluating both a “full treatment” which comprises the entire programme as implemented directly by Mango Tree’s field team, and a “partial treatment” which is implemented by government through Coordinating Centre Tutors at a reduced cost.

In 2013, the original RCT began with the purpose of studying the Mango Tree Literacy Programme, which was geared that academic year toward Primary 1 pupils. Each of the 38 schools selected for the study in the Lango sub-region were randomly placed in the categories of full treatment, partial treatment, or no treatment schools using a public lottery with local government officials, head teachers and school chairpersons. Students were randomly selected for the study and tested through baseline and endline literacy and math assessments that year.

Based on the extremely promising results from the 2013 study, the programme was scaled up in 2014 to include an additional 90 schools, for a total of 128 schools enrolled in the larger programme and study. In 2014, Primary 1 students were again the target group for the intervention and research. A new cohort of entering Primary 1 pupils in all 128 schools were enrolled in the study in 2014. The same Primary 1 teachers in the initial 38 schools from 2013 were enrolled in the study again in 2014, and they received an additional year of training and support supervision. A new cohort of Primary 1 teachers in the addition 90 schools added in 2014 were also enrolled in the study.

The students of the original Primary 1 teachers from the 38 schools in 2013 were also evaluated as they advanced to Primary 2 to determine the learning outcomes that could be attributed after one year of initial support. We continued to follow this first cohort of students although none of their subsequent teachers after the initial year were receiving treatment in the form of training and support supervision. The rationale behind this was that we were interested in studying the effect that only one year of a highly successful intervention had on their continued learning outcomes

## **Results**

### *Cumulative Education Impact*

Mango Tree’s programme succeeded in substantially improving the teaching of literacy in early primary grades, ultimately resulting in children in Primary 3 in target schools obtaining meaningful and relevant reading and writing skills in Leblango and English. End of year testing demonstrated substantial reading gains for pupils in Primary 3 – far above pupils in non-supported government schools and well above the

results of other similar literacy studies among pupils and schools in the Lango Sub-region.

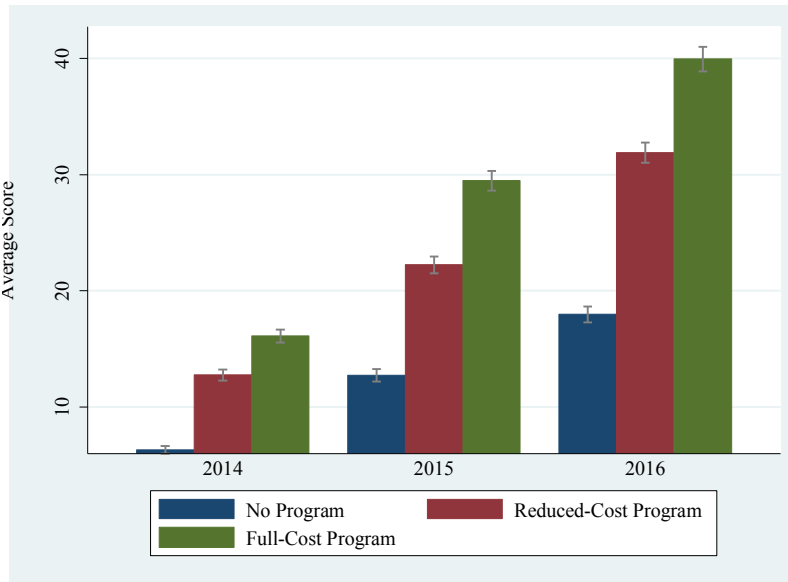
The graphs below demonstrate the cumulative effect the programme has had on pupil reading outcomes from 2014 to 2016, including letters identified per minute, words read per minute (in oral reading fluency tests) and reading comprehension (following oral reading fluency tests). In all of the graphs in this paper, ‘no programme’ schools are control schools. ‘Reduced-cost programme’ schools include schools and teachers supported only by government teacher tutors, or Coordinating Centre Tutors (CCTs), at a reduced cost for implementation. Reduced-cost programme schools still received the same number of trainings and materials, just a cheaper implementation using government staff. ‘Full-cost programme’ schools are supported by Mango Tree’s field staff using the same materials, training and support approaches as reduced-cost schools, just a different delivery mechanism via Mango Tree’s staff.

Scores demonstrate large gains in learning of over 1.7 Standard Deviations per test for pupils in the full cost treatment arm (where the programme was implemented in a cohort of schools by Mango Tree’s field officers). We also learned that scaling up the programme from 38 schools in 2013 to 128 schools from 2014-2016 did not diminish effects on learning – pupil gains persisted at equal levels each year, resulting in large cumulative learning gains by the end of Primary 3 for pupils in our cohort.

Significant gains were also realized through the reduced cost programme arm (where the programme was implemented in a separate cohort of schools by CCTs). The results for both treatment arms are significant, as Mango Tree tracked pupils individually throughout the project each programme year (meaning the same pupils enrolled in Primary 1 in 2014 were tracked in terms of their learning gains through Primary 3 in 2016). The graphs below therefore demonstrate learning gains among the same group of pupils each calendar year from Primary 1 to Primary 3.

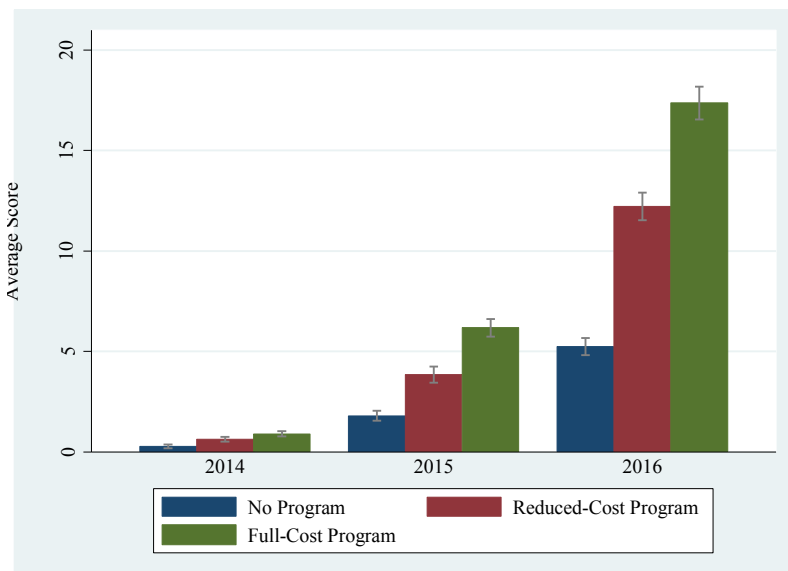
The following graph shows the cumulative effect on the numbers of letters per minute that the average pupil in each treatment arm could read by the end of Primary 1, 2 and 3 from 2014 to 2016. One can see clearly that the effect sizes continue to compound after each year. By 2016, pupils in the full cost programme can read more than 50 percent more letters per minute than the pupils whose schools did not receive the intervention. Pupils in reduced cost schools are also doing considerably better than those from the no programme schools. It should be noted that this graph represents average scores, including students who were non-readers. When non-readers are eliminated from the graphs, the cumulative effects rise considerably for full cost and reduced cost programme schools.

### Cumulative Effect on Letters per Minute

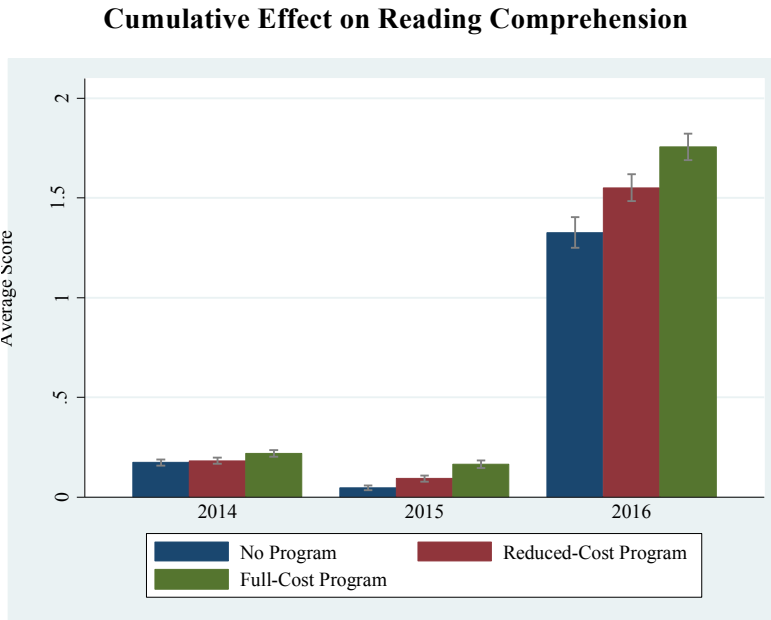


The next graph shows the cumulative effect on the number of words per minute that the average pupil in each treatment arm could read by the end of Primary 1, 2 and 3 from 2014 to 2016. Again, effect sizes for full cost programme schools are impressive, more than triple that of the control schools. The pupils from the reduced cost programme schools also outperform the no programme schools by more than double. It should be noted that this graph represents average scores, including students who were non-readers. When non-readers are eliminated from the graphs, the cumulative effects rise considerably for full cost and reduced cost programme schools.

### Cumulative Effect on Words per Minute



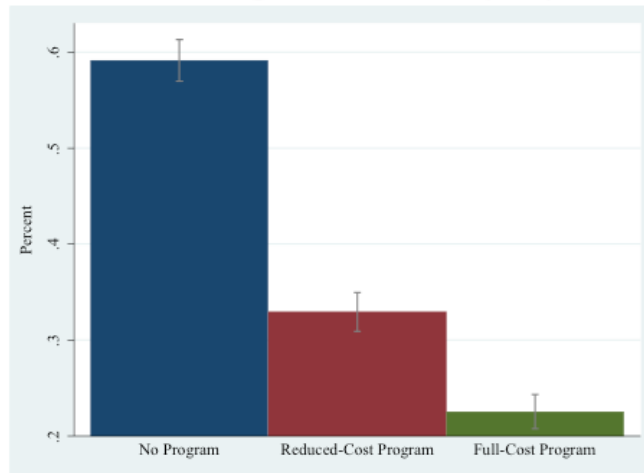
The cumulative effect on reading comprehension in the years 2014-2016 is shown below aggregated by treatment arms. The full cost programme outperforms the schools with the reduced cost programme and those that do not receive the programme.



*Primary 3 Pupils' Education Impact*

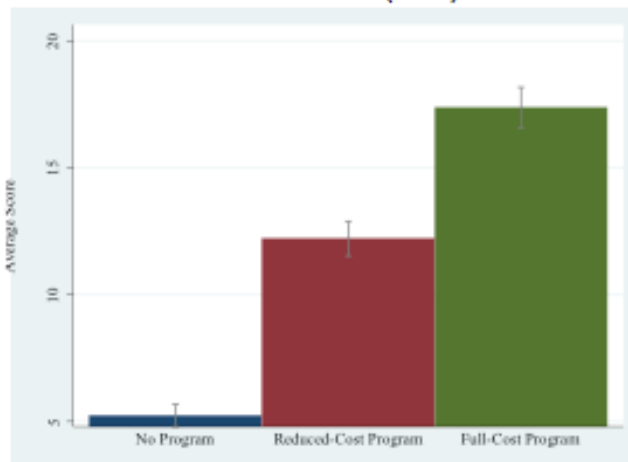
The graph below illustrates the outcomes on learning that the Mango Tree intervention had in the past year 2016. We find that the number of non-readers, pupils who cannot recognize a single word, varies significantly between treatment arms. On average, almost 60 percent of pupils without the literacy intervention are non-readers. In the reduced-cost programme, the number drops drastically by nearly 30 percentage points; this means that in 2016, a little over 30 percent of pupils in the reduced-cost programme are non-readers. In the full-cost programme, there is an even more dramatic decrease in non-readers. In 2016, just over 20 percent of pupils in the full-cost programme remain as non-readers. This is an important educational outcome to measure, as a reduction in the number of non-readers indicates an overall shift in learning gains for pupils in the study, who are transitioning along the reading continuum and growing their ability to recognise letters and words in text.

**P3 Percentage of Non-Readers (2016)**



The next graph shows the differences in treatment arms for the number of words identified per minute by P3 pupils. In the no programme schools, P3 pupils can only identify on average 5 words per minute. In the reduced cost programme, the number of words identified increases to 13 words per minute. The biggest gains can be seen from the full-cost programme where the word count per minute jumps to around 17 words. It should be noted that this graph represents average scores, including students who were non-readers. When non-readers are eliminated from the graphs, the cumulative effects rise considerably for full cost and reduced cost programme schools.

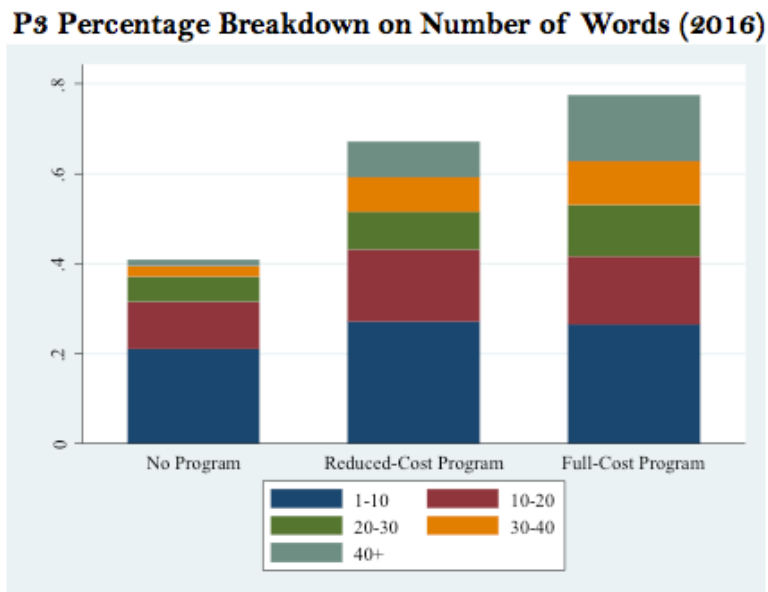
**P3 Words/Min (2016)**



More detail on the breakdown of the number of specified words per minute can be seen in the following graph. In the schools without the Mango Tree intervention, the number of pupils who can read between 40 or less words per minute comprises 40 percent of the pupils. In the reduced cost and full cost programmes, this number increases to almost 70 percent and 80 percent, respectively. In the breakdowns for each treatment arm, the majority of pupils read between 1 and 10 words. In the reduced-cost and full-

cost programmes, it can be seen that the number of pupils reading at the next three higher levels (10-20, 20-30, and 30-40 words per minute) is greater than in the schools without the programme.

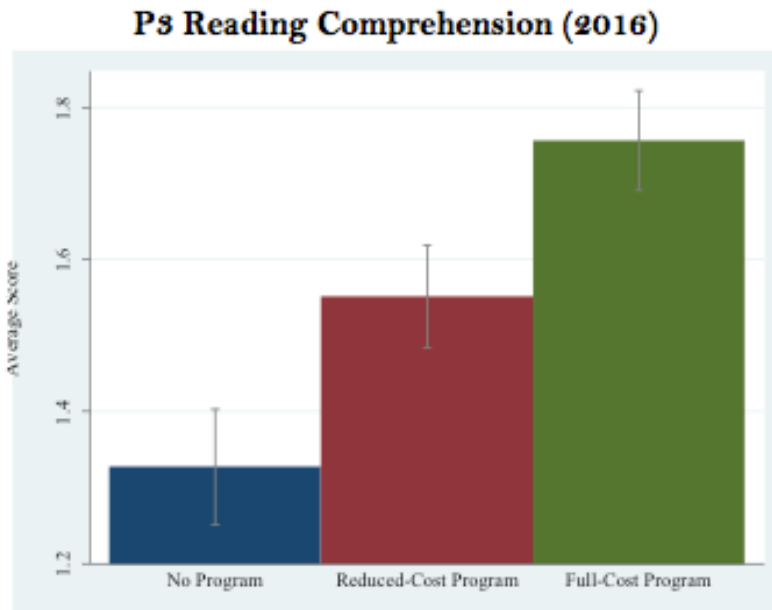
Interestingly, the graphs comparing the full cost and reduced cost programmes are very similar until you compare the higher brackets of words per minute scores. The full cost programme makes substantial gains compared to the reduced cost programme in the category of 40+ words per minute. In this category, full cost programme schools gain more than one percent over reduced cost programme schools. Another notable characteristic of these graphs is that the reduced cost and full cost programmes have succeeded in ‘moving the middle’ – meaning that the average learners in these classrooms are showing learning gains far above their counterparts in no programme schools. This means that not only do these programmes benefit the learners on both extremes in a class – high performing and low performing students – they also serve to benefit pupils who fall into the category of average performers. It can be seen in the graph that the section describing learners reading 10-20 words per minute (red) and 20-30 words per minute (green) increase in size significantly for both the reduced cost and full cost programmes. This is an important outcome, as it means learners on every end of the academic spectrum are benefitting from their engagement in the programme.



Reading comprehension for learners also varies significantly between treatment arms. These results are displayed in the graph below. In the full-cost programme, learners can answer almost 1.8 comprehension questions correctly. In the reduced-cost programme, on average pupils correctly answer almost 1.6 questions on average. The children from schools without the programme answer 1.3 questions on average.



The small differences between treatment arms reflect the fact that the metric for reading comprehension is based on a small number of comprehension questions and therefore there is little variation among pupils.



### **Conclusion**

A large body of research has shed light on the effectiveness of various education interventions on learning. However, the majority have shown relatively small effects. A meta-analysis of 77 randomized trials of primary education programmes in developing countries found the average mean effect size was an increase in 0.14 standard deviations (McEwan 2014).

Results from this study indicate it is one of the most successful programmes ever studied with a randomized trial in the world, with an increase in learning by 1.7 standard deviations in reading in Leblango, the local language, among pupils. This is one of the largest impacts ever measured in a randomized trial of an education programme. Significant effects were also found among reading in English, with an increase in learning by 0.7 standard deviations. Results for specific reading tasks indicate even higher gains. Interestingly, the pupils in the study have been tracked since Primary 1 until Primary 3 in a tracer cohort, allowing us to measure specific learning gains among individual pupils as they compound over time.

In 2017, we will continue the study and have a chance to implement, monitor and measure programming during a key transition year when pupils are beginning to learn more in English. Throughout the project the purpose of mother tongue instruction has been to support a better literacy foundation to help a pupil

learn, and then transfer that knowledge in middle primary to learning in a second language. During this project, we will continue tracking and measuring pupil learning outcomes through the RCT, and continue tracking pupils as they progress beyond P4 into P5 and P6 – the final year of primary before the P7-Senior 1 transition. Over time, we hope this next project will lay the ground work for a longitudinal study to track these same pupils as they make the P7-Senior 1 transition and continue their education beyond primary.