The Effect of Teacher Training and Community Literacy Programming on Teacher and Student Outcomes

Pre-Analysis Plan

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1. **Trial overview**

This pre-analysis plan provides an overview of a randomized controlled trial designed to evaluate the effects of teacher training and community literacy programming (reading camps) on pedagogy and literacy in 160 schools in Nampula province, Mozambique. We partner with World Vision (WV) Mozambique, who is implementing an early grade literacy program (Unlock Literacy or UL) comprising two components. First, teachers are trained in sound pedagogical practices that facilitate early grade reading. Second, community literacy interventions are rolled out, centered around reading camps led by older students in the community that provide an opportunity for children to learn and practice reading outside of school. Schools will be randomly assigned to three groups: control, teacher training, or teacher training and reading camps. This evaluation will focus on evaluating the effects of the interventions on the reading abilities of students in grade three, student grade attainment, and pedagogical practices. We hypothesize that teacher training will improve reading outcomes and may enhance teacher pedagogical practices, reduce student absenteeism, and increase grade attainment. We further hypothesize that the addition of the enhanced reading camps will further improve student outcomes (literacy, absenteeism, and grade attainment).

1. **Background**

Human capital investments in early years have important long-term implications for reducing poverty and building resilience in low-income countries. Mozambique, the site of this evaluation, has one of the lowest educational attainment rates in the world, characterized by primary completion rates below 40 percent (Mambo et al., 2019). Less than one third of primary school graduates progress to secondary school (UNESCO Institute of Statistics).

At the same time, in Mozambique as in many developing countries, teachers still use a “chalk and talk” style of teaching in which instruction centers around a lecture with little student interaction (Glewwe and Muralidharan 2016). This method offers little scope to differentiate instruction to account for the large heterogeneity in preparation levels often observed in early grade classrooms. Teacher training can be an effective method to enhance pedagogy, but it can also be challenging to encourage teachers to adopt different teaching methods (Glewwe and Muralidharan, 2016; Muralidharan, 2017; Beg et al. 2020). In a recent review, Popova et al. (2021) conducted a systematic review of 39 separate teacher training programs. The review shows that teacher training programs generally lead to gains in child test scores, but these gains are substantially larger if there are incentives associated with the training, the training is focused on a specific subject, the training takes place in a face-to-face setting, or the training is focused on lesson enhancement. Longer training courses and those accompanied by follow-up and coaching are generally more effective.

To complement the recent evidence on in-classroom techniques, there have also been several evaluations of out-of-classroom interventions that aim to enhance learning. In a large-scale experiment recently conducted in Kenya, villages were randomly assigned to take part in a “cross-age tutoring” intervention in which upper grade volunteers were chosen to tutor lower grade students in either mathematics or English. At the end of the school year, researchers identified a small but positive increase in math test scores among students who received math tutoring (0.063 SD) but do not find positive effects on English test scores among children who received English tutoring (Romero et al. 2021).

Another objective of reading camps is to increase involvement by parents and communities in literacy promotion. Evidence about the effectiveness of interventions targeting increased parental involvement in the education system is mixed. One trial in Mexican public schools found that an intervention providing parents with information about strategies for school involvement did not improve academic achievement (Barrera-Osorio et al. 2020). One reason why these interventions often do not improve academic performance is that even if parents are involved, they are not themselves educated to a level that allows them to aid in the child’s development. Indeed, the literature on intergenerational transmission of human capital suggests that children born to more educated and literate parents have higher academic achievement (Andrabi et al. 2012).

Informed by this evidence, a trial in Bihar, India conducted by Pratham aimed to improve child achievement by enhancing the literacy of mothers. In the first treatment arm, mothers were provided access to daily instruction on math and literacy. In a separate treatment arm, mothers were provided instructional activities to be completed with their children in the home. The activities were designed for children 5—8 years old and intended to improve mothers’ involvement in their children’s education. Finally, in a third treatment arm, mothers were offered access to both maternal literacy trainings and the instructional activities. During their endline survey, researchers found that children in both the literacy and materials treatment arms scored 0.035 SD better on math tests, and that children born to mothers who received both interventions performed 0.042 SD better on a reading exam and 0.056 SD better on a math exam (Banerji et al. 2017).

There have been few studies that combine both pedagogical and community-based educational interventions. However, results for one similar intervention are presented in Björkman Nyqvist, and Guariso (2021). The intervention, again implemented by Pratham, combined the teaching at the right level intervention previously discussed in Banerjee et al. (2016) with community-managed study groups. These study groups consisted of roughly seven students each and were designed to cover topics from previous classes that students were struggling to grasp. To test the program, 200 villages in Assam Province, India were randomly assigned to four treatment arms in a cross-randomized design. The authors found that the joint intervention led to a roughly 0.1 SD improvement in test scores in math and English (Björkman Nyqvist and Guariso 2021). However, the authors do not find any significant effects of either of the stand-alone interventions, and are able to rule out the possibility of large effects.

1. **Evaluation design**

* 1. *Research questions*

This evaluation seeks to answer the following research questions:

1. What is the effect of literacy training for teachers on teacher pedagogical practices and students’ literacy, and other academic outcomes?
2. Do community-level reading interventions have an additional positive effects on children’s outcomes?
3. Do the effects of the program differ by baseline characteristics, including average baseline student ability at the level, child gender, average baseline socioeconomic status at the school level, and a baseline measure of school quality?
   1. *Interventions*

World Vision’s (WV) “Unlock Literacy” (UL) program, consisting of teacher training and a community literacy intervention, is funded by USDA through the McGovern-Dole program. (All schools in the sample also receive school meals.) There are two main program components.

First, teacher training is provided to teachers in grades one through four on pedagogical techniques for early grade reading. Trainings occurred three to four times a year. The training method adopted in this project followed a cascade model, in which trainers of teacher training institutes provided training at the provincial level to education technicians from the Provincial Directorate of Education. These trainers trained district level trainers who then worked with local level trainers including ZIP coordinators; these coordinators then train teachers in a more regular basis.[[1]](#footnote-1)

The teacher training centered around pedagogical techniques for early-grade reading. Teachers were taught the five phases of reading: letter knowledge, sounding out words, reading fluency, vocabulary, and comprehension. Teachers learned to create a print-rich environment in their classrooms and ensure that children remained motivated while learning to read. They were also provided with materials including books and classroom aids. These materials are in the local language (Emakhuwa), using locally relevant exercises, and are targeted at the appropriate grade level. Teachers also conducted literacy assessments of students at the beginning and end of the school year to measure student progress.

Second, the community component of the UL program includes several elements.

* + 1. Parents attend group meetings highlighting the importance of education and literacy. They are taught strategies to assist their children with reading at home, for example, incorporating reading exercises in daily life. There are also community read-a-thons.
    2. Reading camps are established in which a literate teenager in the community meets with children weekly outside of school. The reading camp leaders are supposed to teach children according to their current reading level, use fun learning materials that are provided, and engage the children outside the classroom. These reading camps are supported by a teacher who assists with recruiting participants, informing parents, and liaising with the school council and school principal.
  1. *Treatment arms*

Schools in the sample were randomly assigned to one of three experimental arms.

1. Control arm
2. Unlock Literacy teacher training
3. Unlock Literacy teacher training + community interventions

All schools in the sample also receive school meals as part of WV’s regular programming. The design is summarized in Figure 1 below.

Figure 1: Study Design

Sample:

160 Schools

Unlock Literacy

teacher training +

community intervention

(50 schools)

Control

(60 schools)

Unlock Literacy

teacher training

(50 schools)

* 1. *Sample*

The overall sampling frame for this study was constituted by World Vision’s target schools in the study districts. Given that WV serves 160 schools, all schools were included in the evaluation. The evaluation uses a repeated cross-section design and was originally targeted to survey a cohort of grade three students (ten randomly selected students) at baseline and endline, in conjunction with teachers and deputy school directors. However, given that baseline data was collected in July—August 2021 following a nearly year-long interruption in schooling, the survey was conducted with grade four students (and the grade four teacher).[[2]](#footnote-2) Grade four students graduated from grade two, but received only minimal instruction in grade three in the 2020 school year due to COVID-related closures; accordingly, their level of literacy served as an appropriate proxy for grade three literacy in other cohorts. The endline survey will include a new cohort of grade three students in 2023.

* 1. *Randomization*

Randomization was conducted by the research team in Stata at the level of the school, stratifying schools with respect to enrollment (above/below median enrollment) and number of teachers (above/below median number of teachers within the enrollment strata). Four strata were constructed. The final assignment includes 54 schools in T1, 56 schools in T2, and 50 schools in T3.

* 1. *Data collection*

The baseline survey was collected in July and August 2021. At baseline, data was collected from grade four students as well as school staff. A roster of grade four students was created to list all students enrolled in the class (whether present that day or not), and 10 students were randomly chosen to be administered the Early Grade Reading Assessment (EGRA), as well as a short interview to collect data on noncognitive outcomes and nutrition-related information. Surveys were also conducted with the grade four teacher, the deputy school director (equivalent to the school principal), and the school cook.

The endline survey will be conducted following two years of implementation, in 2023. The endline data will primarily entail a survey of the new cohort of students enrolled in grade three, though data on dropout among the original 2020 grade four cohort will also be collected.

The following surveys will be administered at endline:

1. Student EGRA – literacy assessment of ten randomly selected grade three students
2. Student questionnaire – administered to the same students participating in the EGRA and including questions around student demographics, classroom and reading camp experiences, and home experiences with reading
3. Grade three teacher questionnaire – demographics, teaching practices, and experience with UL programming. (If feasible, the teacher questionnaire may also collect attendance information for the full class, in addition to the targeted 10 students.)
4. Classroom observation of the grade three teacher’s reading class
5. Deputy school director questionnaire – demographics, school characteristics, and experience with the UL program
6. Baseline grade four roster – list of grade four students at baseline for whom we will ask their current enrollment status and in the case of dropout, the reason for dropout
7. Reading camp leader – demographics, camp practices, and training

All survey data is collected by trained enumerators. Enumerators will receive particularly detailed training on the administration of the EGRA and teacher observations.

1. **Empirical Analysis**

First, randomization balance will be established by comparing baseline data in treatment and control schools. To test for statistical balance, we will run a series of regressions of teacher and pupil characteristics on an indicator variable characterizing the treatment assignment of the school and an indicator variable for randomization strata. Standard errors will be clustered at the school level and an F-test will be used to determine whether we can statistically reject the null hypothesis that covariates are similar across the treatment and control arms.

Second, to identify the impacts of the interventions of interest, we will employ a benchmark ANCOVA specification using ordinary least squares (OLS) regression. Each outcome of interest *yist* for student *i* in school *s* at time *t* will be regressed on an indicator variable for assignment to the Unlock Literacy teacher training (T1) or Unlock Literacy teacher training and community-based literacy programming (T2) arms, a control variable corresponding to the school-level baseline mean of the variable of interest (*ys,t-1*), and indicator variables for the randomization strata, *Stratas*. (Given that the majority of variables will be observed in a repeated cross-section design, baseline data will not be available for the same children; we will use the school-level mean as observed among the children surveyed at baseline.)

*yist = α + β1\*T1s + β2\*T2s + β3\*ys,t-1 + Stratas + εis*

In all specifications, standard errors will be clustered at the school level, generating 160 clusters.

The only variable measured for the children observed at baseline will be dropout. Here, we will use a simpler specification in which we do not control for baseline values (the baseline value of enrollment will be equal to one for all children included in the evaluation, and thus there is no baseline variation).

*yist = α + β1\*T1s + β2\*T2s + Stratas + εis*

*3.1 Outcomes of interest*

We will analyze the effects of interventions on intervention exposure in order to document fidelity of implementation; and will then analyze effects on a set of pre-specified primary and secondary outcomes.

For intervention exposure, we will analyze the effect of random assignment to T1 and T2 on the following variables.

* Binary variable for reported attendance at Unlock Literacy training (reported by teachers)
* Continuous variable for the number of days of training reported (reported by teachers)
* Binary variable for receipt of Unlock Literacy materials at the school (reported by teachers and deputy school directors)
* Binary variable for presence of a functioning reading camp in the community (reported by teachers and deputy school directors)
* Binary variable for reported attendance / participation in a reading camp (reported by students)
* Binary variable for reported observation of pedagogy by local supervisory staff / ZIP coordinator (reported by teachers)
* Continuous variable for number of reading camp sessions reported attended (reported by students)
* Continuous variable for number of reading camp sessions held (reported by reading camp leaders)
* Continuous variable for number of students enrolled in the reading camp (reported by reading camp leaders)
* Index comprised of binary variables capturing reading camp quality (reported by the reading camp leader): types of activities, number of sessions, learning materials available, books available, teacher support, school council support, and community support
* Index comprised of binary variables capturing reading camp support provided by the support teacher (reported by deputy school directors): recruited students, assisted reading camp leader with pedagogy, learning materials, or logistics, liaised with the school council, liaised with parents, other support
* Index comprised of binary variables capturing learning support provided by parents (reported by students): reading books with students, incorporating learning into everyday activities, assisting with homework, encouraging their attendance at reading camps

*Primary outcomes*

The primary outcomes of interest for the evaluation include the following:

* Pupil score on the EGRA (Early Grade Reading Assessment) exam
  + Number correct: letter name identification and reading
  + Number correct: familiar words reading
  + Number correct: listening comprehension
  + Number correct: oral reading fluency
  + Number correct: reading comprehension

We will also report an average standard treatment effect across all five EGRA variables.

* Teacher pedagogical practice: scored based on a tool for classroom observation
* Teacher knowledge of the training curriculum: scored based on a survey-based test of training curriculum items administered to teachers

*Secondary outcomes*

The secondary outcomes of interest for the evaluation include the following:

* School dropout (binary variable): reported for baseline student sample (reported by deputy school director)
* Teacher absenteeism: number of days reported absent in the last five school days (reported by teachers and by deputy school directors)
* Child absenteeism: number of children reported absent on the day of the survey, the day prior, and in the past five school days (reported by students)
* Index of school management practices, constructed using the following variables: variable for school director present at the start of the day of the endline school visit (reported by enumerators); variable for school director conducting an observation of teachers at least once over the past month (reported by teachers); variable for any supervision visit from district or provincial staff at least once over the past month (reported by school director); variable for reported meeting of the school council at least once over the past month (reported by school director); variable for whether parents contact the school to ask about schoolwork (reported by teachers).

*Inference and hypothesis testing*

We will report three *p*-values in the results tables. First, we will report the *p*-values associated with a test where the null that the treatment effect is significantly different from zero. Second, we will report the *p*-value derived from randomization inference with at least 10,000 permutations of the treatment variable to allow for an exact test with a distribution that is known, regardless of the structure of the error terms. Finally, within the family of primary outcomes, we will also report sharpened False Discovery Rate (FDR) q-values to assess whether effects are robust to corrections for multiple hypothesis testing.

*Attrition*

Attrition among students, directors, or teachers will not be a challenge given a repeated cross-section design. If schools attrit, we will use inverse probability weighting as a robustness check to account for selection. Schools may attrit if they close down or merge with another school.

*Analysis of heterogeneity*

We will analyze heterogeneous effects of the treatments of interest for boys and girls; schools with household socioeconomic status above and below the median of the baseline distribution observed across schools; schools above and below the median of the baseline distribution of EGRA scores; schools above and below the median of the school management index calculated at baseline; and schools above and below the median of a school facilities index calculated at baseline. Heterogeneous effects will be estimated using fully interacted models.

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1. A ZIP coordinator is a coordinator in a Zona de Influencia Pedagógica, roughly analogous to a school district. [↑](#footnote-ref-1)
2. The grade three teacher selected for interview will be the primary instructor for the grade three class (if there is more than one teacher, the deputy director will indicate which is the main teacher). [↑](#footnote-ref-2)