Endline Report of Early Literacy among Pre-school and Primary School Children in Gaza Province, Mozambique

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Damiao Mungoi, Nelio Mandlante; Ilidio Nhatuve, Domingos Mahangue, Jodie Fonseca and Amy Jo Dowd

With special thanks to the team of enumerators:

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Executive Summary
While Mozambique, like many countries in Africa, has made tremendous progress toward universal primary education, this progress has not translated into universal literacy. In fact, SAQMEQ II scores are low in comparison to the rest of the region and both systems and children struggle with late enrollment, unfamiliarity with the language of instruction, large classes, lack of support at home, and underpaid, unprepared, ill-equipped, and or ill-attending teachers.

In response to the increasing need to ensure that Mozambican children develop sound early literacy skills, Save the Children and The donor initiated the Early Literacy Project in Mozambique in April 2008. Working in 42 communities in Gaza Province, the project provided teacher training, community mobilization around early literacy, and reading promotion activities to foster systemic and high-quality early literacy instruction in Portuguese. The target population for the project was approximately 7,800 preschool- and primary school-age children (ranging from 3 to 10 years old or enrolled in school until Grade 4), including children affected by HIV/AIDS and other vulnerable children.

The main objectives of the SC-Early Literacy Project were:

1. To improve the quality of early learning opportunities that promote children’s development of literacy skills.
2. To improve community and government capacity to promote children’s literacy.

The Early Literacy Project included two complementary initiatives: 1) teacher training and ongoing support for formal classroom teachers currently working in public primary schools and 2) recruitment, training and ongoing support for community members responsible for teaching preschool-aged children. Preschool teacher training activities began in April 2008, while training activities for primary school teachers started at the beginning of the school year in February 2009. Additional activities included materials creation and distribution to support literacy instruction, such as production of “big books” for pre-school children using local folktales.

To measure the Early Literacy Project’s effectiveness in reaching this project’s first objective, SC conducted a baseline assessment of early literacy skills in a sample of students just after the beginning of the 2009 primary school year in March 2009, and again at the end of the 2010 school year. The preschool assessment evaluated children’s concepts of print, vocabulary and emergent writing. The primary school assessment evaluated children’s concepts of print, letter knowledge, phonological awareness, reading fluency, vocabulary, oral comprehension and writing.

Many children who were assessed during the baseline could not be located at the time of the endline, even though the data collection teams returned to communities a second time to ensure the greatest number of children were included in the assessment. Among children who participated in the ECD program, those who had the most intensive ECD intervention – 3 years – were significantly less likely to be absent. If we consider that absence at endline reflects children’s inability to attend and/or persist in school, then we can conclude that participation in the ECD program helps children thrive and continue in school. Similarly, among the primary school children, girls in LB schools were significantly less likely to be absent in comparison school boys, girls and LB boys. Further, second and third graders in LB schools were significantly less likely than peers to be absent. From this data, we can conclude Literacy Boost may have had a school-wide impact on improving
the attendance/retention of children in comparison to those who did not participate in schools with Literacy Boost interventions. When children remain in school and attend consistently, the entire system benefits through the reduction of repetition and increasing completion of primary school.

Data on early literacy skills from 30 Early Literacy Project escolinhas participants and comparison children reveal the following results:

1. Early Literacy Project escolinhas supported children’s concepts about print mastery; and an additional year of ECD exposure had significant impact on CAP mastery. Further, Early Literacy Project escolinhas promoted greater CAP learning, especially of more challenging text-related concepts.
2. Early Literacy Project also supported the development of emergent writing skills among the three and four year olds who participated.
3. Portuguese vocabulary skills are not being picked up in ECD settings, nor are they abundant in children who have likely attended a single year of primary school (aged 5 at baseline). Shangana vocabulary skills, however, were supported by Early Literacy Project escolinhas.
4. Reading to children supports greater skills development and participation in Early Literacy Project escolinhas with reading enhancing benefits to writing skills in particular.

In short, ECD exposure has supported children in Gaza Province to develop greater concepts of print related to text, emergent writing, and Shangana vocabulary skills than peers not participating in this program. Learning CAP, writing and Portuguese vocabulary was also greater among children who reported their families read to them regardless of participation. While progress on these skills capture some of the benefits of ECD exposure, their focus is on literacy and emergent literacy, setting aside ECD impact on such other developmental skills as problem solving, reasoning, numeracy, communication and social adjustment. It is likely that efforts to document these elements of school readiness would offer a more thorough picture of how the ECD program benefited these children. Further, since the children aged 5 at baseline have entered primary school and completed first grade, it would have been instructive to compare their scores on more advanced tasks like letter identification and phonemic awareness, and even reading tasks, with others in the primary school sample now that they are in the educational system.

Data on early literacy skills from 10 schools supported by Early Literacy Project to implement Literacy Boost and children in 10 comparison schools reveal the following results:

1. More students with low baseline scores, third graders, boys, and comparison school students were absent from the endline sample, rendering the groups unequal and shifting the analysis to: comparison of endline performance and gain scores across grades within LB schools and a comparison of students achieving full mastery.
2. Literacy Boost supported students in grade 2 at baseline to develop skills equivalent to those of students in their schools a grade ahead at baseline who did not receive the intervention. Their skills in letter identification, phonemic awareness, vocabulary, fluency, comprehension, and writing are equivalent.
3. Literacy Boost supported greater performance among children in grade 1 at baseline on every one of the early literacy skills assessed – letter identification, phonemic awareness, vocabulary, fluency, accuracy, comprehension, and writing – when compared to those two years ahead of them in school – and entering third grade just two years earlier.
4. Significantly more LB students than comparison students know all of their letters, rhyme eight words on demand, read 25 familiar words correctly, read 40 words per minute or faster with 100 percent accuracy and write a dictated sentence with complete accuracy. LB has supported more students to fully master letter knowledge, phonemic awareness, vocabulary, fluency, accuracy, comprehension and writing.

In conclusion, Literacy Boost kept more children in primary school and promoted greater skills development during the project period. Further research should consider designs less susceptible to attrition bias (when poorer performing children drop out of the sample); include additional skills assessment once ECD participants enter primary schools; and extend the early literacy tools on which many children are fully mastering skills to capture more complex skills development as children grow older.
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Introduction

The Government of Mozambique has taken three important steps toward realizing universal primary school education: Enacting compulsory education requiring all children between 6 and 12 years old to attend primary education; extending primary school cycle from five to seven years; and abolishing school fees for all of these seven grades (UNESCO, 2008). These actions have increased net primary enrollment rates by 35 percentage points to 80 percent in 2005 and rural-urban disparities in enrollment have decreased (UNESCO, 2008).

Nevertheless, the Mozambican education system is not realizing its potential for delivery of quality early literacy instruction for all. Two-thirds of new entrants are over the mandated age of entry and nearly 900,000 children remain un-enrolled (UNESCO, 2008). Fewer than half of children who begin primary school in Mozambique go on to finish the primary school cycle and less than 40 percent of adults in Mozambique are literate, with female literacy rates less than two-thirds of literacy rates for men (UNESCO, 2008).

Low rates of completion have several possible explanations: Lack of reading materials, including textbooks; poor teacher quality; high pupil-teacher ratios (60:1); high rates of teacher absenteeism, teacher shortage; and lower teacher-training admission requirements. All of these realities in the system combine in the result that children in Mozambican schools are too often learning too little. For instance, among a dozen neighboring nations that participated in the regional educational assessment (SACMEQ II) in 2000, Mozambique had the second lowest percentage of 6th grade students reaching a desirable level of reading literacy (UNESCO, 2008).

The SC-Early Literacy Project

In response to the increasing need to ensure that all children develop sound early literacy abilities, Save the Children and The donor initiated the Early Literacy Project in Mozambique. Working in 42 communities in Gaza Province, the project provides teacher training, community mobilization around early literacy and reading promotion activities to foster systemic and high-quality early literacy instruction in Portuguese. The target population for the project was approximately 7,800 preschool- and primary school-age children (ranging from 3 to 10 years old or enrolled in school until Grade 4), including children affected by HIV/AIDS and other vulnerable children.

The Early Literacy Project, which began in April 2008, had two complementary initiatives: 1) teacher training and ongoing support for formal classroom teachers currently working in public primary schools and 2) recruitment, training and ongoing support for community members responsible for teaching preschool-aged children. Additional activities including materials creation and distribution to support literacy instruction also took place during the 2009 and 2010 academic year.

The main objectives of the SC-Early Literacy Project were:

1. To improve the quality of early learning opportunities that promote children’s development of literacy skills.
2. To improve community and government capacity to promote children’s literacy.

To measure the Early Literacy Project’s effectiveness in reaching this first objective, SC designed and implemented assessments of early literacy skills.

**Methodology**

In March 2009, one year after beginning ECD intervention activity implementation and prior to beginning intervention activities in primary schools, Save the Children conducted a baseline assessment of emergent and early reading skills among 711 children ages 3-5 and 602 children in grades 1 to 3. This project had randomly assigned the intervention to 30 communities and 10 geographically close primary schools, having for each a control community of similar population size. The program provided teacher training, community mobilization and reading promotion activities to foster systemic and high-quality early literacy instruction in Portuguese, the language of instruction. Additional activities included creating and distributing materials to support literacy instruction. Within these, equal numbers of girls and boys were randomly selected from each age/grade. The early literacy assessment was designed based on a literature review of early literacy development among Portuguese-speaking children and bilingual children. It aimed to establish at baseline the range of early literacy skills of children between the ages of 3 to 10 in the following areas:

<table>
<thead>
<tr>
<th>Age</th>
<th>Early Literacy Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 5 years</td>
<td>Concepts of Print</td>
</tr>
<tr>
<td></td>
<td>Emergent Writing</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>Concepts of Print</td>
</tr>
<tr>
<td></td>
<td>Letter Knowledge</td>
</tr>
<tr>
<td></td>
<td>Phonological Awareness</td>
</tr>
<tr>
<td></td>
<td>Reading Fluency</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
</tr>
<tr>
<td></td>
<td>Oral Comprehension</td>
</tr>
<tr>
<td></td>
<td>Writing</td>
</tr>
</tbody>
</table>

Early Literacy Project interventions began in the community-based childcare centers (“escolinhas”) in 2008, while primary school activities began in early 2009. Further, Literacy Boost (LB), Save the Children’s innovative approach to supporting children in the early grades to develop five critical reading skills, was implemented in grades 1 and 2 in 2009, then in grades 1 through 3 in 2010. In discussing the primary school sample, we use the shorthand “LB schools” to refer to the treatment group. Note also that in 2010, the 1st and 2nd grade teachers moved up a grade with their students, and a new cohort of 1st grade teachers was trained to work with the incoming first graders. Table 1 details the grade of the students at baseline and the total intervention by October 2010.

<table>
<thead>
<tr>
<th>Table 1. Early Literacy Project intervention and age/grade at baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age or grade at 2009 baseline</td>
</tr>
<tr>
<td>ELMA/LB intervention by 2010</td>
</tr>
<tr>
<td>comparison</td>
</tr>
</tbody>
</table>

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**Save the Children**

May 2010
Among third graders, any differences discovered in favor of the children in the Literacy Boost schools would be attributable not to direct intervention in classrooms, but to living in a community in which grades 1 and 2 and ECD centers are focused on enhancing reading skills.

In October 2010, the data collection teams returned to the schools and escolinhas (preschools) to reassess these very skills in the same children. This individual child follow up offers the opportunity to analyze the development of these skills across time. The challenge of this research design is that, due to circumstances beyond the control of the program, such as high rates of family migration out of Gaza Province to pursue employment elsewhere, 24.47 percent of children were not found during the second data collection. Table 2 details the change in the analytic sample between baseline and endline.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Preschool Baseline</th>
<th>Preschool Endline</th>
<th>Primary School Baseline</th>
<th>Primary School Endline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>711</td>
<td>550</td>
<td>602</td>
<td>429</td>
</tr>
<tr>
<td>Treatment</td>
<td>349</td>
<td>275</td>
<td>301</td>
<td>228</td>
</tr>
<tr>
<td>Comparison</td>
<td>362</td>
<td>275</td>
<td>301</td>
<td>201</td>
</tr>
<tr>
<td>No. of Students Per District</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilene</td>
<td>235</td>
<td>177</td>
<td>242</td>
<td>180</td>
</tr>
<tr>
<td>Manjacaze</td>
<td>236</td>
<td>186</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Xai Xai</td>
<td>240</td>
<td>187</td>
<td>348</td>
<td>239</td>
</tr>
<tr>
<td>No. of communities/schools</td>
<td>30</td>
<td>30</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Age/Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 years</td>
<td>136</td>
<td>104</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>4 years</td>
<td>231</td>
<td>178</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5 years</td>
<td>251</td>
<td>197</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Grade 1</td>
<td>--</td>
<td>--</td>
<td>176</td>
<td>132</td>
</tr>
<tr>
<td>Grade 2</td>
<td>--</td>
<td>--</td>
<td>209</td>
<td>165</td>
</tr>
<tr>
<td>Grade 3</td>
<td>--</td>
<td>--</td>
<td>210</td>
<td>127</td>
</tr>
<tr>
<td>Female</td>
<td>386</td>
<td>309</td>
<td>310</td>
<td>239</td>
</tr>
</tbody>
</table>

**ECD Sample Attrition: Who’s Missing?**

Among ECD children, the 161 students not assessed at the end of the program, 5 were known to have dropped out, 32 had transferred and 10 were sick that day. The remaining 114 could not be located, even as the team tried twice several months apart to account for school holidays.²

A quarter of the boys but only a fifth of girls are not found at the time of the endline. Further, a greater percentage of children who were three (23.7%) or four years (23.1%) old at the time of the baseline were not located than five year olds (21.5%). The five year-olds, assuming they moved up in the education system, are now in primary school, which supports the data collection team locating them with greater ease, but it is not clear why more boys would be missing than girls. This prevalence is particularly high for boys in comparison schools as 30 percent are not found, while significantly fewer (20 %) of comparison girls and boys and girls are not located a second time.

² A total of 91 ECD children (12.8% of the ECD sample) were located during this second data collection visit. Their CAP and writing scores in March 2011 are not significantly different from their peers’ scores in October 2010, but vocabulary scores are significantly higher in Portuguese and lower in Shangana. To ensure that the development of skills through practice/use during these additional months has not altered conclusions about program impact, all analyses reported here were tested to ensure no change in findings by setting these children’s scores aside.
Overall, 87 ECD students from the comparison sample (24%), and 74 from the treatment sample (21.2%) are absent, and the difference is not significant. Among 4 year olds, those in 2009 Early Literacy Project supported schools are absent at a significantly lower rate (17.1%) than 4 year old peers in schools (28.6%), while 3 and 5 year olds’ rates of absence do not differ across groups. Those who were four years old at baseline had the most intensive ECD intervention – 3 years – so this finding suggests that participation in ECD helps children thrive and continue in school. If this “efficiency effect” can be sustained, then the investment in ECD holds huge benefits for the education system by reducing repetition and increasing completion of primary school.

Primary School Sample Attrition: Who’s Missing?
Among primary school students, 163 are not assessed at the end of the program. Of these, 29 were known to have dropped out, 29 had transferred, 1 had died, and 18 were sick that day. The remaining 85 could not be located, nor could a reason for their absence be gathered. A significantly greater percentage of boys (31.8%) is absent at the posttest than girls (24.1%). This prevalence is particularly low for LB girls as only 17.9 percent are not found, while significantly more (30-31 %) of LB boys and comparison boys and girls are not located a second time. If absence at posttest reflects attendance and/or persistence, then girls in LB schools remain in school in significantly greater numbers than comparison school boys, girls and LB boys. As with ECD children, if this can be sustained and documented, the effect of keeping girls’ in school for longer will argue in favor of sustaining the LB intervention.

Further, a greater percentage of children who were in grade three at baseline (37.2%) were not located than those who were in second grade (20.3%) or first grade (25.3%). The third graders have no intervention, so this finding suggests that LB promoted more consistent attendance by the children who participated.

Looking more closely at the grade differences in absence within the groups, we find a significantly greater percentage (31.3%) of the comparison sample is absent at the posttest than the treatment sample (24.0%). Breaking this down by grade in Figure 1, we see a significantly greater number of second and third graders in the comparison schools absent at posttest. Only 17.2 percent of LB school third grade girls are absent. While LB girls do not receive interventions in their classrooms, this finding hints that support for their consistent attendance is greater than in neighboring schools and should be followed carefully to ensure their persistence is maintained and documented. At the same time, further study of what drives their greater persistence as opposed to that of their comparison school peers could support

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Figure 1. Absence at Posttest by Grade and Group

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3 A total of 61 primary school children (10.1% of the primary school sample) were located during this second data collection visit. We will return to a discussion of how/whether their scores differ in the section on primary school impact.
advocacy as well as programming at scale to benefit girls’ education.

**ECD Impact**

We turn now to an analysis of emergent reading and writing skills among the children aged 3-5 years at baseline, half of whom had access to escolinhas, or ECD programs in their communities. We first ask whether these children scored higher than their peers without an ECD intervention, then consider the relationship between reading at home and these findings.

The baseline data collected on concepts about print (CAP), Portuguese and Shangana vocabulary, and emergent writing established that across many of these skills children in ELMA-supported ECD programs after just one year of intervention were already performing at a level of skill higher compared to peers without such an intervention. The absence of assessment data prior to the ECD intervention means it is not possible to attribute this difference to the Early Literacy Project ECD programming during 2008. It is therefore instructive to look not only at whether average skill levels in 2010 remain higher – we expect they should still be – but also to look at the amount of progress made during this time. To do this, we use a gain score (the score in October 2010 minus the score in February 2009) to consider each child’s learning during these months of the intervention.

**Concepts about Print**

Concepts about print (CAP) measures children’s emergent literacy skills by asking children to assist in getting ready to read a book and assessing whether they know the cover and page, if they can tell text from a picture, know what direction to read, etc. Figure 2 shows that the children with 2 or 3 years of ECD intervention significantly outperform their peers on average in demonstrating mastery of concepts about print. Further, those who were 4 years old at baseline and had three years of intervention (white outline) significantly outperform younger neighbors who were 3 years old at baseline and had 2 years of ECD (yellow outline).

These differences indicate that the ECD intervention was effective in improving children’s concepts about print; and furthermore that an additional year of ECD exposure has significant impact on CAP mastery.

Children who were 5 years old at the time of the baseline and are now in primary school[^4] do not have significantly different scores on CAP. This is expected, as the baseline established that grade 1 students had already mastered these skills and concluded that the primary schools in this sample are effective at teaching these concepts (Da Silva, 2009). The gain in mastering these skills that children made between baseline and endline, however, is not significantly different between the intervention and comparison groups.

[^4]: Assuming they entered primary school at 6 years of age.
The baseline study further noted the difference in levels of mastery between the three structural concepts of print (holding a book correctly, identifying the cover and first page) and the three more challenging text-related concepts (identifying the first word, which direction to read, and reading top to bottom on the page). To tease out the impact of ECD on these skills, Figure 3 shows gains by item for children with Early Literacy Project ECD exposure only (ages 3 and 4 at baseline, in yellow).

![Figure 3. Percentage Point Gain in Children Mastering Items by Group](image)

Many more children with ECD exposure demonstrate mastery of text-related items 4, 5 and 6, and significantly more on item 6 (knowing to read top to bottom). Children in the comparison group show significantly greater gain on item 2 – identifying the cover.

Because learning is significantly greater among children in Early Literacy Project escolinhas, regardless of the starting point, we conclude that Early Literacy Project has supported greater CAP mastery and specifically mastery of more challenging text-related concepts.

Children aged 5 at baseline who participated in the ECD program scored significantly differently from their peers on three of the 6 items, and two of those three were text-related skills. While it is apparent that all children in school are learning these basic skills, children who participated in the ECD program had significantly greater mastery of text-related skills and therefore had reached a more advanced level once in first grade.

**Emergent Writing**

All groups began the 2009 school year at writing level 1 when asked to write their name: they write scribbles without order. Three year olds and 4 year olds in the comparison group make little progress up to endline, moving from level 1 to 1.3-1.5 on average, still mostly scribbles without order. Four year olds with in the Early Literacy Project group – with three years of ECD – make significantly greater progress, gaining a full level on average to 2: writing forms that appear to be letters. Figure 4 shows this significant progress.
Figure 4. Average Writing Level at Baseline, Endline and Gain among 4 year olds by Group

While these averages illustrate the general picture, it is also important to note that the majority of the children who scored above level 1 were the children who participated in ECD:

- Level 2: writes letters (54% at this level participated in ECD)
- Level 3: writes name (59% at this level participated in ECD)
- Level 4: writes other words (53% at this level participated in ECD)

Because the intervention and comparison groups began at baseline with equivalent writing levels, we conclude that Early Literacy Project supported the development of emergent writing skills among the four year olds who participated.

The trends for number of words written are similar, as shown in Figure 5. At baseline, the average number of words written across all ECD age groups was 0. Thus, the groups were equivalent and the endline score is also the average gain score. By the endline, Early Literacy Project three and four year olds are significantly outperforming their peers. Because the groups began at baseline with equivalent writing levels, we conclude that Early Literacy Project supported the development of word writing among these three and four year olds.

We can also see the impact of the ECD intervention on word writing in Figure 6 by considering the percentage of the group still not writing a single word.
Both three and four year olds have made progress on this skill during the intervention, with children who have had two years of ECD (red outline) on par with those a year older who have not had ECD (yellow outline). However, overall levels are still lower than hoped, and the majority of these children will still need to develop basic writing skills to facilitate their transition to school.

**Vocabulary – Portuguese and Shangana**

The children were shown two sets of eight pictures of familiar objects and asked to identify them. One set was in Shangana, the mother tongue of 96 percent of children in the ECD sample, and the other in Portuguese, the language of instruction in primary schools. The children on average identified one picture or fewer in Portuguese at baseline, and one or two at endline. The differences by group were not significant, so it appears that there is still more work to be done in all of these communities to foster skills and comfort in using vocabulary in the language of instruction.\(^5\)

We conclude that **Portuguese vocabulary skills are not being picked up in ECD settings, nor are they abundant in children who have likely attended a single year of primary school (aged 5 at baseline).**

During the intervention, Shangana vocabulary shows greater gains, with 3.2 words identified correctly on average among 3 year olds and less with each year of age as seen in Figure 7.\(^6\)

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\(^5\) Further, the administration of this assessment appears to have been somehow different between baseline and endline, resulting in 28.5 percent of the sample having negative gain scores. This means that a child able to name three pictures at baseline, named 2 or fewer a year and a half later. But even when removing these children from the analysis, the trend remains the same: children identify one or two of the eight pictures correctly in Portuguese.

\(^6\) As with the Portuguese vocabulary assessment 8.8 percent of the sample had large negative values for Shangana vocabulary gains, the source of which is not known. These analyses were conducted with and without these values to assess the trends dependence on these outliers. Here we report values with these observations removed from the analysis.
The five year olds are topping out of this assessment, with 39 percent of the sample identifying all eight pictures correctly. Average endline scores among three and four year olds too (red and yellow outlines, respectively) are above 6 out of 8 identified correctly. Average scores among three year olds (columns highlighted in red) and four year olds (highlighted in yellow) show that Early Literacy Project participants had significantly higher average scores than comparison peers.

Because the groups began at baseline with equivalent Shangana vocabulary levels, we conclude that Early Literacy Project supported the development of Shangana vocabulary skills among these children.

Among children aged 5 (highlighted in pink), comparison peers had significantly greater gains – showing perhaps that they covered greater ground after beginning grade one in 2010 or became more comfortable with expressing themselves in a classroom or assessment setting.

**Reading Habits and Children’s Learning**

Because Early Literacy Project promoted reading with children, we look now at learning across the 2009 and 2010 school years and how this related to children’s reports of whether people read to them at home. Among the skills assessed in these young children, CAP, Portuguese vocabulary and writing level gains differed significantly by whether the child reported people reading to him/her at home. In Figure 8, the learning of children in each skill area was significantly greater among those to whom household members read.
Regardless of group, children who have greater support for reading via actual reading itself (light blue columns) have significantly greater gains in CAP, writing level, and Portuguese vocabulary compared to those not read to (dark blue columns). Within each group, only writing level is significantly different for ECD participants who were read to making 1.3 levels progress on average while those read to without ECD made .93 levels of progress on average.

We conclude that reading to children supports greater skills development and ECD adds to this to benefit writing skills in particular.

**ECD Impact Conclusions and Recommendations**

ECD exposure has supported children in Gaza Province to develop greater concepts of print related to text, emergent writing, and Shangana vocabulary skills than peers not participating in this program. Learning CAP, writing and Portuguese vocabulary was also greater among children who reported their families read to them regardless of participation. While progress on these skills capture some of the benefits of ECD exposure, their focus is on literacy and emergent literacy, setting aside ECD impact on such other developmental skills as problem solving, reasoning, numeracy, communication and social adjustment. It is likely that efforts to document these elements of school readiness would offer a more thorough picture of how the ECD program benefited these children.

Further, since the children aged 5 at baseline have entered primary school and completed first grade, it would have been quite instructive to compare their scores on more advanced tasks like letter identification and phonemic awareness, and even reading tasks, with others in the primary school sample now that they are in the educational system.
**Primary School Impact**

We turn now to a look at these primary school sample results. The baseline data collected on concepts about print (CAP), letter knowledge, phonemic awareness, vocabulary, reading (fluency, accuracy and comprehension) and writing established the low mastery of skills among all students. At the primary school level, the following interventions were experienced by each LB group:

- Grade 1 at baseline: 1 year ECD, plus 2 years Literacy Boost
- Grade 2 at baseline: 2 years Literacy Boost
- Grade 3 at baseline: no intervention

While all third graders are in a non-intervention group, the design would enable a test for “spillover” effects of being in a school where teachers in younger grades are implementing Literacy Boost and promoting reading in the community. These planned comparisons, however, were altered by sample attrition: The absence of children in these and comparison groups when data collectors returned in October 2010 and March 2011.

**Trends in Sample Attrition: What do those missing have in common?**

In October 2010, data collection teams at all 20 schools located only 61 percent of the children in the original sample and by returning again found an additional 10 percent. Both times, the teams had more trouble locating comparison students than treatment students, grade 3 children than their younger peers, and boys versus girls. Grade and treatment group trends relating to absence are shown in Figure 9.

![Figure 9. Sample size at baseline and endline by group.](image)

While decrease in sample size was similar in grade 1 for Literacy Boost and comparison schools, in grades two and three significantly more children are missing from the comparison schools sample (light blue).

**We conclude that Literacy Boost has had a school-wide impact on the attendance/retention of children in grades 2 and 3 at the time of the baseline. This is particularly important in light of the lack of a classroom intervention for those children in grade 3 at baseline in 2009.**
The second data collection effort also gathered reasons for absence to inform potential programmatic responses in the event that these trends indicated drop out, wide-spread illness, etc. and/or to inform future research design. Table 3 has the reasons by group, sex, and grade.

Table 3. Reasons for absence from posttest sample by group, sex and 2009 grade

<table>
<thead>
<tr>
<th>reason</th>
<th>total</th>
<th>LB</th>
<th>comparison</th>
<th>boys</th>
<th>girls</th>
<th>grade 1</th>
<th>grade 2</th>
<th>Grade 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>died</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>dropped out</td>
<td>29</td>
<td>12</td>
<td>17</td>
<td>18</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>sick</td>
<td>18</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>unknown</td>
<td>85</td>
<td>33</td>
<td>52</td>
<td>42</td>
<td>43</td>
<td>23</td>
<td>16</td>
<td>45</td>
</tr>
<tr>
<td>transferred</td>
<td>29</td>
<td>16</td>
<td>13</td>
<td>19</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

More drop outs and cases where the reason for absence is not known are from comparison schools (red), and more transfers are from LB schools (blue). More boys drop out and transfer (pink) than girls, and more older students are sick than younger students and their reason for absence is not known (green).

Given these identifiable trends, analysis of factors related to the likelihood of being absent at posttest resulted in confirming these and identifying one further factor: initial achievement. The lower the baseline scores, the more likely a child was to be absent at posttest. This was true too in grade 1 where absence rates were similar across groups. Figure 10 shows how these factors combine to predict the probability of a girl not being found for posttest data collection.

Figure 10. Probability of posttest absence by age, group and letter knowledge
Nine-year old girls (yellow lines at top) have the highest predicted probability of absence while 7-year olds have the lowest (blue lines at bottom). Girls of the same age (by color) LB or comparison schools have highest probability of absence if they do not yet show mastery of more than one letter. Knowledge of additional letters predicts lower probability of absence (each curve slants downward), as does being in a school where Literacy Boost is being implemented (the second set of curves is lower overall).

In fact, 8 year old girls in Literacy Boost schools (pink at right) are 9 percentage points less likely to be absent at posttest than comparison school peers (pink at left). This differential between LB and comparison students is larger among older children (yellow) and smaller among younger children (blue). Figure 11 shows that while these trends hold across both sexes, boys are also more likely to be absent than girls.

Figure 11. Probability of posttest absence among 8 year olds by group, sex and letter knowledge

LB girls (yellow) are most likely to be present, LB boys (green) next. Of concern are the comparison school boys (blue) whose absence/mobility may well impact their quality of education.

Because of this high level of attrition, we cannot form conclusions about the impact of the Literacy Boost interventions by comparing the average skills of two groups. The groups are no longer equal.

Taking the trends in Figures 9, 10 and 11 together, students in the sample at posttest: know more letters at baseline, are younger, female, and in Literacy Boost schools. This means that comparison schools lost more lower scoring children, inflating their average performance, while LB schools retained more children across the board and performance looks “worse” than hoped for because more lower scorers are still around!

We therefore turn to three alternate analyses to investigate the impact of LB:

1. **Comparison of average endline and gain scores across LB students by grade at baseline.** Developmentally, we expect differences between these grades on basic skills. Recall that grade 3 had no Literacy Boost intervention in the classroom so we interpret the lack of evidence of this difference as program impact for those in grade 2 at baseline.

2. **Comparison of skill levels among 2009 grade 3 students at baseline and 2009 grade 1 students at endline.** these students are within three months of the same level of education, so without the intervention we

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Note that age is used in this model instead of grade at baseline because grade is the variable by which the intervention is defined so it mirrors Literacy Boost/Comparison variables. Age introduces a new piece of information related to likelihood of absence and with a correlation with grade of only .51 (p<.0000).
expect them to have similar skill levels and interpret difference as evidence of impact for those in grade 1 at baseline.

3. *Comparison of the percentage of LB and comparison students demonstrating complete mastery of skills (scoring 100%).* While losing the lowest scorers throws off the comparisons of averages, we consider which group of schools has promoted these basic skills to mastery among more students.

**Average endline and gain scores of LB students by baseline grade**

As noted above, we expect differences between these grades on basic skills because each year at school is exposure to teaching of them and practice using them. Those in grade 2 at baseline had 2 full school years of intervention during which their teachers were trained and supported using the Literacy Boost teaching modules. Those in grade 3 at the time of the baseline in 2009 had no Literacy Boost intervention in the classroom during 2009 or 2010. We therefore interpret the lack of a difference in scores between those in grade 2 and grade 3 at baseline as program impact for those in grade 2 at baseline.

**Concepts about Print**

The majority of children displayed mastery of half of these six concepts about print at baseline. Now, Figure 12 shows that these children score over 5 of 6 regardless of grade and while grade 2 students significantly outperform grade 1 students, grade 3 students do not outperform grade 2 students. This assessment component has a ceiling effect, meaning that many (86%) master all items, so we cannot differentiate between the skills of the second and third graders using CAP. Grade 1 gain scores are significantly higher, as these children have more progress to make on this measure than their older neighbors.

**Letter identification**

Letter identification endline scores in Figure 13 show the same trend as the CAP scores in Figure 12: grade 2 students have significantly outperformed grade 1 students, but grades 2 and 3 are not significantly different. In this case, the total possible is 52 letters, substantially higher than the average scores among second and third graders, so there is no ceiling effect. Gain scores too are not significantly different between these two groups.

**Because Literacy Boost grade 2 students have endline and gain scores equal to those a grade ahead of them at baseline, we conclude that Literacy Boost has supported greater letter identification performance and learning among students in grade 2 at baseline than their peers in grade 3 at baseline.**
Phonemic Awareness

Phonemic awareness endline scores in Figure T show the same trend as the letter knowledge scores: grade 2 students have significantly outperformed grade 1 students, but grades 2 and 3 are not significantly different. In this case, the total possible is 8 items, so we see no ceiling effect. Gain scores too are not significantly different between grade 2 and 3 students.

Because Literacy Boost grade 2 students have endline and gain scores equal to those a grade ahead of them at baseline, we conclude that Literacy Boost has supported greater phonemic awareness performance and learning among students in grade 2 at baseline than their peers who were in grade 3 at baseline.

Vocabulary

Vocabulary scores in Figure 15 show the same trend: grade 2 students have significantly outperformed grade 1 students, but grade 2 and 3 scores on endline and gain scores are not significantly different.

Because Literacy Boost grade 2 students have vocabulary endline and gain scores equal to those a grade ahead of them at baseline, we conclude that Literacy Boost has supported greater vocabulary performance and learning among students in grade 2 at baseline than their peers who were in grade 3 at baseline.

Fluency

Fluency scores in Figure V again show the same trend: grade 2 students have significantly outperformed grade 1 students, but grades 2 and 3 endline and gain scores are not significantly different.

Because Literacy Boost grade 2 students have endline and gain scores equal to those a grade ahead of them at baseline, we conclude that Literacy Boost has supported greater fluency performance and learning among students in grade 2 at baseline than their peers who were in grade 3 at baseline.
**Accuracy**

Accuracy endline scores in Figure 17 do not show the same trend: grade 2 students do not significantly outperform grade 1 students, and grade 3 students do significantly outperform grade 2 students. Gain scores are not significantly different between these three groups, so each grade has made similar gains starting and ending in different places on average. While all students made progress, we cannot see LB impact through expected differences by grade/intervention.

**Comprehension**

Comprehension endline scores in Figure 18 return to the trend showing grade 2 students have significantly outperformed grade 1 students, but grades 2 and 3 are not significantly different. Gain scores too are not significantly different between these groups.

**Because Literacy Boost grade 2 students have endline and gain scores equal to those a grade ahead of them at baseline, we conclude that Literacy Boost has supported greater comprehension performance and learning among students in grade 2 at baseline than their peers in grade 3 at baseline.**

**Writing**

Writing endline scores in Figure 19 show the same trend as CAP, letter, vocabulary, and fluency scores: grade 2 students have significantly outperformed grade 1 students, but grades 2 and 3 are not significantly different. Gain scores are not significantly different between grades 1 and 2, but both these groups have significantly higher gain scores than grade 3 students.

**Because Literacy Boost grade 2 students have endline and gain scores equal to those a grade ahead of them at baseline, we conclude that Literacy Boost has supported greater writing performance and learning among students in grade 2 at baseline than their peers in grade 3 at baseline.**
Skills at third grade entry

Figure 20 compares the average scores of students in grade 3 at baseline (red lines) with those of students about to go into grade 3 at endline (blue column). Without the intervention, we expect these skill levels to be similar.

Figure 20. Average Student Skills in 2009 and 2011 Grade 3 Students

However, LB students entering grade 3 in 2011 on average know: 13 more letters, identify one more rhyming word, read 7 more familiar vocabulary words, read 4 words per minute faster and with 28% greater accuracy, answer 1.75 more of 4 comprehension questions correctly, and score 6 more points of 32 in writing on average. Every one of these differences in statistically significant.

We conclude that Literacy Boost has supported greater performance among children in grade 1 at baseline on every one of these skills as compared to those entering their grade just two years earlier.

Comparing Masters

Finally, we compare the percentage of LB and comparison students demonstrating complete mastery of skills (scoring 100%).

Figure 21. Percent of those demonstrating full master by skill and group
In each skill in Figure 21, significantly more LB students demonstrated full mastery of the skill by scoring 100% correct than did comparison school students. The exceptions are CAP on which over 80% of the children in the sample demonstrated mastery and comprehension. Significantly more LB students than comparison students know all of their letters, rhyme eight words on demand, read 25 familiar words correctly, read 40 words per minute or faster with 100 percent accuracy and write a dictated sentence with complete accuracy.

*We conclude that LB has supported more students to fully master letter knowledge, phonemic awareness, vocabulary, fluency, accuracy, comprehension and writing.*

**Primary School Impact Conclusions and Recommendations**

We see LB impact among grade 2 students at baseline through the absence of differences in endline performance and gain by grade in: CAP, letters, phonemic awareness, vocabulary, fluency, comprehension and writing. Among students in grade 1 at baseline, impact is clear as they are more skilled incoming third graders in 2011 in all skills but CAP. Finally, we see overall LB impact in more fully mastered skills in: all skills but CAP and comprehension.

LB kept more children in school and promoted greater skills development. Further research should consider designs less susceptible to attrition bias and extend those tools on which many children are fully mastering skills.