



**Save the Children®**

# **Literacy Boost Dendi, Ethiopia**

## **Endline II**

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## Executive Summary

In 2011, Save the Children (SC) began implementing the second year of the Literacy Boost (LB) program. The program, designed to improve reading skills for early grade students, focuses on working with teachers, parents, and community members, as well as providing reading materials, to boost students' reading growth in the Oromia Region of the Dendi District in Ethiopia.

Using an emergent literacy and early grade reading assessment, students reading growth is tracked from baseline to endline to chart their progress through the year. These data also enable SC program staff to adapt the intervention's teacher training and community activities to the students' particular needs. In October, 2011, baseline data were collected in 15 Literacy Boost schools and 5 comparison schools, and endline data were collected in the same schools at the end of the school year in May 2012. At each of the 20 schools where data was collected, a target of 20 children in the third grade was sampled. In total, 390 students (300 LB, 90 comparison) were assessed at baseline, and 317 of these same students (259 LB, 58 comparison) were located at endline and assessed.

This study reports on the characteristics of students who could not be located at endline, as well as the observed difference in learning during the 2011-2012 school year between Literacy Boost and comparison students. The following will briefly detail the major findings from the second year endline evaluation.

**Attrition:** At endline, assessors could not locate 18.7% of all students assessed at baseline. While the reasons behind this absence (e.g. illness, household work, or other causes) is not clear, it is very apparent from the data that a higher percentage of students are more consistently present at Literacy Boost schools (86%) than at comparison schools (64%). We can conclude that students in LB schools more regularly attend school than comparison students.

Curiously, we find that male students in LB schools were more likely to be absent if their family owned more horses, possibly indicating uneven work expectations at home.

**Reading Skills:** In nearly every skill assessed, students in Literacy Boost schools statistically significantly outperformed comparison students. Effect sizes ranged from small to medium, with particularly notable gains in reading fluency and reading accuracy ( $d = 0.60$  &  $d = 0.54$ , respectively). Despite these impressive effect sizes, students only met the benchmarks set at baseline for two reading skills: concepts about print and reading fluency. The LB student gains in fluency are particularly impressive: students could read twice the amount of text at endline on average as they could at baseline during the same amount of time. As fluency is a critical ingredient to becoming a good reader, this is an excellent achievement. This accomplishment should be celebrated, but more work is needed to bring all students up to a level of good reading and comprehension.

The one skill where we did not see a significant gain when compared to the comparison group is reading comprehension. There are many possible reasons why this might be the case. First, it could be that students did not really gain significantly in their reading comprehension skills. However, it could equally be the case that the assessment did not contain enough items to capture the true variation in student reading comprehension scores and to eliminate the possibility of measurement error. It is highly recommended that the reading comprehension assessment portions are expanded for year three of Literacy Boost as well as programmatic attention to comprehension both inside the classroom and in reading camps, parent workshops and with reading buddies.

From the data collected at baseline and endline we conclude that Literacy Boost had a dramatic impact at accelerating students' reading skills growth. While benchmarks were only met for two of the seven skills assessed, this had more to do with the relatively high benchmarks set, and probably less to do with implementation. Of particular note are the fluency and accuracy gains: LB students became dramatically faster and better readers, which is confirmed in the effect size calculations. This encouraging data should be used to advocate for the LB model of supporting schools and communities to help children to read.

**Student Background & Socioeconomic Status:** By accounting for attrition by controlling for initial concepts about print scores, the student samples at baseline were comparable enough on background characteristics to facilitate analysis on the effects of Literacy Boost. Student scores were analyzed both within the Literacy Boost sample and across the entire sample. With the data currently on hand, it is not possible to make claims about how LB does or does not differentially impact students based on their socio-economic status. However, we do notice trends related to socioeconomic status in general. Namely, older students from higher SES backgrounds tend to score less well than do their younger, lower SES peers. This might be a similar effect to the one concerning attrition and horse ownership. Students who come from homes with more wealth and livestock may have less time to attend to their studies. Further investigation into this area is necessary before any firm advocacy messages can be made.

**Home Literacy Environment** In terms of the home literacy environment, there was no difference in the change scores between LB and comparison students for home literacy environment variables. The results mirror results from the Year 1 endline evaluation. This indicates that SC must pay greater attention to the community activity portion of Literacy Boost, emphasizing the importance of material creation in Reading Camps and Reading Awareness workshops.

When looking at the entire sample, we find that the more people read to the student at home, the better the student's scores tend to be, on average. This does not necessarily mean that reading to students at home causes better scores, but a strong relationship does exist in the data. Lastly, we see that comparison students who reported having no one reading to them at home at endline had dramatically lower scores than Literacy Boost students. However, this gap becomes smaller and smaller as students report that more family members read to them. This finding is important because it highlights both the importance of the HLE, as represented by family members reading to students, as well as the 'boost' that Literacy Boost provides students who come from disadvantaged backgrounds such as a background with a poor HLE. Advocacy

efforts, both on behalf of Literacy Boost and in support of better HLE, should be pursued to help all students learn to read better.

**Literacy Boost and Girls Equality:** Within the LB schools there was no difference in scores between girls and boys for all skills save one. For letter identification girls started out a disadvantage. However, over the course of the year girls in Literacy Boost schools were able to close the only gap that existed in regards to this reading skill. We also find that Literacy Boost girls who reported borrowing books had higher reading fluency scores than Literacy Boost girls who did not report borrowing books. This finding possibly demonstrates a relationship between exposure to reading materials and the reading fluency of students especially for girls.

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## Introduction

In 2010, Save the Children began implementing the Literacy Boost program – an intervention focused on working with teachers and communities to improve children’s reading skills – in Oromia Region, Dendi District of Ethiopia. The Literacy Boost assessment features emergent literacy and early grade reading assessments used to detail the skills present during the start of the Literacy Boost cycle and to chart progress throughout the intervention. These data are also used to adapt the intervention’s teacher training and community activities. Literacy Boost was implemented in 15 schools with a focus on children in grades 1 to 3. Key interventions that are continuing to be implemented in these 15 schools to date include:

1. a 9-module teacher training on explicit reading instruction, conducted in three phases;
2. provision of community-based Book Banks
3. conducting a Reading Buddy system in schools in which older children read to and with younger children;
4. conducting regular community reading awareness sessions with parents
5. conducting weekly Reading Camps run by trained Reading Camp Leaders (to be implemented)
6. conducting Story Time activities in the community (to be implemented).

At the time of this endline assessment in the month of June, 2012, Table I details the activities that had been implemented by Save the Children and the length of the intervention prior to the assessment.

It is important to note that many students will have been exposed to some or all of the program elements of Literacy Boost during three months in the classroom during the preceding school year. Similar exposure to book borrowing, reading camps and reading buddies occurred during this time. It should be noted that during the summertime when school was out, annual rains prevented community activities from being held. The findings in this report must be interpreted in light of these short intervention times over one and a half school years and will greatly inform activities as Literacy Boost gains steam in Ethiopia.

**Table 1. Literacy Boost Activities prior to Baseline Assessment**

<u>Month &amp; Year</u>	<u>Activity</u>	<u># of Participants/Items</u>
<i>Teacher Training</i>		
October 2011 [2 days]	Teacher Training Year 2: Session 1 Topics: Introduction to Reading Development; Formative Assessment; Letter Knowledge.	72 Literacy Boost Teachers Female: 50 Male: 20
December 2011 [2 days]	Teacher Training Year 2: Session2 Topic: Phonemic Awareness.	72 Literacy Boost Teachers Female: 52 Male: 20
February 2012 [2 days]	Teacher Training Year 2: Session 3 Topic: Reading Fluency.	72 Literacy Boost Teachers Female: 52 Male: 20
April 2012 [2 days]	Teacher Training Year 2: Session 1 Topics: Vocabulary; Reading Comprehension.	71 Literacy Boost Teachers Female: 52 Male: 19
<i>Community Action</i>		
September 2011	Reading Camp facilitation training: Round 1	88 Reading Camp Facilitators Female: 14 Male: 74
November 2011	Additional book bank provision to target areas	25 Book Banks of 135 primers of different titles
November 2011	Reading Camp facilitation training: Round 2 Training for: Community Awareness Raising Workshop facilitators, & local attitude leaders	200 Reading Camp Facilitators, Community Awareness Reading Workshop Facilitators, & Local attitude leaders (community elders, local chiefs). Female: 27 Male: 173
January 2012	Additional book bank provision to target areas	30 Book Banks of 80 primers of different titles
February 2012	Refresher training for Reading Camp facilitators, Community Awareness Raising Workshop facilitators and Directors of Literacy Boost schools	195 participants Female: 34 Male: 161
May 2012	Refresher training for Reading Camp facilitators, Community Awareness Raising Workshop facilitators and Directors of Literacy Boost schools	281 participants Female: 24 Male: 257

### Sample Selection

The 20 total schools in the sample are from a selected group of 25 schools identified by Save the Children program staff as potential sites for Literacy Boost activities, located in the Dendi Woreda of Oromiya Regional State in Ethiopia. These schools were selected based on the following criteria: reflecting the project’s needs: accessibility, empowered parent-teacher associations (PTAs), enrollment size, similar gender population ratios, and the number of grades offered to children at the primary level. The staff also decided to prioritize those schools that Save the Children has worked with over the past four years, typically through providing infrastructure improvement, teacher training, and capacity building for the PTAs. The number of target schools was limited to the 15 schools most alike based on the above criteria. Five comparison schools were selected from ten possible options based on being similar to target

schools based on accessibility, PTA structures and history, enrollment size, and the number of grades offered, as well as socio-economic levels within the communities that they serve. All comparison schools are formal schools, none of which received or benefited from Save the Children programs but could be included into the LB program when we scale up the program. At each of the 20 schools where data were collected, 20 children in the third grade was sampled. However, in two schools less than 20 students were sampled as there were less than 20 students present that day.

The analysis that follows in this report critically examines the gains in reading that individual students made over the course of the year. Consequently, each student must have both baseline scores and endline scores to be included in the analysis. Prior to presenting the findings of the endline, we examine who the students were who left the sample. That is, which students were the assessment teams unable to locate at endline for data collection?

### Instruments

Table 2 offers examples of background and home literacy indicators and offers a detailed description of reading indicators.

In addition to the questions below, this 2nd-cycle endline assessment collected data related to children's participation/use of Literacy Boost activities and resources (participation in Reading Buddy activities and use of book banks). These questions were only asked to students in Literacy Boost schools.

These assessments were developed and pilot tested prior to baseline data collection using the Literacy Boost Toolkit Assessment Component. Many thanks to our colleagues at RTI for sharing EGRA reading passages and word lists to shorten the development process and make our efforts more cost-effective.

Table 2: Data Collected

<u>Student background</u>	<u>Examples</u>
General	Sex, age, language spoken at home, work
School-related	Distance to walk to school, repetition history
Socioeconomic status	Type of home, household size, household amenities/possessions
<u>Home Literacy Environment</u>	<u>Examples</u>
Access to print	Materials present in home, types of materials
Reading at home	Presence and percentage of family members who children see read, and who read
<u>Reading Outcome</u>	<u>Description</u>
Concepts About Print	Number of concepts demonstrated correctly of 14
Alphabet Knowledge	Number of letters/sounds known of 62
Vocabulary/Decoding	Number of single words read correctly of 20
Fluency	Number of words in a connected text read correctly in a minute
Accuracy	Percentage of words in a connected text read correctly
Listening Comprehension	Number of comprehension questions answered correctly of 5 after listening to a text read aloud by the assessor (only for non-readers)
Reading Comprehension	Number of comprehension questions answered correctly of 5 after reading a text read aloud (only for readers)

*A Note about Benchmarks*

While Save the Children has used this approach to reading assessment in Bangladesh, Ethiopia, Guatemala, Haiti, Malawi, Mali, Mozambique, Nepal, the Philippines, South Africa, Vietnam, Uganda, Yemen, and Zimbabwe, comparison across countries and languages is less helpful than more detailed contextual information for setting expectations of impact. For each measure used in these assessments, the baseline established the upper end of the range of scores (the 75<sup>th</sup> percentile) as a benchmark, or a reasonable estimate of what is currently possible among these children. This report will examine whether benchmarks set at baseline were met.

## Absence at Endline

*Was absence during endline different in Literacy Boost schools than in comparison schools?*

This endline assessment includes the same 15 Literacy Boost schools and 5 comparison schools from neighboring communities that were assessed in the 2010-2011 sample. The total sample size at end-line is 317 students. At baseline 390 students were assessed, but there was attrition from the sample<sup>1</sup>.

As seen in Table 3, at the conclusion of the assessments, baseline and endline data exist for 317 students, of which 259 come from Literacy Boost schools, and 58 come from control schools.

**Table 3. 2012 Student Population by Group, Sex, and Attrition Status**

	Literacy Boost Students	Comparison Students
Boys	Present: 131 Absent: 19 ( 12.7%)	Present: 33 Absent: 15 (31.2%)
Girls	Present: 128 Absent: 22 (14.7 %)	Present: 25 Absent: 17 (40.5%)
Total	Present: 259 Absent: 41 (13.7%)	Present: 58 Absent: 32 (35.6%)

Of the 390 students that were interviewed at baseline, 73 students could not be assessed at endline. Of these 41 are Literacy Boost students (13.7% of all Literacy Boost students assessed at baseline) and 32 are comparison students (35.6% of all comparison students assessed at baseline). Literacy Boost schools had significantly lower rates of attrition at the endline assessment, significant at  $p < .01$ . This is an encouraging finding, and might indicate that Literacy Boost encourages better attendance. However, these findings are correlations only, and claims that Literacy Boost directly results in better attendance cannot be made. That said, this is very similar to other findings concerning attrition in Malawi, Pakistan, and Mozambique (Dowd et al, 2010; Mithani et al, 2011; Mungoi et al, 2011), indicating a pattern where **a higher percentage of students are more consistently present at Literacy Boost schools than at comparison schools.**

*Were absent students as a whole different in some way than those present at endline?*

Of all the variables collected about students socioeconomic status, home literacy environment, and reading skills, only four variables collected at baseline predict who might be absent at endline. The technique used to arrive at these findings was a multilevel logistic regression analysis, with students clustered in schools. Each of the four predictor variables discussed below were significant at  $p < .05$ .

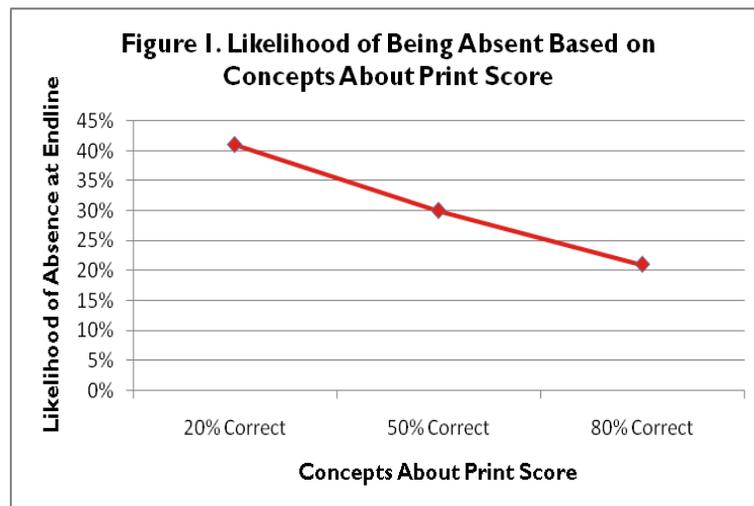
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<sup>1</sup> Please note, this does not necessarily mean that students dropped out. There are many possible reasons for student absence, and we can only note that the students were absent on the particular day of the assessment. The following findings do not establish why students were absent.

The first and second variables that predicted absence at endline had to do with the home literacy environment. Students who reported that no one at home was seen reading, as well as student who reported that no one at home read to them were more likely to be absent. Intuitively, this makes sense: students who come from homes that don't engage in much reading or reading interactions might be less motivated or less able to practice reading, see it as relevant to life and/or consistently attend school. However, we caution again from drawing causal conclusions from this evidence. This finding will be explored in greater detail in later sections.

The third variable concerns family size. The larger the family , the more likely that the student would be absent at endline. This finding echoes other findings from the developed world in which a larger family correlates with lower average education achievement. This is explained through the 'resource dilution hypothesis', which theorizes that as family size grows, children receive increasingly smaller portions of parental time, attention, and material resources (Blake, 1981; Buchmann & Hannum, 2001).

The last variable which significantly predicted attrition was students' scores on the concepts about print (CAP) portion of the reading assessment. Students who scored lower on this portion of the assessment were significantly more likely to be absent at endline, regardless of whether they were in a Literacy Boost school or not. Figure 1 displays this relationship graphically.



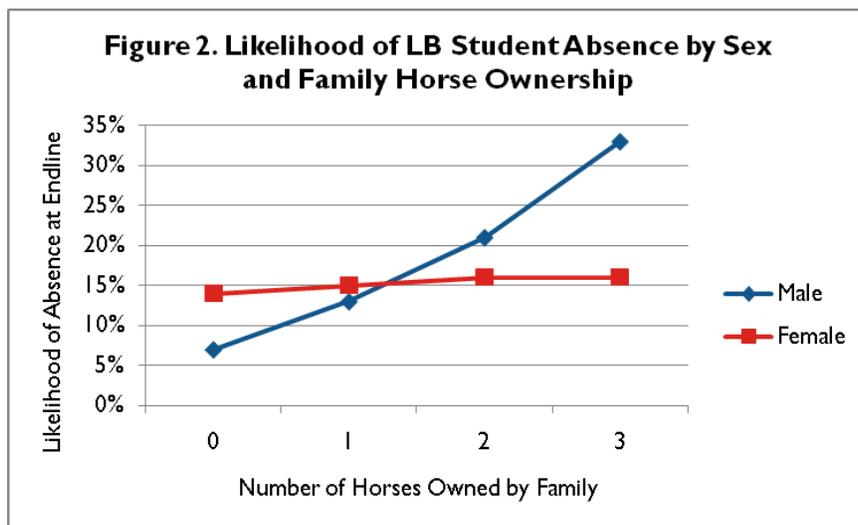
Students who knew less items on the CAP portion of the assessment were significantly more likely to be absent at endline. Scoring lower on CAP indicates that these students are disadvantaged in some regard that is also associated with not attending school. This disadvantage might concern resources available to the student at school, at home, or innate learning disabilities. It is not possible from this data to know precisely which.

*Were students in Literacy Boost schools who were absent at endline different from those who were present at endline?*

We have seen above that LB students were much less likely to be absent at endline than were comparison students, indicating that LB is associated with better attendance. However, another

important area for analysis looks at how those LB students who were not present at endline differed from LB students who were present at endline. This will have implications for who in Literacy Boost schools are still struggling with attendance.

First, similar to the difference that was found in the entire group (with both LB and comparison students), LB students who reported having more family members living at home were more likely not to be present at endline<sup>2</sup>. But the LB students who were absent at endline were also different in other ways. There were key differences in the sex of students and how the students' sex interacted with family possessions, particularly livestock. For example, study Figure 2.



In Figure 2, we see the likelihood of absence at endline based on the student's sex and the number of horses the student reported having at home. The different slopes of the lines for the different sexes indicate that boys and girls are likely being treated differently. While the number of horses a family owns doesn't really matter for female students -- their likelihood of

absence hovers around 15 percent -- the same is not true for boys. If the family does not own horses, boys are much less likely to be absent than are girls. More horses, which may indicate that a family is wealthier, is actually associated with a higher likelihood of being absent. Without further research, we can only offer a hypothesis to why this may be true. One hypothesis is that families with more livestock (in this case horse) need more help tending to the livestock. As this is a job that traditionally falls to male family members, male students who come from families with livestock are more likely to be absent.

**These findings must be understood in light of certain context specific details. Assessors only visited each school once, meaning that it is impossible to differentiate between students who are chronically absent and those who might have only missed that one day of school when the assessors happened to visit the school. Greater investigation, possibly on the part of the West Showa Sub-office might be necessary to better understand this trend, and in general to understand the context-specific reasons behind absenteeism in Dendi and to advocate for the better attendance by all students, regardless of sex or family size, wealth & possessions. Nonetheless, based on the available data, we conclude that students in LB schools more regularly attend school than comparison students.**

<sup>2</sup> For complete regression models, refer to Appendix A.

## Endline Descriptive Statistics

Were students in each group present at both baseline and endline similar enough for comparison?

Table 4 summarizes student background data, presenting the averages and ranges for all Literacy Boost and comparison school students. The numbers in table 4 are only for those students for whom both baseline and endline scores exist. Students who attrited from the baseline sample are not included, nor are extra students assessed at endline.

Table 4. 2011-2012 Student Background Data by LB/Comparison Group for All Students Present at Endline

	Baseline Literacy Boost Average (Range)	Baseline Comparison Average (Range)	Sig. diff. at baseline	Endline Literacy Boost Average (Range)	Endline Comparison Average (Range)	Sig. diff. at endline
N	259	58	-	259	58	-
Age	10.72 years (8 - 17)	10.31 years (7 - 15)	-	10.98 years (8-17)	11.03 years (7-15)	-
% Female	49%	43%	-	49%	43%	-
% who completed ECD	11%	2%	-	9%	0%	*
% who Repeated Grade 1	7%	2%	-	5%	2%	-
% who Repeated Grade 2	10%	5%	-	4%	2%	-
% who Repeated Grade 3	5%	5%	-	0%	0%	-
Time to walk to school	34 minutes (5 - 60)	37 minutes (5 - 60)	-	33 minutes (5-60)	29 minutes (5-60)	-
% who Work outside the home	17%	17%	-	15%	14%	-
Minutes of work per day	30 minutes (0 - 7 hrs)	23 minutes (0 - 6 hrs)	-	21 minutes (0-4 hrs)	20 minutes (0-3 hrs)	-
Minutes of Study per day	21 minutes (0 - 6 hrs)	23 minutes (0 - 3 hrs)	-	18 minutes (0-3 hrs)	16 minutes (0-3 hrs)	-
Family Size	5.5 People	5.4 People	-	6.0 People (2-11)	6.1 People (2-11)	-
% who have Electricity at home	12%	0%	-	11%	0%	-
% who have a Radio at home	70%	59%	-	71%	57%	-
% who have a Television at home	4%	0%	-	3%	0%	-
% who have Bathroom/Latrine at home	57%	43%	-	68%	41%	**
% whose Family owns Livestock	95%	98%	-	95%	98%	-
N of Types of animals	3.59 (0 - 7)	3.46 (0 - 7)	-	3.6 (0-6)	3.5 (0-6)	-
% who have Land	78%	79%	-	86%	91%	-
N of Possessions (elec, radio, etc.)	5.02 (0-9)	4.47 (1-9)	*	5.15 (0-8)	4.45 (0-9)	**

Significant at \*p<.05, \*\*p<.01

On average, students at baseline were similar demographically and reported relatively similar background characteristics. From the time of the baseline assessment to the endline assessment, students' average age increased to 11 years old, which should be expected given the time between assessments. As was true in the entire baseline sample (that included students who were not present at endline), LB students appeared have a slightly higher socio-economic status (SES), as measured by the number of possessions they had at home. This remained true for the endline as well, and also included the number of students who reported having a toilet or latrine at home. **In general, the student samples are comparable enough on background characteristics to facilitate analysis on the effects of Literacy Boost.**

Examining Table 4 closely, one will notice that certain values change from baseline to endline. For instance, at baseline, comparison students reported walking on average 37 minutes to school, while at endline the average was only 29 minutes. This discrepancy could mean that certain students moved closer to the school, however this explanation is unlikely given the agrarian nature of the culture. What is more likely is that there is always some error when asking young students to estimate certain distances or amounts. As the students have matured from baseline to endline, we will assume that the endline values are more accurate (that is, they contain less error) and hence we will use these endline values when analyzing the data later in this report.

It is also important to note that the sample size was reduced from 390 students at baseline to 317 students, which in turn reduces statistical power and the possibility to detect differences between groups. This suggests two things: first, the differences between LB and comparison students might actually be greater than what we can detect in the data. Secondly, **we should always try to collect data from equal amounts of schools at baseline and at endline to increase our statistical power. That is, if Save the Children continues to support Literacy Boost activities in 15 schools, a total of 30 schools (15 LB and 15 comparison) should be assessed at baseline and endline.**

## Home Literacy Environment Data

The change in household literacy environments between baseline and end-line by group is shown in Table 5.

**Table 5: 2011 Baseline & Endline Home Literacy Environment Data by LB/Comparison Group**

	Baseline LB Average (Range)	Baseline Comparison Average (Range)	Sig.Diff at Baseline	Endline LB Average (Range)	Endline Comparison Average (Range)	Sig.Diff at Baseline
<b><u>READING MATERIALS</u></b>						
Has Religious books	20%	7%	-	39%	19%	-
Has Newspapers	40%	28%	-	53%	35%	-
Has Textbooks	100%	100%	-	100%	100%	-
Has Magazines	29%	16%	-	31%	19%	-
Has Storybooks	15%	3%	*	18%	5%	-
Has Government Materials	2%	0%	-	16%	9%	-
N of Book Type	2.06 (1 - 5)	1.53 (1 - 4)	-	2.56 (1-6)	1.86 (1-5)	-
<b><u>READING INTERACTION</u></b>						
Anyone at Home Seen Reading	79%	79%	-	87%	78%	-
N at Home Seen Reading	2.34 (0 - 7)	2.03 (0 - 8)	-	2.41 (0-9)	2.34 (0-6, 8)	-
% at Home Seen Reading	43%	37%	-	40%	35%	-
Someone at Home Reads to student	74%	72%	-	77%	67%	-
N Read to student	2.05 (0 - 7)	1.88 (0 - 8)	-	2.1	2.0	-
% Read to student	37%	34%	-	32%	31%	-
Significant at *p<.05						

When looking at baseline to endline changes in the home literacy environment, what we find are few to no changes at all. All children reported having school textbooks at home, although it is not clear whether these were current textbooks that the students actually used, or other textbooks (outdated ones or ones that possibly belonged to a sibling). At baseline, there was a significant difference in children who reported having storybooks at home, with a greater number of LB students reporting having them as compared with students in comparison schools. This could reflect the fact that LB was starting its second year in the same location, and those stories came from Literacy Boost efforts the previous year. However, even in the LB schools, that percentage was low, at 15% of children. At endline, the number of students reporting having storybooks marginally increased, and the difference between the comparison and LB students was no longer statistically significant.

The differences between baseline and endline in the reported frequency of reading materials and interactions was also tested for significant differences between the two groups. The difference in the scores between the two groups was insignificant for home literacy environment variables. Further, we compared the endline values from Literacy Boost Year II with those of Year I (Cao, Dowd, Mohammed, Hassen, Hordofa, Diyana, & Ochoa, 2011), as seen in Table 6.

**Table 6. Comparing Endline Home Literacy Environment Variables from Years I & II**

	Literacy Boost Endline Year I	Comparison Endline Year I	Sig. Difference in Year I	Literacy Boost Endline Year II	Comparison Endline Year II	Sig. Difference in Year II
Household has reading materials	100%	96%*	*	100%	98.3%	-
Number of types of books	2.76	2.11**	**	2.56	1.86	-
Child sees any one reading ?	79%	76%	-	86.5%	77.6%	-
Anyone reads to the child ?	70%	63%	-	76.8%	67.2%	-
% of hhold members seen reading in the last week	37.5%	31.3%*	*	39.9%	35.4%	-
% of hhold members who read to child in the last week	31.5%	26%	-	32.5%	31.4%	-
Significant at *p<.05, **p<.01						

Upon examining Table 6, we see that very small gains were made by all groups from year I to year II, with the exception of the number of types of books for comparison students. However, these small, likely insignificant gains are not what we would hope to see given a full, additional year of Literacy Boost implementation. **The data leads us to think that further support is needed for community action. For example, SC staff should ensure that students in Reading Camps always participate in Make-and-Take activities. For another example the Parent & Community Workshop session that focuses on making learning materials for young children should be repeated and attendance encouraged. Further support in the area of the Home Literacy Environment, including materials to read and interactions around reading, is needed for year III of LB in Ethiopia.**

## Impact on Emergent Literacy Skills

In this section we examine gain scores in each literacy skill to assess the impact of Literacy Boost on student learning outcomes. In Table 7, baseline & endline data are presented for both LB and comparison students. Furthermore, the percent change from baseline to endline is present, along with the initial benchmark set during the baseline assessment and whether the benchmark was met is also presented.

**Table 7. Change in Reading Skills from Baseline to Endline & Benchmark Achievement<sup>a</sup>**

A	B	C <sup>†</sup>	D <sup>†</sup>	E	F	G	H <sup>†</sup>	I
Reading Skill	Group	Baseline Scores	Endline Scores	Sig. Diff. of Endline Scores Between Groups	Benchmark from Baseline	Benchmark met?	% Gain from Baseline to Endline	Sig. Diff. of Gain Scores Between Groups
Letter ID	LB	89.3%	98.3%				8.9%	
	Comparison	86.7%	89.7%	None	100%	No	3.0%	***
Most Used Words	LB	63.8%	90.6%				26.7%	
	Comparison	68.8%	75.6%	*	100%	No	6.9%	***
Fluency (Words Per Minute)	LB	22.18 wpm	45.92 wpm				23.74 wpm	
	Comparison	24.87 wpm	36.39 wpm	*	42 wpm	Yes	11.53 wpm	***
Accuracy	LB	53.4%	87.6%				34.1%	
	Comparison	58.3%	72.0%	*	95%	No	13.6%	***
Listening Comprehension for Non-Readers <sup>‡</sup>	LB	77.1% (N=23)	83.6% (N=23)				6.4%	
	Comparison	90.0% (N=14)	71.4% (N=14)	None	100%	No	-18.6%	***
Reading Comprehension for Baseline Readers	LB	78.1% (N=155)	95.1% (N=155)				17.0%	
	Comparison	79.8% (N=39)	93.9% (N=39)	None	100%	No	14.0%	None
Reading Comprehension for New Readers	LB	-	89.1% (N=81)				-	
	Comparison	-	92.0% (N=5)	None	100%	No	-	-
Student is a Reader	LB	59.9%	89.6%	**	n/a	n/a	29.7 %	***
	Comparison	67.3%	75.9%				8.6 %	

n/a = not applicable; significant difference at \*p<.05, \*\*p<.01, \*\*\*p<.001

<sup>†</sup> All scores reported were calculated controlling for Concepts About Print at baseline to account for attrition bias. Concepts about print baseline score was held constant at the population average of 89.1 percent correct. See the appendix for the statistical models used to calculate scores. Any difference between baseline plus gain scores versus endline scores is due to rounding.

<sup>‡</sup>For Listening Comprehension, note that sample sizes vary between baseline and endline. See the text below for a full explanation.

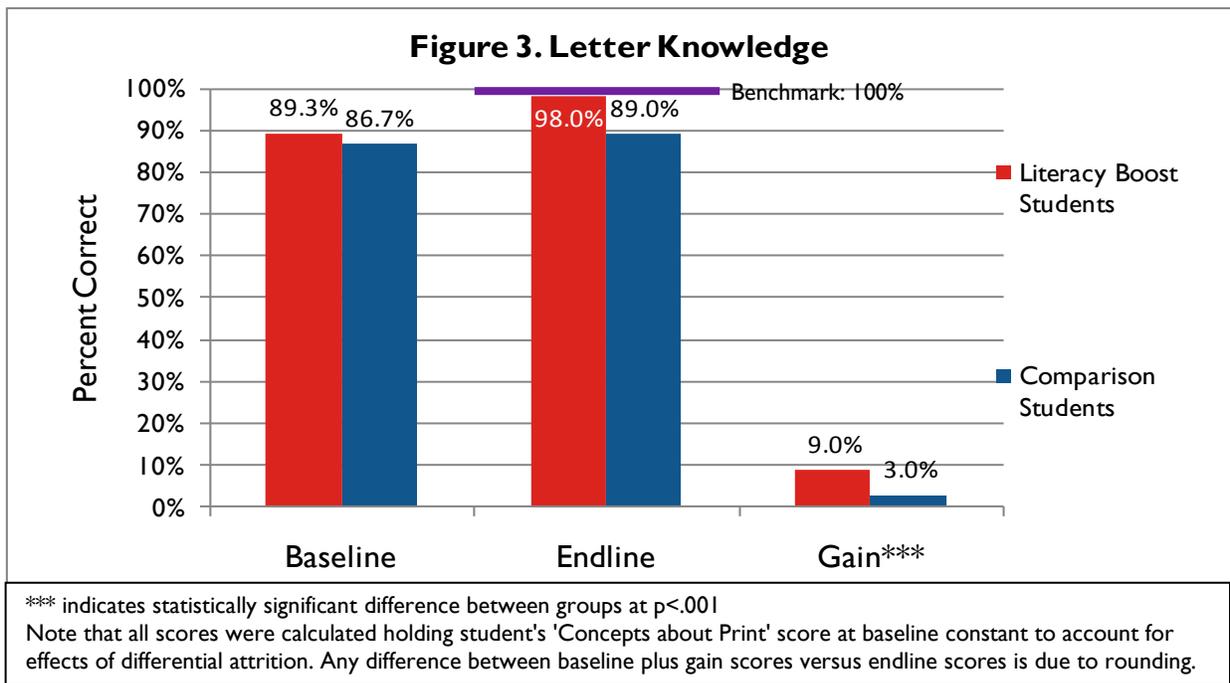
For every skill tested and every measure, Literacy Boost students made more progress than their comparison counterparts. This difference was significant for every skill tested as well, with the exception of concepts about print and reading comprehension. **Therefore, we conclude that Literacy Boost positively affected students' gains in reading skills development.**

*Individual Skill Analysis: Concepts About Print*

Students began at baseline with relatively high scores in concepts about print. Both LB and comparison students averaged 89-90 per cent correct on concepts about print. **Given the smaller sample size due to attrition, and the small room for improvement, it is not surprising that we do not find a greater growth in Literacy Boost students versus comparison students. Even though this score does not appear in the table above because the baseline score was used to control for other literacy scores, it is notable that Literacy Boost students surpassed the benchmark set for them at baseline.**

*Individual Skill Analysis: Letter Identification*

Similar to the preceding description of concepts about print, students began at baseline knowing nearly 90 percent of their letters. Literacy Boost students gained mastery over an additional 9 percent of the alphabet, and on average could identify 98% of letters and digraphs (for example: 'th') correctly. However, this was not statistically significantly more than their comparison counterparts. This endline score was also not enough to meet the benchmark of 100% of letters, as seen in Figure 3, below. 83 percent of LB students at endline knew all the letters, versus 66 percent of the comparison group.

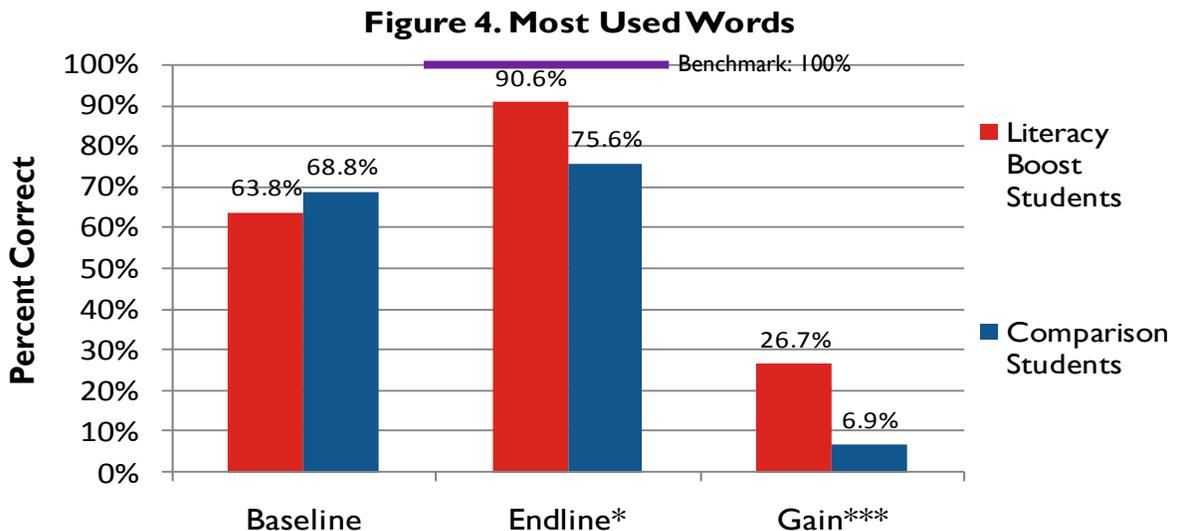


The hardest letters to identify were: 'P' and 'B' in uppercase, and 'ny' and 'b' in lowercase. Meanwhile the letters identified correctly over 95 percent of the time were 'E' and 'L' in uppercase and 'dh', 'i', and 'ch' in lowercase. Because the letters don't suggest a pattern of more or less difficult letters to emphasize in the next year of Literacy Boost, we suggest a focus for the next year of programming from a different viewpoint. **Formative assessment, where teachers are encouraged to collect data on individual students and taught how to use that data to help identify struggling students, should be emphasized so that teachers can provide struggling students the support they need.**

*Individual Skill Analysis: Most Used Words*

At baseline, LB students could only read about 12.5 out of 20 most used words, while comparison students could only read approximately 14 (note that this difference was not statistically significant). However, Literacy Boost students gained enormously in their ability to identify most used words. At endline, LB students read on average 18 words, or 90 percent of the most used words, while comparison students read 15 words correctly on average. Further, Literacy Boost students' gain was significantly higher than comparison students ( $p < 0.001$ ), suggesting that 1 year of Literacy Boost instruction in grade 3 accelerates students' abilities to read words in isolation. Nonetheless, LB students did not reach the target benchmark of 100 percent, seen in Figure 4, below. 184 out of 259 LB students scored 100 percent on the most used words, but this benchmark still escaped the grasp of nearly 1 out of 3 students.

□

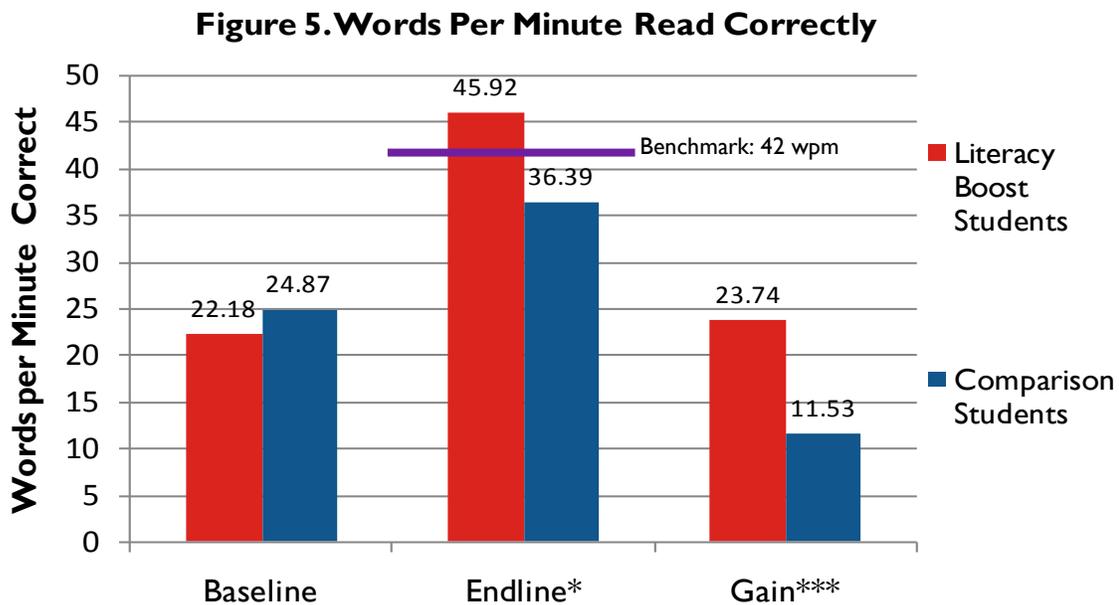


\* indicates statistically significant difference between groups at  $p < .05$ , \*\*\*  $p < .001$   
 Note that all scores were calculated holding student's 'Concepts about Print' score at baseline constant to account for effects of differential attrition. Any difference between baseline plus gain scores versus endline scores is due to rounding..

### Individual Skill Analysis: Fluency

Fluency is measured by counting the number of words per minute correct (wpmc) as read by students who could read at least some words. At baseline, students read roughly between 22 wpmc and 25 wpmc on average, with no significant difference between the two groups. However, LB students made rapid gains over the course of the year and surpassed the benchmark score of 42 wpmc to achieve over 45 wpmc on average. This measure is displayed graphically in Figure 5, below. **The LB student gains in fluency are particularly impressive: students could read twice the amount of text at endline as they could at baseline during the same amount of time. As fluency is a critical ingredient to becoming a good reader, this is an excellent achievement.**

□



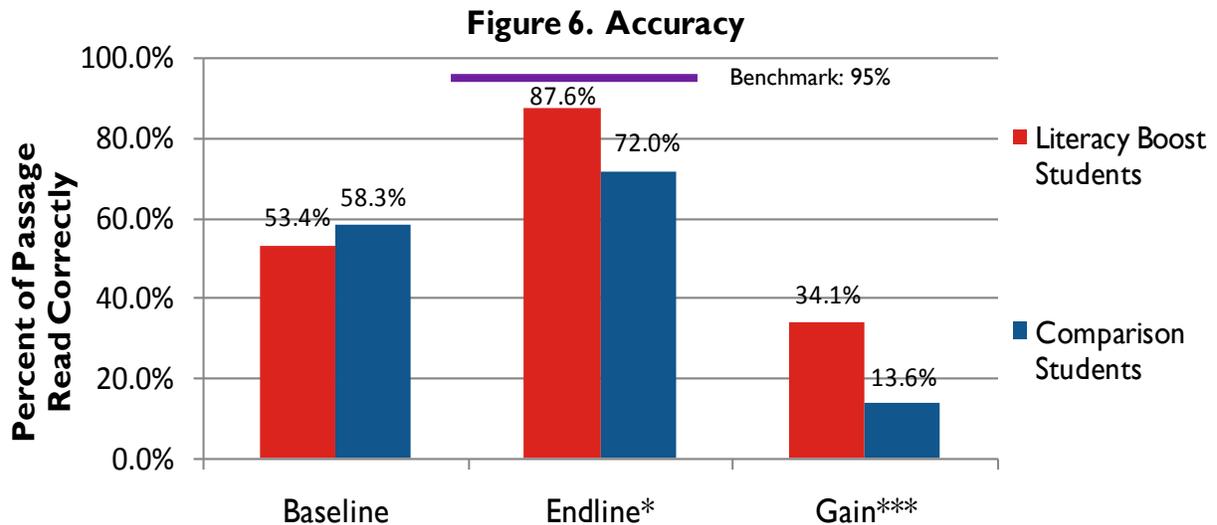
\* indicates statistically significant difference between groups at  $p < .05$ , \*\*\*  $p < .001$   
Note that scores were calculated holding student's 'Concepts about Print' score at baseline constant to account for effects of differential attrition. Any difference between baseline plus gain scores versus endline scores is due to

### Individual Skills Analysis: Accuracy

Accuracy is a skill related to fluency, and measures the overall number of words a student reads correctly in a given passage, regardless of the time it takes him or her to finish the passage. And similar to fluency, LB students started out lower, but not significantly lower than comparison students in terms of accuracy. Again similar to fluency, the gains made by Literacy Boost students were impressive. LB students on average read 35 percent more of the passage at endline than at baseline. This represents greater than 20 percent improvement when compared with the comparison students, a difference significant at  $p < .001$ . Nonetheless, it was not a

great enough gain to have students accurately reading at the benchmark goal of 95 percent, as seen in Figure 6.

□



\* indicates statistically significant difference between groups at  $p < .05$ , \*\*\*  $p < .001$   
 Note that all scores were calculated holding student's 'Concepts about Print' score at baseline constant to account for effects of differential attrition. Any difference between baseline plus gain scores versus endline scores is due to rounding.

*Individual Skills Analysis: Listening Comprehension*

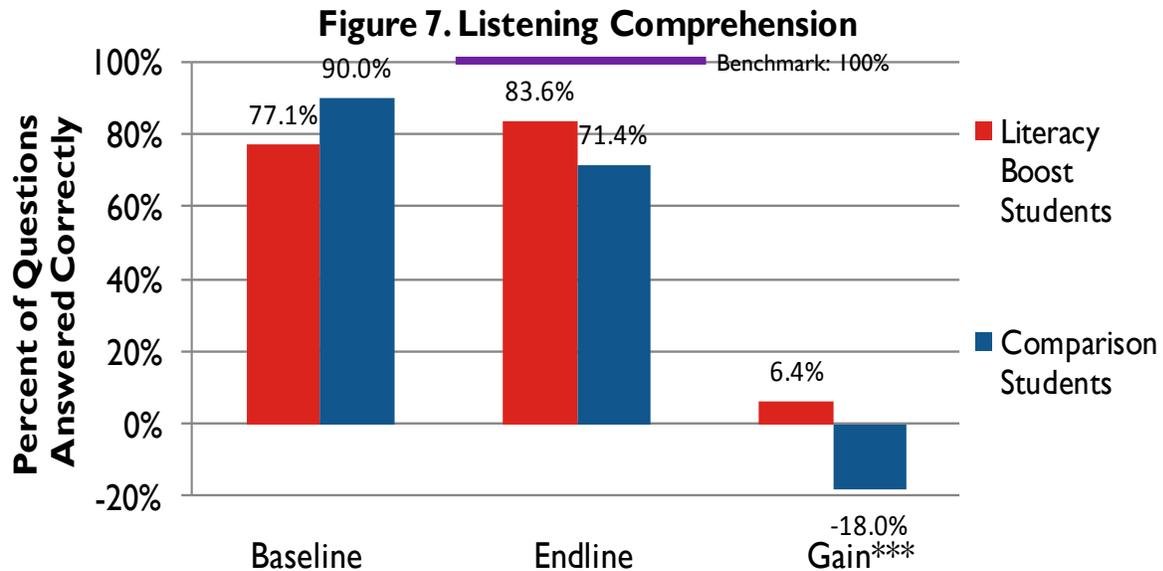
For students who could not read the passage themselves (38.8% of the total sample at baseline, 11.8% at endline), an assessor read the passage to the student out loud and then asked questions of the student concerning the passage in order to gain some data on the listening skills and oral comprehension of students. As students become readers, the sample size of students with listening comprehension measures decreases from baseline to endline. The data presented in Figure 7 represents the scores for students who remained non-readers from baseline to endline. The LB students who did not switch from being a non-read to a reader at least experienced gains in their listening comprehension scores, while comparison students actually answered fewer questions correctly on average at endline than at baseline. While the endline scores were not significantly different, the change in scores was significantly different, at a  $p < 0.001$  level.

We hypothesize that we found these listening comprehension scores because students in LB schools, even the ones who could not read, were being exposed to language and literacy activities and were being actively asked to engage in stories with critical thinking. Even the LB students who did not learn to read connected text out loud were still building their skills. In the comparison group, however, students did not answer as many questions correctly as they did at baseline.

Because of the small sample size of persistent non-readers and the lack in correlation between listening comprehension and other skills, this report will not use listening comprehension

scores to analyze or assess Literacy Boost achievement. It is recommended only to collect listening comprehension measures at baseline.

□



\*\*\* indicates statistically significant difference between groups at  $p < .001$   
 Note that scores were calculated holding student's 'Concepts about Print' score at baseline constant to account for effects of differential attrition.

### Individual Skills Analysis: Reading Comprehension

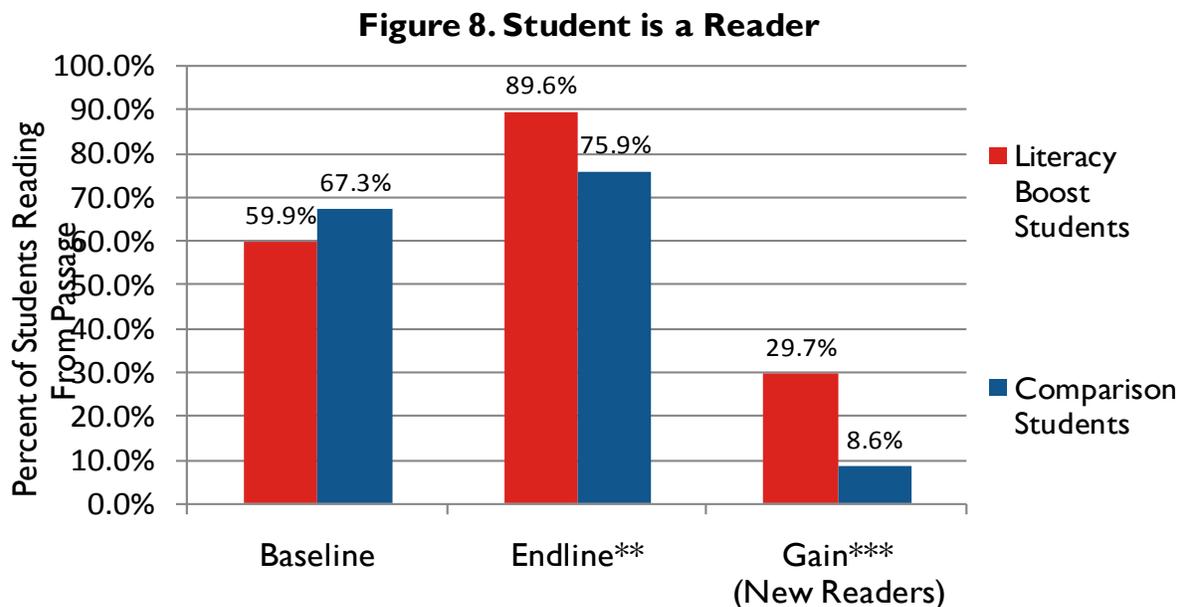
Students reading with comprehension, with understanding, is the ultimate goal of Literacy Boost. The gains we see in this second year of Literacy Boost in Dendi, Ethiopia, are good, but they do not reach the levels we had set as targets at the baseline. In the sample we have two sub-groups of students who have reading comprehension scores: students who could read at baseline (LB N=152, comparison N = 39) have both baseline and endline scores, and hence have a gain score. Students who could not read at baseline (LB N= 81, comparison N = 5) only have an endline score, and hence do not have a gain score.

Literacy Boost students who could read at baseline increased their reading comprehension average scores by 29.7 percent. However, this fell short of the 100 percent benchmark, and did not represent a statistically different gain than the comparison students experienced. The endline scores of the new readers similarly are not significantly different between LB and comparison groups. Due to possibilities of measurement error, **we recommend to change questions or lengthen the number of questions in the reading comprehension section to capture more variation in skills. Further, programmatic strategies to strengthen comprehension both inside the classroom and in reading activates and awareness raising outside the school walls should be highlighted in the coming school year.**

### One Additional Way to Look at the Data: New Readers

There are many additional ways to gauge the effectiveness of Literacy Boost. One of them is to look at how many students are what we call new readers. Using the data on who answered listening comprehension questions, and who answered reading comprehension questions, we can see how many students at endline switched from being non-readers at baseline to readers at endline. At baseline fewer students in the LB schools could read when compared with comparison students (60 percent versus 67 percent, respectively), although statistically this was a non-significant difference. However, at the end of the academic year, the number of students who switched from being unable to read a single word of connected text to being able to read was dramatic in the LB schools as compared to the control schools: LB schools experienced over a 50 percent growth rate in the original number of students who could read, versus only a 10 percent growth rate in comparison schools. Clearly, students are being exposed to some beneficial instruction, materials, and/or literacy interactions that boost their ability to read by the end of the third year of primary school. The new readers can be seen in Figure 8, below.

□



\*\* indicates statistically significant difference between groups at  $p < .01$ , \*\*\*  $p < .001$

### Individual Skills Analysis: Effect Sizes

Another way to quantify the impact of Literacy Boost is to calculate effect sizes. Effect sizes reported in Table 8 represent the Cohen's  $d$ , derived from difference-in-difference calculations of baseline and endline scores for the Literacy Boost students and the comparison students.

Table 8. Effect Size Calculations

Reading Skill	Effect Size (Cohen's $d$ )
Concepts About Print	0.30
Letter ID	0.36
Most Used Words	0.57
Fluency	0.60
Accuracy	0.54
Reading Comprehension <sup>†</sup>	0.12
New Reader	0.43

<sup>†</sup>Calculated using only gain scores from students who could read at baseline.

In every skill except reading comprehension, Literacy Boost generated small to medium effect sizes. An effect size of 0.2 is generally considered a small effect size, while one around 0.5 is considered medium, and over 0.8 is considered large. It is not surprising to find smaller effect sizes for the skills of concepts about print ( $d = 0.30$ ) and letter identification ( $d = 0.36$ ), because all students in both groups started the year scoring on average 89 percent on these two sub-tests. This means that there was not much room for students to make dramatic gains within the Literacy Boost group as compared to the comparison group.

However, in the reading skills that require more practice and familiarity with text, student scores from baseline and endline indicate that Literacy Boost had a medium effect size for most used words ( $d = 0.57$ ), reading fluency ( $d = 0.60$ ), and reading accuracy ( $d = 0.54$ ), as well as for enabling students who could not read at baseline to begin reading at endline ( $d = 0.43$ ). In the field of research, a medium effect size is generally considered an important achievement.

The one reading skill that showed a very small effect size is reading comprehension. This is not surprising, given the fact that no significant differences were observed between LB and comparison groups for this skill. It is impossible to determine whether LB had no impact on students' reading comprehension, or whether the measurement of reading comprehension did not allow us to detect significant differences. As stated above, we believe it is the latter of these two alternatives, and it is important to critically examine how we assess reading comprehension and to find way to improve this measure.

### Individual Skills Analysis: Summary

**From the data collected at baseline and endline we conclude that Literacy Boost had a dramatic impact at accelerating students' reading skills growth. While benchmarks were only met for two of the seven skills assessed, this had more to do**

**with the relatively high benchmarks set, and little to do with implementation. Of particular note are the fluency and accuracy gains: LB students became dramatically faster and more accurate readers, which is confirmed in the effect size calculations. This encouraging data should be used to advocate for the LB model of supporting schools and communities to help children to read.**

**This data also provides insight into two areas that still need attention. First, ensure all students, especially those struggling with basic skills, are provided support to master those skills. Second, while reading comprehension certainly improved, there was no difference between the reading comprehension scores of LB and comparison students, suggesting that either more work needs to be done in reading comprehension, or the assessment itself needs to be examined and lengthened to pick up differences in reading comprehension at baseline and endline.**

## Trends in Reading Skill Data

These next sections examine the drivers behind students' learning within Literacy Boost schools, and compares how learning was related to activities and background factors across the entire sample of students assessed at both baseline and endline. Using a variety of analysis methods, detailed below, we examine how student background factors such as sex, socioeconomic status, and the home literacy environment, as well as how participation in Literacy Boost activities, are related to student scores on a the reading sub-skills.

### *Literacy Boost Activities and Sex: How was a student's sex related to reading achievement?*

First, we examine how boys and girls within the Literacy Boost sample differed in terms of their reading achievement at baseline and endline. Significant differences were calculated for students with both baseline and endline scores using clustered two-tailed t-tests.

**Table 9. Change in Reading Skills in LB students only from Baseline to Endline by Sex**

A	B		C		D <sup>†</sup>	E	H <sup>†</sup>	I
Reading Skill	Sex	N	Baseline Scores (LB Only)	Sig. Diff. of Baseline Scores Between Groups	Endline Scores (LB Only)	Sig. Diff. of Endline Scores Between Groups	% Gain from Baseline to Endline (LB Only)	Sig. Diff. of Gain Scores Between Groups
Concepts About Print	Boys	131	91.0%	-	96.5%	-	5.5%	-
	Girls	128	86.9%		96.4%		9.5%	
Letter ID	Boys	131	91.7%	*	98.5%	-	6.8%	*
	Girls	128	86.9%		97.9%		11.1%	
Most Used Words	Boys	131	68.1%	-	90.9%	-	23.1%	-
	Girls	128	59.2%		90.0%		30.7%	
Fluency (Words Per Minute)	Boys	131	24.9 wpm	-	48.1 wpm (N=129)	-	23.4 wpm (N=129)	-
	Girls	128	19.3 wpm		43.4 wpm (N=127)		24.1 wpm (N=127)	
Accuracy	Boys	131	58.2%	-	87.5% (N=129)	-	29.8% (N=129)	-
	Girls	128	48.2%		87.0% (N=127)		38.9% (N=127)	
Reading Comprehension for Readers	Boys	84	80.7%	-	94.0% (N=117)	-	15.6% (N=117)	-
	Girls	71	80.9%		92.4% (N=116)		13.7% (N=117)	
Student is a Reader	Boys	131	64.2%	-	90.7%	-	n/a	n/a
	Girls	128	65.5%		91.3%		n/a	
% of Students who switched to being an endline reader	Boys	47	n/a	n/a	n/a	n/a	74.5%	-
	Girls	57	n/a		n/a		80.7%	

n/a = not applicable;  
\* indicates a significant difference at \*p<.05,

For every sub-skill except letter identification, boys and girls started out relatively equal in terms of the average skills they possessed. While in many cases it appears that girls scored lower than boys, such as most used words, where boys scored 68% and girls only 59%, these differences are not statistically significant. **For letter identification, however, girls did start out a disadvantage. Over the course of the year girls in Literacy Boost schools were able to close the only gap that existed in regards to their reading skills. This is reflected in their gain scores, which were significantly higher than the gains made by boys (significant at  $p < .05$ ).**

*Literacy Boost Activities and Sex: How were a student's sex and participation in Literacy Boost activities related to reading achievement?*

Table 10 shows how students, again disaggregated by sex, changed in participation in regards to the activities that Literacy Boost afforded them. The figures in Table 9 report baseline and endline Literacy Boost activity participation data for male and female students within the Literacy Boost schools (excluding comparison students. Significant differences were calculated for students with both baseline and endline scores using clustered two-tailed t-tests.

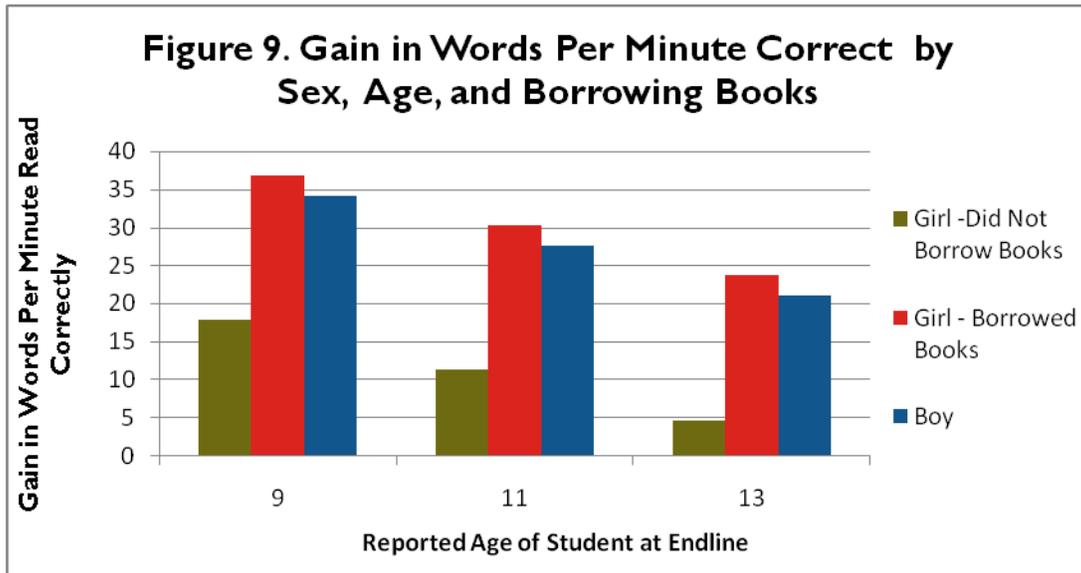
**Table 10. Change in LB Activities in LB students from Baseline to Endline by Sex**

	Sex	N	Baseline Avg.	Sig. Diff. of Baseline Avg. Between Groups	Endline Avg.	Sig. Diff. of Endline Avg. Between Groups
Student Reported Having a Reading Buddy	Boys	131	80.1%	-	93.9%	-
	Girls	128	78.1%		89.8%	
Frequency of Meeting With Reading Buddy (per Month)	Boys	131	9.0	-	10.1	-
	Girls	128	8.8		9.9	
Student Attended Reading Camp	Boys	131	76.6%	-	91.6%	-
	Girls	128	66.4%		89.8%	
Frequency of Reading Camp Attendance (per Month)	Boys	131	5.9	-	6.7	-
	Girls	128	5.7		6.4	
Student Borrowed Books	Boys	131	69.4%	-	86.3%	-
	Girls	128	65.6%		82.0%	
Frequency of Book Borrowing (per Month)	Boys	131	5.4	-	5.8	-
	Girls	128	5.3		5.3	

Since this was the second year of Literacy Boost, students were already familiar with the activities and reading opportunities that Literacy Boost presents. That is the reason why, at baseline, students report having high participation rates in all the activities. No significant differences exist between boys and girls on average. More than 90% of all students have a reading buddy at endline, a 10% increase from baseline, and these students meet with their reading buddies more than twice per week, on average. Similarly, Reading Camp attendance increased from baseline to endline, with over 90% of all LB students attending LB reading camps approximately more than six times per month (or 1.5 times per week), on average. Lastly, many

more students borrowed books at endline than at baseline. However, there was little to no increase in the frequency of borrowing books, on average.

As we analyzed the data, an interesting trend became apparent in regards to the frequency of book borrowing, age, and reading achievement in terms of boys and girls. Figure 9 graphically displays this relationship.



In Figure 9, we see that, in general, older students made fewer gains in the number of words they correctly read in one minute<sup>3</sup>. Remember these are gain scores, so we investigated whether older students started out with higher words per minute correct scores at baseline. We tested this hypothesis using ANOVA analysis with the Tukey-Kramer post-hoc test to account for multiple comparisons, and found that baseline scores were not significantly different. **There is a clear, negative relationship in the data between older students and gains in words per minute correct. This might indicate learning difficulties which have kept the students in lower grades, or other obstacles such as work at home that older students must perform and hence do not have as much time to study.**

Other trends are apparent in Figure 9. First, gains made by boys in the number of words they could correctly read in one minute did not significantly vary between those boys who borrowed books and those boys who did not. The same was not true for girls: those girls that reported that they had borrowed books at endline (N=105) had significantly higher gain scores than those girls who reported that they had not borrowed books at endline (N = 23), no matter what age. **This finding demonstrates the clear relationship between exposure to reading materials and the reading fluency of students especially for girls.**

<sup>3</sup> For complete regression models, refer to the Appendix.

*Socioeconomic Status: What relationships, if any, exist between socio-economic status (SES), reading achievement, and Literacy Boost?*

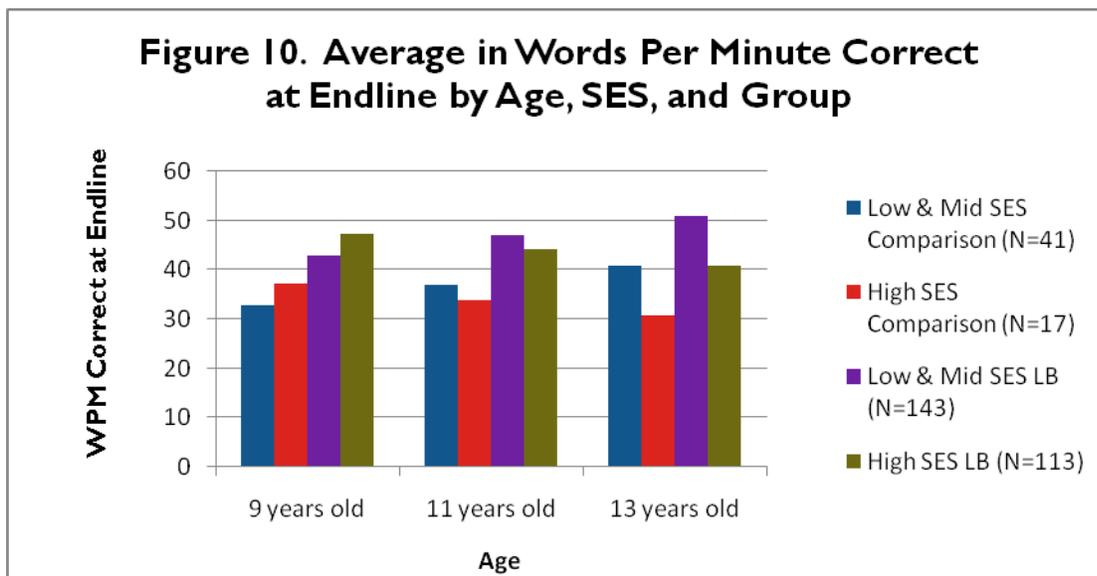
The figures in Table 11 report baseline, endline, and gain scores for 3 groups of students within the Literacy Boost schools (excluding comparison students). These SES groups are defined according to SES terciles. SES terciles were defined by totaling the number of SES-indicative possessions and livestock originally identified by the Ethiopia SC team as good indicators of SES. The sum of possessions ranged from zero to eight. Students were split into three groups: those who reported having 0-2 SES-related possessions & types of livestock were in the low SES group, while those reporting 3-5 were medium SES, and those reporting 6-8 possessions & types of livestock were in the high SES group. Group averages were tested for significant differences using ANOVA analysis with a post-hoc Tukey test to account for multiple comparisons and limit the possibility of *Type I* errors.

**Table 11. Change in Reading Skills from by SES for Literacy Boost Students Only**

Reading Skill	SES	N	Baseline Scores	Endline Scores	Sig. Diff. of Endline Scores Between Groups	% Gain from Baseline to Endline	Sig. Diff. of Gain Scores Between Groups
Concepts About Print	Low SES	14	91.7%	97.6%	None	6.1%	None
	Medium SES	134	88.3%	95.8%		6.8%	
	High SES	114	87.3%	95.0%		6.2%	
Letter ID	Low SES	14	93.0%	96.5%	None	1.7%	None
	Medium SES	134	88.2%	96.6%		7.3%	
	High SES	114	86.2%	96.8%		9.4%	
Most Used Words	Low SES	14	74.0%	90.5%	None	17.6%	None
	Medium SES	134	64.8%	87.7%		21.5%	
	High SES	114	60.3%	87.4%		26.0%	
Fluency (Words Per Minute)	Low SES	14	19.6 wpm	41.3 wpm	None	21.2 wpm	None
	Medium SES	134	24.2 wpm	45.4 wpm		20.7 wpm	
	High SES	114	19.4 wpm	42.8 wpm		22.4 wpm	
Accuracy	Low SES	14	57.4%	85.4%	None	28.7%	None
	Medium SES	134	55.7%	85.0%		27.5%	
	High SES	114	50.5%	83.8%		34.5%	
Reading Comprehension for Readers	Low SES	14	72.4%	86.3%	None	11.4%	None
	Medium SES	134	82.8%	93.9%		13.5%	
	High SES	114	80.5%	93.9%		15.3%	
Student is a Reader	Low SES	14	67.7%	90.5%	None	-	-
	Medium SES	134	62.44%	88.4%		-	
	High SES	114	56.34%	87.7%		-	
% of Students who switched to from non-reader to being an endline reader	Low SES	7	-	-	-	71.4%	None
	Medium SES	58	-	-		67.2%	
	High SES	58	-	-		72.4%	

In examining the table above, we see that no significant differences in reading achievement existed when comparing students in terms of socioeconomic standing, both at baseline and at endline. This could mean several things. First, it might mean that Literacy Boost eliminated any differences that SES might be associated with when looking at reading achievement in the first year it was conducted, and so no differences were detectable at baseline of Year II of LB. It could also mean that the variable used to measure SES was not an accurate reflection of SES within Dendi, and hence does not pick up variation in reading skills according to SES. A third possibility has to do with sample size: too few students (N=14) may have been in the low SES category to see reliable distinctions in reading achievement. **With the data currently on hand, it is not possible to make claims about how LB does or does not differentially impact students based on their socio-economic status.**

Nonetheless, we do see some interesting trends regarding socioeconomic status when examining how it is related to learning across both comparison and LB students. We use multi-level regression analysis with robust standard errors to account for the fact that students are clustered in schools. We further control for baseline concepts about prints scores to account for attrition. We find that in addition to group, an interaction between the age of the student and their SES predicts reading achievement as measured by words per minute read correctly at endline. This model explained 17.4% of the variance in reading fluency. In this instance, due to sample size constraints, we collapsed the definition of SES from three distinct groups to two distinct groups. This was done due to insufficient sample sizes in some groups for a three way comparison. Low to mid SES is defined as having zero to five possessions, while high SES is defined as having six or more possessions. Figure 9 displays this relationship graphically.



There are many features of Figure 9 to point out. First, as we know from earlier sections, on average LB students (green and purple in Figure 10) outperformed comparison students (blue and red in Figure 10) in all age groups, either when divided by SES or taken as a whole. Looking

at both LB and comparison students in the low to mid SES category (represented in blue and purple, above), we find an expected relationship with age: as students grow older, they made more rapid gains in their fluency score (wpm correct). However, the same is not true for LB and comparison students in the high SES category: as students grew older, their achievement in fluency actually decreased on average. That is, younger students from a high SES background actually scored higher on average than their older peers within the same group.

*Why are higher SES and older students learning less on average?*

While we don't have data to conclusively account for this finding, we do offer the following hypothesis. Students in higher SES categories likely come from homes that own more livestock. Similar to the finding in Figure 2 where boys whose family owned more horses were more often absent at endline, it might be that older students bear the greater responsibility when it comes to taking care of livestock. Therefore, these students might be absent from school more often or might have less time outside of school to tend to their studies and focus on learning to read. This finding corresponds with a finding by Friedlander (*under review*) that saw a negative correlation between number of livestock owned and learning achievement in Ethiopia at the first baseline assessment of Literacy Boost in 2010.

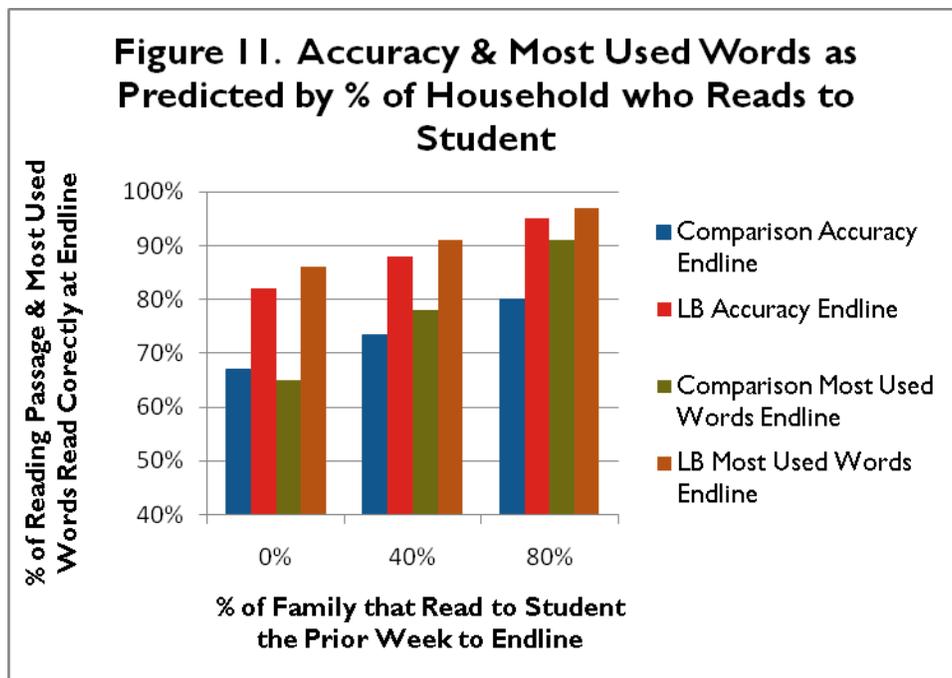
*What are the implications of this finding concerning age and SES?*

The programmatic implications of these findings are complex, as raising livestock is often vital to a family's survival and success. As Literacy Boost moves forward in its third year, parents, community members, and school staff should be made aware of the importance of ensuring that every student attends school regularly, and that students are given as much time as possible after school, on weekends, and during holidays to practice reading, and that they are encouraged to practice reading.

*Home Literacy Environment: What relationships existed in the data regarding the HLE?*

The home literacy environment is one more significant area that is important to critically examine in relation to student's reading achievement. Research performed in the west, and confirmed by many analyses done in Literacy Boost sites across the world show an important connection between the types of literacy exposure students receive at home and in their communities, and those students' corresponding literacy achievement.

In Ethiopia, we asked students about the reading habits of individuals in their home, and whether those individuals read to the student. Figure 11 examines the relationship between the percent of the family who read to the student the prior week at endline. In this figure, we see the potential importance that the home literacy environment plays. This model explained 19.9% of the variance in reading accuracy and 19.9% of variance in most used words. First, **we notice that in both accuracy and for most used words (and fluency as well, although not displayed in the figure), Literacy Boost students (in red and orange) outperformed comparison students (in blue and green) regardless of who read to them at home. We also see that for all students, the more people read to the student at home, the better the student's scores tend to be, on average. This does not necessarily mean that reading to students at home causes better scores, but the strong relationship does exist. Lastly, we see that comparison students who reported having no one reading to them at home at endline had dramatically lower scores than Literacy Boost students. however, this gap becomes smaller and smaller as students report that more family members read to them.**



*Why is this finding important?*

**This finding is important because it highlights both the importance of the HLE, as represented by family members reading to students, as well as the 'boost' that**

**Literacy Boost provides students who come from disadvantaged backgrounds such as a background with a poor HLE. Advocacy efforts, both on behalf of Literacy Boost and in support of better HLE, should be pursued to help all students learn to read better.**

## Conclusion and Next Steps

The second year of Literacy Boost in Dendi proved to be a good one for students in the Literacy Boost sample. Students in the 15 Literacy Boost schools made significant gains in nearly all of their reading skills. Students exceeded benchmark targets for concepts about print and reading fluency, and significantly outperformed comparison students in their scores for letter knowledge, most used words, reading fluency and reading accuracy. While students did not meet benchmark expectations for reading comprehension nor did they outperform comparison students in reading comprehension, they did increase the number of students who could read independently by over 50 percent, a highly statistically significant increase when compared with comparison students.

It bears mentioning that all students, on average, increased scores from baseline to endline, whether they were enrolled in a Literacy Boost school or comparison school. However, Literacy Boost students far exceeded comparison student gain scores in measures such as reading fluency, accuracy, and the likelihood of becoming a new reader. Effect sizes ranged from small to medium, and indicate that the practice of Literacy Boost--that of engaging the community, providing interesting reading materials, and helping teachers to explicitly teach reading skills--is a practice that has strong associations with improved reading skills in students.

For the upcoming third year of Literacy Boost in Ethiopia, it is important to highlight a few items that the SC Ethiopia team can focus on to maximize the impact of LB and help all students achieve at greater levels.

- 1) Focus on attendance for all students. We found in this endline report that students, particularly male students, that come from homes with more livestock might be missing school more frequently than other students. Discuss this finding with community members and develop ways to spread a message on the importance of regular attendance. Also help encourage parents to make sure that all students, regardless of sex or age, have the time outside of school to practice their skills. Findings from this baseline indicate that older students possibly have a harder time achieving the same games, possibly due to extra work at home.
- 2) Sample more students from more control schools. Due to attrition from the sample, the size of the comparison group was cut down by 30 percent in this endline report. With such a small sample size, it is possible that rather than having no results, the sample was just too small to statistically test for certain relationships. In the third year of Literacy Boost, identify more comparison schools to assess at baseline and endline. While the cost of the assessment will increase somewhat, the power of the statistical analysis will increase as well, with a corresponding increase in the impact analysis and the advocacy potential.
- 3) Pay particular focus to the reading comprehension portions of Literacy Boost. During teacher training and community action, emphasize activities that focus on reading comprehension. Since most LB teachers have already been trained once or even twice, possibly begin with reading comprehension training.

- 4) Revise the reading comprehension portion of the LB assessment. Because only 5 questions were asked, and in conjunction with sample size limitations, it was likely that we failed to detect reading comprehension gains not due to a lack of gains, but rather due to the short nature of the questions. Possible alternatives are to add more questions, or more passages to the reading portion of the assessment.
- 5) Encourage book borrowing for every student. At endline, approximately 15 percent of students reported not borrowing books. The only way students will improve their reading is if they have materials with which they can practice. Consider holding read-a-thon or other activities that encourage more book borrowing and book reading by more students.

## References

Blake, J. (1981). Family Size and the Quality of Children. *Demography*, 18(4), 421-442.

Buchmann, C., & Hannum, E. (2001). Education and Stratification in Developing Countries: A Review of Theories and Research. *Annual Review of Sociology*, 27, 77-102.

Cao, Y. Dowd, A.J., Mohammed, O., Hassen, S. Hordofa, T., Diyana, F. & Ochoa, C. (2011). *Literacy Boost Dendi, Ethiopia Three-month Report August 2011*. Washington, DC: Save the Children.

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences (second edition). Lawrence Erlbaum Associates.

Dowd, A.J., Wiener, K & Mabeti, F. (2010). *Promoting reading inside schools and out in Zomba, Malawi: Literacy Boost year 1 impact*. Paper presented at the CIES Annual Conference, Chicago, IL.

Friedlander, E. (Under Review). Factors associated with Reading Achievement in the Developing World: A Cross-National Study. *International Journal of Education Research*.

Mithani, S., Alam, I., Babar, J.A., Dowd, A.J., and Ochoa, C. (2011). *Literacy Boost Pakistan: Year 1 Report*. Washington, DC: Save the Children.

Mungoi, D., Mandlante, N., Nhatuve, I., Mahangue, D., Fonseca, J. & Dowd, A.J. (2011). *Endline Report of Early Literacy among Pre-school and Primary School Children in Gaza Province, Mozambique*. Washington, DC: Save the Children.

## Appendix I: Statistical Models

Table A.1: Logistic Regression Models predicting Attrition

VARIABLES	Attrition	Attrition	Attrition	Attrition	Attrition	Attrition	Attrition	Attrition
Student in LB School	-1.843*** (0.319)	-1.440*** (0.356)	-1.455*** (0.370)	-2.408*** (0.419)	-0.631 (0.582)	-1.041 (0.712)	-1.198 (0.652)	-1.171** (0.363)
Student in Comparison School	-0.595** (0.181)	-0.199 (0.250)	-0.202 (0.238)	-1.141** (0.409)	0.603 (0.502)	0.220 (0.699)	0.0542 (0.618)	
People at Home Seen Reading		-0.541* (0.242)				-0.170 (0.292)		
People at Home Read to Student			-0.554* (0.267)			-0.396 (0.380)		
Family Size				0.0988* (0.0485)		0.112* (0.0503)	0.101* (0.0467)	
CAP % Correct					-1.388* (0.583)	-1.193 (0.609)	-1.400* (0.571)	-0.764*** (0.188)
Observations	390	390	390	390	390	390	390	390

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05. Robust standard errors in parentheses.

Table A.2: Logistic Regression Models Predicting Attrition in Literacy Boost Schools

Variables	Attrition	Attrition	Attrition	Attrition
N of Horses	-0.0625 (0.566)		0.605*** (0.172)	0.589*** (0.163)
Family Size	0.0911 (0.0779)	0.156* (0.0636)		0.137* (0.0573)
Interaction between N of Horses and households	0.0708 (0.0830)			
Sex (Female=1)		0.402 (0.440)	0.698* (0.351)	0.723* (0.351)
Interaction between N of household & Sex		-0.0311 (0.0927)		
Interaction between N of horses & Sex			-0.557* (0.273)	-0.523 (0.268)
Constant	-2.612*** (0.586)	-2.865*** (0.550)	-2.482*** (0.449)	-3.282*** (0.646)
Observations	300	300	300	300

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05. Robust standard errors in parentheses

**Table A.3: Regression Models predicting Baseline Scores Controlling for CAP at Baseline**

Variables	% Letters Baseline	Most Used Words Baseline	Fluency (wpmc) Baseline	Accuracy (% read correctly) Baseline	% Listening Comprehen- sion Baseline	% Reading Comprehen- sion Baseline
Student in LB School	0.0269 (0.0351)	-0.0496 (0.0374)	-2.688 (2.802)	-0.0491 (0.0433)	-0.129 (0.0887)	-0.0176 (0.0287)
CAP % Correct	0.736*** (0.104)	1.641*** (0.164)	71.83*** (10.56)	1.604*** (0.189)	0.763** (0.229)	0.414 (0.355)
Constant	0.211* (0.111)	-0.774*** (0.148)	-39.14*** (9.275)	-0.846*** (0.168)	0.220 (0.197)	0.430 (0.345)
Observations	317	317	317	317	37	194
R-squared	0.333	0.412	0.240	0.333	0.232	0.022

\* p<0.05, \*\*p<0.01 \*\*\* p<0.001. Robust standard errors in parentheses.

**Table A.4: Regression Models predicting Endline Score Controlling for CAP at Baseline**

Variables	% CAP Endline	% Letters Endline	Most Used Words Endline	Fluency (wpmc) Endline	Accuracy (% read correctly) Endline	% Listening Comprehen- sion Endline	% Reading Comprehen- sion Endline
Student in LB School	0.0484 (0.0314)	0.0858* (0.0434)	0.150** (0.0628)	9.471** (3.680)	0.154** (0.0659)	0.122 (0.0838)	-0.00192 (0.0249)
CAP % Correct	0.228** (0.100)	0.278* (0.135)	0.653*** (0.187)	49.19*** (13.10)	0.786*** (0.214)	0.0789 (0.137)	0.127 (0.0758)
Constant	0.713*** (0.112)	0.649*** (0.152)	0.174 (0.183)	-7.436 (12.12)	0.0198 (0.209)	0.644*** (0.122)	0.820*** (0.0767)
Observations	317	317	315	314	314	37	277
R-squared	0.126	0.194	0.171	0.153	0.183	0.049	0.015

\* p<0.05, \*\*p<0.01 \*\*\* p<0.001. Robust standard errors in parentheses.

**Table A.5: Regression Models predicting Change in Scores from Baseline to Endline Controlling for CAP at Baseline**

Variables	% CAP Gain	% Letters Gain	Most Used Words Gain	Fluency (wpmc) Gain	Accuracy (% read correct) Gain	% Listening Comprehension Gain	% Reading Comprehension Gain
Student in LB School	0.0484 (0.0314)	0.0589*** (0.0151)	0.199*** (0.0376)	12.21*** (2.312)	0.205*** (0.0404)	0.250** (0.0789)	0.0300 (0.0220)
CAP % Correct	-0.772*** (0.100)	-0.458*** (0.0933)	-0.986*** (0.187)	-22.32** (10.34)	-0.812*** (0.199)	-0.684** (0.180)	-0.350 (0.316)
Constant	0.713*** (0.112)	0.438*** (0.0899)	0.947*** (0.179)	31.42*** (9.763)	0.860*** (0.191)	0.424** (0.127)	0.452 (0.309)
Observations	317	317	315	314	314	37	191
R-squared	0.573	0.213	0.242	0.087	0.155	0.212	0.018

\* p<0.05, \*\*p<0.01 \*\*\* p<0.001. Robust standard errors in parentheses.

**Table A.6: Model Predicting Gain in Fluency and Interaction between % of Hhold Reading to Student & LB**

Variable	Gain in Fluency (wpmc)						
Gain in % of Hhold Reading to Student	11.91* (4.185)	12.43* (4.632)	12.16* (4.335)	11.93* (4.752)	12.82* (4.839)	12.38* (5.109)	12.15* (4.878)
CAP % Correct	-23.40* (10.06)	-21.85* (10.32)	-23.91* (10.42)	-23.67* (9.912)	-22.49* (10.62)	-22.28* (10.20)	-24.14* (10.25)
Student in LB School	12.01*** (2.213)	12.57*** (2.241)	12.08*** (2.261)	11.92*** (2.246)	12.69*** (2.304)	12.42*** (2.234)	11.98*** (2.295)
Interaction between Gain in % Reading to Student & LB status	-10.82* (4.707)	-11.43* (5.237)	-11.13* (4.782)	-11.13* (5.192)	-11.91* (5.359)	-11.64 (5.624)	-11.41* (5.237)
Age in Years		-1.332 (0.719)			-1.408 (0.704)	-1.170 (0.717)	
Sex (1=Female)			-1.212 (2.450)		-1.744 (2.327)		-1.113 (2.409)
Family Size				1.084 (0.531)		0.980 (0.523)	1.078 (0.534)
Constant	32.64** (9.411)	44.99*** (10.51)	33.62** (10.15)	26.98* (9.844)	47.11*** (11.16)	38.38** (10.84)	27.92* (10.44)
Observations	314	314	314	314	314	314	314
R-squared	0.094	0.104	0.095	0.106	0.105	0.113	0.106

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05. Robust standard errors in parentheses.

Table A.7: Model Predicting Gain in Fluency for LB Group only

Variables	Gain in Fluency (wpmc)
Age in Years	-3.278 (0.765)
Sex (1=Female)	-16.3 (5.409)
Has Borrowed Book from Book Bank or Library	-4.230 (4.575)
Interaction between sex and	18.98 (6.666)
Constant	63.67 (9.429)
Observations	256
R-squared	0.089
*** p<0.001, ** p<0.01, * p<0.05. Robust standard errors in parentheses	

Table A.8: Model Predicting Gain in Fluency with Age/Sex Interaction Term

Variables	Fluency at Endline (wpmc)
CAP % Correct	48.07** (12.92)
Low/High SES (Low=1, High=2)	37.98* (15.27)
Age in Years	5.755* (2.050)
Interaction between SES & Age	-3.714* (1.391)
Student in LB School	10.11** (3.367)
Constant	-66.40* (26.78)
Observations	314
R-squared	0.174
*** p<0.001, ** p<0.01, * p<0.05. Robust standard errors in parentheses	

Table A.9: Models Predicting Most Used Words by HLE

Variable	Most Used Words Endline Score							
% of Hhold members reading to student	0.167*** (0.0289)	0.167*** (0.0311)	0.167*** (0.0289)	0.165*** (0.0302)	0.167*** (0.0310)	0.165*** (0.0322)	0.165*** (0.0321)	0.165*** (0.0300)
CAP % Correct	0.629** (0.176)	0.629** (0.174)	0.630** (0.179)	0.629** (0.175)	0.630** (0.177)	0.628** (0.174)	0.629** (0.177)	0.630** (0.179)
Student in LB School	0.148* (0.0619)	0.148* (0.0603)	0.148* (0.0620)	0.148* (0.0620)	0.148* (0.0602)	0.147* (0.0603)	0.147* (0.0602)	0.147* (0.0620)
Age in Years		4.25e-05 (0.0101)			0.00015 (0.0101)	0.00055 (0.0095)	0.00068 (0.0095)	
Sex (1=Female)			0.0026 (0.034)		0.0027 (0.034)		0.0032 (0.034)	0.0029 (0.034)
Family Size				0.00322 (0.006)		0.00327 (0.006)	0.00330 (0.006)	0.00324 (0.006)
Constant	0.143 (0.174)	0.142 (0.225)	0.141 (0.181)	0.126 (0.165)	0.139 (0.235)	0.121 (0.207)	0.117 (0.215)	0.124 (0.171)
Observations	315	315	315	315	315	315	315	315
R-Squared	0.194	0.194	0.194	0.195	0.194	0.195	0.195	0.195

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05. Robust standard errors in parentheses.

Table A.10: Models Predicting Accuracy by HLE

Variable	Accu- racy Endline							
% of Hhold members reading to student last week	0.160** (0.0425)	0.159** (0.0432)	0.159** (0.0432)	0.153** (0.0440)	0.158** (0.0437)	0.153** (0.0449)	0.153** (0.0453)	0.153** (0.0447)
CAP % Correct	0.763** (0.202)	0.766** (0.201)	0.766** (0.203)	0.761** (0.198)	0.768** (0.202)	0.761** (0.198)	0.764** (0.199)	0.764** (0.199)
Student in LB School	0.152* (0.0649)	0.153* (0.0635)	0.151* (0.0653)	0.151* (0.0646)	0.152* (0.0637)	0.151* (0.0629)	0.150* (0.0630)	0.150* (0.0649)
Age in Years		-0.00225 (0.0122)			-0.0020 (0.012)	-0.0004 (0.012)	-9.7e-06 (0.011)	
Sex (1=Female)			0.00709 (0.0374)		0.00638 (0.0373)		0.0084 (0.0371)	0.0084 (0.0375)
Family Size				0.0120 (0.0068)		0.0120 (0.0062)	0.0121 (0.0062)	0.0121 (0.0068)
Constant	-0.00962 (0.203)	0.0114 (0.252)	-0.0151 (0.205)	-0.0710 (0.194)	0.00398 (0.254)	-0.0673 (0.230)	-0.0777 (0.231)	-0.0778 (0.196)
Observations	314	314	314	314	314	314	314	314
R-Squared	0.199	0.199	0.200	0.205	0.200	0.205	0.205	0.205

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05. Robust standard errors in parentheses.