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Literacy Boost in Rwanda:
Impact Evaluation of a
Two Year Randomized Control Trial

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Compiled and Edited by Elliott Friedlander & Claude Goldenberg

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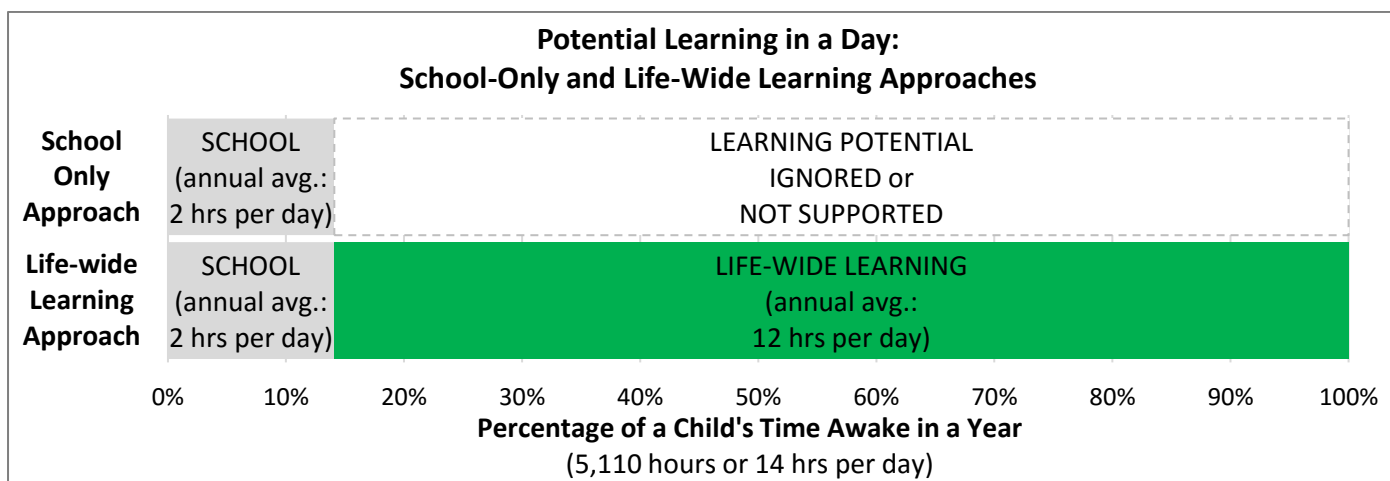
Executive Summary

The Learning Crisis

Reading, writing, and literacy in general are foundational to modern education. Recognizing the importance of literacy development and education more broadly, the global community came together in recent decades and committed enormous resources to ensuring all children globally had access to primary education. These efforts worked to increase school enrollment: by 2015, 91% of the world's children were enrolled in primary school (UNESCO, 2015). However, evidence suggests that merely attending school does not guarantee an education. Approximately 250 million children cannot read regardless of school attendance, and 200 million young people finish their schooling without basic skills (UNESCO, 2013).

Study Motivation: Testing the Difference between *School-Only* & *Life-wide Learning* Approaches to Education

What is fueling the 'learning crisis'? Some hypothesized that the crisis arose because most efforts to improve education adopted a *School-Only* approach to address literacy issues and learning obstacles. In a *School-Only* approach, children receive supports for learning predominantly or even exclusively during school hours and within the school walls, while ignoring learning opportunities in homes and communities. To better address the real challenges that children face in learning both within and outside of school, Save the Children (SC) developed an alternative approach called *Life-wide Learning*. This approach combines enhanced school experiences with wider community activities to help children build a broader, stronger, and more sustainable foundation for learning. SC's Literacy Boost intervention is an example of its *Life-wide Learning* approach: Literacy Boost enhances instruction through teacher training while simultaneously educating families and communities to better support learning outside the school and engaging children in fun learning activities at home and in the village.

The motivation for the study was to test which approach worked better: a *School-Only* or a *Life-wide Learning* approach. The difference between the two is illustrated by analyzing the hours a Rwandan child spends in a 365-day year. First, of the total 8,760 hours in a year, subtract 3,650 hours total for sleeping (10 hours/night), leaving 5,110 hours in which a child is awake in a year (14 hours/day). According to the Rwandan school calendar for the 2015 academic year, students spend a maximum of 720 hours in class (4 hours/day for 180 days). It follows that children spend a minimum of 4,390 hours out of school (12 hours/day). Therefore, as shown in the figure below, the *School-Only* approach supports learning during 15 percent of a child's year, while the *Life-wide Learning* approach expands learning opportunities into children's every waking hour, all year long. The report offers evidence for which of these two approaches most helps children learn.

Potential Learning in a Day:
School-Only and Life-Wide Learning Approaches

School Only Approach	SCHOOL (annual avg.: 2 hrs per day)	LEARNING POTENTIAL IGNORED or NOT SUPPORTED
Life-wide Learning Approach	SCHOOL (annual avg.: 2 hrs per day)	LIFE-WIDE LEARNING (annual avg.: 12 hrs per day)

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

Percentage of a Child's Time Awake in a Year
(5,110 hours or 14 hrs per day)

Literacy Boost in Rwanda

In Rwanda, Literacy Boost is part of the Advancing the Right to Read Programme, which aims to ensure that all children leave school with solid foundations in literacy. To provide more rigorous analysis and a stronger evidence base concerning the effectiveness of Literacy Boost, SC collaborated with researchers from Stanford University, in partnership with the Rwanda Education Board, to conduct a Randomized Control Trial (RCT) of Literacy Boost in

Rwanda. An RCT is generally considered to be the most effective way to determine the impact of an intervention on outcomes of intehirest.

Literacy Boost in Rwanda's RCT randomly assigned all sectors within one Rwanda district to one of two treatment groups—Teacher Training only (referred to as TT), Teacher Training combined with Community Action activities (referred to as LB) — or a Control group. Creating these three groups helped to answer two high-level questions:

1) Does Teacher Training alone have a positive impact on students' learning?

2) Do community activities positively impact student's learning, over and above Teacher Training?

In short, this study found that the answer to both questions is <u>yes</u>. In particular, involving families and communities creates greater numbers of readers who read fluently and with comprehension than simply training teachers alone.

This report presents the results of a mixed-methods study evaluating the impact of assignment either to Teacher Training or to Literacy Boost as compared with assignment to a Control group on children's learning outcomes. The report uses advanced statistical methods to isolate the effect of TT and LB on learning outcomes and qualitative methods to explore the impact in greater depth. The report concludes with a general discussion of findings and recommendation for action and future research.

Data and Methods

<u>Data Collection.</u> All instruments and research protocols were developed or adapted from existing tools. Data were gathered from a wide variety of sources: Reading Assessments, Head Teacher/School Surveys, Teacher Surveys, Teacher Observations, Literacy Ecology Surveys, and Ethnographic observations in homes and communities. The overall sample size included in the analysis of this report is seen in table below.

	Reading Assessment Study		Teacher Study		Literacy Ecology Study	
Year	Cohort 1	Cohort 2	Survey	Observation	Survey	Observation
2013	2,041 P.1 students	--	452 teachers	42 teachers	466 families of students in Cohort 1	2 families
2015	1,668 students assessed in 2013	1,926 P.1 students	561 teachers	42 teachers	344 families from the 2013 survey	4 families
Longitudinal?	Yes	No	Yes	No	Yes	Yes

<u>Data Analysis.</u> Quantitative impact was determined through an "Intention to Treat" analysis. This technique produces a conservative estimate of impact, as it does not estimate impact according to the actual treatment that participants received. Rather, it measures impact according to the assigned treatment status, regardless of the degree to which participants engaged in the program. Qualitative data from an ethnographic sub-study helped deepen our understanding of rural Rwandan children's home literacy environments, the opportunities it provided and constraints it imposed on children's literacy development.

Major Findings

<u>1. Treatments had an impact on reading skills, with LB producing stronger impact than TT.</u> **Children in the LB and TT groups showed improvements compared to children in the Control group**. **The LB condition**, which combined teacher training with community action, **had a larger observable impact than teacher training alone.** Moreover, **two years of treatment had a higher impact than one year alone**.

<u>2. Many students struggle to gain basic skills.</u> Despite these encouraging results, however, too many students struggled to gain basic skills. Overall, **31% of students tracked over two years did not meet a Basic Literacy Threshold (BLT) at endline**.

<u>3. Treatment had an impact on primary level promotion rates.</u> The **LB and TT treatments significantly increased the number of students promoted into P.3 by endline by approximately 44%**, compared to Control students. The difference between LB and TT was not statistically significant.

<u>4. Early primary level repetition rates are still very high.</u> Although the annual rate of student repetition in P.1 to P.3 was significantly lower in the LB or TT group (37% and 36%, respectively) than in the Control group (44%), **nearly 2 in 5 students repeated at least one early primary level.**

5. Print Environment. **Classrooms in schools who received LB Teacher Training** (those in the LB and TT sectors) **had significantly more print materials visible on their classroom walls**.

6. Teacher Knowledge, Beliefs, and Practices. **Teachers in the SC-Trained group had significantly higher scores on their knowledge, beliefs, and practices regarding reading instruction**.

7. Differences between groups in the Literacy Ecology factors. **Students in the LB group experienced improved Literacy Ecologies at home, especially on three of the five Literacy Ecology factors: Reading Habits and Interactions, Reading Materials, and Child Interest/Engagement**. Literacy Competency of the Caretaker and Religious related Reading Activities were comparable across groups.

8. Using the non-school Literacy Ecology to predict reading outcomes. **The most consistent predictor of student's literacy outcomes was student interest and engagement in literacy activities**. The higher a student scored on the interest/engagement factor, the better that student performed on the reading assessments.

9. Ethnographic case studies illustrated how LB could have impact on children's literacy growth, despite less than ideal home conditions. For example, a child in the LB group from an impoverished home with dim prospects for developing adequate literacy skills in 2013 became a confident reader by endline. A mother who could not read assumed an outspoken role in supporting her children to learn, following her attendance at Reading Awareness Workshops. At the same time, case studies also demonstrated that there are some home environments that can negate any potential effect of LB, again suggesting that **promoting literacy growth in the developing world requires a comprehensive effort that touches children's lives in and out of school**.

Next Steps

Advocacy: The findings in this study suggest that **more active community and child engagement in literacy-related activities outside the school is critical to help children learn** and progress through school.

Sustainability: The program will run through the end of 2017, giving the research partners a rare opportunity to understand how participation in the program has affected participants years after the end of direct implementation of activities.

Further Analysis: This report presents findings from an Intention-to-Treat analysis. Future analyses will look at the impact of treatment on those who actively participated, and will systematically compare the reading skills of students in Cohort 1 and Cohort 2. These future analyses will allow a more precise estimation of the relative impact of the LB and TT treatments.

Conclusion

Despite the significant strides made by Rwanda's educational leaders towards improving reading instruction in school, there are challenges that must be overcome if Rwanda is to become a nation of readers. This research demonstrated the power and efficacy of expanding the conceptualization of a learner from a narrow focus on a child's school experience (the *School-Only* approach) to a broader focus on all of the learning potential that a child has throughout her day and life (the *Life-wide Learning* approach). Integrated, systems-level interventions to help families, communities, and schools to support their children's learning are needed for Rwanda to foster a reading culture to transform itself into a knowledge-based economy.

Acknowledgements

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List of Abbreviations and Acronyms

Acronym	Full Spelling
ARR	Advancing the Right to Read
BLT	Basic Literacy Threshold
CF	Community Facilitator
DSTR	Directorate of Science, Technology and Research
ECD	Early Childhood Development
EICV	Integrated Household Living Conditions Survey
ICF	Inner City Fund
IRB	Stanford Institutional Review Board
ITT	Intention-to-Treat
LB	Literacy Boost
LBPO	Literacy Boost Project Officer
MEAL	Monitoring, Evaluation, Accountability & Learning
MINECOFIN	Ministry of Finance and Economic Planning
MINEDUC	Ministry of Education in Rwanda
MT	Dr. Michael Tusiime
MTK	Model Teacher of Kinyarwanda
NISR	National Institute of Statistics of Rwanda
OLS	Ordinary Least Squares
RAW	Reading Awareness Workshop
RB	Reading Buddies
RC	Reading Club
RCBI	Rwandan Children's Book Initiative
RCT	Randomized Control Trial
REB	Rwanda Education Board
RNEC	Rwanda National Ethics Committee
RTI	Research Triangle Institute
RWF	Rwanda Franc
GBP	British Pound
SC	Save the Children
SCI	Save the Children International
SCOPE	School-Community Partnerships for Education (also known as *Mureke Dusoma*)
SCUK	Save the Children United Kingdom
SCUS	Save the Children United States
SD	Standard Deviation
SES	Socioeconomic Status
SGSE	Stanford Graduate School of Education
TT	Teacher Training
UNICEF	United Nations Children's Emergency Fund
USAID	United States Agency for International Development
USD	United States Dollars
WWC	What Works Clearinghouse

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Chapter 1   Introduction

CHAPTER AUTHORS[1]:
Elliott Friedlander, Stanford University
Claude Goldenberg, Stanford University
Richard Germond, Save the Children

We need, all of us, to develop the habit of reading every day for life-long learning and pleasure. We share a common vision of a stable and vibrant country where life quality is defined not only by its citizens' capacity to draw upon objective knowledge, critical thinking and creativity to find original solutions to the development challenges ahead, but where each of us is enriched by the passions, ideas and dreams that have been set down in print across time and borders by others just like ourselves, dreaming of a bright future for the generations to come.[2]

- Minister of Education, Rwanda (Rwanda Reads, 2016)

Providing relevant, quality education for all children is a global challenge. While education access continues to improve, there are too many children in classrooms across the world who are not learning what they need to thrive in today's world. Despite increased access to schooling, there are many contexts in which children are not mastering the basic skills they need to learn. It is estimated, for example, that there are 250 million children in primary school who have not learned the basics in reading and mathematics (UNESCO, 2014).

Governments, bilateral aid agencies, and non-governmental organizations are trying to address the learning crisis in a variety of ways. The international non-governmental organization Save the Children believes that the ability to read and write is the foundation for all future learning. To address the learning crisis, it is essential that children master literacy skills early. Reading is therefore a core focus of Save the Children's global education strategy.

In 2013, Save the Children, in partnership with Rwandan organization Umuhuza, launched its Education Signature Programme, Advancing the Right to Read in Rwanda. The program both reflects Save the Children's core organizational priorities around education and learning and also helps support the Government of Rwanda's commitment to improve children's literacy and reading, and its overall goal of creating a strong culture of reading throughout the country[3].

Advancing the Right to Read's strategy is to address the many and interlinked factors which conspire to prevent children from becoming confident learners who can read fluently and with comprehension. The ARR program therefore provides children with a series of holistic interventions from birth through early primary school by working with children and their families, communities and schools. Within the Advancing the Right to Read programme, there are four connected objectives.

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[1] Recommended citation for this chapter:
Friedlander, E., Goldenberg, C., & Germond, R. (2016). "Chapter 1: Introduction". In Friedlander, E., & Goldenberg, C. (eds.). Literacy Boost in Rwanda: Findings from a 2-year Randomized Control Trial. Stanford, CA: Stanford University.
[2] Quote taken from the Rwanda Reads website (Rwanda Reads, 2016).
[3] For more on Save the Children's work in Rwanda, include the Advancing the Right to Read in Rwanda programme, visit http://rwanda.savethechildren.net

- Improving pre-reading development and emergent literacy: Advancing the Right to Read's interventions include helping parents to support their children's early cognitive development from birth onwards, and offers comprehensive family education and classroom-based early learning and math skills development to ensure children are ready for school.
- Improving the teaching of reading: teacher training and support aims to improve the teaching of reading in primary schools and ensure that teachers can effectively use and manage books in their classrooms.
- Creating a culture of literacy and learning outside of school: Along with family education and support for teachers, the program creates opportunities for children to play and practice reading in the communities where they live. It has established book clubs, community book banks and reading buddy activities.
- Creating a rich, literate environment: The program strengthens every stage of the book chain, working with local authors, illustrators, editors, publishers and sellers to increase availability and access to high quality, age appropriate Kinyarwanda children's books.

The programme is piloting approaches and interventions in each of these four areas. It aims to generate evidence about what works and why, and use this evidence to help inform policy development and practice at a national level.

Literacy Boost, a significant element of Advancing the Right to Read's research and evidence agenda, is a randomized control trial of its core intervention for primary school-aged children. Specifically, Literacy Boost is an approach to improving the teaching of reading while simultaneously increasing community and family support for developing and strengthening children's literacy skills.

This comprehensive impact evaluation of Literacy Boost is the result of a collaboration of nearly a dozen program implementers, researchers, and others. It consists of the following chapters.

Chapter 2 provides an in-depth description of Literacy Boost in Rwanda. This description includes contextually important information on Rwanda and the district in which the project was implemented. Included in this chapter is a description of the Literacy Boost approach as designed by Save the Children for global adoption, as well as the adaptations made by Rwanda's implementation teams.

Chapter 3 describes the research question, the research design, and the methods used to randomly assign different groups to participate in different treatments.

Chapter 4 covers the data sources, sampling frameworks, and other procedures used to collect the data used in this report

Chapter 5 presents evidence on the impact of Literacy Boost on Primary school students. This chapter begins with descriptive statistics, before describing the methods of the analysis used and the key findings. The chapter ends with a summary and discussion of its findings. We consider this the key chapter in the report since it documents the positive impact of Literacy Boost on students' reading development. The chapters that follow present data and findings related to teachers, families, and communities. These following chapters serve to illuminate plausible paths of influence that help explain the outcomes we observed in Chapter 5.

Chapter 6 presents evidence on the impact of the teacher training efforts on teachers' knowledge, beliefs and practices, as observed in classrooms and reported in survey. Similar to the previous chapter, this chapter begins with descriptive statistics, before describing the methods of analysis used and the findings. The chapter ends with a summary and discussion of its findings.

Chapter 7 presents evidence on the impact of Literacy Boost community activities on the Literacy Ecology of children's homes in and communities in Rwanda. Similar to the previous chapter, this chapter begins with descriptive

statistics, before describing the methods of analysis used and the findings. The chapter ends with a summary and discussion of its findings.

Chapter 8 departs from the predominantly quantitative evidence presented in the three preceding chapters by qualitatively investigating the culture of reading and literacy in the lives of Rwandan children. This chapter begins with a description of the homes of four children, and examines how each child interacts with literacy in their daily lives, as well as the literacy ecology that surrounds them. The chapter ends with a summary and discussion of its findings. The end of this chapter provides a discussion on the findings presented in Chapter 8 only.

Chapter 9, the final chapter, synthesizes the findings presented in Chapter 5 through Chapter 8. In bringing together the diverse findings, central themes emerge that indicate specific actions or advocacy points that are likely to improve the reading of children in Rwanda. It also lists the limitations and explores questions of implementation and sustainability.

Following Chapter 9 are the lists of works cited and the Appendix.

Chapter 2   The Literacy Boost Program and its Implementation in Rwanda

CHAPTER AUTHORS[4]:
Elliott Friedlander, Stanford University
Avrile Pacifique Niyibizi, Save the Children
Sofia Cozzolino, Save the Children
Saima Malik, Stanford University

This chapter[5] first provides contextual information about Rwanda overall and the project site specifically. It then provides a detailed description of Literacy Boost, both globally and how it was specifically adapted for the Rwandan context.

Image 1: Map of Provinces and Districts in Rwanda

(Image taken from National Institute of Statistics of Rwanda, Rwandan Ministry of Health, & ICF International, 2015, p. 4)

2.1   Rwanda Overview

The Republic of Rwanda is an extremely hilly country, approximately 25,000 square kilometers in area, which, to put into a United Kingdom-context, is about 25% larger than the country of Wales. The capital, Kigali, lies virtually in the center of the country. According to the National Institutes of Statistics of Rwanda (NISR), 83 percent of the 10.5 million inhabitants of Rwanda live in rural areas, and 50 percent of all Rwandans are under the age of 20. The official

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[4] Recommended citation for this chapter:

Friedlander, E., Niyibizi, A.P., Cozzolino, S., & Malik, S. (2016). "Chapter 2: The Literacy Boost Program and its Implementation in Rwanda" In Friedlander, E. & Goldenberg, C. (eds.) Literacy Boost in Rwanda: Findings from a 2-year Randomized Control Trial. Stanford, CA: Stanford University.

[5] Portions of this section first appeared in the baseline and midline reports on Literacy Boost in Rwanda, published by Stanford, as well as a thesis that analyzed the baseline data (Friedlander, Habimana, & Goldenberg, 2014; Friedlander, 2015; Malik, Gasana, Raab, Cha, & Goldenberg, 2014; Tusiime et al., 2014).

literacy rate[6] for individuals aged 15 to 59 stands at 80.2 of the female population, and 82.4 percent of the male population, with slightly lower rates of literacy in rural areas as compared to urban areas (National Institute of Statistics of Rwanda et al., 2015).

2.1.1 Administrative & Political Organization of Rwanda

Rwanda is divided into provinces, which are further divided into districts, sectors, cells, and villages, which then comprise individual households. These various administrative levels are described below, and depicted in Figure 1.

Provinces & Districts

Rwanda has five provinces —Northern, Eastern, Southern, and Western, and Kigali City—divided into 30 districts (see Image 1). An elected District Mayor leads each district. The decentralized system in Rwanda means that districts are autonomous administrative entities with legal status and financial autonomy (Republic of Rwanda, 2013). The purpose of the district is to promote democracy and serve as a basis for socio-economic development. That is, district authorities are responsible for promotion of solidarity among the population in its development efforts. A District Council and an Executive Committee are responsible for the administration of the population and safeguarding its interests.

Sectors

Districts are further divided into *sectors*. Citizens of Rwanda participate politically at the sector level through elected representatives. Two bodies, the Sector Council and the Sector Executive Committee are responsible for overseeing administrative and technical issues within the sector.

The Sector Council is a political organ for policy-making decisions. The number of cells contained within the sector determines the number of Sector Council members. The Sector Council's functions include approval of sector action plans and programs as well as ensuring the follow-up of their implementation. The Sector Council is also responsible for electing the Sector Executive Committee, which supports the preparation and implementation of the Sector Council's policies, plans, and decisions.

Cells

Sectors are further divided into *cells*, which are managed by an executive secretary and an officer in charge of social and economic development. Also at the cell level is a team that serves as decision makers and advisors to the executive secretary and the development officer. Technical and key political matters are handled and addressed at the cell level. The key organizational bodies of the cell are the Cell Council and the Cell Executive Committee.

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[6] Individuals are literate if they "attended secondary school or higher", or "can read a whole sentence or part of a sentence" (National Institute of Statistics of Rwanda et al., 2015, p. 40)

Figure 1: Administrative Schematic of Rwanda

Administrative Schematic of Rwanda
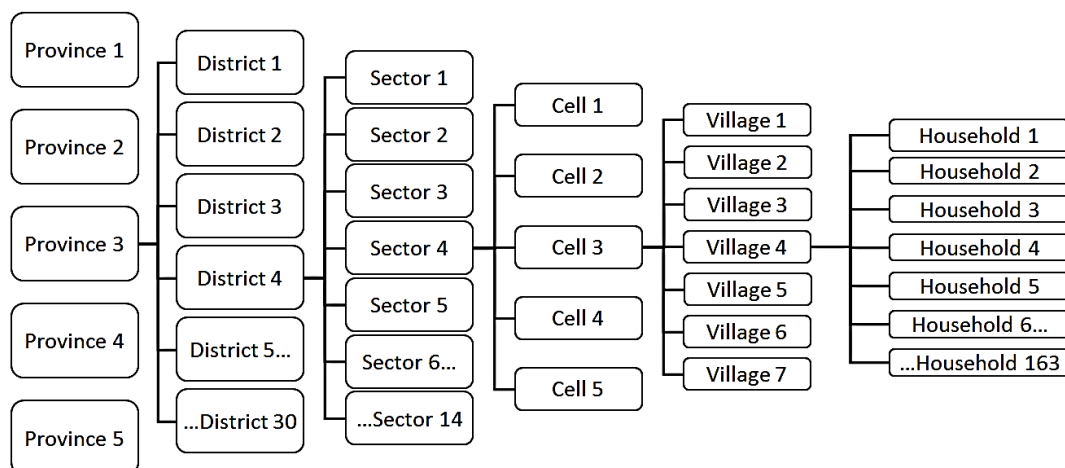
Total in Rwanda*	Provinces	Districts	Sectors	Cells	Villages	Households	Residents
	5	30	416	2,148	14,837	2,424,898	10,515,973
National Average	--	6 Districts per Province	14 Sectors per District	5 Cells per Sector	7 Villages per Cell	163 Households per Village	4.3 Residents per Household

*All data taken from the 4th Population & Housing Census (NISR & MINECOFIN, 2012)

Villages

Finally, cells are divided into *villages*. The village is the smallest political/administrative entity in the country, made up of individual households, and hence are the closest political unit to the people of Rwanda. The village is the entity through which the problems, priorities and needs of the people at a grassroots level are identified and addressed. Leaders at the village level are volunteers who are elected to serve their country, through a direct and universal suffrage by all villagers aged 18 and older. Village leaders do not handle any technical issues, such as deciding agricultural priorities, infrastructure development, or other areas that require skills and abilities acquired through education and experience.

2.1.2   National Focus on Literacy

In the policy document Vision 2020, the leaders of Rwanda envisioned a modern, middle income country with a knowledge-based economy (Republic of Rwanda, 2000). To achieve this by the year 2020, the government acknowledged the necessity to "encourage and support a culture of reading throughout Rwanda"(Rwanda Reads, 2014). Educators in Rwanda have expressed their intention to use the published research in reading and literacy to reform the early acquisition of reading skills. As an example, the 2013-2017 Education Sector Strategic Plan (Rwanda Ministry of Education, 2012b) calls for training teachers on "effective reading classroom practices" and creating "evidence-based reading instructional materials" (Rwanda Ministry of Education, 2012b, p. 53). The Literacy, Language, and Learning (L3) Initiative, a collaboration between the Ministry of Education, the Rwanda Education Board, Education Development Center, Concern Worldwide, Never Again Rwanda, VSO and other partners, and funded by the United States Agency for International Development (USAID), have been working since 2012 to completely overhaul the early grades reading curriculum and classroom pedagogical practices to more closely align with the established research-based best practices on early reading acquisition (Education Development Center, 2014).

The limited but informative existing research on the culture of reading in Rwanda points to some challenges that must be overcome: a general lack of reading materials, a strong oral culture, and an education system that does not foster good reading habits nor a love of reading in young students (Ruterana, 2012).

2.1.3 The Ministry of Education & the Rwanda Education Board

The Ministry of Education (MINEDUC) in Rwanda oversees all education in Rwanda. According to its website,

> *The mission of the Ministry of Education is to transform the Rwandan citizen into skilled human capital for socio-economic development of the country by ensuring equitable access to quality education focusing on combating illiteracy, promotion of science and technology, critical thinking and positive values.* (Rwanda Ministry of Education, 2012a)

The Rwanda Education Board (REB) is the agency within MINEDUC responsible for implementing education policy. It sets quality standards, oversees curriculum development, trains teaching staff, and performs many other functions within the education system.

2.1.4 Schooling in Rwanda

The schooling system in Rwanda is composed of pre-primary, primary, secondary, and tertiary levels. As this report focuses solely on primary school, we review here the pre-primary and primary levels. Pre-primary education in Rwanda is encouraged but is not compulsory. Widespread access to pre-primary education has not yet been achieved, with only 14.2 percent of three to six year olds attending some form of pre-primary school (National Institute of Statistics of Rwanda, 2015). Primary school, unlike pre-primary, is compulsory. Children start their primary school education in Primary 1 (P.1) at age seven (Rwanda Ministry of Education, 2016), and continue through Primary 6 (P.6) at which time they should be twelve years old (National Institute of Statistics of Rwanda & Ministry of Finance and Economic Planning, 2012). P.1 is the equivalent of the 1st grade in the United States of America (USA) or Year 1 in the United Kingdom (UK); P.2 is the equivalent of 2nd grade in the USA or Year 2 in the UK, and so on.

School Catchment Areas[7]

As some cells contain more than one school, while other cells do not contain any primary schools, students may attend schools that lie outside their village, cell, sector, or even district. As such, the actual school catchment areas exist independent of administrative boundaries. Catchment areas are defined in a very simply and utilitarian way: a school catchment area encompasses all the villages in which enrolled students live. School catchment areas may therefore change year to year. Anecdotal evidence suggests that some students can walk up to one or even two hours to reach school each day (and another one or two hours on the return trip), indicating that school catchment areas likely overlap to varying degrees.

Language of Instruction

The language of instruction for the first three years of primary school is Kinyarwanda. English is taught as a separate subject in these early primary school years. In P.4, teachers transition to using English as the language of instruction for all subjects except for instruction in the Kinyarwanda language subject. Starting in P.1, teachers specialize in teaching one or more subjects and hence do not stay with one class for the entire school day, but rather move from classroom to classroom to teach one or more specific subjects.

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[7] The term School Catchment Area is not one commonly used in Rwanda. Indeed, the research team did not locate a definition of this term published by Rwandan authorities. Therefore, the research team sets forth a simple definition here, as the term will be important for understanding decisions regarding the research design.

Alleviation of Overcrowding in Schools

Given the large difference in the size of the youth population versus the adult population, the government employs two techniques to alleviate overcrowding in primary school. First, multiple different classrooms of the same primary grade may exist in one school. That is to say, for example, there may be two or more Primary 1 classrooms in a large school, each of which has a distinct student population. The second technique to combat overcrowding is the two school shifts conducted each school day – one in the morning and one in the afternoon. That is, in many schools, one set of students attend school in the morning from 7:20 to 11:40, while a second distinct set of students attend school in the afternoon, from 12:40 and staying until 17:00. These sets of students alternate which session they attend, meaning that at times one set of students will attend in the morning, and at other times the same set will attend in the afternoon. Each student's school day, therefore, lasts 4 hours and 20 minutes, which includes 4 hours for direct instruction and a 20-minute recess or break period.

Length of the School Year and Hours Available for Instruction

According to the official school calendar in 2015, primary schools in Rwanda were open for five days a week for 36 weeks in total. This equals 180 official school days in 2015. This total number of days includes holidays when school is closed and exam periods (during which time instruction is limited), so that the total number of days during which instruction is occurring is likely less than 180 days.

We will use the 180 days in which school is open in order to calculate the number of hours of possible instruction. In this way, we demonstrate the very maximum number of hours available for instruction. When we multiply 4 hours of direct instruction by 180 days, we see that the official Rwandan school year comprises 720 hours of instruction. Given that there are 8,760 hours in a year, children who attend primary school are in school for a maximum of 8.2 percent of the total time in a year.

Education Oversight within Districts

All districts in Rwanda are part of a decentralized education system. Each district is assigned a school Inspector, who is employed by the REB to provide inspection across all schools within the district.

In addition, at the district level there is a Director of Education, District Education Officers, and Sector Education Officers. The Sector Education Officers complement the REB inspector by providing additional human resource to increase the schools' inspection and supervision. It is important to note that the District Education Officers and Sector Education Officers answer not to REB authorities, but rather to their respective District Mayors and Sector Executive Secretary. Head Teachers (the equivalent of principals in the United States) are not directly line-managed by the SEOs, but are accountable to the sector executive secretaries and the District Mayor.

2.2   Gicumbi Overview

The Literacy Boost project, the subject of this report, was implemented in the district of Gicumbi.

2.2.1   Gicumbi Administrative Organization

Gicumbi (pronounced *Gi-chu-mbee*) is in the Northern Province and one of the northern-most districts of Rwanda. It is bordered by Uganda to the north and shares borders with seven other districts, as seen in Image 2. Gicumbi contains 21 sectors, 109 cells and 630 villages (Republic of Rwanda, 2013).

2.2.2   Population and Socioeconomic Status of Gicumbi

Gicumbi is one of 30 districts of Rwanda, with a population of just under 400,000 residents (National Institute of Statistics of Rwanda, 2012b) and slightly more women (52.3 percent) than men (National Institute of Statistics of Rwanda, 2012b). In terms of age groups, the population in Gicumbi is young, with 62 percent of the population under 25 years old. It is also predominantly rural, with 91 percent of the population residing in rural areas. The

average household size in Gicumbi is 5.1 persons, which is slightly above the national average of 4.8 persons per household (National Institute of Statistics of Rwanda, 2012b).

Poverty levels in the district are high compared to the national levels, with 49 percent of the population living under the poverty line and 34 percent of the population in extreme poverty. In comparison, the national levels of poverty and extreme poverty are 45 percent and 24 percent, respectively. When compared with other districts of Northern Province, Gicumbi has the highest percentage of extreme poverty (National Institute of Statistics of Rwanda, 2012a).

The overall employment rate is 86 percent of the resident population aged 16 years and above. This rate is slightly higher than the national average of 84 percent (National Institute of Statistics of Rwanda, 2012a).

The EICV3 survey shows that household income in Gicumbi comes primarily from agricultural activities (76 percent), followed by trade (7 percent) and government jobs (5 percent) (National Institute of Statistics of Rwanda, 2012a).

Finally, data presented in a thematic report on population size, structure, and distribution indicated that Gicumbi has the second highest population of foreign residents, with nearly 14 percent of Gicumbi residents classified as non-Rwandan nationals (National Institute of Statistics of Rwanda & Ministry of Finance and Economic Planning, 2014). This statistic is not surprising given that Gicumbi district both shares an international border with Uganda and hosts a refugee population.

2.2.3   *Schooling and Literacy Statistics in Gicumbi*[8]

From 2010 through 2015[9], the Net Attendance Ratio in primary school for Gicumbi ranged from 91.8 percent to 97.9 percent depending on the source of the data. The Gross Attendance Ratio ranged from 133.0 percent to 152.8 percent. The Net Attendance Ratio reflects that nearly all of the entire population of 7 to 12 year olds that live in Gicumbi are enrolled in primary school, but that somewhere between 2.1 to 8.2 percent of children of the appropriate age still do not attend primary. The Gross Attendance Ratio implies that the total primary school student enrollment is between 33 and 53 percent greater than the number of children who should be enrolled in primary school based solely on the ages of children (NISR 2012a, 2015, 2016; Rwanda Ministry of Education, 2016).

Similar to the Net Attendance Ratio and Gross Attendance Ratio reported above, the promotion and repetition rates, both within Gicumbi and nationally, vary depending on the source of the data and the year in which the data were collected and analyzed. Promotion rates (the percentage of students who move up one primary level from the level in which they studied the previous year) vary from a low of 67.6 percent of primary school students to a high of 76.4 percent. Repetition has a similar range, between a low of 12.5 percent and a high of 30.3 percent (NISR 2012a, 2015, 2016; Rwanda Ministry of Education, 2016).

In 2014, 78 percent of primary leavers in Gicumbi (those students in P.6, which is the highest level of Primary school) passed end-of-year national examination in 2014 (Rwanda Ministry of Education, 2015).

In 2014, Gicumbi had a total of 95,848 primary pupils, 1,434 primary school teachers, 102 schools and 1,164 classrooms (Rwanda Ministry of Education, 2015). These figures imply a student to teacher ratio of 67 to 1, and a

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[8] Depending on the data source and year of data collection, the rates of enrollment, promotion, repetition, and drop-out vary. Refer to the Appendix for the officially reported statistics and the source and year for each statistic.
[9] Note that the references cited at the end of this paragraph extend through 2016. However, the statistics reported in these publications extend only through the 2014 school year at the latest.

student to classroom ratio of 82 students for every 1 classroom. Though official statistics for 2015 have not yet been released, one more primary school opened in Gicumbi, as observed by the Stanford research team and its partners, for a total of 103 primary schools.

Image 2: Gicumbi Administrative Map
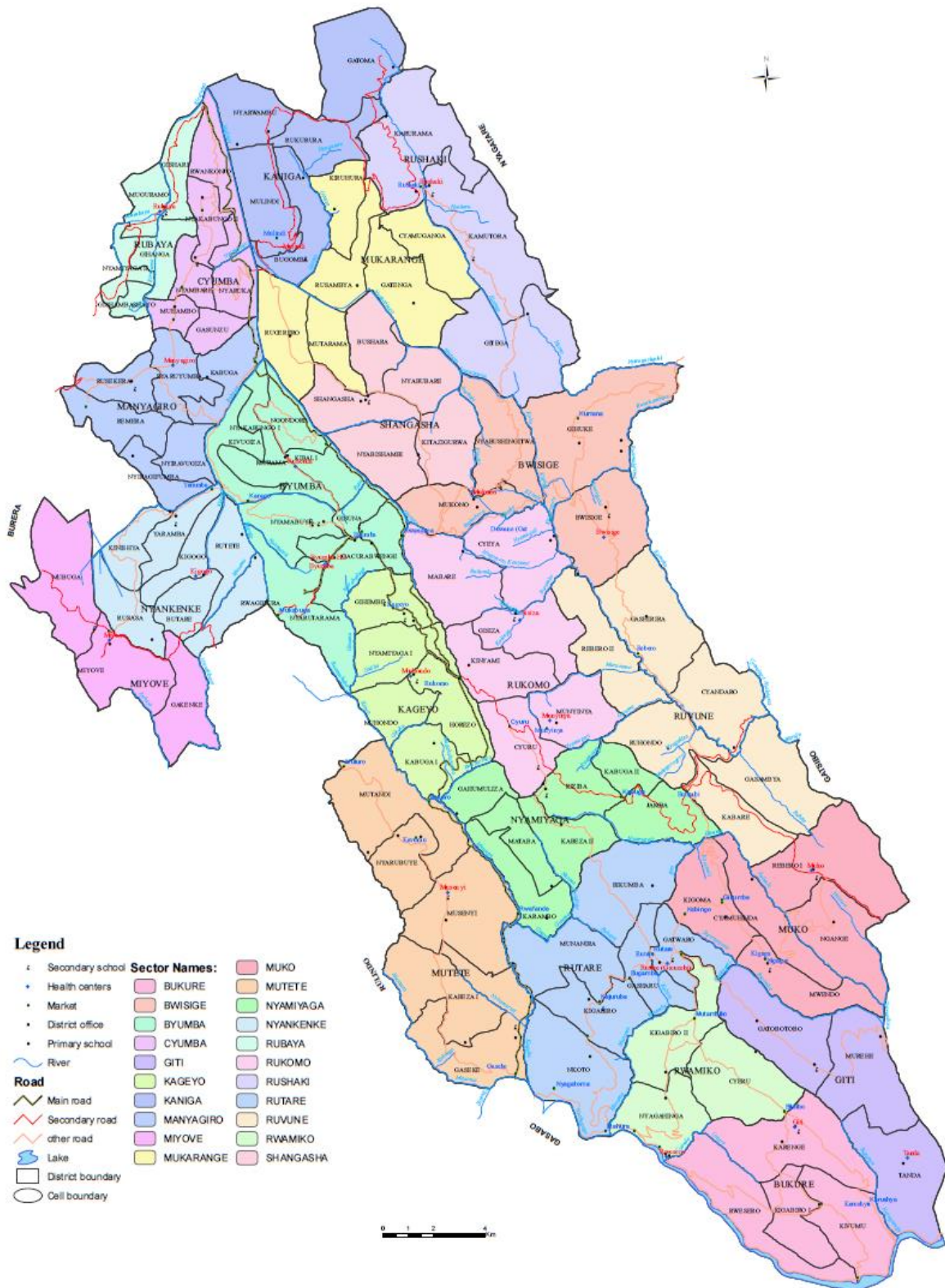
(Gicumbi map reproduced from National Institute of Statistics of Rwanda, 2010)

2.2.4   Other Non-Governmental Organizations & Charities/Initiatives in Gicumbi

Gicumbi's District Development Plan (2013-2018) defines a set of priorities for the five years between 2013 and 2018 (Republic of Rwanda, 2013). In the Development Plan, officials define three types of critical stakeholders or actors in

specific domains. We present this table to give an idea of the official, registered organization working in Gicumbi. Table 1 indicates the classification of stakeholders/organizations and their respective domains of intervention.

Table 1: Stakeholders and Intervention Domains, & Sectors Covered in Gicumbi

Org Type	Organization Name	Domain of intervention	Sectors
International Non-Governmental Organizations	ADEPR (The Pentecostal Church of Rwanda)	Education	1
	American Refugee Committee (ARC)	Health in Gihembe refugee camp	1
	Association of Volunteers in International Service (AVSI)	Hygiene & Sanitation	3
	Family Health International 360 (FHI 360)	HIV / AIDS at Gatuna border	6
	Help a Child (HAC)	Education	3
	Save the Children	Education, Literacy Boost	21
	SOS	Education	21
	Volunteer Services Overseas	Mentoring / coaching of teachers & Head Teachers	3
	Winrock/Reach Tea	Education & IGAs	4
	World Vision	Education, Health, Nutrition	7
Local Non-Governmental Organizations	Action pour le Development du Peuple (ADEPE)	Education & IGAs	4
	African Evangelistic Enterprise (AEE)	Education, Agribusiness	3
	Appel pour l'Avenir des enfants du Rwanda	Water, Shelter, Library	6
	Caritas Byumba	OVCs, IGAs	21
	Hannah Ministry	OVCs and mother girls [sic], HIV AIDS, Education	1
	Red Cross	OVCs, Historically Marginalized People (HMP)	3
	Transformational Leadership Center	Peace Building and Library [sic]	1
	Umuhuza	Literacy Boost	21
	ZOE (Zimbabwe Orphan Endeavour) Ministries	OVCs	6
	Imbuto Foundation	Support girls to life skills thru 12 PLUS project	21
Faith Based Organizations	ADEPR (The Pentecostal Church of Rwanda)	Evangelization, education	NS
	Adventiste	Evangelization	NS
	Catholique	Evangelization, education	NS
	Eglise Anglicane au Rwanda (Anglican Church of Rwanda) (EAR)	Evangelization, education, OVCs	NS
	Eglise Presbyterienne au Rwanda *(Presbyterian Church in Rwanda)* (EPR)	Evangelization, OVCs	NS
	ISLAM	Evangelization	NS
	RODCC Irembo	Evangelization	NS

Org = Organization; NS = Not Specified (Information reproduced from original pdf file provided by the Joint Action Development Forum, 2015)

2.3   About Literacy Boost

Literacy Boost comprises three components: 1) Teacher Training, 2) Community Action, and 3) Assessment. Program implementers use a 'toolkit' – separated into three parts corresponding to each of the three components – to roll out and implement the program. The following sections describe: the development of Literacy Boost; then an overview of each component as it appears in the toolkit; and finally the adaptations and variations made by program implementers in Rwanda.

The information presented in this section is distilled from the *Literacy Boost Toolkit* (Save the Children US, 2012c), as well as conversations with program staff and monitoring data, collected by SCI in Rwanda and partner staff during the day-to-day routines of Literacy Boost[10].

2.3.1   Impetus behind Literacy Boost Development

In order to get children into school, countries around the world abolished school fees for primary schools. This action achieved the intended consequence of opening up primary school for a vast population of students whose families previously could not afford to enroll their children in school. While an undoubted achievement, the mass drive towards universal primary enrollment also had unintended negative consequences around the world. School systems were not ready to cope with the surge in enrollments, leading to crowded classrooms and high ratios of students to teachers across the developing world.

Towards the middle of the last decade, a new and alarming trend emerged: many students reaching Primary 5 were unable to read a simple text. The efforts of international education experts quickly moved away from the enrollment issue and focused in on learning. Experts called for empirically proven methods to support learning, often with a focus on reading development. The evidence base clearly showed that many of the efforts being enacted by partners were well situated within the research on supporting children's reading development. That is, without properly trained teachers who have properly scoped and sequenced textbooks and other materials in classrooms that are extremely overcrowded, students will have a harder time learning to read in school. Hence, common programs across a range of development organizations emerged that targeted curricula, textbooks, teacher training, school management, and school accountability, all efforts that attempted to improve students' learning.

2.3.2   The Life-wide Learning Framework

Save the Children, too, set out to improve students learning. However, rather than focusing solely on the research supporting student learning in schools, researchers and program designers looked for proven methods aimed at supporting children's learning throughout their day and throughout their life. The research clearly stated that in order for a child to become literate, it is essential that the child's environment (both in and out of school) should support their literacy development (Snow, Burns, & Griffin, 1998). Studies consistently show that parents' level of education, family socio-economic status, the number of books present in the home, and family participation in literacy activities such as shared reading are positively associated with children's emergent language and literacy skills (Hess & Holloway, 1984; Payne, Whitehurst, & Angell, 1994; Purcell-Gates, 1996; Snow, Barnes, Chandler, Goodman, & Hemphill, 1991).

This relationship holds true both in the high-income countries as well as lower or low-income countries. Understanding that the aim must be to improve students' ability to learn both inside and outside of the schools, throughout their day and life, Save the Children adopted an educational approach that they termed 'Life-wide learning' (Friedlander, Dowd, Borisova, & Guajardo, 2012).

Life-wide learning posits that children are capable of learning not just during school hours, but during every waking moment of their day, from the day they are born. Educational efforts that align with the life-wide learning philosophy go beyond traditional efforts of teacher training, curriculum design, or school accountability measures in

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[10] In 2016, Save the Children program designers have revised the toolkit into Literacy Boost 2.0. The description of the Literacy Boost program contained in this section is reflective of the original program, and does not mention the changes or improvements made in Literacy Boost 2.0.

attempt to improve children's learning. Life-wide learning seeks to involve parents, siblings, community members, as well as traditional school staff to improve children's cognitive growth and learning (Friedlander et al., 2012).

Using a larger and more holistic research base upon which to base a literacy program, Save the Children developed the Literacy Boost toolkit and began initial pilots of the program. With its position in communities and schools around the world, Save the Children was an organization uniquely situated to address the many 'life' obstacles children face in their learning outside as well as within the confines of the school.

As described below, Literacy Boost is an example of a program embracing Life-wide learning through its spectrum of activities. Specifically, Literacy Boost both trains teachers to teach reading more effectively and helps family and communities provide support for children's nascent literacy skills. Vital to these efforts is the development of local language reading materials to help children practice their skills. First we will describe the creation and general implementation of Literacy Boost and then describe the program in depth.

2.3.3   Literacy Boost Creators

In 2007, Dr. Amy Jo Dowd at Save the Children created the original Assessment Component in order to assess whether students in Save the Children program sites were experiencing the challenges in their learning. This assessment was conducted in Haiti, Nepal, Ethiopia, and Guatemala. As results came back showing low levels of learning, she enlisted Carol da Silva to develop the Teacher Training Component and Elliott Friedlander to create the Community Action Component. This Community Action Component built on activities that had been implemented across a range of Save the Children countries, specifically originating in Bangladesh's *Reading for Children* program, as well as incorporating new ideas for activities in the home and community. Several others at Save the Children, most notably Cecile Ochoa, spent several years refining the toolkit, adding features to make it more adaptable, easier to use, and filling in gaps that existed in the original toolkit.

2.3.4   Worldwide Implementation of Literacy Boost

Literacy Boost was first implemented in Malawi in 2009. Nepal, Mali, and Pakistan quickly followed with their own pilot projects. Since then, communities and schools in more than thirty countries around the world have participated in Literacy Boost activities. Image 3 provides a global overview of countries that have participated in Literacy Boost. Note that none of these countries have implemented the full Literacy Boost program on a national scale. Nonetheless, over one and a half million children have participated in Literacy Boost worldwide since the start of the program (Dowd et al., 2016).

Image 3: Literacy Boost Countries as of October 2015

Map Key

🔴 Literacy Boost Countries

🟢 Literacy Boost Countries (planned for 2016)
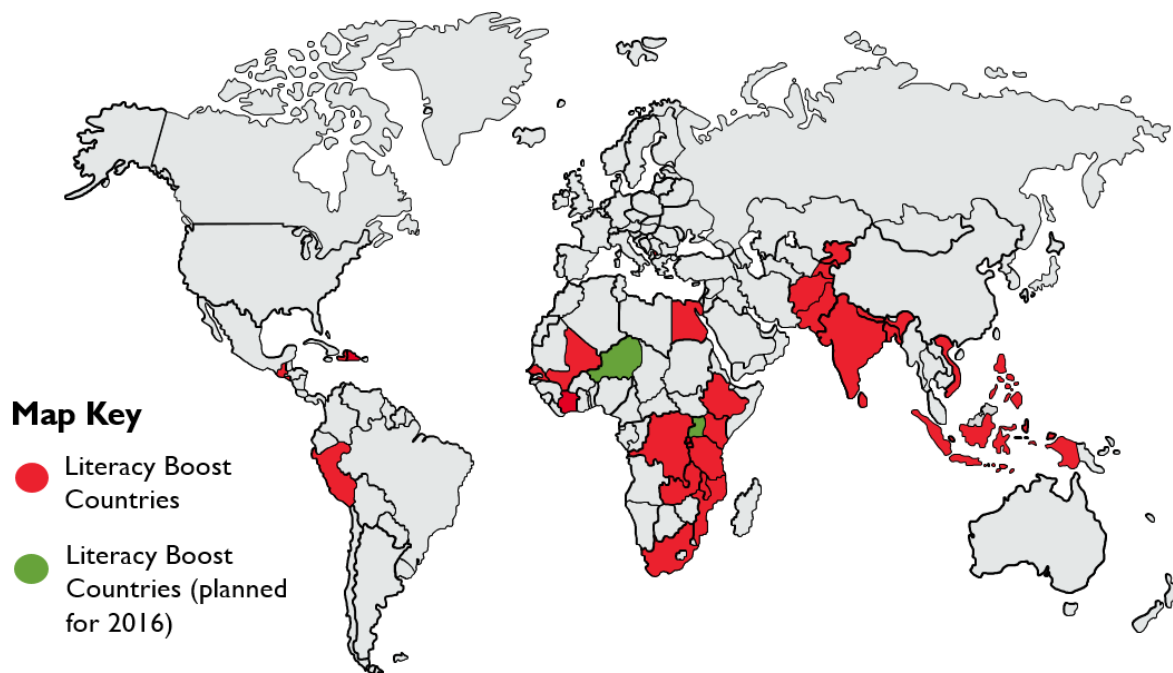
Literacy Boost Countries

1. Afghanistan	9. Ethiopia	17. Mali	25. Senegal
2. Bangladesh	10. Guatemala	18. Mozambique	26. South Africa
3. Burundi	11. Haiti	19. Nepal	27. Sri Lanka
4. Cote d'Ivoire	12. India	20. Niger (planning)	28. Tajikistan
5. Democratic Republic of Congo	13. Indonesia	21. Pakistan	29. Tanzania
6. Dominican Republic	14. Kenya	22. Peru	30. Uganda (planning)
7. Egypt	15. Kyrgyzstan	23. Philippines	31. Vietnam
8. El Salvador	16. Malawi	24. Rwanda	32. Zambia

Save the Children®

Image reproduced with permission from Save the Children USA

A Literacy Boost pilot/proof of concept is generally implemented over the course of one school year. An impact evaluation of the program estimates the impact of Literacy Boost on children's reading abilities versus the abilities of a counterfactual group. These evaluations follow experimental research designs where feasible, and quasi-experimental designs otherwise. Schools and students that serve as comparison schools are generally invited to participate in Literacy Boost programming the subsequent year.

Implementers include Save the Children International staff, staff from partner non-governmental organizations, staff from the Ministry of Education or associated agencies, and local volunteers. Internationally, Save the Children also has licensed World Vision International to implement Literacy Boost in World Vision's program sites around the world. Some of the shaded countries included in Image 3 are in fact among the 13 countries in which World Vision implements Literacy Boost. In some places, including Rwanda, Ethiopia, and Nepal, both World Vision and Save the Children had separate locations where each organization was implementing LB.

2.4   Component 1: Teacher Training

The teacher-training component aims to improve teachers' reading pedagogy. This component provides in-service teacher training to all early primary teachers over the course of an academic year. All of the information provided in this sub-section is summarized from the Literacy Boost Teacher Training Toolkit (Save the Children US, 2012d).

2.4.1 Teacher Training sessions

The teacher training toolkit is organized according to the teacher training sessions set out for delivery. The toolkit contains nine sessions in total. Those are:

Session 1: Introduction to Reading Development and Instruction for Young Children
Session 2: Formative Assessment
Session 3: Addressing Language Issues in the Literacy Classroom
Session 4: Letter Knowledge / Alphabetic Principle
Session 5: Phonemic Awareness
Session 6: Reading Fluency
Session 7: Vocabulary
Session 8: Reading Comprehension
Session 9: Conclusion

Session 1 provides an orientation to the training methods as well as ideas on how to create print-rich classrooms using locally resourced materials (e.g. discarded cardboard cartons, string, etc.). Sessions four through eight cover skills that have been shown to be related to success in reading in English, as highlighted in a landmark meta-analysis (National Reading Panel (US) & National Institute of Child Health & Human Development (US), 2000).

2.4.2 Structure and Schedule of TT sessions

Sessions 4 through 8 each contain the following six activities:

Activity 1: Reflection from Previous Training
Activity 2: Introduction to the Session Topic (e.g. reading fluency)
Activity 3: Model Lesson
Activity 4: Assessment
Activity 5: Lesson Planning
Activity 6: Reflection on the Day's Training

Training sessions are spread out over the year, allowing teachers to learn specific skills on a focus topic within the field of reading pedagogy. As laid out in the toolkit, each session is roughly four to five hours long. Teachers then are given two to four weeks to put their training into action in their classrooms. Following this period, teachers reconvene for a new training session on a new topic. The first activity in each session, the reflection activity, provides teachers a forum in which to discuss their successes and challenges in teaching reading and in teaching the specific skill they had learned in the previous training session. Activity 2 provides teachers with the content knowledge needed to understand the skill being introduced and its importance. Activity 3 and 4 allow teachers to see how the target skill is taught and how to use formative assessment to gauge the success of their teaching. Activity 5 provides teachers a chance to plan their own lessons and to share these lesson plans with their peers. Activity 5 is important as it provides teachers a set of lesson plans for immediate use in their classrooms.

2.4.3 Guidance for Local Adaptation

Literacy Boost Teacher Training is not a rigid, prescribed curriculum. Indeed, it is not a curriculum at all, but a training program to improve teachers' reading pedagogy. As described in the paragraphs below, the training sessions adapt to the local needs and context in four ways: first, by coordinating their lessons with the government curriculum, second, by meeting the needs of learners who may speak a language at home that is different from the language of instruction, third, by encouraging implementers to adapt the foreign content of sessions, and fourth, by encouraging implementers to change the order of the sessions, add new sessions, or combine sessions to meet their local needs.

The first adaptation to local context is designed to support teachers in their teaching of the government curriculum. This is an acknowledgement that many teacher trainings encourage teachers to teach an alternative curriculum, placing the trained teachers in a difficult position. Literacy Boost Teacher Training avoids this situation by providing teachers with the skills, techniques, and ideas to adapt and include the existing, official curriculum, regardless of the curriculum's focus on reading pedagogy. For example, if the curriculum requires that students learn about different animals, the methods for teaching vocabulary learned in Session 7 might be put to use to accomplish the dual goals of teaching about animals and building students' vocabulary.

The second adaptation is an acknowledgement of the reality that many learners across the world come to school with variable mastery of the language of instruction. Tips and techniques for teacher learners who speak a different language or dialect at home than the language of instruction are offered in a separate session, and mentioned in other sessions as well. While the life-wide learning approach endorses the well-researched and generally accepted theory that children learn to read best when they learn to read in their own language (August, Shanahan, & Escamilla, 2009), Save the Children does not generally engage in direct advocacy to change languages of instruction or shift other policies within the classroom. Rather, the LB Teacher Training sessions provide teachers the tools and skills necessary to address the diverse needs of learners across the world while abiding by rules and guidelines set forth by national Ministries of Education or other education policy makers.

The third adaptation involves the content of the model lessons within each session. The goal of the model lessons is to demonstrate best practices in teaching the target skill or topic of the session. Save the Children very explicitly recognizes that each country, each language, each culture is not only different, but contains a treasure trove of knowledge, stories, and traditions. By incorporating this treasure trove into the trainings, the sessions become more engaging and relevant to the local context. Indeed, the toolkit suggests ways to incorporate this local knowledge and tradition. For instance, when the story Rumpelstiltskin appears in Session 4, the toolkit authors point out that this story can and should be replaced with another story that might be more appropriate for the context.

The fourth adaptation involves revising the order and/or frequency of the implementation of sessions. If Teacher Training sessions occur once per month, and the session order is explicitly followed, teachers will not receive the requisite in-depth training on reading comprehension skills until the ninth month, though the skill will be touched upon in other sessions (e.g. formative assessment). As such, the toolkit suggests that implementers decide which skills they want to emphasize early and in which order they want to implement the sessions.

2.4.4   Teacher Trainers
The toolkit does not specify who can and cannot be a teacher trainer. Rather, it encourages implementers with deep knowledge of local systems to identify their own group of trainers. This could be staff members of Save the Children, local education officials, senior teachers, or other individuals with deep knowledge of the local context.

2.4.5   Guidance on the When & Where of Literacy Boost Teacher Training
The Literacy Boost toolkit recommends that one full month elapse between training sessions, allowing teachers enough time to practice the skills they have learned in the training. The toolkit also encourages implementers to provide trainings locally. That is, Teacher Trainings should occur in the schools or in neighboring schools in which the teachers actually teach. This reduces the potential travel burden on teachers as well as keeps costs lower by avoiding room-and-boarding fees for teachers who would have to travel significant distances to attend a centrally based training.

2.4.6   Literacy Boost Teacher Training in Rwanda
Literacy Boost Teacher training in Rwanda was provided to all lower primary (P.1 through P.4) teachers regardless of the subject they taught, including sport teachers, who taught in schools located in sectors assigned to either the Teacher Training Condition or the Literacy Boost treatment (treatment conditions and random assignment are

described in detail in Chapter 3). This meant that the teachers of 73 schools across 14 of Gicumbi's 21 sectors were trained in Literacy Boost pedagogical techniques. Training was led by eight full-time SCI-staff members who were specifically hired to train and monitor teachers. The eight staff members were managed and supported by two Literacy Boost coordinators.

Trainers & the Training of Trainers
Eight new Rwandan SCI staff members were recruited to train the treatment groups over the course of the two-year trial. These eight Literacy Boost Program Officers (LBPOs) were each responsible for the training of approximately 9 schools. The LBPOs were all university graduates who had experience as teachers. In order to train the LBPOs on the delivery of the training sessions, staff members from SCUS and SCUK conducted a Training of Trainers workshop in 2013 for all LBPOs, LB Coordinators, and 6 Head Teachers. This first Training of Trainers lasted five days. A refresher Training of Trainers was held in May 2014 following a request by LBPOs for refresher trainings for phonemic/phonological awareness and issues related to students who did not speak Kinyarwanda at home. Staff members again led this training from SCUS and SCUK, and all LBPOs and 6 Head Teachers were again in attendance. During this second training, the group also reflected on the teacher training sessions as a whole and discussed various issues that had arisen during the implementation of Teacher Training workshops.

In addition to this training, and prior to the random assignment of sectors to treatment conditions, LBPOs served as data collectors for the teacher survey and teacher observation baseline studies. This provided the LBPOs a chance to observe the baseline pedagogical practices around reading in Rwandan classrooms. Due to potential conflicts of interest, LBPOs were not involved in subsequent data collection efforts.

Teacher Training Sessions in Rwanda
Prior to the commencement of training, the SCI team in Rwanda, with the assistance of staff from SCUS, SCUK, and Volunteer Services Overseas (VSO) adapted the toolkit to fit the Rwandan context. The SCI team decided to group the nine sessions listed in the original toolkit into six sessions. Those six sessions were:

1. Introduction to Reading Development and Instruction for Young Children & Letter Knowledge
2. Reading Comprehension & Formative Assessment
3. Phonemic Awareness
4. Reading Fluency
5. Vocabulary
6. Conclusion

All six of these sessions were delivered over the course of 2014. However, there were a sizeable number of targeted teachers who could not attend some of the sessions. In 2015, the sessions were offered again for teachers who did not attend them during 2014, and for teachers who were new to the treatment schools in 2015. In some instances, teachers who had been trained in 2014 returned to participate again in the same training session in 2015. Also in 2015, three new training sessions were introduced that were developed by the Rwanda Children's Book Initiative (RCBI). Those training sessions were:

1. Effective Use & Management of Storybooks in the Classroom
2. Creating a Classroom Culture of Reading
3. Creating a Classroom Print Rich Environment

This inclusion was made following positive results from an impact evaluation of RCBI, published by Save the Children in 2014 (Malik et al., 2015). These sessions were offered to all teachers regardless of the previous year's training.

Implementation of and Participation in Teacher Training

Sessions were conducted on Saturdays, Sundays, and days when schools were officially closed. Teachers were not paid to attend the training sessions, but received travel stipends of RWF 4000 ($5.36 USD as of May 2016) per training. As per the guidance provided in the toolkit, sessions were held in schools scattered through the treatment sectors. Schools were grouped into clusters, and one school was selected to host the training within each cluster. Teachers from all schools within a given cluster would then attend the training session on a given day.

During the first training session in early 2014, teachers within each sector voted for one of their peers to be a Model Teacher of Kinyarwanda (MTK). MTKs then helped the LBPOs to co-facilitate the training sessions. MTKs also acted as a resource for teachers during the interval between training sessions, so that teachers could ask questions and immediately discuss issues that arose. MTKs participated in the extra training of trainers, quarterly or semi-annual refresher trainings, and received additional transport allowance to help the LBPOs co-facilitate in schools or clusters outside of their own cluster. In December of 2014, it was decided to expand the number of MTKs to provide more resources for teachers who were trying to incorporate better literacy pedagogy into their practice. It was decided to designate two teachers per school as MTKs.

Since there were only eight LBPOs to train teachers, and since trainings could not occur on days in which school was in session, each of the six sessions was delivered to clusters of schools over time across the full school year, delivered on weekends or during days when school was not in session. All clusters within the treatment sectors were given a training session before the subsequent training was given. This exposed all teachers who attended the trainings to roughly the same amount of training over the same amount of time.

The participation goals for teacher training were for one LBPO and a MTK to train between 30 to 35 teachers. Some attendance data that SCI collected indicated that this was largely on target, but attendance had a slightly larger range of 15 to 40 teachers. LBPOs and MTKs used PowerPoint presentations (printed out when electricity was unavailable) to train teachers as well as summary handouts to give to teacher to take home with them. The Appendix contains a checklist used by SCI to monitor the quality of the training sessions. Table 2 provides a list of teacher training sessions and the date that the session was conducted for the first time and for the final time.

 LBPOs also visited schools during weekdays between sessions. The purpose of these visits was to support teachers in applying the skills they had just learned and to get a sense of how well teachers understood the content of previous trainings. LBPOs conducted lesson observations using a standard lesson observation form (different from the one created and used by Stanford), and then met with the teacher following the lesson to offer feedback. These observation forms and the data they generated were used solely for the purpose of supporting the teachers as they learned new skills and to help inform the SC team on the efficacy of training. According to monitoring documents shared with the Stanford research team, LBPOs were aiming to conduct 1508 observations over 33 weeks that school was in session and LBPOs were available for observing in 2015. At the time of the writing of this report, the data on actual observations conducted was not available.

Table 2: LB in Rwanda Teacher Training Schedule

Year	Session name	First day of session training	Final day of session training
2014	Introduction to Reading Development and Instruction for Young Children & Letter Knowledge	Sat., Mar. 1	Sat., Apr. 5
	Reading Comprehension & Formative Assessment	Sat., Apr. 5	Thu., Apr. 17
	Phonemic Awareness	Sat., Jun. 7	Sun., Jul. 27
	Reading Fluency	Tue., Aug. 5	Sat., Aug. 23
	Vocabulary	Sat., Aug. 23	Sat., Oct. 4
	Conclusion	Sat., Oct. 11	Tue., Nov. 18
2015	Introduction to Reading Development and Instruction for Young Children & Letter Knowledge	Sat., Jan. 17	Sun., Jan. 25
	Phonemic Awareness	Sat., Feb. 7	Sun., Feb. 15
	Reading Comprehension	Sat., Feb. 21	Sat. Mar 8
	Reading Fluency	Sat. Mar. 21	Sun. Apr. 5
	Effective Use & Management of Storybooks in the Classroom	Sat. Apr. 18	Sat Jul. 11
	Creating a Classroom Culture of Reading	Thu. Aug. 6	Sun. Aug. 23
	Creating a Classroom Print Rich Environment	Sat. Sep. 5	Sun. Oct. 4
	Addressing Second Language Issues	Sat. Oct. 10	Sun. Nov. 8
	Conclusion	Tue. Nov. 10	Thu. Nov. 26

2.5   Component 2: Community Action

The Community Action portion of Literacy Boost seeks to fulfill SC's commitment to the education approach called Life-wide learning. All of the information provided in this sub-section is summarized from the Literacy Boost Community Action Toolkit (Save the Children US, 2012b).

The Community Action component provides implementers a list of potential activities to improve children's opportunities to engage in quality reading activities outside of school hours. The Literacy Boost Community Action component is separated into the following three sections:

> Section 1: Enhancing the Literacy Environment
> Section 2: Community Reading Activities
> Section 3: Reading Awareness Workshops

For reasons explained below, we only describe the 'Community Reading Activities' and the 'Reading Awareness Workshops' in this chapter section, and reserve the description of 'Enhancing the Literacy Environment' for Section 2.6, below.

2.5.1   Community Reading Activities

The toolkit describes four potential activities that implementers may choose to implement within a given Literacy Boost site. Those four activities are:

> Activity 1: Reading Camps / Reading Clubs
> Activity 2: Reading Buddies
> Activity 3: Story Time
> Activity 4: Community Read-A-Thon

Reading Camps are regular (occurring anywhere from a few times a week to a few times a month), village-based gatherings for children. Led by a trained local volunteer, children who attend Reading Camps / Reading Clubs participate in a variety of activities intended to support children's reading development, including reading storybooks aloud, playing games that involve letters, words or oral language, storytelling, and singing. There are also

recommendations for a Make-and-Take activity to occur during Reading Camps, to provide children with materials that they can bring home to encourage their continued engagement with reading throughout their day.

Reading Buddies pairs up competent readers with other children who are struggling to read. The Reading Buddies then borrow books together to read and share. This activity provides children with a fun and engaging way to have one-on-one exposure to reading and print.

Story Time is an activity open to all villagers, regardless of their literacy abilities. During Story Time, villagers tell stories to children. This has many functions: it provides children exposure to oral language, questions and discussions of the story encourage critical thinking skills, and the telling of the stories themselves encourage intergenerational transfer of cultural knowledge, local traditions, and the local folklore.

Community Read-a-Thons track the number of books children read over a specific period of time. As laid out in the toolkit, these Read-a-Thons can be competitive, or can simply recognize all children for the effort they put forward in reading.

Country offices and program implementers are not limited to these four activities, but rather are encouraged to add in different activities to fit the local context and communities.

2.5.2   Reading Awareness Workshops
The Reading Awareness Workshops are workshops whose target audience is not the children themselves, but rather the families of students. These workshops build off of earlier work done by Save the Children around the world, and particularly in Bangladesh.

In the toolkit, seven workshops are outlined. Those seven sessions are:

1. Children's Language and Literacy Development
2. Everyday Activities for Reading Readiness
3. Reading for Children Part 1
4. Reading for Children Part 2
5. Reading for Children Feedback and Reading with Children
6. Creating Reading Materials to Help Children Learn to Read
7. Reading Corners

Each Reading Awareness Workshop occurs locally, where family members can easily attend. Sessions last for approximately 90 minutes. They are led by Save the Children staff members, partner organization staff members, trained volunteers who live in or close to the village, or some combination thereof. Different countries remunerate volunteers according to local norms and customs. Workshops are recommended to occur over a short timeframe and, similar to the teacher trainings, participants in the Reading Awareness Workshops are encouraged to practice what they learn in the workshops and return to the next session ready to discuss their success and challenges with the previous week's content.

Three of the seven sessions focus on shared reading. This is a tacit recognition of the fact that the common developed-world tableau of a parent reading a storybook to a child is not a common practice in places where storybooks are rare, electricity is non-existent, and the habit of shared reading has never fully taken hold. These sessions therefore provide family and community members scaffolding upon which to build their skills in reading stories that engage children interest, and later, reading *with* children in such a way that supports their skill development.

The sessions also provide all attendees with tips and techniques for supporting children's oral language development, thereby enabling family and community members who may struggle to read themselves with an important and recognized role in children's language development[11].

Literacy Boost program implementers are also encouraged to add sessions that they think are relevant to their target population.

2.5.3   Community Action in Rwanda

The Community Action component of Literacy Boost is implemented at the village level by a local partner organization called Umuhuza. Founded in 2005, Umuhuza is a non-governmental organization that aims to promote a culture of peace through peace education and peaceful conflict management (for more on Umuhuza, visit www.umuhuza.org).

The Community Action component is challenging to implement for a number of reasons:

1) Unlike Teacher Training, which works in existing school systems, there is no single institution through which to deliver trainings and activities in a given community.
2) Schools are generally easy to locate, with maintained roads and signposts that direct visitors to the school. The boundaries between sectors, cells, and villages on the other hand are easy to miss (if they are signposted at all).
3) Teachers are all skilled readers who congregate in one place five times weekly, so it is easy to disseminate messages. While village meetings do occur regularly, passing on messages about what activities are occurring when can at times be challenging given a wide range in reading abilities.
4) Whereas teachers have a steady income from a job with very explicit working hours, many community members are subsistence farmers, or may work long hours in a factory or elsewhere to meet their daily needs. For many of these community members, time is a very precious commodity, and recruiting individuals to meet once weekly may be challenging.

Given the challenges described above, Umuhuza made important decisions and adaptations to the Literacy Boost Community Action Toolkit. This section describes the personnel responsible for implementing the activities, Umuhuza's implementation approach to ensure all villages received community activities, and finally the adaptations made to the Community Activities from the toolkit.

Umuhuza Personnel and Training

The individuals on the ground who were responsible for direct implementation or monitoring of Community Action activities were 16 Community Facilitators (CF). These 16 CFs, full time employees of Umuhuza, had all completed a minimum of Secondary 6 (the final year of Secondary School) and were all residents of the Gicumbi district. Preference was given to individuals who had motorcycle driver's license to help move them around project sites.

Similar to the LBPOs, Umuhuza CFs received training from experienced trainers at SCUS and SCUK. They also participated in baseline collection of the Home Literacy Environment survey, providing them insight into the homes

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[11] Following the principles laid out in the Reading Awareness Workshops, Save the Children also created a flipbook titled Community Strategies for Promoting Literacy Flipbook, freely available for download in 14 languages at http://resourcecentre.savethechildren.se/library/community-strategies-promoting-literacy.

and communities in which they would be working and insight into both the challenges as well as the opportunities that children already had in their efforts to learn to read.

Staged Implementation & Cohort Creation

The original proposal called for immediate implementation of Community Action in all 237 villages in the 7 sectors participating in Community Action. Umuhuza quickly realized that this original plan was not feasible given the large geographic spread of the sectors and challenges in accessing the sites, combined with limitations of gatherings only being possible in the afternoons to allow communities time to tend their gardens and crops in the morning. Instead, Umuhuza grouped villages into six village groups and staged the implementation so that only one village group was participating in Community Action training and start-up activities at a given time. In this staged implementation, one group of villages (distributed across the seven sectors included in the Literacy Boost treatment group) would receive a complete cycle of LB community-based activities over the course of approximately three months. Once this cycle was completed, a new group of villages (again distributed across the sectors) would participate the Community Action activities, while the former group of villages would continue the activities that had been started up. In total, the villages were divided into six different village groups, with plans to reach all the villages by the end of the 2015 school year.

To assign villages to the seven groups, Umuhuza brought together local leaders and randomly selected which villages to include in the first village group. To select villages for the second group, Umuhuza first set aside cells that contained villages from the first group (for more on relationship between villages, cells, and sectors, see Figure 1). Then, Umuhuza examined the populations of the remaining cells and villages. Those villages with a larger population of early primary students were selected to participate in the second village group to provide LB community based activities to the most students and families as soon as possible.

For the third village group, those villages and cells that participated in the second village group were set aside, and new villages were selected according to the same procedure described above (using population of students to assign villages) to ensure maximum coverage and largest number of participants.

As seen in Table 3, the first five village groups for Community Action contained approximately 45 villages, and the final contained the remaining 11 villages that had not yet participated in Community Action.

To implement these activities most efficiently, CFs were provided with motorcycles and were asked to live in the sector to which they were assigned to lead activities. CFs were free to choose the village in which they would live within that sector. This enabled the CFs to form close ties with the villages and community members with whom they worked.

Table 3: Village Group Size and Implementation Schedule for Community Activities

		Village Group 1	Village Group 2	Village Group 3	Village Group 4	Village Group 5	Village Group 6
N of Sectors	(Total Possible: 7)	7	7	7	7	7	7
N of Cells	(Total Possible: 37)	25	18	22	21	34	7
N of Villages	(Total Possible: 237)	48	42	44	44	48	11
Book Banks	Delivery	Jun-14	Jun-14	Oct-14	Mar-15	Jun-15	Nov-15
	Replenishment, if any	Apr-15	Apr-15	Apr-15	--	--	--
Reading Clubs (RCs)	First RC	Jun-14	Jun-14	Oct-14	Mar-15	Jun-15	Nov-15
	Monitoring 1	Jun-14	Jun-14	Oct-14	Mar-15	Jun-15	Nov-15
	Monitoring 2	Jul-14	Jul-14	Nov-14	Apr-15	Jul-15	Dec-15
	Monitoring 3	Aug-14	Aug-14	Dec-14	May-15	Aug-15	Jan-16
Reading Awareness Workshops (RAWs)	First RAW	Feb-14	May-14	Sep-14	Jan-15	May-15	Sep-15
	Final RAW	May-14	Aug-14	Dec-14	May-15	Aug-15	Nov-15
	Monitoring 1	Feb-14	May-14	Sep-14	Jan-15	May-15	Sep-15
	Monitoring 2	Mar-14	Jul-14	Oct-14	Mar-15	Jun-15	Oct-15
	Monitoring 3	May-14	Aug-14	Dec-14	Apr-15	Aug-15	Nov-15
Reading Buddies		Feb-15	Feb-15	Feb-15	Apr-15	Jul-15	Sep-15

Community Mapping

For the first village group, it was necessary to account for the number and location of villages within each sector, and then to identify and select parents to target for attendance in the Reading Awareness Workshops (RAWs). Umuhuza staff members did this mapping themselves for the first village group, and then hired enumerators to continue the process for the subsequent five village groups. This mapping was critical for the later success of their outreach efforts.

Reading Awareness Workshops

The first activity that Umuhuza implemented was the RAWs. As mentioned above, the Literacy Boost toolkit provides guidance for seven RAW sessions. Umuhuza adapted the existing content and added new content to create a series of 10 RAWs to implement in Rwanda. Those sessions were:

1. Brain Development
2. Emotional wellbeing/ Social Competence / Positive Images
3. Cultural & Spiritual Roots
4. Children's Language & Literacy Development
5. Every day activities for reading readiness
6. Reading to / Telling Stories to Children (Part 1)
7. Reading to / Telling Stories to Children (Part 2)
8. Reading to Children Feedback & Reading with Children
9. Creating Reading Materials to Help Children Learn to Read
10. Reading Corners

The new content added by Umuhuza came from their previous experience conducting similar work with parents who had just had their first child. These sessions were selected as critical pieces to both engage parents and families with interesting and culturally relevant knowledge, as well as to educate families how to better support their children's growth.

The target population for RAW participation was parents. That is, Umuhuza staff set out to enroll both the mothers and the fathers of early primary students within a village. In single parent households, households where no parents lived (e.g. the child lived with a relative), or in households where one parent was simply not interested in attending, other family members/caregivers attended the RAWs. The RAW participants attended sessions once a week over the

course of ten weeks. Each RAW was attended by an average of 61 parents/caregivers participating in each village. The CFs who led the RAWs also conducted home visits, for the purpose of monitoring whether the knowledge and skills that were shared and practiced during the RAWs were being applied. CFs were trained to use monitoring forms during home visit observations. CFs sought to determine what areas of support that they could provide specific families. The monitoring form identified four specific areas: 1) Establishment of Reading Corners/ Home Libraries, 2) Learning Materials Production by s. Parents and Children, 3) Frequency of Parents Reading to Children, 4) Other Literacy Activities. When they observed gaps or areas for improvement in supporting children's language and literacy growth, the Umuhuza CFs provided families with technical support to better apply the skills that had been covered during the RAWs. Further, home visits enabled facilitators to help parents establish Reading Corners in their homes. In addition to immediate feedback to the families, Observation forms were also collected and summarized by Umuhuza Monitoring Staff to see whether there were trends in the areas that needed support across village.

Reading Clubs

After the first two or three RAW sessions in each village, facilitators explained the new activity of Reading Clubs to participants, and asked if any of the participants would like to volunteer to lead the Reading Clubs. Umuhuza decided to wait until after the first few RAW sessions were completed before recruiting Reading Club Volunteers, to give the RAW participants time to better understand the goal of the RAWs and the Literacy Boost project as a whole. RAW participants were asked to identify a pair of individuals who would serve as good Reading Club Volunteers, and who would have time to volunteer to lead children in Reading Club activities. . The two volunteers were then trained by the RAW facilitator in how to lead the Reading Club, which was open to children in Primary 1 through Primary 3. Note that children of all ages attended the Reading Clubs due to curiosity and the public setting of the Reading Clubs. Even though volunteers led the Reading Clubs, Umuhuza Community Facilitators maintained oversight, support, and monitoring responsibilities for the Reading Clubs. Reading Club Volunteers were instructed to conduct the Reading Clubs outside, but with shelter close by in case of inclement weather.

Image 4: A Building Near a Church (Ibibeho) Used for Reading Clubs

Photo credit: Dr. Michael Tusiime

Umuhuza staff reported during conversations that being selected to be a Reading Club Volunteer seemed to confer a higher social status to the person selected. At times these volunteers also expected compensation for their efforts. To incentivize Reading Club Volunteers, Umuhuza took on the cost of national health insurance for the volunteer and three relatives, a total cost of RWF 12,000 per leader per year (£10.92 GBP or $16.08 USD as of May 2015).

Reading Festivals

Umuhuza also introduced Reading Festivals, a different type of Community Activity that relates to the Read-a-Thon activity detailed in the Community Action Toolkit. Reading Festivals consisted of a set period in which children practiced reading storybooks, newsletters and other reading materials. Reading Clubs then engaged in competitions, starting at the village level and working up to the district level. These competitions were also a time for Umuhuza to informally gauge the children's improvement in the quality of their reading, as well as provide community members in general a sense of children's reading abilities.

Reading Buddies

Reading Buddies in Rwanda was at first implemented at the school level in 2014. LBPOs set up a Reading Buddy program in schools, pairing older students in upper primary levels (i.e. P.4, P.5, & P.6) with younger buddies in early primary. However, the program was set up late in the school year, the buddies were not necessarily matched according to the proximity in which they lived, and by the start of the school year in 2015, there was no evidence that the Reading Buddy program set up in the schools in 2014 was still in operation.

In 2015, Umuhuza restarted the Reading Buddy activity. In this incarnation, Reading Buddies were paired during Reading Clubs by the Reading Club Volunteer, ensuring that the pairs of students lived close to one another to better support reading practice outside of school.

2.6   Literacy Boost Reading Materials Creation & Provision

Underlying both the Teacher Training Toolkit and the Community Action Toolkit is a foundation of local language reading materials for children. In the Literacy Boost toolkit, the creation of these materials is included officially in the Community Action Component. However, we separate it out here as it is critical feature of the program and the activities involved or recommended extend far beyond the boundaries of a village.

Image 5: Reading Material Creation Idea from the LB Community Action Toolkit

Literacy Boost: Community Action
Appendices

3. Anagrams

This game uses the letters of larger words to make smaller words.

Instructions:

1. Write a long word on a piece of cardboard
2. Now write all the letters of a long word on separate pieces of paper/cardboard, as shown.
3. Show the children the word.
4. Ask them to make other words using the same letters.

Example: long word =
W-O-N-D-E-R-F-U-L

Words made from **wonderful:** drew, end, for, four, flu lend, low, now, red, rode, run, etc.

(Image reproduced with permission from Save the Children US, 2012b)

Literacy Boost provides children access to local-language reading materials through the Literacy Boost Book Banks. These Book Banks are essentially mini-libraries, and are placed in both schools and communities. Implementers may purchase professionally printed books to fill the Book Banks. In many places, however, there are few high quality children's books for purchase in the local language(s). As such, the Community Action toolkit details several different techniques to create content to fill the Book Banks, including:

- simple letter or topic primers, containing a few words per page and a corresponding image downloaded from the public domain,
- purchasing materials available in the marketplace,

- laminated one-page stories that are easy to create and durable,
- translating children's books from other languages and creating photocopies (only with the written permission of the original publisher),
- convening a writing/illustration workshop to generate locally authored and illustrated stories, and
- compiling a magazine/newspaper with content generated from Literacy Boost school and community activities.

The Community Action component also contains ideas for creating reading materials from locally available resources. These ideas are found in the Appendix of the Community Action Toolkit. Image 5 is a toolkit excerpt of one of these possible ideas.

2.6.1 Reading Material Creation & Provision in Rwanda

Another unique aspect of Literacy Boost implementation in Rwanda was the approach to reading material development and provision. As in other countries, the Teacher Training and Community Action components were supplied with Book Banks containing age-appropriate stories that were read aloud to children during Story Time activities. However, rather than having the Literacy Boost implementers responsible for creating reading materials, a separate initiative took over the task of ensuring the quality provision of books. The Rwanda Children's Book Initiative (RCBI), a concurrent project funded by Comic Relief and the Department for International Development (DfID), under the Advancing the Right to Read program described in Chapter 1, set out not only to increase the availability of engaging reading materials for young children in their local language, but also to do so in a sustainable manner that would build a demand for authors, illustrators, and local publishers to continue creating children's storybooks without direct support from Save the Children.

As commonly observed in nearly every country in which Literacy Boost is implemented, a critical children's book gap existed in Rwanda. Apart from school textbooks, there was a limited number local language reading materials available for children. The few available storybooks were often poorly written, edited, illustrated and designed, or frequently not age- or level- appropriate for children in early primary years (Malik et al., 2015). In Rwanda, most attempts to address the lack of reading material or improve its quality had been narrow interventions that procured books in English or privately developed and printed materials for intervention schools[12]. While this approach is understandable within the parameters of school-focused literacy improvement efforts, it fails to address the longer term, systemic issue of a lack of a sufficient supply of quality, local language children's books which are available to populations outside the boundaries of the project.

To address the broader, systemic problem of a lack of quality materials, RCBI piloted a unique, whole-system approach to book supply, working with the local stakeholders throughout the publishing process, including writers, illustrators, editors and graphic designers. Through formal training as well as on-going coaching, a cadre of local book sector actors built their knowledge, skills and confidence to produce high-quality and age-appropriate children's books. To financially empower local publishers to continuously reinvest in new book production, advance purchase commitments were offered to stimulate production. Purchasing consortia, or cooperative purchases, were also organized to combine Literacy Boost book orders with the book purchases from other projects within the Advancing the Right to Read program. Other independent organizations also participated in this cooperative purchasing. By combining simultaneous orders, publishers planned for larger print runs of newly developed titles and therefore could offer significantly reduced unit costs.

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[12] This latter approach of privately developing and printing materials is the default method for Literacy Boost in contexts where no local language and/or age appropriate books are available.

Additionally, the RCBI pilot provided technical assistance in the selection of books for use in Literacy Boost activities. A book review committee reviewed new story drafts and provided publishers with suggestions on ways to improve storylines, illustrations, and formatting to meet accepted best practices in children's book creation. After revisions, books were resubmitted and those meeting minimum quality standards were officially endorsed by the committee and added to the RCBI-endorsed list of titles. With support from RCBI staff, books from this list were then strategically selected for use in Literacy Boost activities, with efforts made at providing unique books in the school and community-based Book Banks. That is, Book Banks placed in the villages and communities contained different titles from those placed in the school. As a result, the children who lived in sectors assigned to LB had access to the largest amount of books to read.

Through the activities of the RCBI pilot, Literacy Boost in Rwanda has both benefitted from and contributed to the establishment of a Kinyarwanda language children's book publishing industry.

2.7   Component 3: Assessment
An important feature of Literacy Boost is the focus on rigorous, longitudinal assessment. The third component of Literacy Boost is the Assessment Toolkit. This component differs from the Teacher Training formative assessment training session in that this component describes how to conduct summative assessments. Summative assessments track how students' reading skills grow over time. The Assessment Toolkit provides Save the Children staff guidance on how to assess children longitudinally to estimate program impact. The Assessment Toolkit offers guidelines on how to create a reliable and valid reading assessment in the language of instruction as well as other languages that program staff think appropriate. In addition to creating tests of students reading skills, the Assessment Toolkit outlines what sort of questions to ask to pick up variation in children's background characteristics, including basic demographics such as the sex and age of the child, as well as socioeconomic status, the ecology of literacy in the home and community (also referred to as the Home Literacy Environment), and other questions of interest to the program implementers and researchers.

The reading skills subtests included in the Assessment Toolkit, independently created by researchers at SCUS, resemble some subtests found on the Dynamic Indicators of Basic Early Literacy Skills (DIBELS), used widely in the United States) and the Early Grades Reading Assessment (EGRA), used widely in low income countries (RTI International, 2009). However, the LB Assessment component has important differences that distinguish it from similar assessments and provide program staff with the most useful and actionable information possible.

The Assessment toolkit also outlines methods to collect baseline data as well as endline data from the same students, meaning that estimates of impact by Save the Children researchers are based on longitudinal samples.

The toolkit calls for teams of assessors to visit schools at baseline and endline to collect data on student reading skills and other relevant information. The assessments are usually led by researchers employed by Save the Children, and employ local data collectors who speak the language and know the context very well.

2.7.1   Assessment in Rwanda
The assessment of LB was led by Stanford University, in partnership with REB. Details on this assessment are described in the next chapter.

2.8   Partners/Funders
Table 4 details the partners involved in the project, including funders, implementers, researchers, and regulatory bodies.

Table 4: Funders, Implementers, Researchers, & Regulatory Bodies of LB in Rwanda

Funders	Private Donation	This charity provided financial support to purchase books for Book Banks.
	Comic Relief	The U.K.-based charity Comic Relief provided the vast majority of funding for all activities across the entire five-year life span of the project, covering both implementation and research-related costs.
	Private Donation	This charity provided financial support to purchase books for Book Banks.
	James Percy Foundation	This foundation provided matching funds for all activities supported through the Comic Relief Grant in 2015.
	Jersey Overseas Committee	JOAC provided funding to complement the Comic Relief grant, specifically supporting the Community Action aspects of Literacy Boost from 2015 to 2017.
	Isle of Man	This organization provided funding to complement the Comic Relief grant, specifically supporting the activities of RCBI to improve the quality of local language children's books produced by publishers in Rwanda.
	Save the Children UK (SCUK)	SCUK received the overall grant from Comic Relief for its Advancing the Right to Read programme. SCUK enlisted Stanford as independent researchers for the Literacy Boost portion of the larger program, and provided Stanford the funding to conduct the independent evaluation and research of the project.
	Roy A. Hunt Foundation	Annual contributions from the Roy A. Hunt Foundation provided financial support to for classroom book collections, and tablet computers to improve the efficiency and accuracy of data collection.
	The Schwartz Foundation	A grant from the Schwartz foundation supported hiring a full time Research Director to assist the Principal Investigator starting from June 2015.
	Stanford Graduate School of Education (SGSE)	The SGSE provided in-kind support to this project by way of funding extra graduate students to work part-time on the project, as well as publicizing the project through two articles featured on the Stanford website.[13]
	Stanford Office of Sponsored Research	The Office of Sponsored Research provided in-kind financial support by allowing a reduction in standard indirect cost recovery charges to the grant.

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[13] For the two articles, see: https://ed.stanford.edu/news/reading-rwanda-researchers-map-state-literacy-rural-africa and https://ed.stanford.edu/news/two-families-same-region-yet-worlds-apart-reading

Table 4: Funders, Implementers, Researchers, & Regulatory Bodies of LB in Rwanda (Continued)

Imple-menters	Save the Children International (SCI) in Rwanda	SCI in Rwanda is the lead implementing partner with overall responsibility for implementing Literacy Boost as part of Advancing the Right to Read (ARR). The SCI team in Gicumbi was responsible for the implementation of the school-based elements of Literacy Boost. The team leading the Rwanda Children's Book Initiative (RCBI), another component of ARR, was responsible for enabling authors, illustrators, and publishers to be able to produce and publish local language storybooks and other materials.
	Umuhuza	Umuhuza is a Rwanda non-governmental organization responsible for implementing the Community Action portion of Literacy Boost, described above.
	Save the Children UK (SCUK)	SCUK, in partnership with SCI, was responsible for the initiation, overall design and development of Advancing the Right to Read. SCUK provided technical assistance for Literacy Boost activities alongside SCUS.
	Save the Children US (SCUS)	SCUS were the original developers of Literacy Boost. SCUS supported the grant writing process and gave technical assistance in implementation planning and training of trainers.
Research Partners	Stanford Graduate School of Education (SGSE)	A team of researchers at the SGSE oversaw all research related activities for this project.
	SCI Monitoring, Evaluation, Accountability, & Learning (MEAL)	The MEAL team within SCI in Kigali helped SGSE coordinate all research activities, including but not limited to: hiring & managing the data collection team, liaising with government officials, timely submission of paperwork & securing clearances for the multiple research activities that have taken place since 2013.
	Rwanda Education Board (REB)	REB, and particularly Janvier Gasana, the project co-researcher and now the Director General of REB, played a key role in the research. REB ensured the data collection tools were relevant to the Rwanda context and reflected expectations for children, and provided thorough reviews of baseline and midline findings.
	Prof. Michael Tusiime, University of Rwanda - College of Education	Prof. Tusiime was a partner on the project, specifically responsible for conducting the ethnographic observations and co-authoring the write-up of that data.
Oversight & Ethical Review Bodies	Rwanda National Ethics Committee (RNEC)	RNEC reviewed the research protocols to ensure that the planned research met the international standards regarding individual's rights in research involving human subjects. Further, their comments and questions about the protocol refined and improved the study.
	Directorate of Science, Technology and Research (DSTR)	The DSTR further reviewed SGSE and SCI plans for the Literacy Boost project, ensuring that proper clearances and permissions were obtained from relevant bodies/organizations.
	Stanford Internal Review Board (IRB)	The Stanford IRB provided a second layer of ethical review and approval.

Chapter 3   Research Questions, Research Design, & Random Assignment

CHAPTER AUTHOR[14]
Elliott Friedlander

Since the first implementation of Literacy Boost in Malawi in 2009, Literacy Boost has predominantly been evaluated by internal evaluators at Save the Children and partner staff[15]. These evaluations have been relatively small proof of concept efforts to test that the Literacy Boost method for supporting children's learning functioned as intended. In a large majority of the evaluations, Literacy Boost groups outperformed their comparison peers on reading scores. These evaluations almost always compare the impact of the full Literacy Boost model (Teacher Training and Community Action) versus a counterfactual group that did not participate in Literacy Boost activities. The research design of these completed (and still ongoing) evaluations range from quasi-experimental to fully experimental, randomized control trials, with classrooms, schools or clusters of schools randomly assigned. Despite post-hoc analyses that try to tease out the added benefit of one component over another, none of these evaluations to date have planned to examine the differential impact of each component on children's reading skills from the outset of the project. That is, as of 2013, no evaluation assessed whether teacher training alone was sufficient for improving children's reading, or whether Community Action alone was sufficient, or how one of the components combined with the other to produce improved reading.

Given the need for better information about how the separate components contribute to children's reading development, the Stanford research team proposed a randomized control trial of Literacy Boost to get better insight into how the individual components contributed to children's reading development.

Literacy Boost in Rwanda represents the first time an external academic partner has led the research and impact evaluation. This chapter[16] details the research design and methods used to generate the data necessary to evaluate the effectiveness of Literacy Boost.

3.1   Motivation for the Study

The expansion of free access to primary education and the introduction of laws compelling families around the world to enroll children in primary school have been linked with an overall decline in education quality around the world. Many interventions in dozens of countries have sought to address the decline of quality by addressing issues systemic to schools. Better teaching, better curricula, better reading materials, have shown limited results in

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[14] Recommended citation for this chapter:

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[15] Note that in academic settings, it is commonplace for academics to evaluate programs which the academics themselves designed and helped implement (for examples, see Lesaux, Kieffer, Faller, & Kelley, 2010; Saunders, Goldenberg, & Gallimore, 2009; Slavin, Madden, Karweit, Livermon, & Dolan, 1990). In the realm of international development, however, this is often deemed to be less rigorous than engaging external evaluators. Conflicts of interest certainly exist in both academia and international development: successful programs are easier to publish in academic journals and garner more publicity and funding for both academics and international organizations. Such conflicts of interest must be open acknowledged, as we do here and in the Appendix.

[16] Portions of this section first appeared in the baseline and midline reports on Literacy Boost in Rwanda, published by Stanford, as well as a doctoral thesis that analyzed the baseline data (Friedlander, Habimana, et al., 2014; Friedlander, 2015; Malik et al., 2014; Tusiime et al., 2014).

boosting achievement. The research team at SGSE hypothesized that this is because actors in international education envision the child's potential time for learning as existing solely when school is open. In Figure 2, this is represented approach is represented in the "School Only Approach" seen in the upper bar. Using the hours that Rwandan schools are open (see Chapter 2 for how we calculated the number of hours in a school year), the figure estimates that the education interventions that provide support to children only during school hours target less than 15 percent of a child's waking day. This estimation assumes that both students and teachers have perfect school attendance, and that school is never closed or instruction is never cancelled for events, holidays, exams, or other reasons. That is, the 720 hours per year of instruction (4 hours per day for 180 days) is likely an overestimation of the hours children spend in school. However, as stipulated in Save the Children's Life-wide Learning framework, opportunities for learning are available everywhere, throughout a child's day, regardless of whether the school is open or not. This is represented in the lower bars in Figure 2. In the figure, we assume that of the 8760 hours in a year, children in Rwanda spend 3650 hours (10 hours per night) asleep, leaving 5110 hours awake. Children spend 720 hours per year in school and, therefore, spend 4,390 hours (12 hours per day) when the child is not in school, on average. Even with this allowance for sleep and school, more than 50% of children's time could be better used for supporting children's learning.

Figure 2: Research Motivation – Life-wide Learning
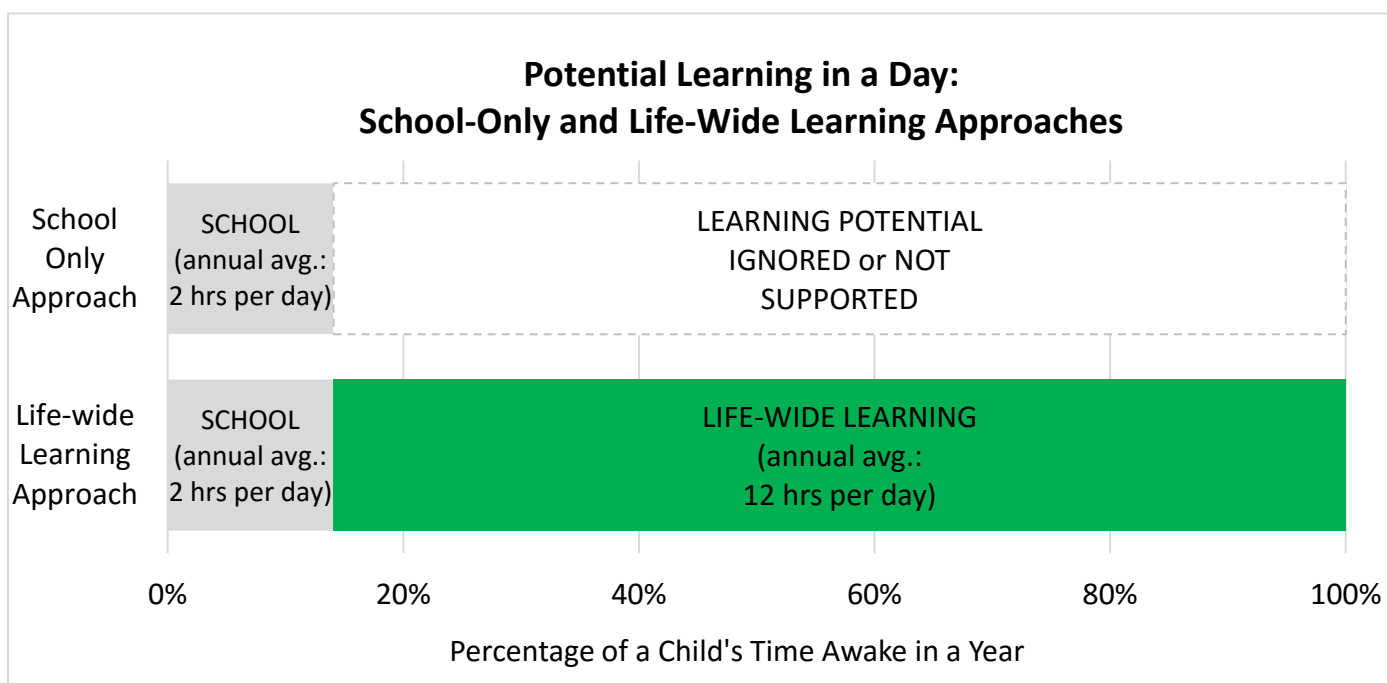
SGSE's original motivation for this study, therefore, was to test where the most positive impact on children's learning can be achieved: through school support alone or through a holistic model supporting children both within and outside school.

3.2   Determining the Treatment Conditions for Impact Analysis

During the grant proposal writing in 2012, a few Rwandan districts were identified for potential participation in Literacy Boost. These were districts wherein Save the Children had been working and had existing relationships with district officials. SCI's work in Rwanda had focused on child protection and early childhood education, setting up Early Childhood Development (ECD) centers in some of the most disadvantaged cells and districts in Rwanda.

Of the four possible districts, Gicumbi had the largest number of sectors, 21 in total. When it became clear that effective evaluation of the Literacy Boost project would require assignment at the sector level, Gicumbi was selected as the project district. For more on why the unit of assignment had to be the sector, see section 3.4, below.

With only 21 units to randomize, SCI, SCUK, and the research partners had to decide how many groups the trial would have. The options were to combine the 21 units into two, three, or four groups, including a group designated as control).

Option 1: Create a 1-treatment/1-control group design
Option 2: Create a 2-treatment/1-control group design
Option 3: Create a 3-treatment/1-control group design

Option 1 would have provided the best statistical power to detect effects of Literacy Boost (refer to the Appendix for more on power calculations). When the team considered the existing literature, it was clear from Save the Children-led evaluations of Literacy Boost (including both experimental and quasi-experimental designs) demonstrated that the entire Literacy Boost program impacted student learning (Brown, 2013; Dowd, Wiener, & Mabeti, 2010). Given these strong, existing findings, Option 1 would have provided little additional learning.

Option 2 would have provided insight into the differential impact of one part of the program versus another. The drawback of Option 2 would be an increase in the effect size necessary to detect significant impact on children's outcomes (i.e. an effect size of approximately 0.5 of a standard deviation).

Option 3 would have provided more insight into the impact of different treatments, but would have dramatically increased the effect size needed to detect significant impact (an effect size of approximately 0.75 of a standard deviation).

The team at SCI, SCUK, and the research partners decided Option 2 was the best use of the research opportunity.

The next step was to decide what the two different treatment groups would be. Possible treatments that were considered included a group of sectors that received only Literacy Boost Teacher Training activities, a group that received only Literacy Boost Community Action activities, and finally, a group that received the full Literacy Boost program. The research and implementation partners discussed these possibilities and decided to create the following treatment groups:

Treatment Group 1: The first group of sectors was assigned to receive Literacy Boost Teacher Training activities alone, to test the impact of teacher training on children's reading development. This teacher training was provided to all lower primary (P.1 through P.4) teachers regardless of subject taught. Hereafter, this group will be referred to as the Teacher Training (TT) group.

Treatment Group 2: The second group of sectors received both Teacher Training activities and Community Action activities. This treatment tested the added value of involving the home and community in children's literacy development, over and above any benefit derived from improved teaching. This group received the full Literacy Boost program as it was originally conceived and as it has largely been implemented in other countries. Therefore, this group will be referred to as the Literacy Boost (LB) group.

Control: A third group of sectors was assigned to the Control group, to serve as a counterfactual for causal analysis.

The approach that Literacy Boost takes to supporting learning is fundamentally a holistic approach that requires support both in school and out of school. A project that only provides in school support is not a Literacy Boost project. For that reason, we call the group that receives only Teacher Training as TT, while the students that receive both in-school and out of school activities and support as LB.

3.3   Research Questions

The following research questions were proposed in the original grant proposal:

1) What are the effects on children's early reading development of the (a) teacher training alone and (b) a combination of teacher training with home and community support for children's reading development in a developing world context such as Rwanda?

2) How are children taught to read Kinyarwanda and English in schools in Gicumbi, Rwanda, and does this change after regular, local, in service teacher training? If so, how, does it change?

3) What culture exists around reading in Rwanda? In regards to parents, teachers, and other community members, what are average beliefs, expectations, and practices around reading and literacy? Given time and access to information and resources, do they change? If so, how?

4) How sustainable are the continued literacy practices targeted by this intervention?

This endline report answers the first research question in full. The second and third questions were answered, in part during baseline reports. In this current endline report, we answer the latter parts of the second and third question, regarding changes that resulted from TT and LB treatments. The fourth question will be answered in 2017, following the final planned follow-up data collection and sustainability.

3.4   Unit for Random Assignment

To decide the unit for random assignment, the research team looked to the political and administrative system in Rwanda as well as the possible confounders that might exist in different implementation scenarios.

When considering the administrative system, sectors were the best choice for randomization, since the sector is an existing functional administrative entity; each sector has its own Sector Education Officer who oversees schools and supports teachers and Head Teachers in their work. Sectors contain 4 to 5 schools on average. The next smaller administrative unit, the cell, did not have an education officer or position. Further, some cells did not have a primary school within its borders. From an administrative viewpoint, and from a standpoint of sustainability and eventually going to scale, working within the existing sector structure was a logical choice. (See Piper, 2016 on working with and within existing administrative structures to facilitate eventual scale up efforts.). For more on sectors, cells and villages, refer to section 2.1.

Implementation issues also factored into the decision to use sectors as the unit for assignment. The LB treatment group would participate in activities in both their homes and communities. Since families could enroll students in any school they wished, it was conceivable that children living in one village could attend two or more different schools. Therefore, a village that was assigned one treatment might send students to a school that received a different treatment. There was no way to avoid this possible contamination. However, as the unit of assignment increases in area, the likelihood that children cross over the boundaries from one treatment assignment to another decreases. It was therefore decided to use sectors as the unit of assignment

3.5   Stratified Random Assignment

Sectors were randomly assigned to treatment or control conditions using a cluster stratified randomization process. First, the reading assessment data was analyzed for students who reported speaking a language other than

Kinyarwanda at home[17]. The research team used statistics from the baseline reading assessment (described below) as they could not locate any official statistics regarding languages spoken at home and disaggregated by sector. We used the percentage of students who reported speaking a language other than Kinyarwanda at home as representative of the actual population. Four sectors with sizeable percentages of students who reported speaking a language other than regular Kinyarwanda at home were assigned to treatment groups or control[18]. Four sectors do not divide evenly among three groups. Therefore, to conduct random assignment, the research team assigned a rank at random to the four sectors within each assignment block. The first of these sectors was assigned to X, the second to Y, and the third to Z. The fourth was moved to a new assignment block for the additional fourth sector from each group. After conducting the initial round of random assignment, there were three sectors in the additional block. One of each of these three sectors was assigned at random to each of the study conditions.

Following this, the remaining sectors were categorized as low, medium or high achieving sectors based on Primary school leaving examination results for P.6 students, provided to the research team by the district education office for 2012. These were the only data available for assessing average achievement in schools. Within each of these three groups (low, medium, and high achieving), sectors were randomly assigned to treatment or control groups. Following this procedure, each treatment and control group was made up of seven randomly assigned sectors.

For transparency, the actual assignment of sectors to control or treatment conditions was done in the presence of and with the participation of Sector Education Officers in October 2013, and was video recorded (available from the authors upon request).

3.6   Limitations Stemming from Random Assignment

The biggest limitation from random assignment at the sector level was the small number of units that were available for assignment. With only seven units in each of the treatment and control groups, the trial was statistically underpowered. That is to say, fairly large differences at endline would need to exist in order to be statistically significant.

A second limitation is the potential for treatment groups to become contaminated with students assigned to another group. Though this potential for contamination was reduced via assignment at sector level, it nonetheless remains. Further, teachers are also a vector for contamination, either through changing the sector and school in which they taught during the second year of the trial, or through LB and TT teachers sharing the knowledge they learned from Literacy Boost Teacher Training session with peers who taught in the Control group.

Third, the home language data used for stratification may not represent actual differences in language or dialects spoken. We are confident that assessors correctly recorded students home language – word usage by students clearly indicated whether they spoke a language or dialect different to that of Kinyarwanda. However, just because a sample is drawn randomly does not mean it is representative of a population, and therefore the random sample of students in Primary 1 may not have accurately represented the total population.

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[17] While Rwanda is unusually homogenous in terms of the language spoken when compared with other sub-Saharan African countries, Gicumbi shares a border with Uganda. The district is home to foreign residents that make up about 14% its population (National Institute of Statistics of Rwanda & Ministry of Finance and Economic Planning, 2014). As such, there is a small but significant portion of the population within the district and hence within the sample that may speak a language other than Kinyarwanda at home.

[18] However, the probability that the fourth sector was assigned to LB, TT, or Control groups were the same. Since the probability of assignment to treatment group was equal across all sectors, the statistical models estimating program impacts did not require weights to account for imbalance in probability of assignment to treatment group.

Fourth, the groupings of high, medium, and low achieving schools may not reflect actual school quality. It is conceivable that low performing schools were actually schools that managed to retain more students and see them progress to P.6. The students in these schools might have a greater range of abilities, and hence the average score could be lower than schools in which struggling students did not find the support they needed and dropped out at greater rates.

3.7   Reversing Treatment Groups in 2016 through 2017

To promote equitable access to any benefits that Literacy Boost activities might confer, Control schools and communities began receiving LB activities in 2016, and the TT group began receiving Community Activities. No Teacher Training occurred in the sectors originally assigned to LB or TT starting in 2016 to enable an analysis of sustainability of LB-promoted habits and activities at the end of 2017.

Chapter 4   Data Sources, Sampling Procedures, & Data Collection

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This five-year study employed multiple methods of research, and required a large amount and diverse types of data to be collected. This chapter[20] describes the tools in detail and the methods used for recruiting participants and collecting data. For the full tools in Kinyarwanda and in English, please refer to the separate Report Annex "Data Collection Tools". For reliability information on instruments, rater agreement, and data entry, please see the Appendix.

4.1   Reading Assessment Tools

The Reading Assessment tools used during the baseline, midline, and endline assessments were created by the Stanford research team, in partnership with REB and MINEDUC. Both REB and MINEDUC representatives were participant observers in the tool creation and piloting at baseline. REB Inspectors contributed at midline to the amendments made to the reading assessment as well.

4.1.1   Baseline Reading Assessment Tool

The reading assessment collected data on reading skills, student background, and aspects of the home and community Literacy Ecology. Table 5 contains an overview of the data collected during the reading assessment.

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[19] Recommended Citation:

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[20] Portions of this section first appeared in the baseline and midline reports on Literacy Boost in Rwanda, published by Stanford, and a thesis that analyzed the baseline data (Friedlander, Habimana, et al., 2014; Friedlander, 2015; Malik et al., 2014; Tusiime et al., 2014).

Table 5: Data Collected During the Baseline Reading Assessment

Assessment Section	Type of Data	Examples
Background / Demographic	General	Sex, age, language spoken at home, work duties at home.
	School-related	Repetition history, attendance in pre-primary classes[21].
	Socioeconomic status	Type of home, household size, household amenities/possessions.
Literacy Materials & Practices at Home	Materials	Presence of storybooks, textbooks, newspapers.
	Habits & Practices	N of family members who read to child, help child study, talk to child.
Language & Reading Skills	Phonological & Phonemic Awareness	Composed of 5 separate sub tests: a) Similar beginning sounds (10 items); b & c) Blending & Segmenting syllables (6 items each, 12 total), d & e) Blending & Segmenting Phonemes (12 items each, 24 total).
	Letter Identification	Identification of uppercase/lowercase letters in random order. Contains 29 letters representing all 24 letters of the Kinyarwanda alphabet, orthographic variations on "g" (i.e. G, g, & ɡ), "t" (i.e. T, t & t), and "a" (i.e. ɑ & a).
	Individual Word Reading	Includes reading high frequency words (10 items) and reading pseudo words (10 items).
	Writing	Includes dictation of high frequency words (10 items) and encoding of pseudo-words (10 items).
	Reading Comprehension	Includes reading one-sentence statements and answering a simple question (6 separate items) and orally completing written cloze exercises (6 items).
	Reading Fluency & Accuracy	N of words in a connected text read correctly in a minute & percentage of words read correctly on 2 separate passages, one approved by a Rwanda Education Board inspector as appropriate for P.1 (21 words total) and one appropriate for P.3 (60 words total).

The assessment adapted portions of the instruments used by Save the Children in over two dozen countries around the world and added new subtests and protocols (Save the Children US, 2012a). This researcher-created assessment was preferable to published, psychometrically validated instruments (e.g. the Woodcock-Johnson) for several reasons. First, the language of instruction in Rwanda is Kinyarwanda in the early primary grades, and translation would not be feasible. Second, distinct skill scores rather than an overall composite score were preferable to offer feedback to Save the Children for programming purposes. Third, by creating this assessment in Kinyarwanda, the local culture and context could be taken into account.

4.1.2   Midline & Endline Reading Assessment Tool

The research team, with the guidance of REB inspectors, revised the baseline reading assessment prior to the midline data collection. The decision to do so was based on the following reasons:

- English skills were not assessed at baseline as there was no reason to believe that students would have significant English skills at the time of the baseline assessment.
- The baseline assessment demonstrated a floor effect on phonemic skills and a ceiling effect on syllabic skills. The assessment was changed at midline to address this.
- We added vocabulary and listening comprehension at midline at the suggestion of Prof. Connie Juel, an expert in the field of early literacy.

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[21] Due to concerns about reliability of the reported attendance in pre-primary education, we do not use these data in the subsequent analyses. For more on this, see the Appendix.

- Some skills were so highly correlated at baseline that they were dropped at midline because they were not providing any new information analysis of the baseline data and the knowledge that students reading abilities should grow over time.
  - For example, the correlation between reading pseudo words and high frequency words was 0.9423. Writing pseudo words and writing high frequency words was correlated at 0.9396.
- We wanted to add one additional reading passage in case there was a ceiling effect on the P.3 passage.
- To prevent the possibility of children's exposure to the baseline reading passages influencing their endline reading abilities, new reading passages for P.1 and P.3 levels were created. These new passages were equated with the ones used at baseline, and a third reading passage, leveled for P.4 students, was also added.
- Lastly, we added questions regarding children's participation in Literacy Boost activities to gauge the degree of exposure children had to the treatment.

The following table contains an overview of the midline and endline assessments.

Table 6: Data Collected During the Midline & Endline Reading Assessment

Assessment Section	Type of Data	Examples
Background	General	Sex, age, language spoken at home.
	School-related	Repetition history, Pre-Primary attendance
	Socioeconomic status	Type of home, household size, household amenities / possessions, etc.
Home Literacy Ecology	Materials	Presence of storybooks, textbooks, newspapers, etc.
	Habits	N of family members who read to child, help child study, etc.
	Child Interest / Motivation / Engagement	Do you like to read? Do you share books with your family?
Dosage	Exposure to LB activities	Do you have a Reading Buddy? Do you attend Reading Clubs? Did you create materials to take home at the Reading Club?
Kinyarwanda Oral Language & Reading Skills	Vocabulary	Includes a) Receptive (5 items), and b) Productive (20 items).
	Listening Comprehension	Assessor read a story to the student and asked questions (5 questions total).
	Individual Word Reading	Includes reading decodable words (also known as invented words or pseudowords) (15 items).
	Writing	Includes dictation of high frequency words (15 items).
	Reading Comprehension	Includes reading one-sentence statements and answering a simple question (10 items) and orally completing written cloze exercises (10 items).
	Reading Fluency & Accuracy	N of words in a connected text read correctly in a minute & percentage of words read correctly on 3 separate passages, one approved by a Rwanda Education Board inspector as appropriate for P.1 (23 words), one for P.3 (74 words), and one for P.4 or higher (105 words).
Kinyarwanda & English Letters	Letter Knowledge	Identification of 31 uppercase/lowercase letters in random order. Includes the letters Z and Q for assessment of English letter knowledge, and the orthographic variations described in Table 5.
English Oral Language & Reading Skills	Receptive Vocabulary	Student was shown a group of four pictures and asked to point to one containing a word that the assessor spoke out loud (20 items).
	Individual Word Reading	Includes reading high frequency words (10 items) and reading pseudo words (10 items).
	Reading Comprehension	Includes orally completing written cloze exercises (7 items).

4.1.3   Explanation of Differences in Tools

Table 7 provides a side-by-side comparison of the assessment used during baseline data collection and the assessment used during midline and endline data collection. As the table shows, the research team decided not to measure phonological and phonemic awareness during midline and endline assessments. This was done for a few reasons:

1) Students at baseline performed extremely well on the syllabic portions of the phonological awareness measure, suggesting that a ceiling would be reached during midline and endline.

2) Students performed very poorly on the Phonemic Awareness sub-tests at baseline. Their performance was only slightly above what would be called a 'floor effect'. Even the assessors administering the assessment found the distinction between phonemes and onset-rhyme, or between phonemes and syllables, a difficult distinction to make and therefore perhaps not meaningful.

3) Prof. Connie Juel, an expert in early literacy development, urged the inclusion of different oral subtests, particularly vocabulary and listening comprehension.

4) The Literacy Boost toolkit urges teachers to build student's vocabulary skills; therefore, measuring vocabulary differences among the groups seemed to be a more relevant construct to measure.

5) Phonemic awareness in particular and phonological awareness more generally is highly predictive of later reading skills in English. Having already collected data on phonological awareness at baseline, we could test out whether these relationships holds true in a Bantu language like Kinyarwanda (at the time of writing this report, this analysis was still pending).

Table 7: Differences between Reading Assessments at Baseline and Endline

Skill	Specific Task	Description	N of items at baseline-- endline	N of common items
Phonemic Awareness	Similar Beginning Sounds	Identifying words with the same beginning sound.	13---na	--
	Blending Phonemes	Blending 2-5 phonemes to create words.	15---na	--
	Segmenting Phonemes	Identifying each individual sound in words heard.	15---na	--
Syllabic Awareness	Blending Syllables	Blending 2-3 syllables heard to create words orally.	8---na	--
	Segmenting Syllables	Child clapped syllables in word heard.	8---na	--
Vocabulary	Receptive	The child heard the name of an object and was presented with an image of that object among a group of objects.	na---5	--
	Productive	The words correctly named by the child when presented with an image of an object.	na---22	--
Listening Comprehension	Listening Comp	Assessor read a story and asked student questions.	na---5	--
Alphabet	Letter Identification	Student identifies the sound or name of a letter.	29---31	24
Single Word Reading	High Frequency Words	Student read a list of common words.	12---na	--
	Pseudo words	Student read invented words.	12---17	10
Writing	High frequency words	Student wrote common words found in textbooks.	12---17	10
	Pseudo words	Student wrote pseudo words.	12---na	--
Reading Comprehension	Simple Sentences	Student read a simple sentence and answered a question about the sentence.	8---12	3
	Cloze	Student orally completed written cloze exercises.	8---12	5
Fluency & Accuracy	P.1 level text	Student read a passage out loud while being timed.	21 ---23 words	Equated
	P.2/P.3 level text	Student read a passage out loud while being timed.	60 ---70 words	Equated
	P.4 level text	Student read a passage out loud while being timed.	na---105 words	--

na = not assessed.

4.1.4 Combining Subtests into Composite Outcomes

The reading assessment at endline contained 11 separate sub-tests. In order to analyze these items efficiently, the subtests were grouped into four composite scores: 1) Oral comprehension, 2) Student met the Basic Literacy Threshold, 3) Reading Comprehension, and 4) Reading Fluency. Table 8 provides an overview of these constructs, including how each construct was created for each Cohort of students.

Table 8: Constructs & Outcomes Used to Assess Impact

Cohort[†]	Constructs & Outcomes	Binary or Continuous?	Subtests Included or Data Source	Method Used to Create Outcome
1	Child reached P.3 by 2015	Binary	Assessor Observation	Assessor generated Primary level
1 & 2	Oral Comprehension	Continuous	Kinyarwanda Productive Vocabulary & Listening Comprehension	Sum total of the standardized scores of each subsection
1 & 2	Child Met the Basic Literacy Threshold (BLT)	Binary	Kinyarwanda Letter ID, Decoding and Dictation	Student identified 18 or more Kinyarwanda letters correct and scored 1 or more on both of dictation and decoding
1	Phonological Awareness	Continuous	Beginning Sound Matching; Blending & Segmenting Phonemes and Syllables	Sum total of the standardized scores of each subsection
1	Reading Fluency	Continuous	Passage 1, Passage 2/3, and Passage 4	Sum total of the standardized words correct per minute of each passage
1	Reading Comprehension	Continuous	Kinyarwanda Reading Comprehension and Cloze	Sum total of the standardized scores of each subsection
2	Child reported that 2015 was the first year they were enrolled in P.1	Binary	Students reported whether they repeated P.1	If student reported he did not repeat P.1, that means 2015 was the first year he was enrolled in P.1
2	Reading Fluency	Continuous	Passage 1 and Passage 2/3	Sum total of the standardized words correct per minute of each passage
2	Reading Comprehension	Continuous	Kinyarwanda Reading Comprehension and Cloze	Sum total of the standardized scores of each subsection

[†] For a description of the cohorts, see section 4.2.2 below.

The composite scores for oral comprehension, reading comprehension, and reading fluency are standardized within the analytic sample. The binary variable 'Met Basic Literacy Threshold' (BLT) was created due to a bi-modal distribution of scores on the reading skills subtests. The bi-modal distribution suggested that the sample broke down into 2 distinct groups: Students who had at least very basic literacy skills and students who did not. Since most of the literacy measures required at least very basic skills (reading words and decoding, reading fluency, reading comprehension, writing from dictation), we had to divide the sample into these 2 groups in order for the analysis to be meaningful. We therefore created a variable with two possible values: 0 for students who did not meet three thresholds and 1 for students who could meet three basic thresholds. Those three thresholds were:

1) identify 18 or more of the 24 letters of the Kinyarwanda alphabet,
2) read one or more words on the decoding subtest, and
3) write one or more words on the dictation subtest

Students who met all three of these criteria were assigned a value of '1' on the BLT outcome. Students who did not meet all three criteria had a value of '0' on the BLT outcome. The number of students who met these criteria are reported in the table of reading skills in the Appendix.

It is important to note that across the whole sample, the problematic bi-modal distribution also existed for the reading fluency and reading comprehension composite scores. To address this problem, only students who met the BLT were included in analyses that predicted reading fluency and reading comprehension.

For more on these outcomes, refer to Chapter 5 and the Appendix.

4.1.5   School Survey

The school survey collected data on enrollment, attendance, the teaching staff, the organizations that work in the school, and the sectors encompassed in the school catchment area. During the midline and endline, questions regarding the L3 initiative (see section 2.1.2 for more on the L3 Initiative) as well as Save the Children training efforts were included. During the midline, the school survey was collected for all 85 schools that originally participated in the baseline reading assessment. During the endline, school data was collected only at schools that were included in Cohort 2 of the reading assessment but who had not participated in the assessment at baseline in 2013.

4.2   Reading Assessment Sample Selection

4.2.1   Cohort 1: Random Sampling at Baseline

A random sample of students from P.1 was assessed in each of the 85 schools[22] at baseline. This sample of students makes up the Cohort 1 (more on Cohort 2, below). The goal of the data collection was to visit all 102 schools. However, there was not sufficient time or resources to do this. As such, schools for assessment were randomly ordered for school visits in the following manner.

To prioritize the schools to be assessed, all schools were grouped by sector and assigned numbers 1 to N, with N being the total number of schools in a particular sector. The first set of 21 schools were randomly selected, one from each sector. The second set of schools were selected in the same way, with one difference: if a cell contained 2 or more schools, and one of those schools had been randomly selected and included in the first set of schools, then the other school(s) located within the same cell as a school in the first set were excluded in the second round of selection. During the third round, schools were again selected randomly, excluding schools that were located in the same cell as other schools that had been selected in rounds 1 and 2. This continued on until all schools were randomly prioritized for assessment. In the event that no more schools existed in a unique cell within a sector, then the schools that shared a cell with a school already selected were re-included in the sample. In this manner, all 102 schools in Gicumbi were prioritized for assessment. At the end of the data collection process, 85 of the 102 schools participated in the assessment.

To select the students, first the P.1 classrooms at the particular school were identified. If only one class of Primary 1 existed, students were sampled from that classroom. If more than one class of Primary 1 existed, one of the classes was randomly selected, and students from that one stream were randomly sampled. In the event that less than the target number of students (N=25) were present that day in one particular stream, additional students from another stream (where one existed) were sampled.

The selection of students at baseline was intended to sample boys and girls equally.[23] To sample students, assessors first asked girls to stand up and randomly chose 12 students. They then asked that group to sit down, and then asked the boys to stand up and chose 13 names. At the next school, they would reverse the process and have the boys

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[22] In the original project proposal, we intended to reach 102 schools. However, due to resource and time constraints, it was only possible to assess a random sample of 85 of the 102 existing schools. See the Appendix for more on power calculations.

[23] We follow previous studies in creating a stratified random sample based on student's sex (Ross, 2005). We do this because there are reasons to believe that there might be differential effects of the intervention for girls and boys and we wanted to ensure that we had sufficient samples to compare impact by student sex (which would probably, but not certainly, be the case if we had taken a straight random sample without stratifying by sex).

stand up first and then the girls and noted down their names. However, this alteration in who stood up first did not happen, resulting in a slight oversampling of boys at baseline. Refer to the baseline report for more details (Friedlander, Gasana, & Goldenberg, 2014).

Given that students alternate between attending school in the morning shift one week and attending in the afternoon shift the following week, students were selected during both morning and afternoon shifts in school at baseline. This was to maximize the number of students and schools for inclusion in the study.

4.2.2   Cohort 2: Random Sampling
A new cohort of Primary 1 students was assessed at the same time that endline data were being collected. The purpose of this new cohort is to enable cross sectional comparisons, and to track the progress of students following the reassignment of groups to new treatments in 2016 and 2017. Students eligible for inclusion in this cohort were all students currently enrolled in Primary 1 who were not already part of the endline sample. The same sampling procedures were used for Cohort 2 as were used at baseline in 2013 for the first cohort. The only two differences were that the girls and boys were more evenly sampled, and only 20 students were sampled from each school. The reduction from 25 to 20 students reflects our expectation of attrition in the different samples. The research team needed a larger sample in 2013 from each school so that they could be tracked over the course of five years. Cohort 2 would only be tracked over three years, and hence we expected to have less attrition within Cohort 2.

4.3   Reading Assessment Data Collection Procedures
4.3.1   Baseline
Personnel and Assessment Teams
To collect the reading assessment data, independent assessors were hired to collect the data. Assessors were all students or recent graduates from the Kigali Institute of Education or Byumba Polytechnic in Rwanda. Active teachers currently teaching in Primary schools were not hired to avoid removing teachers from classrooms. Assessors were grouped into teams to visit schools. Each team was composed of one Team Leader (at baseline, this was a newly hired LBPO), and a team of 8 to 9 assessors. The number of assessors per team varied depending on the proximity of the school to SCI headquarters in Gicumbi. That is, larger assessment teams would visit schools that were located far away, to reduce the amount of time necessary to collect data.

Training of Assessors
The Stanford research team trained assessors and team leaders in research ethics, including how to gain informed consent from Head Teachers and informed assent from students. Assessors were also trained in how to assess children of a young age, how to put them at ease as best as possible to ensure that the data collected is the most reliable and valid data possible, and proper ways to administer the assessment. As a part of capacity development, as well as to solicit and incorporate critical local input from interested authorities, members of the Rwanda Education Board and the Rwandan Ministry of Education actively participated in the creation and piloting of the reading assessment tool. This training also included pilot assessment visits to schools in the neighboring Burera district, which shares similar characteristics to Gicumbi.

Data Collection Materials
For the baseline assessment, student stimuli were created in large font and size that matched the font in use in student readers. Data were recorded on paper assessments.

Notifying Schools of Data Collection
All schools in Gicumbi were notified that they may receive a visit from a team of data collectors from Stanford University and Save the Children. In any school data collection, there is a possibility that Head Teachers and teachers, desiring to have the best results possible, might have low performing students stay at home on assessment day, and/or might move older students from upper primary levels into the lower primary classrooms to boost

aggregate reading scores. To avoid this possibility, schools were told that they may receive a visit before the end of the school term. This was done as the research team theorized that Head Teachers and/or teachers would be less likely to manipulate the student make up of lower primary if the possibility of a visit extended over a longer period of time.

Data Collection in the School & Interrater Reliability Procedures
Upon arrival at school, the team leader (at baseline this was a newly hired LBPO) would meet with the Head Teacher of the school to explain the research and obtain informed consent from the Head Teacher. After this, the random sampling of students occurred, as described above (see section 4.2.1). While assessors collected Reading Assessment data, team leaders oversaw collection efforts and collected data for the school survey.

Assessors in each team were assigned a list of students to assess following the collection of student names. The first set of students listed in the sampling sheet for assessment was assessed by two assessors simultaneously, both marking their own unique assessment form. One of the assessors would administer the assessment as normal, marking his or her own assessment, the second assessor would listen in on the assessment and mark another separate assessment. The purpose of this was to collect continuous data on both interrater agreement and interrater reliability. (See the Appendix for more on Agreement and reliability.) Student data for actual analysis was retained for the assessor who had administered the assessment. Data from the assessor who only listened and marked a separate copy were used only for interrater reliability calculations, and were not used in the actual analysis. At baseline, approximately 10 percent of all assessments were interrater agreement assessments.

Following the interrater agreement assessment, assessors administered the assessment to the remaining sampled students one-on-one. Each assessor would provide the students with the appropriate stimuli needed for each task. Once the assessment of one child was completed, the child returned to class and the assessor called the next child of the list. The average assessment took 35 minutes to complete at baseline.

Student assessments always began with an informed assent from the student. Students were told the purpose of the study, expected benefits from participating, and the consequences (or lack thereof) of not participating. Anecdotal evidence suggests only a handful of students declined to participate. However, systematic data on students who declined to participate was not recorded.

Assessing Students who Spoke a Different Language/Dialect at Home
Because Gicumbi contained a population of students who spoke Rukiga at home, a team of assessors was formed who could also speak and understand Rukiga. Sectors that potentially had non-Kinyarwanda Rukiga-speaking students were identified through discussions with local authorities and other individuals who were familiar with the district and sectors in question.

Data Entry
After the conclusion of baseline data collection in October 2013, four assessors with good computer skills were hired as data entry specialists. These assessors were trained in the process for entering data into a prepared MS Excel template. To verify the accuracy of data entry, ten percent of all data were entered twice. Agreement on quantitative items for these twice-entered assessments was greater than 99 percent. Qualitative items were not included in this analysis as a stray space or comma would be interpreted as disagreement, when in fact the entry conveyed the identical meaning.

4.3.2   Data Collection at Midline and Endline
The midline and endline reading assessment data collections followed largely the same procedures, except for a few key points.

Team Leaders
At baseline, team leaders were full time employees of Save the Children. To ensure accurate and independent data collection, and to prevent any potential bias from distorting the midline data, the Stanford research team decided that no Save the Children representatives should accompany the assessment teams. As such, team leaders were selected from the pool of assessors hired for each assessment. Team leaders were individuals who had shown leadership qualities, a good mastery of the principles of ethical research, and excellent skills in administering reading assessments.

Tracing Baseline Students at Midline & Endline
The research design called for following students longitudinally. Rather than selecting a new random sample, it was therefore necessary to locate students who were assessed at baseline. This was done according to the following procedure[24]:

1) Assessors arrived at the school with a list of the names of P.1 students assessed at baseline in September 2013.
2) They went to each P.3 classroom and asked for the child by name.
3) If the child was not present in the P.3 classrooms, the assessors asked if any of the students present knew the study child and where they could be found; in some cases, students reported that the child was absent, had stopped attending school, or could be found in another classroom at the school.
4) If the child was in the class but absent on that day, assessors went to the child's home themselves or asked someone to go to the child's home and see if it was possible for the child to come to school for the assessment. At no point did assessors ever ask a student or teacher to leave school to search for another student. No students or teachers missed any class time in the search for other students.
5) In cases where a child was not present and no one could provide information about the child, assessors asked other children from the study child's village if they knew the study child's parents or the leader of the child's village. If the school authorities had the parent or village leader's phone number, then the parent or leader was called to request that the child come to school if possible. [25]

The midline data collection in February 2015 provided the research and data collection teams practice in locating students, as well as information about school movers. At endline in September and October 2015 we used information acquired during the midline to locate as many students who had been assessed at baseline as possible.

Schools Assessed per Day
Since the sample of students at each school during baseline was randomly selected, it was feasible at baseline to assess two schools per day. At endline, however, teams of assessors only assessed one school per day. This was due to the double shift system of school attendance, where one unique group of students attends classes in the morning, and another unique group of students attends classes after lunch.

The student population in the two shifts varies from year to year. It was therefore impossible to be certain which shift a certain student attended. Assessment teams had to stay at schools the entire day to find the students who had been assessed at baseline.

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[24] The procedure listed here varied slightly depending on schools.
[25] In future analyses we plan to examine the difference in baseline scores for students who were requested to come to school and did not come as compared to those who came after being called.

Data Collection Materials

For the midline and endline assessments, the research team used tablet computers to record student data. This both saved costs in terms of printing and data entry, as well as reduced errors stemming from the data entry process following data collection.

The software used for the reading assessments was Tangerine, developed by RTI International. For more on this software, see http://www.tangerinecentral.org/.

The laminated sheets that were used for student stimuli were updated to reflect the changes in the reading assessment. On average, endline assessments took 41 minutes to complete. We hypothesize the endline assessment took slightly longer to administer since more children were readers at endline and were not stopped as frequently, because new subtests (e.g. vocabulary) took slightly longer to assess, and because English subtests (not reported on in this report) were also included.

4.4   Teacher Surveys

4.4.1   Baseline Survey

At baseline the Stanford research team created the teacher survey form based on content from the Literacy Boost Teacher Training Toolkit and collaborated with Save the Children's Education team in Gicumbi to pilot and refine the form. Survey items aimed to investigate teacher understanding of the essential components of literacy development, teaching strategies, formal/informal assessment strategies, and methods to engage learners who did not speak the language of instruction at home, or who spoke a distinct dialect from the language of instruction at home. Members of the Stanford research team drafted the survey, trained two LBPOs on the instrument remotely and sought their feedback for adjustments to the form. Following training, the LBPOs translated the revised survey form into Kinyarwanda and piloted it with nine teachers in the neighboring district of Burera. The form was also translated back into English to confirm that the intended meaning of items was retained during translation. The LBPOs provided feedback from the pilot to the Stanford team regarding the contextual relevance of items, item redundancy, any challenges in survey administration and survey completion time. Following this feedback, the Stanford team made further adjustments to the survey form. The final form consisted of six sections and 45 items, and had a completion time of approximately one hour. As a final question, teachers were asked whether they would be interested or willing to allow an observer to come and observe their class.

4.4.2   Endline Survey Tool

Based on lessons learned during the administration and analysis of the baseline teacher survey, members of the Stanford research team made some important changes to the endline teacher survey form. The major aim of the changes made to the survey tool was to gather more teacher reported data about actual strategies used to teach reading in the classroom, attendance at Literacy Boost training sessions and teacher beliefs regarding whether there had been changes in their teaching and if so, to what extent they believed these changes impacted their students' reading performance. The final endline form consisted of 7 sections and 57 items. Again, as a final question, teachers were asked whether they would be interested or willing to allow an observer to come and observe their class.

4.4.3   Explanation of Differences in Survey Tools

There were a number of differences between the surveys at baseline and endline. Some questions at baseline were open-ended and yielded qualitative responses, whereas at endline in order to ease teachers' responses as well as analysis all questions required selecting one or more answers from a list or table. Items in the lists were derived from the qualitative responses at baselines. The baseline survey form had focused mainly on teacher knowledge and beliefs and had not elicited a sufficient amount of information regarding actual teacher practice around literacy instruction in the classroom. Hence, there were significant differences in the section investigating teachers' self-reported literacy instruction practices in the endline form. In order to have more thorough information regarding actual teacher practice with regards to literacy instruction, teachers were given a table of 37 reading activities that

mirrored activities present in the teacher observation tool, to which they indicated whether the activity occurred "never", "at least sometimes," or "daily" in their classroom. This allowed data from the teacher survey tool to be used to corroborate data from the classroom observation form. The endline survey also included items to investigate teachers' self-report of attendance at the Literacy Boost training sessions, as well as their perception of the usefulness of the training they received. Finally, the endline survey added a 7th section that aimed to investigate teachers' perceptions of parent engagement in their students' literacy development.

4.5   Teacher Survey Sampling & Data Collection Procedures

4.5.1   Baseline

Requesting Teachers to Participate in the Survey

The Save the Children team in Gicumbi district informed all primary school teachers who taught Kinyarwanda about the survey. Teachers were informed that the survey would be administered in a location in their sector, and that if they would like to participate, to please come to that location on a specific date. A total of 452 teachers participated in the survey at baseline.

Survey Administrators

The LBPOs served as survey administrators at each of the survey sites as part of their regular monitoring protocol. Teachers signed consent forms prior to survey administration. The LBPOs introduced the study and the survey to the teachers who attended. Teachers were given the survey, instructed to complete the form independently and return it to the LBPO, who was available to answer any administrative questions.

Remuneration for Participating in the Survey

There was no remuneration provided to teachers for participation in the survey. However, the cost of teachers' travel from their villages to the survey site was covered by Save the Children funds. Teachers who participated were reimbursed RWF 4,000 ($5.36 USD or £3.64 GBP as of May 2016) for their transportation. Teachers were also offered a beverage after they had completed the survey.

4.5.2   Endline

Requesting Teachers to Participate in the Survey

At endline, the LBPOs informed all of the teachers in the treatment group about the teacher survey, including which time and place it would be administered. The MEAL officer in Gicumbi district contacted all Primary 1 through Primary 3 teachers who taught Kinyarwanda and informed them of the time and place of survey administration. Teachers were contacted by phone.

At total of 561 teachers took the survey at baseline, at endline, or both. These 561 constitute the cross sectional sample (150 control, 411 SC-trained). A subset of these teachers (n=263; 75 control, 188 SC-trained) took the survey at both baseline and endline. These constitute the longitudinal sample. As we present findings in Chapter 6, we distinguish between findings from the longitudinal and the cross-sectional samples. See Table 20 in Chapter 6, for additional information on number of teachers who participated in the survey.

Survey Administrators

At endline, 14 of the reading assessment assessors were hired as survey administrators. Members of the Stanford research team trained them in the survey administration. Teams of two survey administrators plus one member of the SCI MEAL team administered the survey at each of the survey sites. SCI MEAL team members were responsible for dispensing the travel fee to teachers at each site.

Survey Administration Sites

Seven schools were selected at the sector level as survey administration sites. Teachers were informed of the survey site that was closest to them. Surveys were administered over the course of two weekends. This included one Sunday in order to accommodate teachers who attended church on Saturdays.

Remuneration for Participating in the Survey

Again, no direct payments were provided to teachers for participating in the survey but all participants received RWF 4,000 ($5.36 USD or £3.64 GBP as of May 2016) to cover the cost of travel from their homes to the survey site.

4.6   Teacher Observation

4.6.1   Baseline Observation Tool

These baseline observations took place in the final term of the 2013 Rwandan school year. Two observers observed each lesson. The observers used an observation form to note the physical condition of the classroom, the presence of print materials, the pedagogical practices of the teacher, and student participation.

The Stanford research team created the teacher observation form in order to assess the presence and use of print material in the classroom and literacy instruction practices of teachers in Gicumbi at baseline. Observation items were based on content outlined in the Literacy Boost Teacher Training manual and included checks for presence and use of reading material, explicit instruction of and strategies used to teach the five components of literacy development, classroom management and assessment strategies used by the teacher and literacy instruction for second language learners.

Members of the Gicumbi Education team served as observers for the baseline classroom observations. The Stanford research team trained the observers on the observation instrument in person. Training included piloting the form in 14 classrooms in a neighboring district. The team held an extensive debriefing and discussion following each pilot session with the aim of developing a shared understanding of items to try to achieve high inter-rater agreement and revise items to be more relevant based on experiences in the field. Items were modified based on both contextual relevance and to facilitate coding and inter-rater agreement.

The final form consisted of 196 items. Items required observers to estimate the number of print materials, indicate presence of a teacher behavior/reading activity (check 'Yes' or 'No'), or indicate frequency of a behavior/activity on a scale (e.g. check whether teacher reads aloud 'Never', 'A Few Times', 'Sometimes' or 'Frequently').

4.6.2   Endline Observation Tool

At endline the Stanford research team revised the observation form, in order to better assess the presence and use of print material in the classroom and teachers' literacy instruction practices. The endline observation form followed the same structure as the baseline observation form, and was again based on the content of the Literacy Boost Teacher Training manual. The form included checks for the presence and use of reading material, explicit instruction of the five components of literacy development, classroom management, assessment strategies, and literacy instruction for second language learners.

The final endline form consisted of 173 items similar in format and content to the baseline form.

4.6.3   Explanation of Differences between Observation Tools

There were some differences between the baseline and endline observation forms. First, due to the implementation of the L3 curriculum and materials (see section 2.1.2), some teachers used audio for an activity rather than leading it themselves. In order to accommodate this change, the endline observation form added "led by audio" columns to many items. Second, the language of some items on the observation form was simplified from "Teachers and/or students do…" at baseline to "Students do…" at endline. Finally, the section checking for reading fluency and

comprehension activities at baseline was divided into sub-sections asking about different types of books, e.g. one sub-section asked about teaching fluency and comprehension strategies using textbooks; another asked about teacher teaching these skills, using storybooks. In order to simplify the reading fluency and comprehension section, the endline form was revised so that the observer was asked to first specify each type of book that was used and then note in one comprehensive table which strategies were used to teach fluency and comprehension.

4.7   Teacher Observation Sampling & Data Collection Procedures

4.7.1   Baseline

Observers

Newly hired LBPOs served as observers for the baseline observation of classroom teaching. Observers participated actively in piloting the tool and modifying items based on pilot feedback. In order to maximize inter-rater agreement, each item was discussed during the pilot phase until a shared understanding of the item and its corresponding scale was reached. Each classroom observation was conducted by two independent observers on two separate occasions (four observations total) so that inter rater agreement could be assessed during the data analysis phase. Two team members were paired as co-observers and remained in this pairing for all classroom observations.

Teacher Participation and Final Sample

As reported above, teachers had indicated they would be willing to participate in the observation study when filling out the teacher survey. In the Control group, 96 percent of teachers indicated they were willing to be observed, and in the LB and TT groups together, 97 percent of teachers responded that they were willing to participate when they filled out the survey. From those willing teachers, 42 were randomly selected to be observed. These teachers were contacted to explain the study in more detail and confirm that they would still be willing to participate. Teachers were evenly divided across treatment groups; 14 in control, 14 in Teacher Training only group, and 14 in full Literacy Boost group.

Data Collection Procedures

Teachers selected for observation read and signed a more in-depth consent form, approved by the Rwanda National Ethics Committee and by the Stanford University Human Subjects Internal Review Board prior to the classroom observation. Observation pairs were present in the classroom for the duration of a lesson, and filled out the observation form during and immediately after observing. In some cases, if clarification was required (e.g. regarding presence of formal assessment records or location of books) observers spoke briefly with the teacher following the lesson. Observers did not share or discuss their individual observations with their partners.

Remuneration for Participating in the Observation

Teachers were not paid or otherwise compensated for participating in the observation at baseline or endline.

4.7.2   Endline

Observers

While LBPOs were used as data collectors at baseline, four independent observers were hired for endline data collection. This was to prevent any potential bias creeping into the data and ensure a reliable and valid endline observation. The team of observers was trained by the Stanford research team at endline using procedures similar to those used at baseline.

Data Collection Procedures

Each classroom observation was conducted by two observers present in the same classroom, and they stayed for the duration of the lesson. Each observer filled out an independent observation form during and immediately following the lesson. In a departure from baseline procedures, after completing the independent forms, the two observers conferred regarding their notes and together filled out a third form that combined their observations. This combined

form provided the data used for the endline analysis. The observers did not alter their independent forms and these were later used to calculate inter-rater reliability.

At endline teachers were observed only once, whereas teachers were observed teaching two lessons at baseline. This change was because interrater agreement was so high at baseline, one observation was deemed sufficient. Moreover, we were not interested in making judgments about individual teachers; rather the purpose of the observations was to determine whether there were group differences between teachers who had been trained by Save the Children and those who had not.

Teacher Participation and Final Sample
From the pool of teachers that indicated they would be willing to be observed, 2 teachers were randomly selected to be observed from each sector, for a total of 42 teachers. They were evenly divided across treatment groups; 14 in control, 14 in teacher training only group, and 14 in full Literacy Boost group[26]. Teachers again read and signed consent forms approved by the Rwanda National Ethics Committee and by the Stanford University Human Subjects Internal Review Board prior to the classroom observation. For an overview of teachers who consented to be observed by group, refer to the Appendix.

4.7.3   Teacher Data from the School Survey
Assessors also collected teacher data as part of the school surveys. The items regarding teachers investigated teacher participation and use of L3 and/or Literacy Boost training and curricula. For L3, items asked whether teachers received training in L3 methods, how many received L3 training, what amount of teaching time teachers follow the L3 curriculum. For Literacy Boost, items asked when the book bank is available to teachers, whether teachers attended Literacy Boost training, and the date of each Literacy Boost training.

4.8   Classroom Photographs: Sampling and Procedures
Given that one topic contained in the LB Teacher Training modules concerns the print environment in the classroom, it was important to assess the impact of LB training on the print environment of the classrooms. At baseline, this assessment was not feasible due to limitations in available time and resources, specifically cameras.

During midline, tablet computers were used for reading assessment data collection. Since each tablet included a built-in camera, photographs of classrooms were taken to see what difference, if any, existed in the print environment in the classrooms of each of the groups.

To collect the photographs, team leaders were given the following instructions.
1) First, take a picture of the name of the school (it can be the school sign, or the name written into a notebook).
2) Identify three classrooms used for P.1, P.2, and P.3 students.
3) If more than one classroom is used for a specific Primary level, randomly select the classroom to photograph in the following manner:
    a. Ask the Head Teacher to give each classroom a number.

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[26] Teachers who were contacted for observations were asked if they were willing to be observed on a specific day. A handful of teachers (approximately 4 or 5) replied that they would not be present at school that day, or gave another reason why they could not participate. Because time was short, rather than trying to reschedule for a different day, we sampled a new teacher. We did not keep statistics on the exact N of teachers who declined due to scheduling conflicts in total nor broken down by group.

     b.   Write those numbers down on small pieces of paper.

     c.   Fold the papers containing the numbers that correspond to each class and place them into a hat, bowl, or another receptacle.

     d.   Ask the Head Teacher to pick out one of the numbers.

     e.   The number that the Head Teacher selects is then photographed.

4) Enter the classroom for photographing during a break, after the school day has ended, or at another time when the classroom is not in use.

5) In a notebook, on the chalkboard, or in some other way, take a photo that contains the Primary level of the class that is about to be photographed.

6) Following the picture of the Primary level, place your back to one of the four walls, and take a picture of the wall opposite

7) Move either clockwise or counter clockwise in the room so that your back is on an adjacent wall and take a second picture

8) Continuing moving clockwise or counter clockwise to take two more photos of the two remaining walls.

9) Move to the next available classroom and repeat steps 4 through 8.

In following this procedure, team leaders captured sixteen photos per school:

Photo 1: Name of School

Photo 2: P.1, P.2, or P.3	Photo 7: P.1, P.2, or P.3	Photo 12: P.1, P.2, P.3
Photo 3: Wall 1	Photo 8: Wall 1	Photo 13: Wall 1
Photo 4: Wall 2	Photo 9: Wall 2	Photo 14: Wall 2
Photo 5: Wall 3	Photo 10: Wall 3	Photo 15: Wall 3
Photo 6: Wall 4	Photo 11: Wall 4	Photo 16: Wall 4

Team leaders were careful to ensure that no students, school staff, or other individuals were included in the photographs in accordance with ethical protocols.

4.9   Literacy Ecology Survey of the Home and Community

4.9.1   Baseline Survey

The Literacy Ecology Survey[27] collected data about a number of different aspects of the home and of the family and how they relate to literacy. Table 9 presents a broad overview of the areas that the survey covered, and the data collected. The full tool is included in the separate annex to the report titled 'Data Collection Tools'.

The Literacy Ecology survey comprised 113 items. It was originally created for a research project in Lesotho (Friedlander, 2008) and later adapted by Save the Children for use in rural areas of Malawi, Nepal and Ethiopia (Wiener, 2009). The Stanford research team made further additions and adaptations for use in Rwanda following a pilot study.

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[27] During the baseline data collection and the baseline report, we referred to this tool as the Home Literacy Environment. However, after a thorough review of the literature as well as a more in-depth analysis of the baseline data, it was clear that the tool, and the constructs of interest, went beyond merely the environment. The term Ecology implies that the individual is part of a broader system and interacts with that system.

Table 9: Constructs in Literacy Ecology Survey

Area of Inquiry	Examples of Data Collected
Background Information	Family size, gender ratio of the family, home possessions, SES, materials used in home construction.
Readers, Reading Habits and Practices at Home	People living at home, number of people who read, write, read to child, help child with homework etc. Educational history of family (years of schooling).
Attitudes towards Reading and Literacy	Age at which a child should read independently; Confidence in supporting children's reading.
Reading History of Respondent	Who taught respondent to read? What does the respondent read?
Material Resources	Number and types of different reading and writing materials at home.
Child Interest/ Engagement	Does the child like to read? Does the child ask to be read to? Does the child initiate other reading or literacy-related interactions?

4.9.2   Endline Survey

The Literacy Ecology survey at endline was adapted based on experience analyzing the baseline data to better capture variation in homes and communities, as well as to capture information about program participation. Changes made to the survey tool at endline included:

1) questions concerning workshops held in the village for adults.
2) questions about reading-focused child activities in the village.
3) questions about the frequency with which children or other family members use a specific type of reading materials.
4) questions asking whether Reading Corners existed in the home.
5) questions asking respondents to evaluate their own reading abilities.
6) questions asking more explicitly about child interest and engagement.
7) changing attitude questions from a binary format (agree/disagree) to ordinal (e.g. extremely disagree/ somewhat disagree/ somewhat agree/ extremely agree).
8) adding stimuli that pictorially showed the difference between ratings on the ordinal scale.

A number of questions about the reading history of the respondent, as well as items that demonstrated floor or reading effects at baseline, were removed.

4.10   Literacy Ecology Sampling & Data Collection Procedures

4.10.1 Baseline

Respondents

Respondents to the Literacy Ecology survey were family members of a subset of children who participated in the 2013 baseline Reading Assessment. Data collectors were instructed to go to the homes of students and request to interview the parent or caretaker with whom the child spends the most time. If no parent or caretaker was available, an older sibling or relative who lived with the child was asked to participate.

The baseline Literacy Ecology respondent breakdown was: Mothers: 46.8 percent, Fathers: 40.2 percent. Other Siblings or Relatives: 13.0 percent

Sampling

As the TT treatment group was not receiving any community activities, it was decided to exclude them from the Literacy Ecology survey and only focus on students who were either a) in the Control group or b) in the LB group. Following the completion of the reading assessment data collection, focus villages were selected for the Literacy Ecology survey data collection. This was done according to the following steps. Schools that participated in the

reading assessment data collection within the Control and LB-assigned sectors were grouped by sector, and two schools were randomly selected from each sector. This resulted in 28 schools selected (two per sector for 14 sectors). As data collection capacity allowed for two additional schools to be selected, one more school from both the control group and the LB group was selected.

Due to the extremely hilly topography of the district, roads that are sometimes impassable, and data collection resource constraints, it was not possible to visit the homes of every student included in the Literacy Ecology survey sampling frame. Nor was it possible to randomly sample students from among the 25 students assessed in each school during the reading assessment, as it would require the two small data collection teams to cover areas several kilometers-squared, which again was not feasible given time and resources.

In order to collect data as efficiently as possible, the caretakers of 16 out of the 25 students assessed at baseline in each school were targeted for the Literacy Ecology data collection in the following manner. In the first step, a list of villages was generated for each of the 30 schools. This list included all the villages in which students who were selected for the reading assessment lived. Then, each village was assigned a value ranging from 1 to 25. This value (V_i) was equal to the number of assessed students who lived in that village. Then, villages were ordered so that value (from one to twenty-five) met the following criteria:

$$V_1 \geq V_2 \geq V_3 \geq \dots V_x,$$

with V_x being the village with the fewest number of students who participated in the reading assessment.

Starting with V_1, the value of each village (corresponding to the number of assessed students who lived in that village) was added to the village preceding it until the sum of students was greater than or equal to 16. This process is described in Formula 1.

Formula 1: $$\sum_{i=1}^{n}(V_i) \geq 16$$

In this formula, *n* is the village number that brings the sum greater than or equal to 16. In the event that two villages had equal number of students and the addition of one of these villages would exceed a total of 16, one of the villages with equal number of students was randomly selected for inclusion.

In total, 466 surveys were completed across all 30 schools. The number of students from each school for whom LE survey data was collected ranged from 9 to 21. The lower bound of this range was a result of either being unable to locate specific students' homes or there being no one at home to respond to the survey. The limitations of this sampling technique are discussed below.

Data Collectors
Two teams of Kinyarwanda-speaking university graduates, who were about to commence their employment to implement the community action portion of the randomized control trial, collected the data. In order to limit any potential biases, the two data collection teams were not informed about the assignment of specific schools and sectors to LB or control groups. The teams also had no information on students' reading assessment performance or students' general academic performance. In addition to the Umuhuza staff, four Save the Children LBPOs also collected data, and were also unaware of assignment to treatment status.

4.10.2 Endline
Respondents
During the endline, data collectors were instructed to seek out the same families interviewed at baseline, and if possible, to interview the same family member. If the baseline respondent was not available, another caretaker or

relative could be interviewed. As described below, new respondents were also recruited, in which case the guidelines for selecting respondents at baseline was followed

The endline Literacy Ecology respondent breakdown was:

Mothers:	42.8 percent	
Fathers:	43.5 percent	
Other:	13.8 percent	

The percent of respondents who participated in both the baseline and endline surveys was 50.6 percent. The percent of respondents whose spouse or another family member participated at baseline was 29.3 percent.

Sampling

Data collection for endline aimed to collect a longitudinal sample. That is, data collectors went back into the 14 sectors for data collection and attempted to interview the same family member who was interviewed in 2013. If the data collector could not find the 2013 respondent, then another family member was sought to participate in the survey.

The approach used for scheduling and visiting communities differed in 2015 from that of 2013. Rather than using the school as the unit by which communities were targeted, communities themselves were identified for targeted data collection. This was done in the following manner:

The 466 respondents at baseline were grouped by the village in which they lived. These villages were then grouped together into clusters for targeted data collection on the same day. This was intended to avoid visiting a village on two separate days. This had happened during the baseline Literacy Ecology data collection because a group of sampled students in School X lived in that village, and another group of students sampled in School Y also lived in that village. Organizing data collection at the village level, rather than the school level, prevented this from occurring.

With the advice of data collectors who spent their childhood and still resided in Gicumbi, villages that were close in proximity to one another were grouped into clusters. This enabled the data collection teams to cover several villages within the 14 sectors for data collection in one day. Villages were grouped based on the number of target families and the proximity of villages to one another.

Each village was only scheduled to be visited once. Cognizant that the respondents in 2013 might be difficult to find, the Stanford research team provided the data collection team with a list of high priority individuals to interview (i.e. those who participated in the 2013 survey) as well as a list of low priority families to interview should the data collection teams have extra time and/or cannot locate the high priority respondents. The list of low priority respondents were family members of children who lived in one of the villages visited at baseline, but who had not participated in the baseline survey.

Data Collectors

Data collectors for the endline Literacy Ecology survey were independently contracted, almost all of who had participated in the endline reading assessment and/or the endline teacher study.

Teams of data collectors were led by a Team Leader, who showed good understanding of the principles of ethical research and a mastery of the observation tool.

4.11   Literacy Ethnography Observer and Sample Selection

4.11.1   The Observer and Pilot Observations

Dr. Michael Tusiime, a lecturer at the University of Rwanda – College of Education[28], conducted the observations for both baseline and endline ethnographic observations. We refer to him hereafter as MT.

Prior to baseline observations, Elliott Friedlander accompanied MT on pilot observations and also provided MT information and materials on the specifics of the Literacy Boost project and possible points of interest within the home and community around reading, writing, and literacy. This included specific occurrences, actions, and habits for which to look, as well as possible topics of conversation to discuss. During the pilot observation process, a rough sketch of observation protocols and guidelines were established. Using field notes and initial draft reports written by MT, the Stanford research team members collaborated to produce the baseline and this endline report.

Prior to endline observations, MT was again provided with information and possible points of interest. In particular, MT reviewed findings from the baseline Literacy Ecology report as well as the secondary analysis of the baseline data which first presented the five factors of the Literacy Ecology (Friedlander, 2015). The purpose of this review was to achieve a better understanding of the possible vectors of change or stasis within the observed homes.

4.11.2   Literacy Ethnography Sampling

At the conclusion of the baseline Literacy Ecology Survey in 2013, participants were asked whether they would be willing to have an observer visit their homes for one week to follow their P.1 student around and record observations. Over 98 percent of respondents indicated they would be willing to participate[29]. Respondents who consented were added to the list of potential participants. The random selection of the subgroup of respondents who indicated they would be willing to participate yielded the names of two girls, *Flora* and *Jolly* (both pseudonyms to protect participant identities). Flora lived in a sector assigned to LB, while Jolly lived in a sector assigned to Control. At baseline, the research team was unsure the amount of time necessary to yield useful and analyzable observational data. Given budget constraints, time limits, and data analysis considerations, the sample at baseline was limited to two families, with MT observing each family for seven days. In 2015, the families of Flora and Jolly were again contacted and asked whether they would be willing to participate in the ethnography. Both consented to participate.

At endline, following discussions with Dr. Tusiime, the research team decided to expand the sample for ethnographic observations but reduce the number of days that the observer would spend with each family. For the endline, a purposive sample of two additional children was drawn. To do this, we first set aside all students whose families did not participate in the endline Literacy Ecology survey, or who had participated but who responded 'no' when asked whether they would like to participate in the endline ethnography (overall, 96.7 percent of respondents indicated that they would be willing to have an observer come during the endline survey). We further restricted the sample by removing any children who resided in the same sector as Flora or Jolly, in order to visit more of Gicumbi. In an effort to understand factors that may have enabled or inhibited children's reading development and response to LB, the research team decided that the additional two students would be in the Literacy Boost group, one student whose reading had improved over time and another who was still a struggling reader. Using the reading scores of the LB students at baseline, we removed students who could already read the P.1 passage at baseline. We then looked at

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[28] In 2013 when Dr. Tusiime originally joined the study, the University of Rwanda – College of Education was called the Kigali Institute of Education

[29] Many of those who did not want to participate were women who responded that they could not consent without their husband's permission first.

the remaining students' endline P.1 fluency scores, sorting them into two lists: those who could read the P.1 passage and hence had a fluency score, and those who could not read the P.1 passage and did not have a fluency score. We then used Microsoft Excel to put the names of these students in random order within each list, and contacted the families of the students' whose name appeared at the top of the list. Both of the families contacted again agreed to participate in the ethnography. These two children were Daniel and Marie: Daniel had shown great improvement in the reading assessment data after two years, while Marie still struggled to read. Therefore, at endline, four children were observed: Jolly, Flora, Marie, and Daniel.

4.12 Literacy Ethnography Data Collection and Analysis

4.12.1 Observations

The approach to observations began with understanding the child's sociocultural and economic "niche" (Gallimore, Weisner, Kaufman, & Bernheimer, 1989; Weisner, 1984). The observer used an activity-settings-model approach (Gallimore & Goldenberg, 1993) to his observations to understand this niche. In this approach, MT noted the activity taking place, the setting in which the activity was occurring, who was taking part in the activity, the motivations behind the activity, and the shared cultural understandings, perceptions, and norms within the sociocultural niche in which the activity occurred.

4.12.2 Observation Timeline

During the baseline observations, MT observed both children for one continuous week each, as seen in Table 10. During the endline observations, the coordination of several different children and their families, and a shorter amount of time available, required MT to, at times, alternate which child he observed on a specific day. The advantage to this was that it allowed MT to set up a few appointments for interviewing key individuals in the community or the lives of the children (e.g. Jolly's father), with whom he otherwise would not have been able to speak. It also enabled MT to visit Daniel on a Sunday when he attended church (more on this in Chapter 8).

Table 10: Ethnography Observation Schedule at Baseline and Endline

Baseline [End of 2013]		Observation Day	Endline [End of 2015]	
Week Day	Observed Child		Week Day	Observed Child
Monday	Flora	1	Thursday	Jolly
Tuesday	Flora	2	Friday	Jolly
Wednesday	Flora	3	Saturday	Jolly
Thursday	Flora	4	Sunday	Marie
Friday	Flora	5	Monday	Marie
Saturday	Flora	6	Tuesday	Marie
Sunday	Flora	7	Wednesday	Daniel
Monday	Jolly	8	Thursday	Daniel
Tuesday	Jolly	9	Friday	Flora
Wednesday	Jolly	10	Saturday	Flora
Thursday	Jolly	11	Sunday	Daniel
Friday	Jolly	12	Monday	Flora
Saturday	Jolly	13	Tuesday	Jolly
Sunday	Jolly	14	--	--

4.12.3 Interviews and Casual Conversations

At baseline in 2013, MT spent one week (seven consecutive days) with each child, observing their activities and speaking with them about their lives. At endline in 2015, MT spent three to four days with each of four children. Informed consent was obtained from parents and other participants prior to their participation, in accordance with regulations set forth by the Stanford Internal Review Board, the Rwanda National Ethics Committee, and The Directorate of Science, Technology, and Research at the Rwanda Ministry of Education.

At both data collection time points, MT conducted structured planned interviews with both parents of the children observed. This was in addition to the unplanned discussions and exchanges he had with them whenever they were at home, especially in the morning before they left for work or in the evening when they returned. He also conducted planned and unplanned interviews and held casual conversations with several neighbors, community members, neighborhood youth and local leaders. His questions sought to solicit the interviewees' perceptions of ways in which village activities may have related to literacy practices. Table 11 presents the individuals who were formally interviewed in each of the children's homes and communities.

Table 11: Interview Participants by Focal Child at Endline

Jolly	Flora	Marie	Daniel
- Jolly's father - Jolly's mother - Jolly's elder sister - Cell Official - P.1 teacher at Jolly's school	- Flora's father - Flora's mother - Reading Club Volunteer - Reading Club Volunteer / Village Leader	- Marie's father - Marie's mother - Ex-village leader - Village leader/catechist - Head teacher at Marie's School	- Daniel's father - Daniel's mother - Brother 3 - Church leader - Reading Club Volunteer

4.12.4   Photographs and Artifacts

In order to provide a deeper understanding of the contexts, MT also took photographs in the homes and villages of the participants. He also took photographs of literacy artifacts, including notebooks with children's writing and consumer products with text (such as juice boxes) found in the children's environment.

4.12.5   Data Analysis

MT gathered extensive notes, separated data thematically, and compiled the key findings and evidence into a draft ethnography report. The co-authors then sorted through MT's notes and reports from 2013 (baseline) and 2015 (endline) and coded them using Atlas.ti for:

1) the five factors of the Literacy Ecology
2) findings relevant to program implementation, and
3) any additional themes that emerged in the data.

For a description of the Literacy Ecology factors, refer to Chapter 7.

4.13   Participation Data

Save the Children and Umuhuza collected a significant amount of monitoring data. Save the Children collected data on teacher attendance at the Teacher Training sessions, and collected observation data. Umuhuza collected data on attendance at the RAWs, disaggregated by parent or caretaker sex, and on attendance at the Reading Clubs for the Primary school aged children who attended. Umuhuza also trained Volunteers to keep registers of which children borrowed books. All of this monitoring information can be linked to the students included in the reading assessment and the families who participated in the Literacy Ecology Survey. At the time of writing this report, the data was not yet entered into Excel. Future analyses will use this data to estimate the impact of Treatment on the Treated. The subsequent chapters, therefore, only report on Intention-to-Treat.

4.14   Limitations

This chapter has presented information about data collection tools, sampling methods, and the procedures used to collect the data. With limited time and resources, the research team made certain decisions that necessarily came with at least nine limitations.

First, on every data collection tool, some items that were collected during baseline were not collected at midline or endline. For these items, it is impossible to discuss longitudinal change.

Second, other items on each tool were altered at midline or endline data collection points in order to address floor effects, ceiling effects, or other issues that arose in the baseline dataset. For some of the altered questions, the research team changed the scale used to measure the item. For instance, a simple answer set of [*agree* | *disagree*] at baseline became [*strongly disagree* | *disagree* | *agree* | *strongly agree*] at endline. Making direct comparisons on questions where the scale of the answers has changed must be done cautiously.

Third, most of the study participants do not speak English with enough fluency to permit the team to administer the data collection tools in English alone, if at all. Therefore, we had to translate all of our tools, instructions, training materials, etc. Whenever translation occurs, there is always a possibility of losing the intended meaning. The research team had all the instruments that were originally translated from English into Kinyarwanda reverse translated back into English by a different translator than the one who first translated the tool. This enabled us to get a better sense of which words, phrases, questions, or other content might be contributing measurement error to our data. Even with the reverse translations, certain words in use in English may not exist in Kinyarwanda. Indeed, even the concept that the English word represents may not exist.

Fourth, even when translations are 100 percent accurate, the cultural knowledge and the cultural norms that different people apply to the words and sentences on a page may differ drastically. For instance, in the Literacy Ecology survey, we asked parents "What do you read to your child?" We received many of the answers we expected, such as storybooks, the newspaper, magazine articles, or textbooks. However, some respondents told us that they read "Mathematics" or "Kinyarwanda". It is not immediately clear what the respondents meant when they reported reading Mathematics to their children. It is possible that when they are answering, they are recalling a time they helped their child with the homework, or even just check the child's homework. Further inquiry is needed to better understand the nuance in the responses to the "what do you read to your child" question in particular.

Fifth, the small sample size of the teacher observation and the literacy ethnography limit the generalizability of certain conclusions. However, as this is a multi-methods study, we synthesize findings across datasets and time points to provide both breadth and depth to the findings and conclusions of the report. A table that covers the entire sample and the percentage of the sample that has participated in the study at two or more times is included in the Appendix.

Sixth, measurement error is always a possibility, especially when collecting data from young children. Children may not completely understand a question but may answer anyways, providing bad data. Children are also generally eager to please adults, and may provide answers that they think are the answers that the data collector may want to hear. This sixth limitation actually applies for all respondents. Observed teachers may go to extra lengths to plan a session that they know will be observed, or parents who have just attended RAWs may tell an interviewer about the great importance of reading to children, despite not yet having tried to do it themselves. These risks exist across social science research. In order to address this source of measurement error, we triangulate findings in various ways: by asking the same question in different ways, by asking different types of respondents (e.g. children and caretakers) the same question, and by providing assessors specific steps to take to follow up on respondents' answers that are ambiguous.

Seventh, our analysis in this report relies on our ability to know the exact sector in which a child lives in order to conduct an Intention-to-Treat analysis. At baseline, we did not anticipate how hard it might be for children to know the name of the sector, cell, and/or village in which they live. Digital data collection techniques helped improve our accuracy at midline, and we refined it further to get even more accurate data at endline. Nonetheless, some students are excluded from the analyses as it is impossible to definitively say in which sector, cell, or village the children live. The breakdown of which students were excluded when and why is included in Chapter 5 and the Appendix.

We refer to the fourth sub-study as the Literacy Ethnography. However, a true ethnography situates an observer in a context wherein he does not have any preconceived ideas of what to look for, conversations to have, etc. Therefore, our 'ethnography' is best described as a descriptive inquiry into literacy and learning in rural Rwanda.

Eighth, it is likely that students and families from larger villages and villages closer to schools are overrepresented in the sample. This is because larger villages had more students, and students from closer villages are more likely to attend school and therefore participate in data collections.

Finally, a ninth limitation involves tracking students longitudinally. In Rwanda, very rarely do children inherit the surname or family name of their parents, as is commonly done in other countries. Students are not issued individually identifying numbers in any systematic way. Villages are not planned out in a simple grid system wherein a researcher can look at a map and know exactly where to head to find a particular subject. And mobile phone reception is not yet widespread enough or cheap enough for many of our participants to own a phone, which bars a simple telephone call for follow-up data collection. See the Appendix for exact percentages of the baseline samples that participated at midline and/or endline.

Chapter 5 Literacy Boost Impact on Students

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CHAPTER ABSTRACT

PURPOSE OF THE CHAPTER

This chapter examines how student reading skills improve from exposure to SC trained teachers in the TT group, and the added benefit of including community activities for the reading skills of students in the LB group. The sample includes a longitudinal group followed over 2 years (Cohort 1), as well as a new sample of P.1 students (Cohort 2). It further examines whether certain subgroups within the LB and TT sectors that may experience systematic disadvantages benefitted differentially from the treatment conditions. Finally, it explores whether the length of exposure to treatment differentially impacts student's reading abilities.

DATA ANALYZED

   2,041 Reading Assessments in 2013 (Baseline: Cohort 1)

   1,668 Reading Assessments in 2015 (Endline: Cohort 1, longitudinal)

   1,926 Reading Assessments in 2015 (Baseline: Cohort 2)

KEY FINDINGS

- LB and TT increased the number of students who reached P.3 by more than 40% when compared to the Control group.
- LB had significant impact on oral comprehension scores in Cohort 1, and on reading fluency and comprehension for both Cohort 1 and Cohort 2
- TT had a significant impact on reading comprehension for Cohort 1, and reading fluency for Cohort 2.
- Neither treatment group had any significant impact on whether children met the basic literacy threshold (BLT); 31 percent of the entire sample did not meet this threshold

DISCUSSION & IMPLICATIONS

- Literacy Boost provides policy makers with new methods to address the persistent problem of student repetition and low reading skills.
- Despite the positive effects of Literacy Boost, overall achievement across the sample was still low and rates of repetition were high. Further efforts, in and out of classrooms, are needed to help all students learn to read.

As described in Chapter 2, the central goal of Literacy Boost is to improve children's early reading development by enhancing literacy learning opportunities both within and out of school. We therefore present the impact on reading achievement for students who lived in the Teacher Training only sectors (the TT group) and for students who lived in the Literacy Boost sectors (the LB group).

This chapter reports on the Intention-to-Treat (ITT) analysis of the randomized control trial, as opposed to Treatment on the Treated analysis. Intention-to-Treat is a conservative estimate of impact, as it does not estimate impact according to the actual treatment that participants received. Rather, it measures impact according to the assigned

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treatment status, regardless of the degree to which participants engaged in the program.[31] This conservative estimate of impact likely underestimates the impact that the program had on participants. This is because we do not account for the possibility that children may have lived in one sector assigned to a treatment, but attended school in another sector that was assigned to a different treatment. Further, this analysis does not account for the fact that circumstances may have prevented participation of some beneficiaries in project activities. For example, anecdotal evidence suggests that some teachers did not attend TT activities because they spent weekends in Uganda studying, and some parents could not attend RAWs because their working hours spanned from 8:00 to 17:00 and therefore missed the afternoon RAW sessions. These circumstances would only serve to moderate, or reduce, the impact of any treatment. The analysis presented here is the most relevant for policy makers and government officials because it closely adheres to the reality faced by policy implementers in the real world. For example, the government can provide free primary schooling opportunities for its population, but whether families send their children to school may be beyond the control of government officials.

This chapter first establishes the internal validity of the data by answering the first two questions in Table 12, and assesses the impact of treatment assignment by answering the remaining questions.

Table 12: Research Questions, Purposes, and Outcomes

	Research Question	Purpose	Specific Outcome(s)
1.	What attrition bias, if any, existed in the sample?	Establish internal validity	Difference in attrition between groups.
2.	Were the groups that make up the analytic sample at endline sufficiently similar at baseline to validly compare with each other?	Establish internal validity	Difference in baseline characteristics and reading skills.
3.	What impact did TT and LB have on student promotion in early primary school?	Causal analysis of impact	Student was in P.3 in 2015.
4.	What impact did TT and LB have on literacy skills?	Causal analysis of impact	Oral Comprehension; BLT; Reading Fluency; Reading Comprehension.
5.	Did sub-groups (e.g. girls, repeaters, students with low home literacy ecology scores) benefit more or less than their counterparts?	Equity	Student was in P.3 in 2015; Oral Comprehension; BLT; Reading Fluency; Reading Comprehension.
6.	How did the amount of time students were exposed to LB activities relate to their achievement?	Dosage/Duration	Student was in P.3 in 2015; Oral Comprehension; BLT; Reading Fluency; Reading Comprehension.

Each of the questions in Table 12 is answered in a separate section within this chapter. Within each section, we first present relevant raw statistics. Then, we estimate impact by fitting multi-level mixed effects regression models and logistic regression models. Except when specifically noted within a section, the multi-level models we fit have the following characteristics:

- To account for structural features of the random assignment process we include:
  - fixed effects for randomization blocks, and
  - random effects at the sector level.
- We include a control for baseline phonological awareness, standardized within the analytic sample, to adjust for baseline differences in a variable highly correlated with each of our outcomes and measured with precision at baseline.

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[31] The Intent-to-Treat analysis measures the effect of student assignment to or offer of treatment. Given that perfect compliance cannot be enforced, this estimate is a policy relevant estimate and the only estimate not subject to selection bias (Murnane & Willett, 2010).

- We include dummy variables for program assignment (Literacy Boost or Teacher Training) to estimate the program impact.

We adjust models to account for the distribution of the outcome variable:
- Continuous outcome variables
  - Are standardized within the analytic sample.
  - Use restricted maximum likelihood estimation and the Kenward-Roger correction for the small degrees of freedom at the sector level.
- Binary outcome variables
  - Are estimated using multi-level mixed effects logistic regression models.
  - Are translated into percentage points to describe the predicted probability of the outcome for an average student in each group (i.e., LB, TT, and Control).

We compare each treatment condition to the Control group. We do not compare the LB and TT group directly at this stage in the analysis because our sample of sectors is too small to reliably estimate effects. After answering the questions, we discuss the findings overall in the Discussion section at the end of this chapter, pointing out the limitations of our data and concluding with avenues for future research.

For information on random assignment to treatment, participant sampling, data collection tools, outcome variables and timing of data collection, refer to preceding chapters.

5.1 Attrition Analysis & Findings
To make causal claims of LB impact, we first examine whether attrition from the longitudinal sample may have differentially altered the composition of the treatment and control groups, thereby biasing our impact estimates.

5.1.1 Methods
We first examine the absolute number and percentage of students assessed at baseline and again at endline within each group. The only variation in this section from the methods described above is that we do not control for baseline phonological awareness.

5.1.2 Findings: Attrition
At baseline, the original sample comprised 2,118 students. Seven of these students were excluded from the sample as students' names were different in the baseline, midline and endline survey, leaving 2,111 students. In order to conduct the Intention to Treat analysis, it is necessary to know the sector in which a child lives. Using all the data sources available (student report, teacher report, school register reports, and parent reports for those families who participated in the Literacy Ecology sub-study), we determine the home sector of 97 percent of the sample with reasonable confidence. The remaining 3 percent (70 students) for whom a home sector could not be reasonably determined, were excluded from the analysis, leaving a sample of 2,041 students in the baseline for analysis.

Table 13: Longitudinal Sample Size for Reading Assessments & Attrition Rate

	N of Students: Baseline	N of Students: Endline	% of baseline students assessed at endline	N (%) of attrited students
Control	634	521	82.1%	113 (17.8%)
Teacher Training	694	545	78.5%	149 (22.5%)
Literacy Boost	713	602	84.4%	111 (15.6%)
TOTAL	2041	1668	81.7%	373 (18.3%)

It is important to note that the 373 students who attrited from the sample were not necessarily students who 'dropped out' from school. There are many reasons that students could not be located, including that they were sick the day of the assessment, their family had moved away, they enrolled at a different school, or that they were no

longer enrolled in any school. The only thing we can say for certain is that we were unable to locate 373 of the original 2,041 students assessed at baseline. This overall 18.3 percent attrition, with differential attrition between the control group and either of the treatment groups below 5.5 percent, is within the conservative bounds of attrition in a randomized control trial, as defined by the What Works Clearinghouse (Institute of Education Sciences, 2013).

The multi-level mixed effect logistic regression reveals that there was no significant differential attrition between groups, meaning that <u>we do not observe any attrition rate bias in the longitudinal sample. This means that student attrition is unlikely to bias the estimates of TT's and LB's impact on children's reading achievement.</u>

5.2   Similarity of the Reading Assessment Analytic Sample at Baseline
Before we present the methods and findings for the questions driving this chapter, we provide an overview of the sample and compare the groups to test whether there were significant differences among them at baseline.

5.2.1   Methods
To estimate treatment impacts, we must determine whether the groups in the analytic sample start out sufficiently similar in demographic characteristics and skills. If students are similar at baseline, we can confidently assert that any observed changes in the treatment group that do not appear in the control group were probably caused by the program. Initial equivalence cannot be assumed because even in a randomized control trial groups can be different at baseline. This section describes the sample of students assessed at endline and determines the extent of similarity in the group of students assessed at both baseline and endline.

To estimate the differences between groups in the analytic sample, we predicted baseline characteristics using the multi-level mixed effect regression models described above. These models include the fixed and random effects described earlier in this chapter.

5.2.2   Findings
When we looked at significant differences between groups, we found that students were overall very similar across a range of characteristics, including the balance between males and females, socioeconomic status, and the reading materials and reading habits at home they report. As seen in Table 14, there were no statistically significant differences across groups.

Table 14: Differences between Groups in the Analytic Sample at Baseline

	N Children	N Sectors	Control	TT	LB	Sig Diff
% Female (binary)	1668	21	45%	50%	49%	none
% of students who reported repeating P.1 (binary)	1659	21	58%	51%	55%	none
Socioeconomic Status (z-score)	1668	21	0.07	-0.09	0.01	none
Index of Home Reading Materials (z-score)	1668	21	-0.08	0.02	0.03	none
Index of Home Reading Habits (z-score)	1668	21	-0.04	0.04	0.01	none
Phonological Awareness Score (∑ sub-test z-scores)	1668	21	-0.09	-0.03	0.09	none
Met the BLT (binary)	1668	21	23%	29%	39%	none

No significant difference observed at a $p < 0.05$ level or lower. Differences in sample sizes are due to missing data.

Though not statistically significant, the difference between groups on their Phonological Awareness and on whether the student met the BLT is notable – a difference of 0.18 on Phonological Awareness (PA) between Control and LB groups – merits more investigation.

Following the WWC guidelines, we analyze the effect size difference between groups on phonological awareness[32] scores through a comparison of raw standardized means using a pooled standard deviation. We chose to analyze PA rather than whether the student met the BLT as phonological awareness has been shown to be highly predictive of later reading achievement in academic literature. Further, the phonological awareness measure is a continuous variable, versus the BLT outcome, which is binary. When controlling for variables in a regression, a continuous variable provides greater statistical precision as a control variable and more precisely estimated results.

The analysis of raw standardized means determines whether we need to include a control for any differences existing at baseline. In Table 15 we present the group averages, the pooled standard deviations for the two comparisons (between LB and Control and also between TT and Control). According to the WWC guidelines, the observed effect size difference between the LB and Control group is fairly small – around 0.12 of a standard deviation. While not strictly required by the guidelines, we decide to control for baseline phonological awareness.

Table 15: Raw Standardized Differences in Baseline Phonological Awareness Scores

		Group Average			Pooled Std. Deviation		Effect Size Difference	
	N	Control	TT	LB	Control + TT	Control + LB	TT – Control	LB – Control
All students assessed at baseline	2041	-0.10	-0.12	0.24	2.97	3.26	0.00	0.10
All students assessed at both baseline & endline	1650	-0.14	-0.05	0.26	3.06	3.30	0.03	0.12
Students met the BLT at endline	1135	0.57	0.61	0.97	3.15	3.41	0.01	0.12

In conclusion, the three groups within the analytic sample at baseline are sufficiently similar to maintain the integrity of the randomized control trial. However, to be sure that we do not attribute impact of LB to a pre-existing difference, all further analyses will control for children's baseline phonological awareness.

5.3 Treatment Impact on Student Repetition & Promotion

5.3.1 Methods

To see whether the assignment to the TT or LB treatment groups had any impact on a student's primary level promotion from one year to the next, or whether students repeated a primary level, we turned to two data sources: the students themselves and assessors' recording of the students' primary level. We first look at the raw data from

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[32] Upon review of the analysis and findings, the research team felt that the magnitude of the difference between LB and Control groups on the Basic Literacy Threshold measure merited further investigation, even though it is not statistically significant, beyond what had already been done with Phonological Awareness. We repeated the analysis for BLT, and did see a larger effect size difference at baseline, though still within the bounds of acceptable as identified by WWC.

This led us to rerun the models controlling for BLT instead of PA. The findings from those models showed smaller effects of treatment, but still significant ones and ones that resembled the impact seen for PA, though for fewer outcomes and with larger *p*-values (i.e. fewer statistically significant results).

We report on the analysis controlling for PA in the report, and include the BLT analysis, tables, and figures in the Appendix for those who are curious. The true impact of the Intention to Treat with LB & TT interventions likely fall somewhere in between the two, but it is hard to determine where precisely. We will discuss this briefly in Chapter 9.

these two sources in tables and figures, below. Then, in order to analyze the data statistically we created a variable that indicated whether the student was promoted through primary school normally between 2013 and 2015. We used the assessor-collected data to create this variable as it is likely more reliable, since assessors directly observed the students' classrooms. This variable took on a value of '1' for children who were in P.3, and a value of '0' if students were in a P.2 or P.1 classroom.

For the step-by-step calculations used in calculating repetition and promotion rates, refer to the Appendix.

5.3.2   Findings

We first examined the raw numbers on student enrollment and repetition. Table 16 and Figure 3 display the numbers of students observed in each Primary level. Table 16 also contains data from Cohort 2 students who were newly sampled during the 2015 assessment. All data from cohort 2 concerning repetition is from student report.

Table 16: Primary Enrollment in 2015 for Students Enrolled in P1 in 2013[†]

		Overall			Control			TT Only			LB		
		N	Avg	SD	N	Avg	SD	N	Avg	SD	N	Avg	SD
Cohort 1: % of children that assessors found in each Primary level	P.1	1668	15%	0.35	521	15%	0.36	545	16%	0.37	602	13%	0.33
	P.2	1668	48%	0.50	521	53%	0.50	545	44%	0.50	602	48%	0.50
	P.3	1668	37%	0.48	521	32%	0.47	545	41%	0.49	602	39%	0.49
Cohort 1: % of sample who reported they repeated P.1	Baseline	1659	55%	0.50	521	56%	0.50	540	51%	0.50	598	56%	0.50
	Endline	1668	76%	0.43	521	84%	0.37	545	69%	0.46	602	76%	0.43
Cohort 2: % of children who repeated P.1		1921	54%	0.50	587	57%	0.50	644	55%	0.50	690	51%	0.50

[†]All data come from the endline data collection unless otherwise noted

Figure 3: Percent of Students Enrolled in P.1, P.2, & P.3, Overall & by Group, as Directly Observed by Assessors
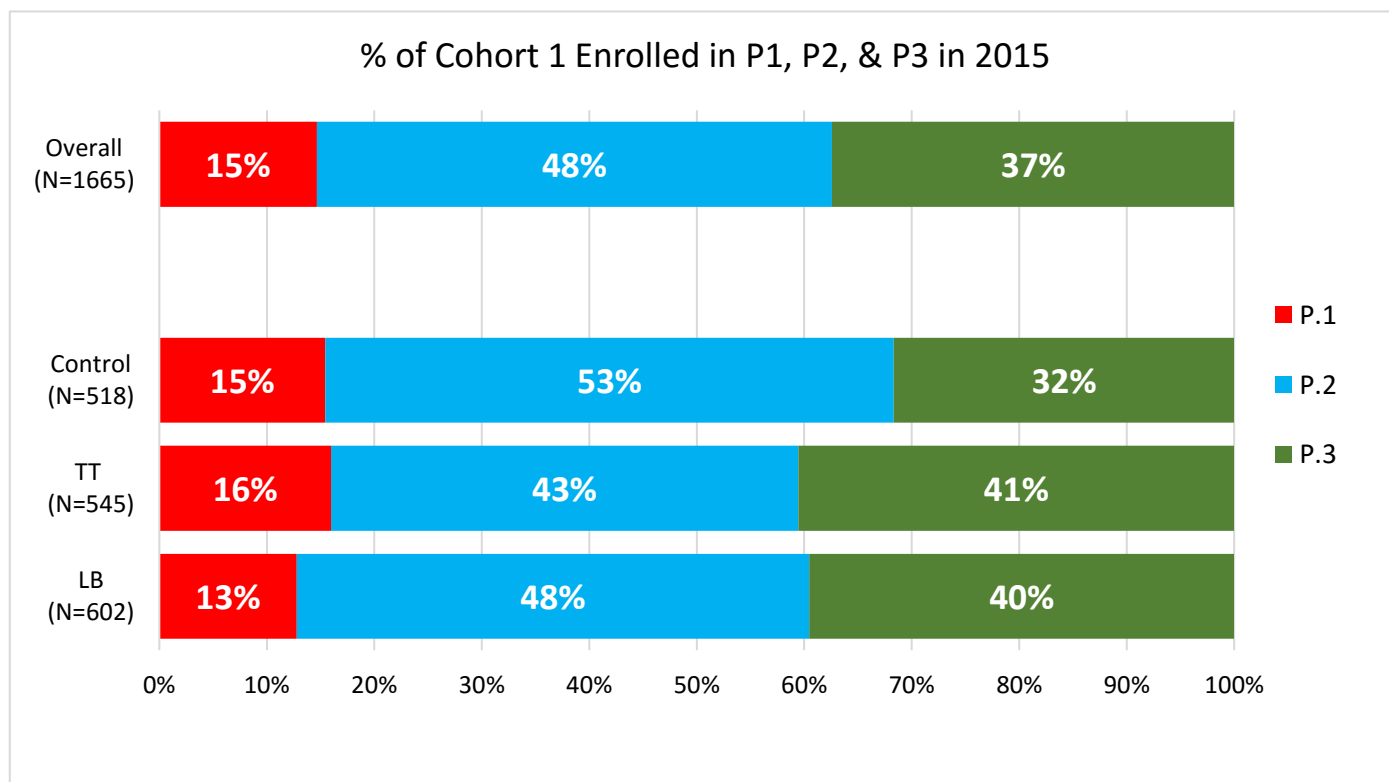
As shown in Figure 3, in comparison to the Control group, proportionately 25-28% more students in TT and LB reached P3 in two years (40 percent and 41 percent are 25 and 28 percent greater, respectively, than 32%).

In the statistical analyses that control for differences in baseline phonological awareness, we find even stronger evidence of impact: <u>43 and 46 percent more students in LB and TT groups reached P.3 than in the Control group, respectively</u> (see Figure 4, below).

Figure 4: Predicted Percentage of Students that Reached P.3 in 2015
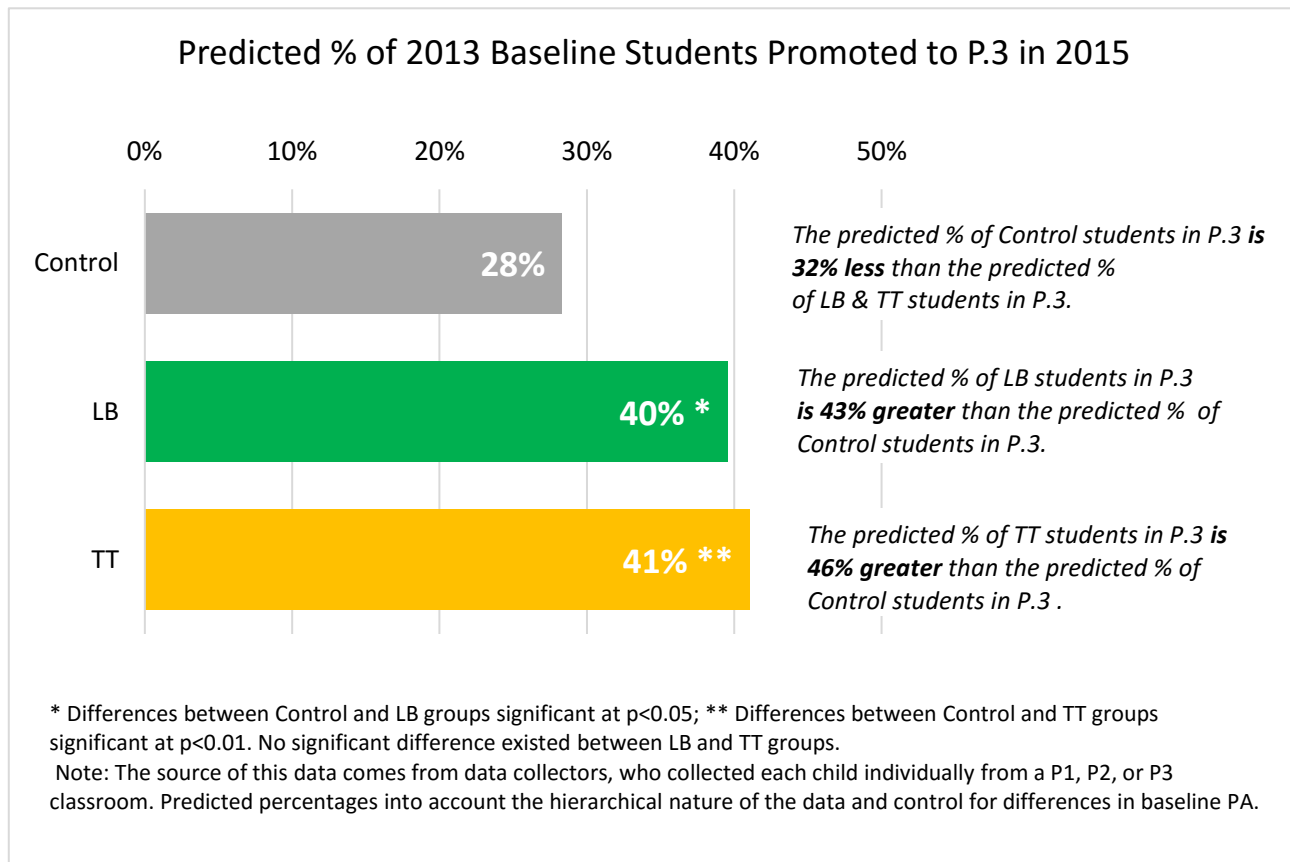
Finally, we calculate the annual percentage rates of students who are promoted and those who repeated, as seen in Table 17. In this table

- Column B contains the N of students assessed at both baseline and endline. Students who attrited from the sample before the 2015 endline assessment are not included.
- Column C presents the subset of students from Column B that were found in P.3 during the endline assessment. Data source for this is the assessor observation.
- Column D presents the 2-year promotion rate, which is simply the percentage of students assessed in 2013 who were assessed while in P.3 in 2015 (i.e. Column C divided by Column B).
- Column E presents the annual promotion rate, which we calculate using the 2-year promotion rate in column D. This is done by taking the square root of the 2-year promotion rate,
- Column F shows the annual repetition rate, which is the result of subtracting the annual promotion rate in Column E from 100%.

Table 17: Summary of Repetition and Promotion Rates

Column A	Column B	Column C	Column D	Column E	Column F
Group	N assessed at baseline in P.1 (Year 0)	N assessed at endline in P.3 (Year 2)	Promotion rate over 2 years $[C/B]$	Annual Promotion Rate $\sqrt{D}$	Annual Repetition Rate $[100\% - E]$
Control Group	518	164	31.7%	56.3%	43.7%
TT Group	545	221	40.1%	63.3%	36.7%
LB Group	602	238	39.5%	62.8%	37.2%
TT & LB groups	1147	459	40.0%	63.2%	36.8%
Total Sample	1665[†]	623	37.4%	61.2%	38.8%

[†] The total analytic sample is 1668 at endline. Three of these students were reported to be in P.4. We exclude them from our analysis, as we cannot be sure whether they skipped a year of Primary, or whether the assessor made an error in the data entry, or some other issue. The loss of 3 students will not affect the conclusions in any substantial way.

Using the raw, unadjusted data, we estimate that the repetition rate for the entire sample is around 38.8 percent of students each year. Repetition rates by group vary from 36.7 percent in the TT group to 43.7 percent in the Control group. Although assignment to treatment produced lower repetition rates, on average more than one third of all students still repeated each year in the early primary grades.

5.4 Treatment Impact on Literacy Skills

5.4.1 Methods

To analyze the data, we follow the procedure described in the beginning of this chapter, predicting the four literacy outcomes of Oral Comprehension, BLT, and, for those students who scored 1 on the BLT outcome, Reading Fluency and Comprehension Scores.

5.4.2 Findings

Findings from the Longitudinal Sample (Cohort 1)

Oral comprehension. Students in the Literacy Boost group significantly outperformed those in the Control group in oral comprehension. The effect size was 0.36, meaning that the average LB student (at the 50th percentile) scored higher on the oral comprehension measures than nearly 65% of the students in the control group. There was no significant difference between TT and control in oral comprehension. (See Table 18, "Composite: Kinyarwanda Oral Comprehension" and Figure 5).

Students met basic literacy threshold. There were no significant differences among the groups in the predicted percentages of students who met the BLT by group (See Table 18, "Composite: Student met the BLT" and Figure 5). Overall, nearly 74% of students met the BLT, regardless of treatment group. This is an important finding because when seen alongside the reading outcomes we discuss next, it suggests that LB's impact is not on very basic, even minimal, literacy skills; rather its impact is on more functional aspects of reading—being able to comprehend text and read with greater fluency.

Reading comprehension. Among students who met the BLT, those in the Literacy Boost group significantly outperformed those in the Control group in reading comprehension. The effect size was 0.33, meaning that the average LB student (at the 50th percentile) scored higher on the reading comprehension measures than about 63% of the students in the control group. Students in the TT group also significantly outperformed those in the control group in reading comprehension. The effect size was 0.22, meaning that the average TT student (at the 50th percentile) scored higher on the reading comprehension measures than about 59% of the students in the Control group (See Table 18, "Composite: Reading comprehension at Endline" and Figure 5).

Reading fluency. Among students who met the BLT, those in the Literacy Boost group significantly outperformed those in the control group in Reading Fluency. The effect size was 0.29, meaning that the average LB student (at the 50th percentile) scored higher on the reading fluency measures than nearly 62% of the students in the control group. There was no significant difference between TT and Control in reading fluency (See Table 18, "Composite: Fluency at Endline" and Figure 5).

Figure 5 summarizes all significant findings of impact on literacy outcomes: LB had significant positive effects on oral comprehension, reading fluency, and reading comprehension. TT had significant positive effects reading comprehension.

Table 18: Impact on Oral Comprehension and Decoding Skills at Endline – Cohort 1

	Control		LB			TT			N of Students & Sectors
Outcomes	N	Avg	N	Avg	Sig?	N	Avg	Sig?	
Composite: Kinyarwanda Oral Comprehension	**518**	**-0.15**	**599**	**0.21**	*****	**533**	**-0.08**		**Students: 1650 Sectors: 21**
Subtest: Kinyarwanda productive vocabulary	*518*	*-0.11*	*599*	*0.15*	***	*533*	*-0.06*		*Students: 1650 Sectors: 21*
Subtest: Kinyarwanda listening comprehension	*518*	*-0.14*	*599*	*0.18*	*~*	*533*	*-0.07*		*Students: 1650 Sectors: 21*
Composite: Student Met Basic Literacy Threshold	**518**	**72%**	**599**	**76%**		**533**	**73%**		**Students: 1650 Sectors: 21**
Subtest: Student identified 18 or more out of 24 letters	*518*	*78%*	*599*	*81%*		*533*	*79%*		*Students: 1650 Sectors: 21*
Subtest: Student read ≥ 1 decodable word	*518*	*77%*	*599*	*79%*		*533*	*76%*		*Students: 1650 Sectors: 21*
Subtest: Student wrote ≥ 1 dictation word	*518*	*79%*	*599*	*79%*		*533*	*77%*		*Students: 1650 Sectors: 21*
Composite: Reading Fluency	**348**	**-0.16**	**430**	**0.14**	******	**357**	**-0.02**		**Students: 1135 Sectors: 21**
Subtest: P.1-levelled Passage	*348*	*-0.11*	*430*	*0.11*	***	*357*	*-0.03*		*Students: 1135 Sectors:21*
Subtest: P.2 / P.3-levelled Passage	*316*	*-0.18*	*400*	*0.14*	****	*323*	*0.00*	*~*	*Students: 1039 Sectors: 21*
Subtest: P.4-levelled Passage	*237*	*-0.18*	*331*	*0.16*	****	*257*	*-0.04*		*Students: 825 Sectors: 21*
Composite: Reading Comprehension	**347**	**-0.20**	**430**	**0.13**	******	**357**	**0.02**	*****	**Students: 1134 Sectors: 21**
Subtest: Kinyarwanda Reading Comprehension	*347*	*-0.13*	*430*	*0.10*	***	*357*	*0.00*		*Students: 1134 Sectors: 21*
Subtest: Kinyarwanda Cloze	*347*	*-0.22*	*430*	*0.15*	****	*357*	*0.03*	***	*Students: 1134 Sectors: 21*

Figure 5: Impact of Assignment to LB and TT Groups on Literacy Outcomes – Cohort 1

Cohort 1: Differences between Control and Treatment Groups on Literacy Measures

*The * or ** symbol above specific bars indicate significant difference from the Control group.*
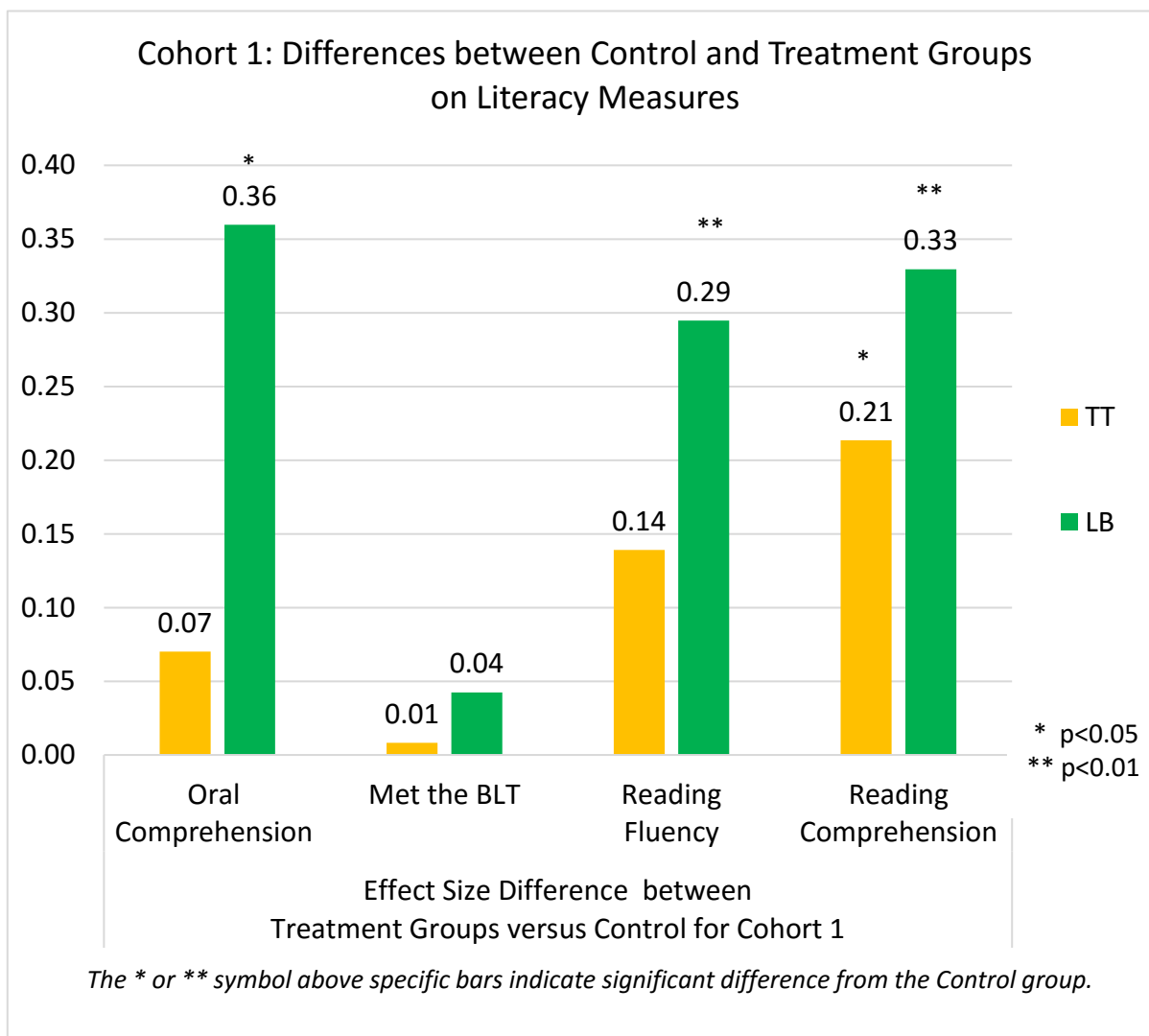
Findings from the Cross Sectional Sample (Cohort 2)

Oral comprehension. There were no significant differences between treatment groups and Control in oral comprehension (See Table 19, "Composite: Kinyarwanda Oral Comprehension" and Figure 6).

BLT students. There were no significant differences among the groups in the predicted percentages of students who surpassed the threshold by group (See Table 19, "Composite: Student met the BLT" and Figure 6).

Reading fluency. Among students with basic decoding skills, those in the Literacy Boost group significantly outperformed those in the control group in Reading Fluency. The effect size was 0.40, meaning that the average LB student (at the 50th percentile) scored higher on the reading fluency measures than nearly 66% of the students in the control group. Students in the TT group also significantly outperformed those in the control group in reading comprehension. The effect size was 0.35, meaning that the average TT student (at the 50th percentile) scored higher on the reading fluency measures than about 64% of the students in the Control group. (See Table 19, "Composite: Fluency at Endline." and Figure 6)

Reading comprehension. Among students with basic decoding skills, those in the Literacy Boost group significantly outperformed those in the Control group in reading comprehension. The effect size was 0.51, meaning that the average LB student (at the 50th percentile) scored higher on the reading comprehension measures than about 70% of the students in the control group (See Table 19, "Composite: Reading comprehension at Endline" and Figure 6). There were no significant differences between the TT and the Control group on reading comprehension for Cohort 2.

Figure 6 summarizes all significant findings of impact on literacy outcomes for Cohort 2. <u>LB had statistically significant effects on reading fluency and reading comprehension for these P.1 students. TT also had significant positive effects on reading fluency.</u>

Table 19: Impact on Oral Comprehension and Decoding Skills – Cohort 2

Outcomes	Control		LB			TT			N of Students N of Sectors
	N	Avg	N	Avg	Sig?	N	Avg	Sig?	
Composite: Kinyarwanda Oral Comprehension	**576**	**-0.10**	**678**	**0.08**		**631**	**-0.05**		**Students: 1885 Sectors: 21**
Subtest: Kinyarwanda productive vocabulary	*576*	*-0.02*	*678*	*0.04*		*631*	*-0.09*		*Students: 1885 Sectors: 21*
Subtest: Kinyarwanda listening comprehension	*576*	*-0.14*	*678*	*0.08*		*631*	*0.01*		*Students: 1885 Sectors: 21*
Composite: Student Met Basic Literacy Threshold	**576**	**0.36**	**678**	**0.36**		**631**	**0.38**		**Students: 1885 Sectors: 21**
Subtest: Student identified ≥ 18 of 24 letters	*576*	*0.41*	*678*	*0.43*		*631*	*0.42*		*Students: 1885 Sectors: 21*
Subtest: Student read ≥ 1 decodable word	*576*	*0.42*	*678*	*0.41*		*631*	*0.44*		*Students: 1885 Sectors: 21*
Subtest: Student wrote ≥ 1 dictation word	*576*	*0.43*	*678*	*0.44*		*631*	*0.44*		*Students: 1885 Sectors: 21*
Composite: Reading Fluency	**208**	**-0.27**	**254**	**0.13**	******	**242**	**0.08**	******	**Students: 704 Sectors: 21**
Subtest: P.1-levelled Passage	*208*	*-0.28*	*254*	*0.14*	****	*242*	*0.08*	****	*Students: 704 Sectors: 21*
Subtest: P.2 / P.3-levelled Passage	*143*	*-0.18*	*206*	*0.05*		*190*	*0.07*	*~*	*Students: 539 Sectors: 21*
Composite: Reading Comprehension	**208**	**-0.27**	**254**	**0.24**	******	**242**	**-0.03**		**Students: 704 Sectors: 21**
Subtest: Kinyarwanda Reading Comprehension	*208*	*-0.28*	*254*	*0.20*	****	*242*	*0.02*	*~*	*Students: 704 Sectors: 21*
Subtest: Kinyarwanda Cloze	*208*	*-0.23*	*254*	*0.23*	****	*242*	*-0.06*		*Students: 704 Sectors: 21*

Figure 6: Impact of Assignment to LB and TT Groups on Literacy Outcomes – Cohort 2

Cohort 2: Differences between Control & Treatment Groups on Literacy Outcomes

*The * or ** symbol above specific bars indicate significant difference from the Control group.*
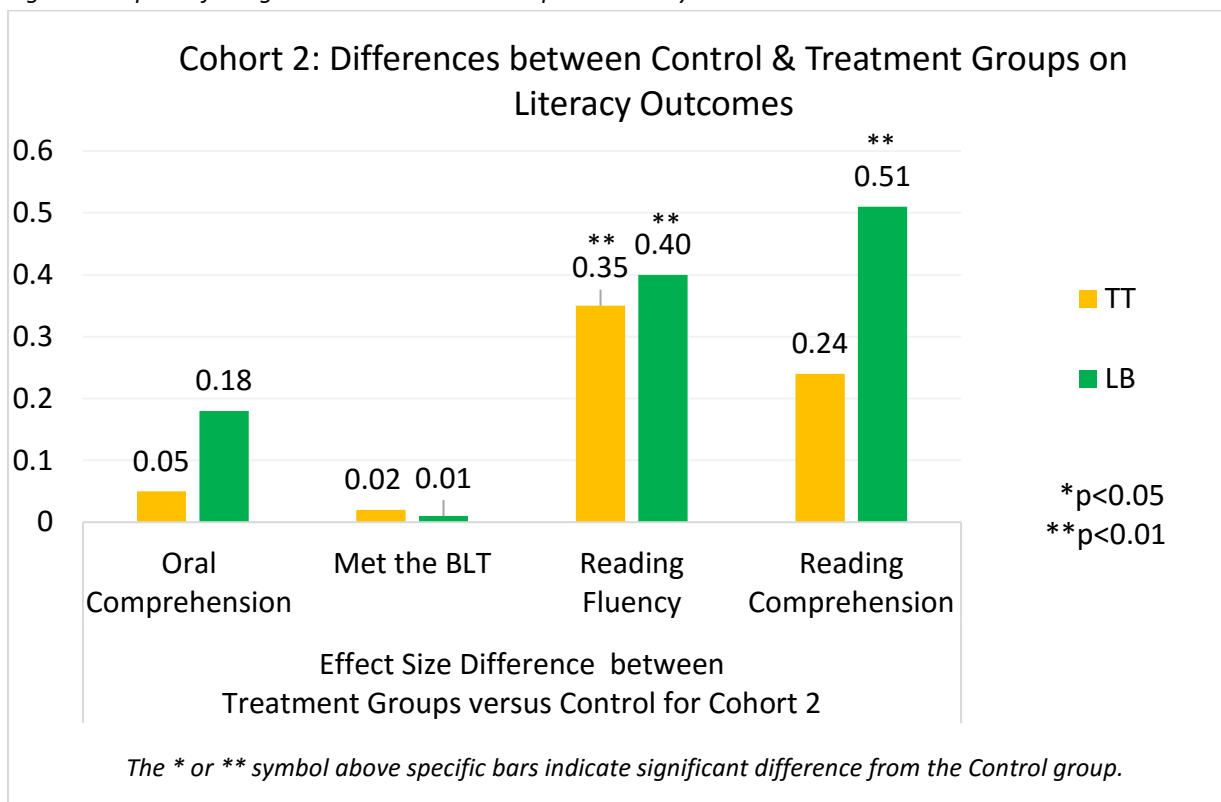
5.5 Equity Analysis of Treatment Impact

5.5.1 Methods

To test whether LB or TT had differential impact on literacy outcomes for student sub-groups, we first defined the sub-groups of interest and/or the dimensions of equity to investigate. The four subgroups were:

- Girls,
- Students who met the BLT at baseline,
- Students who had reported repeating P.1 at baseline, and
- Students who reported speaking a language other than Kinyarwanda at home.

We also specified four equity dimensions to investigate for differential impact. Those four equity dimensions were:

- Phonological awareness at baseline,
- The amount of reading materials to which students had access at home
- The amount of reading habit and interactions that occurred at home,
- Socioeconomic status of the home

We fit regressions as described in the beginning of this chapter, except in these regressions we include interactions terms to test the differential impact each treatment may have had on student outcomes.

5.5.2 Findings for the analysis of sub-groups

Among the eight factors tested for differential program effects, there were very few patterns that were discernible in the data. We report below on the one pattern that could be discerned, albeit weakly, having to do with girls' achievement in Cohort 1. The other findings that did not yield discernible patterns at reported in the Appendix.

The positive effect of LB and TT accrued disproportionately to girls and was seen on reading fluency and reading comprehension—both LB and TT have significantly larger effects on fluency and comprehension scores for girls who met the BLT at endline than for boys who met the BLT at endline. The effects of LB and TT on boys were minimal,

with a slight and marginally significant effect on oral comprehension for boys in LB and decreased probability of being held back for boys in TT. The overall LB effects on both sexes were stronger than those of TT.

5.6   Impact of Treatment by Amount of Exposure Time to Activities

Literacy Boost community activities, implemented by the Rwandan non-governmental organization Umuhuza, were rolled out in the seven sectors randomly assigned to LB in several phases, as described in Chapter 2. Within each sector, different cohorts of villages received and participated in LB activities at different points during the two-year implementation period. As such, it is possible to estimate the impacts of LB on student's reading achievement as mediated by the length of time students were exposed to LB community activities[33]. This section details that analysis and the findings generated from that analysis.

5.6.1   Methods

To test whether the amount of time that students were exposed to LB activities related to their achievement, we first restrict our sample to the students who were assigned to the LB group in the baseline. We follow the same methods described in the beginning of this chapter, except we replace the treatment group variables with an exposure to treatment variable. The exposure to treatment variable is defined the number of days between the date that the first RAW was conducted in a student's village and the day the child was assessed during endline. For example, if the assessment occurred on September 1st, 2015, and RAWs began on September 1st, 2014, the exposure to treatment would be 365 days.

5.6.2   Findings

No significant relationship was found between the length of time LB was implemented in the village and student level outcomes within the LB group. This was true for both Cohort 1 and Cohort 2. To view the regression models of this analysis, refer to the Appendix.

5.7   Discussion

The randomized control trial of Literacy Boost sought to (a) test the impact of training teachers to teach reading using more effective practices on children's reading ability, and (b) assess the additional impact of involving homes and communities on children's reading skills and other associated outcomes.

The findings in this chapter show that Literacy Boost Teacher Training and Literacy Boost Community Action had significant impacts on reducing the percentage of students who repeated a primary year. There was no difference in the impact of the two groups, suggesting that the teacher-training portion of Literacy Boost may be what is driving the difference in repetition between treatment and Control groups.

The students in the LB and TT groups were not simply promoted more often. They were promoted *and* had better reading skills. In the TT group, students in Cohort 1 and Cohort 2 had greater reading comprehension and read more fluently, respectively, than students in the Control group.

The impact of the LB treatment was more pronounced. LB students had significantly higher oral comprehension scores on average, and those who met the BLT at endline had significantly higher fluency scores, and significantly

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[33] The same analysis is not possible to perform on the TT group. The Teacher Training activities were implemented across both LB and TT sectors simultaneously, and all teachers within these groups had immediate access to the trainings. Therefore, exposure to Teacher Training activities was uniform across treatment groups, and we are, unable to estimate the impact of different exposure periods for TT

higher reading comprehension scores. <u>Competent readers are individuals who can read text fluently **and** who can take basic information from the text. Students who met the BLT at endline in the Literacy Boost group demonstrated higher achievement in both of these reading aspects.</u>

Unfortunately, the study overall was underpowered. The number of units for randomization was the primary constraint on the statistical power, and it was not possible to alter the number of units (i.e. sectors) in the project district. Figure 5 and Figure 6 displayed above, suggests that with greater statistical power, a significant difference might have been seen between the TT group and the Control group. The non-significant effect size for reading fluency (0.14) is slightly under half that of the LB group (0.29). The effect size for reading comprehension in the TT group shows a similar relationship to the effect size of the LB group. Given a sample with greater statistical power, it is likely that the impact of TT would be significant, and the involvement of the home and community would double that impact. However, given the power constraints, we can only point out this trend as a possibility.

Neither the TT treatment nor the LB treatment had any significant impact on the probability that students met the BLT after two years of implementation. One explanation for this lack of significant improvement versus the Control group is that the L3 initiative may have been just as effective, or more so, in helping students meet the BLT. If this is the case, we would see no impact on the number of students who met the BLT as L3 materials and scripted lessons were present in all schools in the district. However, this explanation alone is not sufficient to explain why 31 percent of the entire sample still did not meet the BLT.

The 31 percent of the sample that did not meet the BLT after three or more years of schooling[34] likely have obstacles to learning that LB and L3 did not adequately address. At this stage, we can only speculate on what these obstacles might possibly be. There is extant literature to suggest that some children may struggle with learning disabilities (Snow et al., 1998). Others might have physical impairments that interfere with their reading acquisition (UNESCO, 2015). Still others may suffer from extreme poverty, and don't have the daily nutrition needed for learning. Others may suffer from neglect or abuse that makes learning difficult. Still others might primarily require additional time and/or more intensive instruction and opportunities to learn basic literacy skills. Class sizes that are very large may create issues in providing students with sufficient intensive instruction, whether individualized or in small groups, to help them acquire the necessary skills. Again, all of these reasons are speculative. The only thing that can be said of these students is that the interventions to which these struggling students had access, whether LB, TT, L3, or others, were not enough to provide them adequate scaffolding for reading development.

The persistence of students who could not meet the BLT may also be explained through other reasons: a continued lack of support at home. Though LB provided homes and communities with support and materials to help children read, children may come from homes that do not value education, do not participate in LB activities, and do not provide children the required time and support outside of school to help them learn.

Whatever the cause, further interventions may be necessary for these students who struggled with the BLT: for those with learning disabilities, more intense and skill-specific instruction that lies outside what program implementers can currently provide would be required to help these children read. For students with physical impairments (e.g. poor eyesight, poor hearing), diagnosis of the impairment, and remedies for the impairment (e.g.

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[34] The project implementation spanned two years. However, the students had been enrolled in school for three or more years. During the baseline in 2013, students had already completed one year of school. Assuming that they attended school in 2014, by the end of 2015 students had completed at a minimum 3 years of schooling. Further, many students who reported having already repeated P1 at baseline had been in school for more than 3 years.

eyeglasses, cochlear implants) are needed. And for students that come from families or communities that do not value education or that do not support their children's learning, more intensive and systematic efforts should be undertaken by local and national authorities as well as community members.

Despite the positive impact of TT and LB on a variety of skills, the overall average scores of students on these basic tests of reading skills leave much to be desired. After more than 3 years in school, students identified fewer than 20 of the 24 letters in the Kinyarwanda alphabet correctly on average. Despite the notable efforts put forth by the Ministry of Education, the Rwanda Education Board, head teachers, teachers, program implementers, and others, Rwandan children are still facing challenges in their reading acquisition efforts.

The analysis of the data also yielded important findings regarding student repetition and promotion in primary school. According to statistics published by MINEDUC, the repetition rate in Primary school is 18.4 percent of students in 2015 (Rwanda Ministry of Education, 2015). Other surveys such as the EICV4 (2013-2014) and the 4th Population and Housing Census (2012) reported higher rates of 25.5 percent and 30.3 percent, respectively. These statistics cover the overall repetition rate in Primary school, including P.1 through P.6.

In our dataset, which only covered the first three years of Primary school, we observed an even higher repetition rate – 43.7 percent of students in the Control group repeated each year. The discrepancy may be explained through the fact that we focus only on the early years of primary (specifically P.1 to P.3). Our data are only derived from one district as well, and it is possible that this one district is an outlier.

Research in other countries on repetition in early primary is limited, but there is some indication that in early primary (P.1 to P.3) levels, repetition rates may be double the overall repetition rate for primary school (Crouch & Merseth, 2015; Schiefelbein & Wolff, 1993). Considering that the officially reported repetition rates have increased in recent years (Rwanda Ministry of Education, 2016), and MINEDUC is interested in understanding more about the underlying causes of this challenge, these findings provide an important opportunity for reflection on causality, and ways to help students learn and progress through primary school.

MINEDUC & REB have both acknowledged that there is an issue of increasing repetition rates, and to understand why this repetition exists, they have prioritized this as analytical work to be undertaken in FY 2015/16. This study provides potential causes and solutions to help address this inefficiency in the education system. Suggestive causes of repetition are explored in the qualitative data in Chapter 8. The Stanford research team would like to offer any support it is able to provide to REB and MINEDUC in investigating the repetition rates presented in this report as well as those reported by schools and districts across the country.

The attrition rate in this study across treatment groups was about 20 percent of the sample. This means that, after two years, one out of every five children was not in the school in which they enrolled two years previously. There are undoubtedly diverse causes for this: illness on a particular assessment day, enrollment in a different school, or families moving out of the project sector or district explains a part of these absences. However, a portion of the 373 children who could not be located were likely students who no longer attended school at all. Further inquiry into the causes of children dropping out of school is needed to better address the problems. For some possible causes of drop-out that we found in our research, refer to Chapter 8.

Summarizing this diverse group of findings regarding which subgroups benefitted more is difficult. Of the eight subgroups tested, there was one subgroup that clearly benefitted more from treatment: Girls who met the BLT at endline in the LB and TT groups received significantly more benefit from the program activities to which they were exposed than did boys in the same group. However, this finding is likely not of much use programmatically. First, it applies only to the girls who met the basic threshold, and does not provide any insight to the part of the sample that

did not meet the BLT. Second, our study was not designed to investigate the causal mechanisms that might benefit boys or girls more. As such, we report the findings here but do not carry the discussion further.

5.8   Limitations

Apart from issues of statistical power, the estimates of LB impact reported in this chapter are likely moderated by two important factors. First, the Intention-to-Treat analysis we conducted only looks at the results of *assigning* students to a specific treatment. It does not provide indications of impact based on participation in the activities. As we stated in the introduction, the Intention-to-Treat analysis is presented here as it is the most relevant for policy makers and government officials. It is the most relevant as it closely adheres to the real life systems and challenges faced by policy implementers. For example, the government can provide free primary schooling opportunities for its population, but whether families send their children to school may be beyond the absolute control of government officials.

The lack of findings regarding the length of exposure to LB activities could be due to several causes. First, merely assigning a treatment exposure value to a student based on the village in which they live may not represent the true exposure that student had to the program. Indeed, the implementation model, as described in Chapter 2, changed over time. For instance, Reading Clubs did not commence immediately with the first Community Action cohort. Across the entire sample, it is possible that students crossed sector borders and received different treatments than the original treatment to which they were assigned. Follow-up analyses using detailed monitoring data collected by Save the Children and Umuhuza will tease apart how treatment assignment and activities were taken up by participants.

A second possible factor to take into account as we interpret our findings is the presence of other initiatives in the project district seeking to address reading skills. In particular, the LB and TT effects have to be interpreted in light of widespread use of L3 materials. In recent years, many countries in sub-Saharan Africa and elsewhere have been revising curricula, textbooks, and teacher training to focus more concertedly on supporting reading development explicitly. These efforts include the provision of early literacy texts, similar to those of L3, for students to use, with each student having a copy they can hold in their hands. This study cannot make conclusions about the effects of providing these materials and other efforts of L3. The current study can only shed light on how LB and TT treatment augments the effects of L3's efforts.

This interaction between L3 and the two treatments of the RCT may have either enhanced the effects of the LB and TT treatments, or reduced the observed impact of LB and TT. On one hand, the structured, scoped-and-sequenced curriculum, audio-led and scripted lessons, and decodable readers that REB provided through the L3 initiative may have provided a foundation without which the gains seen in the LB and TT groups would not have been possible. This is another possible explanation for why no impact was seen on children's predicted probability of meeting the BLT at endline. On the other hand, the audio and scripted lessons may have reduced teachers' abilities to use the pedagogical techniques they learned about to the best of the teachers' ability, and hence lessened the impact of teacher training.

One last limitation concerns the students who did not meet the BLT. The collected data and the analysis included here was not sufficient to give us insight into the reasons that this considerable portion of the sample failed to meet the BLT. This is clearly an area in need of much greater attention from researchers, evaluators, and program developers.

5.9   Next Steps

The research team will continue to analyze the data to better understand program impacts. Future investigations will examine the impact of treatment on the treated (versus the Intention-to-Treat analysis reported here).

Further, we will look into characteristics of the 31 percent of the sample that did not meet the basic threshold to qualify as an emerging reader. It is possible that existing data, analyzed with new techniques, may provide more insight. For example, are these students very low in phonological awareness? Are their home literacy environments less supportive of literacy growth?

An important direction to pursue is to focus on research that investigates the students who did not meet the BLT. What diagnostic tools are available to diagnose the obstacles that prevent the students from meeting the BLT? Once the obstacle is identified, what can teachers do in schools to identify these students and provide them the support they need? What can families and communities do to support their children? How can REB, Save the Children, and other partners help teachers and families to help these struggling readers? In the USA, students who struggle to read are provided tiered interventions, which become progressively more intensive and individualized to meet the demands of the learner. We recognize that resource constraints prevent an identical model of tiered intervention in Rwanda. But using the resources that are present, how can we help these learners?

The Stanford research team is eager to continue its partnership with REB and Save the Children in whatever capacity possible to help address the issues of repetition, drop out, and ways to improve students reading and learning in Rwanda.

Chapter 6   Literacy Boost Impact on Teacher Knowledge, Beliefs, and Practices

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CHAPTER ABSTRACT

PURPOSE OF THE CHAPTER

This chapter examines the impact of Literacy Boost Teacher Training on the knowledge, beliefs and habits of teachers. It also tests the impact of that assignment to receive training on reading pedagogy had on the aggregate skills of students and the print environment of early primary level classrooms

DATA COLLECTED

- Teacher Surveys in 2013 & 2015
- Teacher Observations in 2013 & 2015
- Student Reading Skills
- Photographs of Classrooms of Early Primary Students (P.1, P.2, & P.3)

KEY FINDINGS:

- Teacher Training had a significant impact on teachers' knowledge and beliefs about reading comprehension.
- Teacher Training had a significant impact on teachers' classroom practices.
- Teacher Training significantly affected classroom print environment by increasing the amount of print materials visible to students.

DISCUSSION & IMPLICATIONS

- LB's Teacher Training model is effective at:
  1) changing the beliefs and knowledge of teachers in regard to reading pedagogy, and
  2) changing the teachers' classroom practices, including display of print materials.

This chapter analyzes the extent of impact that the teacher training provided by Save the Children as part of the randomized control trial of Literacy Boost had on teachers' knowledge, attitudes, and practices relating to reading and literacy that teachers in Gicumbi possessed. Data presented in this chapter were collected via teacher surveys and classroom observations conducted at baseline and endline. For more on the tools, sampling, and data collection, refer to Chapter 4.

We begin the quantitative impact analysis by assessing the degree of similarity between the teachers trained by Save the Children as part of the Literacy Boost randomized control trial and those in the Control group at baseline. We do this for both the survey sample and the observation sample. We then delve into differences between groups at endline, and interpret which differences can be attributed to the impact of LB teacher training. We then attempt to link any differences between LB trained teachers and Control teachers, with students' reading skills, aggregated at the school level. Last, we look to photographic evidence of the impact that Save the Children's teacher training had on the print environment in early primary school classrooms. We address the following questions:

- What impact did LB Teacher Training have on teachers' reading comprehension content knowledge and beliefs about teaching?
- How did LB Teacher Training influence teachers' pedagogical practices?

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[35] Recommended Citation:

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- How did LB Teacher Training affect the classroom print environment to which children had access?

We conclude this chapter by synthesizing findings, making general recommendations, and suggesting avenues for future research.

6.1 Terminology and Groups for Analysis

As described in Chapter 3, the randomized control trial assigned the 21 sectors of Gicumbi into one of two treatment groups and a control group, with the same number of sectors (7) within each group. For both the treatment groups (LB and TT), Save the Children provided training for early primary teachers on ways to support children's literacy development. Save the Children LBPOs led the training, and the training content and schedule of training did not differ across groups. That is, all teachers in the 14 sectors assigned to LB or TT treatment groups received the same support from Save the Children.

As this chapter is focused on the effect of Literacy Boost teacher training specifically, the analyses that follow look at differences between two groups of teachers—those who taught in schools assigned to the <u>Control</u> group and those who received Save the Children training and support, the <u>SC-Trained</u> group.

6.2 Teacher Survey and Observation Samples

The total number of teachers observed at baseline and endline, as well as those surveyed at baseline and endline, are displayed in Table 20. This section provides more detail on the samples used in the analysis.

6.2.1 Teacher Survey Samples

The SC-Trained group attended regular in-service training sessions to help them develop content and pedagogical knowledge concerning reading instruction. For more about these sessions, see Chapter 2. As this survey was administered at two points in time, it is possible to form two distinct sample sets for analysis: a cross sectional sample and a longitudinal sample. A total of 452 teachers responded to the baseline survey, 147 from the Control group and 305 from the SC-Trained group. Of the 452 teachers who responded at baseline, 189 did not respond to the endline survey two years later. The other 263 teachers, or 58 percent who responded to the baseline survey, also responded to the endline survey. <u>The 263 teachers who answered both surveys form the longitudinal sample.</u>

At endline, an additional 293 teachers answered the endline survey. Seventy-five of these teachers were from the Control group and 223 were from the SC-Trained group. <u>The 561 teachers who answered the endline survey form the cross-sectional sample.</u> As shown in the tables in this chapter, teachers from primary levels 1-6 were represented in the surveys. But very few teachers reported teaching P.5 or P.6 (9% each). Teachers reported teaching many subjects (see Table 21). Ninety-seven (97) percent reported teaching Kinyarwanda as one of their subjects. Note that the longitudinal sample is a subset of the cross-sectional sample. As we present findings, we distinguish between findings generated from the longitudinal sample and the cross-sectional sample.

6.2.2 Teacher Observation Sample

In order to gain a deeper understanding of the extent to which training influenced teachers' pedagogical practices, and to compare how teaching practice compares with teachers' self-report, lesson observations were conducted both at baseline and at endline. Both the baseline and the endline teacher surveys asked if the teacher would be willing to be observed while teaching a reading lesson. The percentages of teachers who volunteered are nearly identical across treatment groups: in the Control group, 96 percent teacher volunteered, and in the SC-Trained group 97 percent of the teachers volunteered for observations. Volunteering for observation is not correlated with treatment status. See the Appendix for the breakdown of teachers who opted in for observations.

Out of the teachers who answered yes at baseline, 42 were randomly chosen to be observed: 14 from the Control group and 28 from the SC-Trained group (2 per school, 1 school per sector in 21 sectors). These baseline

observations took place in the final term of the 2013 Rwandan school year. Each lesson was observed by two observers. The observers used an observation form to note the physical condition of the classroom, the presence of print materials, the pedagogical practices of the teacher, and student participation.

Table 20: Number of Teachers Surveyed & Observed by Group

		Baseline only	Baseline + Endline	Baseline Total
Teacher Survey Sample	Control	72	75	147
	SC-Trained	117	188	305
	Overall	189	263	452
		Endline Only	Longitudinal Sample	Cross Sectional Total
	Control	75	75	150
	SC-Trained	223	188	411
	Overall	298	263	561
		Baseline Only	Baseline + Endline	Baseline Total
Teacher Observation Sample	Control	14	0	14
	SC-Trained	26	2	28
	Overall	40	2	42
		Endline Only	Baseline + Endline	Endline Total
	Control	14	0	14
	SC-Trained	26	2	28
	Overall	40	2	42

Similar to the process conducted at baseline, teachers volunteered to be observed at endline after filling out the endline teacher survey. Ninety-three percent of the control teachers and 92 percent of teachers volunteered to be observed. There is no significant difference between SC-Trained and Control groups in the proportions of teachers who volunteered. Forty-two teachers who volunteered to be observed in the endline survey were again randomly selected for observation, 14 from the Control group and 28 were from the SC-Trained group. Out of these 42 teachers, 2 had been observed at baseline and the other 40 had not. Both of the teachers who were observed at baseline and endline were from the SC-Trained group.

6.3   Similarity between Samples at Baseline

In order to test if assignment was effectively random, pre-treatment characteristics, knowledge, beliefs, and practices of teachers in the two treatment groups were compared. This is necessary to do to ensure that the internal validity of our sample is high.

6.3.1   Methods

For each teacher characteristic reported in the teacher surveys, the mean value for the Control group and the mean value for the SC-Trained group were compared using a t-test. Items on the baseline surveys assessed teachers' knowledge, beliefs, and practices. To measure *teacher knowledge,* teachers were awarded one point for answering each knowledge question correctly. Knowledge scores took on whole number values between 0 and 7, with no possibility to score a fraction of a point. We first used ordinary least squares regression to compare group means in knowledge. Then we checked our results by running a logistic regression, which is more commonly used when an outcome takes on discrete, whole number values. Both methods produce the same results for knowledge scores.

To measure *teacher beliefs*, teachers were awarded one point for identifying each instance of resources and practices that would help students become better readers. For questions that asked respondents to "select all that apply", teachers lost a fraction of a point when they chose a wrong answer. The fraction was based on the total number of options in the survey item. For instance, if the item listed four options, the teacher lost 0.25 points for choosing a wrong answer. This was to correct for the probability of guessing the correct answer, which would be 0.25 for a four-option item. If the item had 10 options listed, the teacher lost 0.10 points. Belief scores were

continuous and took on any decimal or whole number value. We compared the average score of the Control group and the average score of the SC-Trained group using a t-test.

To measure *teacher practice* on the survey as well as the observation, teachers were provided or were scored on items in a multiple-choice format, with choices ordered from least to most frequent or fewest to most. This kind of ordered choice responses are commonly analyzed using ordered logistic regressions. The resulting odds ratios refer to the relative likelihood of the SC-Trained group of choosing a higher frequency or a larger number. An odds ratio of 1 means that SC-Trained and Control teachers were equally likely to report a frequency category. Odds ratios less than 1 indicate that SC-Trained teachers were less likely to report higher frequencies than control teachers.

Since randomization was done by sector, we cluster all standard errors at the sector level to adjust for the possibility that teachers in the same sector may have correlated errors.

6.3.2   Teacher Survey Sample: Baseline Equivalence
Teacher Survey Sample at Baseline Overall: Teacher Characteristics
Table 21 shows the comparison of average teacher characteristics across treatment groups at baseline. The difference in proportion and means between the SC-Trained group and the Control group were very small and statistically insignificant at the 0.05 level for nearly every characteristic. The two exceptions are the proportion of female teachers in each sample and whether the teacher reported teaching P.1 as the Primary level for which they were answering the survey. Given that 23 characteristics are being tested for statistically significant differences, it is expected that at least one of these variables is statistically significantly different between groups are due to random causes rather than a true difference between groups. We can therefore conclude that observed characteristics are balanced across treatment groups, and any group difference observed at endline in the cross sectional sample can be interpreted as an unbiased estimate of the average treatment effect of teacher training on teachers' knowledge, belief, and practices.

Table 21: Characteristics, Knowledge & Beliefs for Entire Baseline Sample, by Group

	Control		SC-Trained		Difference		
	mean	SD	mean	SD	T-C	p-value	N
Teacher Characteristics							
Female teacher	0.46	0.50	0.67	0.47	0.21**	0.00	0.46
Teaching P.1	0.32	0.47	0.38	0.49	0.06*	0.02	0.32
Teaching P.2	0.29	0.46	0.33	0.47	0.04	0.28	0.29
Teaching P.3	0.27	0.45	0.28	0.45	0.01	0.86	0.27
Teaching P.4	0.23	0.42	0.24	0.42	0.01	0.95	0.23
Teaching P.5	0.09	0.29	0.09	0.29	0.00	0.75	0.09
Teaching P.6	0.09	0.29	0.06	0.24	-0.03	0.24	0.09
Primary level for answering survey	2.41	1.23	2.33	1.32	-0.08	0.41	2.41
Teaching Kinyarwanda	0.97	0.18	0.99	0.11	0.02	0.51	0.97
Teaching English	0.27	0.45	0.30	0.46	0.03	0.76	0.27
Teaching French	0.03	0.18	0.04	0.19	0.01	0.86	0.03
Teaching Math	0.41	0.49	0.38	0.49	-0.03	0.72	0.41
Teaching Science & Technology	0.06	0.24	0.11	0.31	0.05	0.12	0.06
Teaching Social Studies	0.23	0.42	0.22	0.41	-0.01	0.76	0.23
Teaching Sports	0.33	0.47	0.35	0.48	0.02	0.66	0.33
Teaching Culture	0.17	0.38	0.14	0.34	-0.03	0.50	0.17
Teaching Drama	0.07	0.25	0.06	0.23	-0.01	0.69	0.07
Teaching Music	0.23	0.42	0.29	0.46	0.06	0.17	0.23
Teacher's birth year	1975	9.68	1975	8.44	0.00	0.92	1975
Years at the current school	8.67	7.68	8.04	6.72	-0.63	0.49	8.67
Total teaching years	12.85	10.25	13.52	8.99	0.67	0.60	12.85
Volunteer teacher	0.01	0.08	0.01	0.10	0.00	0.75	0.01
Government teacher	0.95	0.23	0.95	0.21	0.00	0.77	0.95
Teacher Knowledge and Beliefs							
Knowledge	2.68	1.13	2.92	1.04	0.24	0.06	452
Beliefs about reading comprehension	12.44	2.70	12.48	2.66	0.04	0.78	452

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

Table 21 also shows how Control and SC-Trained groups scored on the multiple-choice content knowledge and beliefs questions in the baseline survey. The content knowledge questions asked teachers to identify constructs in reading comprehension and show understanding of those constructs. For instance, teachers were asked to identify the number of phonemes in a word in Kinyarwanda to represent their knowledge of phonemic/phonological awareness. For the belief questions, teachers selected their definitions of reading fluency and comprehension, as well as what they consider to be important to the development of reading comprehension. Questions in the belief category include identifying resources and practices that would help students become better readers. These questions ask teachers to identify instances of resources or practices that aid the development of reading comprehension. Teachers were awarded one point for correctly identifying each instance. Some questions asked teachers to mark all options that apply. For these 'mark all that apply' questions, teachers may have "guessed" by selecting a large number of options. Hence, teachers were penalized a fraction of a point for each incorrect option selected to adjust for guessing. <u>The two groups did not differ significantly at baseline on content knowledge and beliefs. This suggests that the random assignment process created treatment groups that serve as valid counterfactuals to each other. We can therefore compare the cross sectional sample's group scores at endline to determine the impact of the LB teacher training component.</u>

Teacher Survey Longitudinal Sample: Baseline Teacher Characteristics, Knowledge & Beliefs
For the 263 teachers who answered both the baseline and endline surveys, we observe growth in content knowledge and changes in beliefs and practice over time. We conduct a separate analysis using these teachers as our longitudinal sample. Table 22 shows that baseline characteristics across treatment groups are also balanced in this sample.

Table 22: Characteristics, Knowledge & Beliefs for Longitudinal Sample, by Group

	Control		SC-Trained		Difference		
	mean	SD	mean	SD	diff	p-value	N
Teacher Characteristics							
Female teacher	0.57	0.50	0.74	0.44	0.17	0.06	258
Teaching P.1	0.43	0.50	0.40	0.49	-0.03	0.40	263
Teaching P.2	0.30	0.46	0.34	0.48	0.04	0.51	263
Teaching P.3	0.27	0.45	0.26	0.44	-0.01	0.91	263
Teaching P.4	0.12	0.33	0.20	0.40	0.08	0.10	263
Teaching P.5	0.05	0.23	0.07	0.25	0.02	0.52	263
Teaching P.6	0.05	0.23	0.06	0.23	0.01	0.87	263
Primary level for answering survey	2.09	1.13	2.18	1.26	0.09	0.40	220
Teaching Kinyarwanda	0.99	0.12	0.99	0.07	0.00	0.53	263
Teaching English	0.30	0.46	0.29	0.46	-0.01	0.96	263
Teaching French	0.05	0.23	0.06	0.23	0.01	0.93	263
Teaching Math	0.38	0.49	0.40	0.49	0.02	0.89	263
Teaching Science & Technology	0.09	0.29	0.11	0.31	0.02	0.80	263
Teaching Social Studies	0.16	0.37	0.25	0.43	0.09	0.10	263
Teaching Sports	0.35	0.48	0.39	0.49	0.04	0.48	263
Teaching Culture	0.23	0.42	0.16	0.37	-0.07	0.42	263
Teaching Drama	0.11	0.31	0.06	0.23	-0.05	0.27	263
Teaching Music	0.24	0.43	0.33	0.47	0.09	0.22	263
Teacher's birth year	1977	8.73	1975	7.76	-2.41	0.09	263
Years at the current school	7.96	8.38	8.65	6.61	0.69	0.55	262
Total teaching years	10.77	9.23	13.87	8.59	3.10*	0.03	260
Volunteer teacher	0.00	0.00	0.01	0.07	0.01	0.30	260
Government teacher	0.99	0.12	0.96	0.19	-0.03	0.42	259
Teacher Knowledge and Beliefs							
Content knowledge	2.51	1.10	2.95	1.00	0.43*	0.02	263
Beliefs about reading comprehension	12.03	2.59	12.63	2.54	0.60*	0.01	263

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

Table 22 also shows the between-group differences in content knowledge and beliefs at baseline. <u>Despite sharing similar characteristics across a number of dimensions, SC-Trained</u> teachers and Control teachers in the longitudinal sample at baseline differed significantly in knowledge and beliefs, as reflected by their responses on the survey. Because of this difference, we control for baseline knowledge and belief scores when examining impact.

The teacher surveys at baseline and endline also included items that capture teachers' pedagogical practices, observations and expectations about students, use of language other than Kinyarwanda in the classroom, and perception of parent involvement in children's literacy development. Baseline comparisons are displayed in Table 23. Items have different sample sizes because the observers left some items blank for some teachers. Two out of the 36 baseline estimates, or only about 6%, are significant at the 0.05 level. That is, SC-Trained teachers reported reading a storybook aloud to their students and fewer numbers of their students' being able to read a paragraph aloud than Control teachers. <u>We therefore can assume that the two treatment groups were largely equivalent at baseline.</u>

Table 23: Other Baseline Survey Items

	Odds ratio	p-value	N
Frequency of Reading Activities			
Individual reading out loud	0.986	0.962	427
Using books (other than text books)	0.652	0.097	400
Chorus reading out loud	0.860	0.668	392
Teacher's reading a storybook out loud	0.614**	0.008	391
Teacher's reading texts out loud	0.842	0.286	390
Frequency of homework involving reading or writing	1.264	0.240	448
Frequency of Reading Out Loud			
Words teacher wrote	1.171	0.506	407
Newspapers or magazines	0.760	0.323	341
Textbooks	1.149	0.536	411
Storybooks	0.705	0.184	371
Words students wrote	0.654	0.058	371
flashcards/word strips	0.660	0.076	358
Skills with which students struggle			
Letter identification	0.894	0.509	447
Letter writing	1.137	0.437	447
Understanding words in Kinyarwanda	0.735	0.350	447
Decoding	0.750	0.301	447
Figuring out the word meaning	0.836	0.479	447
Reading sentences fluently	0.931	0.735	447
Reading paragraphs fluently	1.270	0.218	447
Reading stories fluently	1.267	0.239	447
Comprehending text told	0.959	0.849	447
Comprehending text they read	0.966	0.845	447
By what grade children should identify all letters	0.846	0.612	444
Amount (none, few, most, all) of students who can			
Identify some letters	0.656	0.173	438
Identify all letters	0.712	0.290	429
Read out loud a sentence	0.547	0.038	435
Read out loud a word	0.809	0.484	342
Read out loud a paragraph	0.518***	0.000	418
Summarize a text	0.712	0.130	411
Languages & dialects used during instruction			
Use another language/dialect during instruction	1.349	0.465	445
Use Rukiga during instruction	0.902	0.918	331
Use Kiswahili during instruction	1.621	0.665	331
Use English during instruction	1.095	0.873	333
Teachers' comfort with teaching in English	1.184	0.494	335
How often teachers teach English as a subject	1.318	0.516	408

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

6.3.3   Baseline Equivalence in the Teacher Observation Sample

Baseline Teacher Observation: Teacher Characteristics & Classroom Activities

The characteristics of the teachers whose lessons were observed at baseline are summarized in Table 24. These characteristics were self-reported on the teachers' baseline surveys. <u>There are no statistically significant differences in the sample of teachers observed on any of the teacher characteristics data gathered by the observers or self-reported by teachers in the baseline survey.</u>

Table 24: Baseline Observation Teacher Characteristics & Classroom Activities

	Control		SC-Trained		Difference		
	mean	SD	mean	SD	T-C	p-value	N
Teacher Characteristics							
Female teacher	0.71	0.47	0.90	0.30	0.19	0.27	35
Teaching P.1	0.64	0.50	0.76	0.44	0.12	0.40	35
Teaching P.2	0.43	0.51	0.33	0.48	-0.10	0.51	35
Teaching Kinyarwanda	1.00	0.00	1.00	0.00	0.00	n/a	35
Teaching English	0.43	0.51	0.38	0.50	-0.05	0.80	35
Teaching French	0.00	0.00	0.05	0.22	0.05	0.32	35
Teaching Math	0.50	0.52	0.52	0.51	0.02	0.90	35
Teaching Science & Technology	0.07	0.27	0.00	0.00	-0.07	0.31	35
Teaching Social Studies	0.36	0.50	0.10	0.30	-0.26	0.09	35
Teaching Sports	0.21	0.43	0.24	0.44	0.03	0.88	35
Teaching Culture	0.14	0.36	0.10	0.30	-0.04	0.68	35
Teaching Drama	0.07	0.27	0.00	0.00	-0.07	0.35	35
Teaching Music	0.21	0.43	0.24	0.44	0.03	0.88	35
Teacher's birth year	1976	9.28	1975	5.83	-1.11	0.66	35
Years at current school	7.38	5.92	7.86	6.86	0.48	0.86	34
Total teaching years	13.38	7.30	12.60	7.90	-0.78	0.76	33
Government teacher	1.00	0.00	1.00	0.00	0.00	n/a	35
Teacher-led Reading Activities							
Phonemic awareness activities led by teacher	3.29	1.54	3.00	1.47	0.70	0.62	42
Letter knowledge activities led by teacher	1.36	1.01	1.57	0.96	1.40	0.58	42
Encoding decoding activities led by teacher	3.00	0.88	3.21	1.13	2.03	0.22	42
Vocabulary activities led by teacher	3.71	1.82	3.43	1.37	0.43	0.18	42
Fluency activities led by teacher	2.64	0.93	2.68	0.77	0.84	0.84	42
Comprehension activities led by teacher	2.00	1.30	2.54	1.58	1.82	0.35	42
Student reading practice	3.50	1.35	2.64	1.28	0.24	0.11	42
Types of materials read in class (textbook, storybook...)	0.93	0.62	0.75	0.65	0.56	0.33	42
N of students read textbook aloud fluently	2.67	1.16	2.88	1.00	1.81	0.67	15
N of students read phrases/sentences aloud fluently	2.50	0.74	3.13	0.87	3.64	0.08	35

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

The bottom portion of Table 24 also presents a summary of the number of activities teachers led during the lessons that were observed at baseline. Observers noted six categories of reading activities: phonemic awareness, letter knowledge, encoding and decoding, vocabulary, fluency, and comprehension. Also reported are the types of student reading practice that took place, the types of materials read during the lesson, the number of students heard to be reading aloud, and the number of students heard to be reading aloud fluently. The table presents raw counts of the types of activities, materials, and number of students. The p-values indicate that <u>there was no statistically significant difference between the number of types of reading activities or reading materials used in class. The number of students reading aloud and reading aloud fluently also did not differ between SC-Trained and Control groups.</u>

Baseline Teacher Observation Sample: Classroom Environment and Non-Literacy-related Teaching Practices
In addition to the types of reading activities and materials teachers employed in class, observers also noted the physical condition of the classroom and other pedagogical practices.
Table 25 shows results from 29 separate comparisons. Some items show fewer observations because the observers left the response blank. Only one out of 29 differences appears to be significant, which is to be expected. This indicates that <u>the classroom environment of students at baseline did not differ significantly between groups.</u>

Table 25: Baseline Classroom Condition & Print Materials

	odds ratios	p-value	N
Adequate seating space	0.161	0.099	42
Classroom organized-ness	0.231	0.216	42
Condition of the room	0.046	0.014	42
Type of lighting	0.481	0.613	42
Total number of items on the walls	1.055	0.941	42
Number of professionally printed items with text in English	0.429	0.436	42
Number of teacher made items with text in Kinyarwanda	0.992	0.990	42
Number of teacher made items with text in English	0.521	0.366	42
Number of teacher made items with only images	1.182	0.879	42
Number of student made items with text in English	0.481	0.613	42
Only words on the walls	0.324	0.171	42
Words matched to pictures on the walls	1.008	0.990	42
Songs/poems on the walls	0.481	0.613	42
Alphabet letters on the walls	0.941	0.928	42
Syllables on the walls	0.666	0.649	42
Number of textbooks in Kinyarwanda in the classroom	1.594	0.573	42
Number of textbooks in English in the classroom	0.636	0.423	42
Number of storybooks in Kinyarwanda in the classroom	0.206*	0.030	42
Number of storybooks in English in the classroom	0.367	0.249	42
Relevance of storybooks to the grade	0.167	0.056	25
Newspapers/magazines in Kinyarwanda in the classroom	0.669	0.708	42
Relevance of newspapers/magazines to the grade	0.167	0.289	11
Number of religious books in Kinyarwanda in the classroom	0.862	0.853	42
Relevance of religious books to the grade	0.467	0.467	24
Number of dictionary in Kinyarwanda in the classroom	0.440	0.402	42
Number of dictionary in English in the classroom	0.138	0.003	42
Relevance of dictionary to the grade	1.499	0.717	25
Where books are stored	0.715	0.660	42
Whether students can access the books	0.535	0.340	42
Number of other print materials in Kinyarwanda in the classroom	1.508	0.454	42
Number of other print materials in English in the classroom	2.052	0.436	42

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

As shown in Table 26, there are no differences between groups in the non-literacy related pedagogical practices teachers' pedagogical practices recorded during baseline lesson observations.

Table 26: Baseline Observation Non-Literacy Pedagogical Practices

	Odds Ratio	p-value	N
N of students paying attention to the lesson at any given time	0.448	0.182	42
Whether the teacher provides students with clear instructions	2.838	0.395	42
Whether the teacher responds when the students are not paying attention	0.821	0.774	42
Whether the teacher uses positive disciplines (praise, discipline)	1.449	0.576	42
Whether the teacher uses negative discipline	1.208	0.809	42
Whether the teacher promotes small group interactions among students	1.000	1.000	42
Whether students ask question during the lesson	0.925	0.952	42
Whether students actively participate during lesson activities	0.641	0.706	42
Whether students have opportunities to practice the skill or activity	0.593	0.566	42
Whether the teacher asks students questions related to the lesson	0.462	0.498	42
Number of students called upon	1.177	0.805	42
Whether the teacher asks short, right/wrong questions	2.316	0.282	42
Whether the teacher asks long, right/wrong questions	0.882	0.860	42
Whether the teacher asks questions that can be answered with short answers	1.982	0.412	42
Whether the teacher calls on another students providing no help	0.491	0.319	42
Whether the teacher provides the right answer providing no help	0.462	0.447	42
Whether the teacher says the answer is incorrect and ask to answer again	0.533	0.338	42
Whether the teacher provides clues in response to a student's wrong answer	2.166	0.329	42
Whether the teacher assesses students formally	7.221	0.056	42
Whether the teacher provides oral feedback to individual students	1.000	1.000	42
Whether the teacher provides oral feedback to a small group of students	0.462	0.447	42
Whether the teacher provides oral feedback to the entire classroom	2.385	0.196	42
Whether the teacher asks to link the lesson with students' home experiences	0.862	0.853	42
Whether the teacher gives students literacy homework	1.000	1.000	42

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

6.4 Impact of Literacy Boost on Teacher's Knowledge, Attitudes, and Practices

Having established equivalence in teachers' pre-treatment characteristics, we now discuss differences between teachers' knowledge, beliefs, and practices at endline and how participation in LB teacher training sessions changed teacher's knowledge, attitudes and practices.

After describing our methods, we then look at the impact of the LB teacher-training component on

1) teacher knowledge, beliefs, and practices in the cross-sectional survey sample,

2) teacher knowledge, beliefs, and practices in the longitudinal survey sample, and

3) teacher practices in the endline observation sample.

6.4.1 Methods for Assessing Impact

Items on the teacher endline surveys assessed teachers' knowledge, beliefs, and practices and were scored, combined, and analyzed in the same way as described for the baseline survey, above.

We do two things to ensure we are making the correct inferences. Since randomization was done by sector, we cluster all standard errors at the sector level to adjust for the possibility that teachers in the same sector may have correlated errors. When we run ten or more statistical tests separately, we use a stricter rule to determine statistical significance. For instance, if we test twenty teaching practices to see if the groups are different, we would expect at least one difference to appear statistically significant at the 5% level purely by chance. To avoid misinterpreting chance differences as true impact, we use a conservative Bonferroni correction and divide 5% by the number of tests we run. If we run 20 tests, we use 0.025% as our criterion to judge statistical significance. These are referred to as adjusted significance in our results tables.

To explore the relationship between teachers' knowledge, beliefs, and practices to students' outcomes, we draw on the teacher survey data and the students' outcomes as described in Chapter 4. Since we are not able to link individual students to their teachers, we look at school level averages for both the teacher survey responses and the student outcomes. We take an average score for teachers in the same school for endline knowledge, beliefs, strategies, reading activities used at least sometimes, and reading activities used daily. Similarly, we average students' outcome scores at each school. Then we look at the Pearson correlation between teacher's scores and students' construct scores.

6.4.2   Impact on Knowledge and Beliefs in the Cross-Sectional Teacher Survey Sample

In this part of the analysis we use responses from the cross-sectional sample, or all teachers who answered the endline survey, regardless of whether they answered the baseline survey. The endline survey expanded on the baseline survey's attempts at assessing teachers' content knowledge, beliefs about and strategies for teaching reading, and pedagogical practices. In addition to content knowledge and beliefs, the endline survey also captured the number of strategies teachers employed to teach and assess reading, and the types of reading activities that teachers used in class at least sometimes and daily.

Table 27 shows the mean scores of the two treatment groups in the five categories mentioned above: Content Knowledge, Beliefs about Reading Comprehension, Strategies for Teaching and Assessing Reading, Reading Activities Used at Least Sometimes, and Reading Activities Used Daily. Note that the 'N of Reading Activities Used Daily' are a subset of those 'Reading Activities Used at Least Sometimes'.

In Table 27 and Figure 7 we see that the Control group answered 3.39 out of seven content knowledge questions correctly on average, while the SC-Trained group answered 3.86 correctly. The SC-Trained group out-performed the Control group in content knowledge by about half a question, which is about 0.38 standard deviations of the Control group. The effect sizes for beliefs and strategies were 0.63 and 0.42 standard deviations, respectively. An effect size of 0.63 can be restated as follows: the average SC trained teacher scored higher than 67 percent, or two out of every three teachers in the Control group. An effect size of 0.42 can be restated as follows: the average SC trained teacher scored higher than 74 percent, or three out of every four teachers in the Control group. For reading activities that teachers reported using 'at least sometimes', SC-Trained teachers reported using about three more than control teachers. For reading activities that teachers reported using daily, SC-Trained teachers reported about two more reading activities than Control teachers. All differences are statistically significant.

Table 27: Endline Teacher Knowledge, Beliefs, and Practices – Cross Sectional Sample

	Control		SC-Trained		Difference		
	mean	SD	mean	SD	diff	p-value	N
Content knowledge	3.39	1.23	3.86	1.18	0.47**	0.00	560
Beliefs about reading comprehension	12.38	2.63	14.05	2.62	1.67**	0.00	560
Strategies for teaching and assessing reading	7.30	3.20	8.65	3.25	1.35**	0.00	560
N of reading activities that occur 'sometimes'	28.28	7.11	31.42	5.68	3.14**	0.00	560
N of reading activities occurring daily	17.15	8.15	19.44	8.49	2.29**	0.00	560

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

Based on the data in Table 27 and Figure 7, we conclude that LB teacher training had a modest positive impact on teacher's content knowledge, beliefs about reading comprehension, strategies for teaching and assessing reading, and the reported frequency of reading activities in the classroom.[36]

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[36] Although this could be considered a trivial impact, since teachers might be assumed simply to repeat back the content of their training, in fact impact on teachers' beliefs and self-reported practices cannot be assumed. See, e.g.,

Figure 7: Teacher Knowledge, Beliefs, & Practices at Endline – Cross Sectional Sample
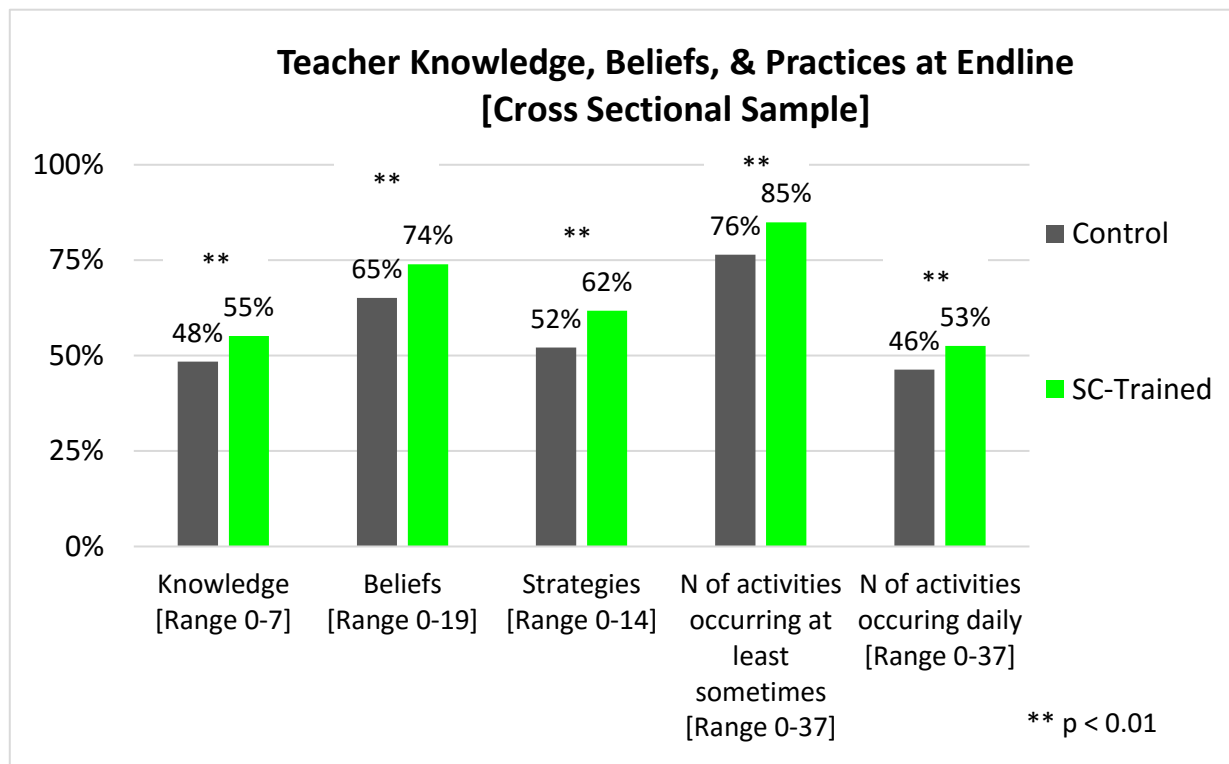
Table 28 displays the comparison of reported pedagogical practices from the endline surveys[37]. Four out of 24 estimates are statistically significant at the 0.05 level, as indicated by the asterisks in the 'odds ratio' column. SC-Trained teachers reported more frequent use of storybooks, flashcards, and word strips in class, perceiving parents to be creating learning materials for their children, and believing their teaching improved over the six months prior to the endline survey. Even with our conservative adjusted criterion, three out of the four (unadjusted) significant estimates are still significant. When using the adjusted criterion, the reported frequency of reading storybooks is no longer significant.

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[37] We report each item separately because most items had unique scales and could not be easily collapsed into a group of continuous outcomes (such as the "knowledge" category with 7 possible points). An exception was the "Frequency of read-aloud" items, which, when analyzed as a continuous outcome, did not show statistical significance between the two groups.

Table 28: Other Endline Survey Items – Longitudinal Sample

	odds ratio	adj. sig.[†]	p-value	N
Frequency of read aloud				
Newspapers/magazines	1.042		0.866	506
Textbooks	0.850		0.602	546
Storybooks	1.813***		0.007	542
Words I write on the board	0.974		0.928	549
Words students write on the board	1.261		0.283	538
Flashcards/word strips	1.872***	*	0.000	541
Other	0.826		0.553	324
Primary level by which children should:				
Identify all letters	0.912		0.706	552
Read words containing all letters without blends	0.739		0.190	558
Read words containing all letters and blends	0.886		0.673	558
Number of students who can:				
Identify some letters of the alphabet	1.113		0.531	546
Identify all letters of the alphabet	0.939		0.756	550
Read a word by themselves out loud	1.099		0.645	543
Read a sentence by themselves out loud	0.991		0.966	551
Read a paragraph by themselves out loud	1.053		0.789	546
Summarize a text	0.949		0.821	539
Parent involvement				
Degree of involvement of parents in reading and writing at home	1.035		0.896	547
N of parents who spoke to teacher about child's literacy skills	0.930		0.766	550
Use alphabet cards	0.773		0.309	558
Use flash cards	0.785		0.482	560
Create learning materials	3.850***	*	0.000	559
Play learning games	0.884		0.765	559
Read to child	0.971		0.887	559
Help with homework	1.041		0.918	560
Purchase school materials	0.972		0.900	559
Do other things to help student	0.779		0.612	560
Languages & dialects used during instruction				
Use a language other than Kinyarwanda to teach in class	0.935		0.842	557
Teach in Rukiga	0.635		0.599	555
Teach in Kiswahili	2.524		0.349	555
Teach in English	0.875		0.647	555
Perceived improvements in teaching				
Teaching improved in past 6 months	8.398***	*	0.000	543
How important are improved skills	1.363		0.126	524

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001
[†] Adjusted Signficance corrects the significance level to account for multiple comparisons.

Other items were included in the baseline and endline surveys but excluded from statistical analysis because there was not sufficient variation in the teachers' responses within each group. We do not include these items because the odds ratio compares the likelihood of differences between groups. When there is no variation within one group, the comparison is not possible. We provide an overview of teaching practices and other statistics related to teaching, taken from the survey and the observation, in a narrative table in the Appendix.

6.4.3 Impact on Knowledge and Beliefs in the Longitudinal Teacher Survey Sample

As shown in Table 29 and Figure 8, between-group differences for the longitudinal sample at endline in content knowledge, beliefs, and the number of teaching strategies and reading activities teachers report using are statistically significant. The effect sizes for this sample, measured in units of standard deviations, are 0.49 standard deviations for knowledge, 0.70 for beliefs, and 0.47 for strategies, all of which are even larger than those estimated

for the cross sectional endline sample (i.e. the sample that includes teachers who did not answer the baseline survey).

It is important to note that the endline survey included one more question on content knowledge than the baseline survey. Therefore, each group's raw knowledge score at endline should not be directly compared to that group's knowledge score at baseline because the number of questions was different. For example, the Control group in the longitudinal sample scored 2.51 at baseline and 3.32 at endline. This should not be interpreted as a 0.81-point gain over time. In order to compare growth from baseline to endline, we compare responses to questions that appear in both the baseline and endline surveys. This comparison is seen in the bottom of Table 29.

Table 29: Endline & Gain Values in Teacher Knowledge and Beliefs – Longitudinal Sample

	Control		SC-Trained		Difference		
	mean	SD	mean	SD	diff	p-value	N
Average values at endline							
Content knowledge	3.32	1.24	3.93	1.16	0.61**	0.00	263
Beliefs about reading comprehension	12.50	2.43	14.21	2.44	1.71**	0.00	263
Strategies for teaching and assessing reading	7.27	2.91	8.64	3.11	1.37**	0.00	263
Number of reading activities sometimes	27.92	6.59	31.62	5.00	3.70**	0.00	263
Number of reading activities occurring daily	16.20	8.08	19.72	8.29	3.52*	0.01	263
Growth in scores from baseline to endline							
Change in knowledge score	0.57	1.52	0.62	1.37	0.05	0.80	263
Change in belief score	0.43	2.98	1.59	3.14	1.16**	0.00	263

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

Figure 8: Teacher Knowledge, Beliefs, & Practices at Endline – Longitudinal Sample
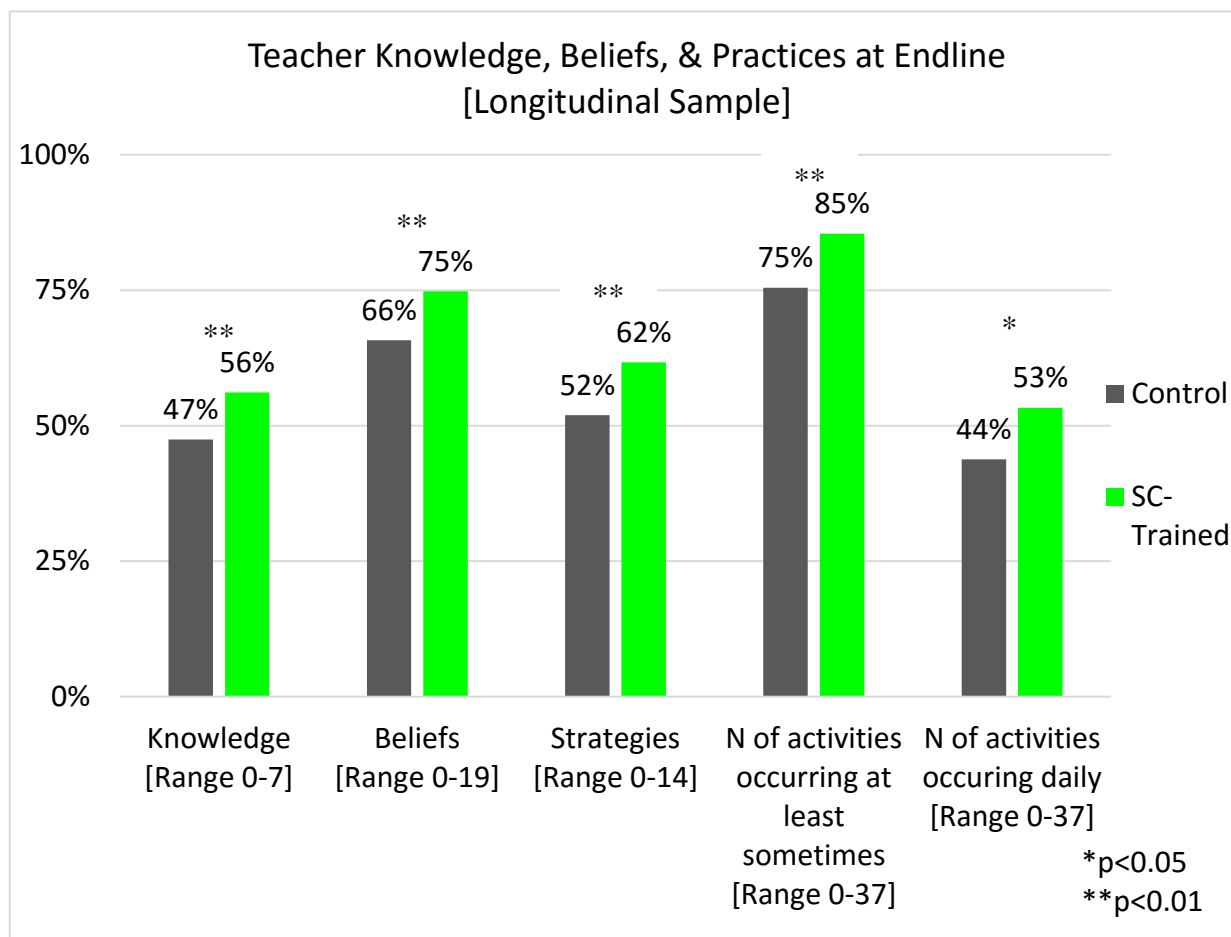
Of the seven content knowledge questions that appeared on the endline survey, six of the same questions appeared on the baseline survey. Therefore, for this current analysis, the content knowledge question that only appeared at endline was excluded from this portion of the analysis. Questions on strategies for teaching reading and the number of reading activities used in class were also unique to the endline survey, so these categories were not used in the growth comparison. As shown in Table 29, the SC-Trained and the Control groups had statistically equivalent gains in their knowledge scores. However, the SC-Trained group's average belief scores increased by 1.16 points more than the Control group's scores. This difference in growth is statistically significant, indicating that the Literacy Boost Teacher Training component positively impacts teacher beliefs in the longitudinal sample.

6.4.4   Impact in the Teacher Observation Dataset

Endline observations took place during the final school term of 2015. Similar to baseline, two observers visited each teacher's classroom and used a standard form to note the physical condition and presence of print material in the classroom, the teachers' practices, and the students' level of participation and engagement. As in the preceding analyses, we first establish whether any systematic differences exist in the background characteristics of the endline sample to ensure we are comparing teachers who were similar prior to the intervention implementation.

Table 30 shows the self-reported characteristics of the teachers who were observed at endline. Control teachers observed at endline were about eight years younger on average than SC-Trained teachers. Out of the 22 characteristics that were compared, this difference and another related to it, the number of years of teaching experience, are the only statistically significant differences between the two groups. The difference in the years of teaching matches the age difference: on average, SC-Trained teachers had about eight years more experience teaching than did the Control group. This could potentially bias the results or compromise the external validity, although it is not clear in which direction. On one side, older more experienced teachers might be better able to take up the training; on the other, older teachers might be more resistant to change, and therefore the results could be a

conservative estimate of impact. That being said, the general consensus in the literature is that after about 5 years, there is no evidence of differences among teachers as a function of years teaching (Clotfelter, Ladd, Vigdor, & Wheeler, 2007; Kane, Rockoff, & Staiger, 2006). Given these statistics, <u>it is reasonable to believe that randomization produced equivalent groups for lesson observation at endline. We can then interpret any between-group differences as the causal impact of teacher training.</u>

Table 30: Endline Observation Teacher Characteristics

	Control		SC-Trained		Difference		
	Avg.	SD	Avg.	SD	diff	p-value	N
Female teacher	0.60	0.51	0.63	0.49	0.03	0.79	42
Teaching P.1	0.40	0.51	0.44	0.51	0.04	0.75	42
Teaching P.2	0.60	0.51	0.48	0.51	0.12	0.51	42
Teaching P.3	0.27	0.46	0.33	0.48	0.07	0.54	42
Teaching P.4	0.07	0.26	0.11	0.32	0.04	0.66	42
Teaching P.5	0.00	0.00	0.04	0.19	0.04	0.33	42
Teaching P.6	0.00	0.00	0.04	0.19	0.04	0.33	42
Teaching Kinyarwanda	1.00	0.00	1.00	0.00	0.00	n/a	42
Teaching English	0.33	0.49	0.33	0.48	0.00	1.00	42
Teaching French	0.00	0.00	0.00	0.00	0.00	n/a	42
Teaching Math	0.47	0.52	0.56	0.51	0.09	0.65	42
Teaching Science/Tech	0.07	0.26	0.15	0.36	0.08	0.38	42
Teaching Social Studies	0.33	0.49	0.37	0.49	0.04	0.85	42
Teaching Sports	0.60	0.51	0.44	0.51	0.16	0.43	42
Teaching Culture	0.47	0.52	0.11	0.32	0.36	0.05	42
Teaching Drama	0.13	0.35	0.04	0.19	0.10	0.31	42
Teaching Music	0.53	0.52	0.37	0.49	0.16	0.37	42
Teacher's birth year	1983	5.78	1975	8.97	8.00***	0.00	42
Years teaching at current school	5.14	4.17	6.06	4.98	0.92	0.48	42
Total years teaching	6.61	4.83	14.54	10.76	7.93***	0.00	41
Volunteer teacher	0.00	0.00	0.07	0.27	0.07	0.15	42
Government teacher	0.93	0.26	0.81	0.40	0.12	0.27	42

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

Table 31 summarizes between-group differences in the number of different types of reading activities observed, the number of different types of reading materials read, and the percentage of students reading aloud as well as reading aloud fluently.

At the endline, there was an important addition to literacy practices and materials unrelated to Literacy Boost activities. The USAID-funded Language, Literacy, and Learning (L3) Initiative had provided schools and teachers with new curricular materials as well as a new lesson format led by audio recordings played by teachers and scripted lessons to guide teachers during non-audio lessons[38]. Therefore, the observations had to take into account lessons and activities led by the teacher or led by an audio recording.

For each of the six categories of literacy development activities (phonological awareness, letter knowledge, encoding and decoding, vocabulary, fluency, and comprehension), we report the number of types of activities led by the teacher and the number of types led by the teacher or by audio. The results are nearly identical regardless of whether audio is included. The mean columns report the raw counts of the number of types of activities and

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[38] For more on the L3 intervention, see http://l3.edc.org/.

materials used during the lesson. <u>SC-Trained teachers led more types of phonological awareness activities, more types of vocabulary activities, and more types of comprehension activities than control teachers did</u>. The differences were statistically significant. However, using more types of activities during the lesson does not necessarily mean more effective teaching. Some teachers may have led one type of phonological awareness activity and spent considerable amounts of time explaining concepts and providing students extensive support. Other teachers may have spent less time on each type of activity and tried a variety within the same lesson. The use of more types of activities should not be interpreted as better pedagogical practice.

Table 31: Endline Teacher-led Reading Activities Observed

	Control		SC-Trained		odds ratios	p-value	N
	mean	SD	mean	SD			
Phonological awareness activities led by teacher (no audio)	0.07	0.27	1.46	1.71	18.67**	0.005	42
Phonological awareness activities led by teacher and/or audio	0.07	0.27	1.46	1.71	18.67**	0.005	42
Letter knowledge activities led by teacher (no audio)	0.43	0.65	0.68	0.82	1.78	0.336	42
Letter knowledge activities led by teacher and/or audio	0.43	0.65	0.68	0.82	1.78	0.336	42
Encoding decoding activities led by teacher (no audio)	3.29	1.59	3.25	2.37	1.35	0.538	42
Encoding decoding activities led by teacher and/or audio	3.29	1.59	3.25	2.37	1.35	0.538	42
Vocabulary activities led by teacher (no audio)	0.50	1.02	2.11	1.42	11.18**	0.001	42
Vocabulary activities led by teacher and/or audio	0.50	1.02	2.11	1.42	11.18**	0.001	42
Fluency activities led by teacher (no audio)	1.29	1.14	1.32	0.95	1.17	0.804	42
Fluency activities led by teacher and/or audio	1.43	1.09	1.57	1.03	1.29	0.637	42
Comprehension activities led by teacher (no audio)	0.86	1.35	2.25	1.53	7.76*	0.017	42
Comprehension activities led by teacher and/or audio	1.00	1.30	2.50	1.77	7.32*	0.020	42
Student reading practice led by teacher	5.64	2.76	6.96	3.14	2.26	0.105	42
Types of material read by teacher	1.21	0.70	1.21	0.69	1.11	0.867	42
Types of material read by student	0.93	0.62	1.29	0.85	2.26	0.286	42
Percentage of students observer heard read aloud	0.20	0.19	0.14	0.14	0.54	0.303	40
Percentage of students observer heard read fluently	0.02	0.03	0.03	0.03	2.84	0.235	30

Notes: standard errors clustered at the sector level; * p<0.05 ** p<0.01 *** p<0.001

We also analyze the observed classroom conditions, print material availability, and teacher pedagogy at endline in a similar fashion. Figure 9 shows the percentage of the SC-Trained and Control samples who had *x* number of items on the wall. The raw percentages in this table show a very obvious difference in the classroom environment of Control and SC-Trained groups, significant at p < 0.05 level.

Percentage of Sample, by Group, with N of Items Observed on Classroom Walls
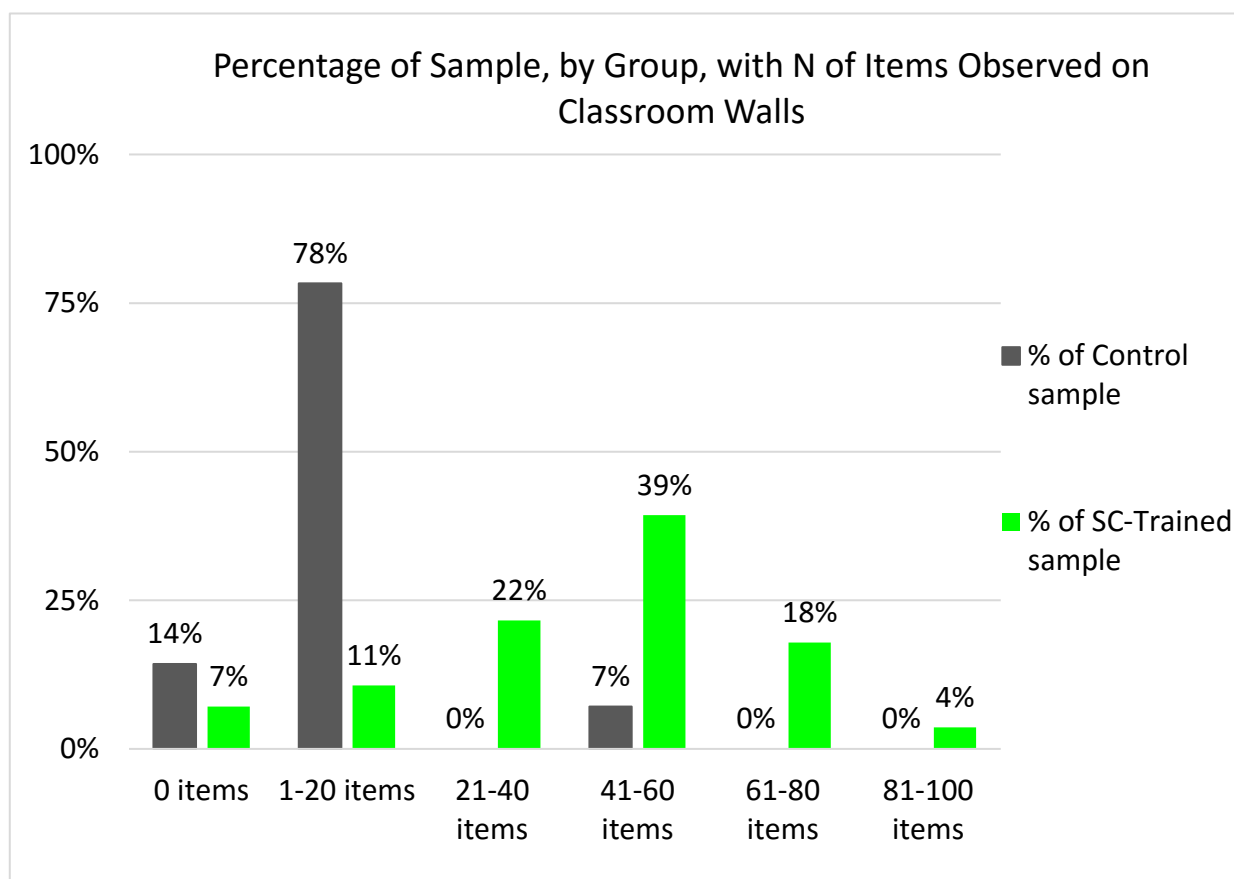
Table 32 shows the between-group differences. SC-Trained teachers were observed to have more print materials displayed in their classrooms than Control teachers. This is reflected by the predicted probability estimates on 14 observation items that were significant at the 0.05 level. When asked by the observer about students' access to books, SC-Trained teachers were also more likely to report that students have more immediate access than Control teachers. This is also significant at the 0.05 level[39]. We are therefore reasonably certain that LB Teacher Training had a positive impact on the classroom environment.

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[39] When we use the conservative Bonferroni correction, only the number of storybooks in Kinyarwanda remain statistically significant. However, there is reason to suspect that Bonferroni may be overly stringent in this case. It is unlikely that as many as 14 out of 41 estimates would be significant by chance. Although most of those estimates are not classified as significant at the 0.0012 level, they still suggest that SC-Trained teachers displayed more print materials in their classroom than control teachers did.

Table 32: Endline Observation Classroom and Print Materials

	odds ratio	Adj. sig.	p-value	N
Adequate seating space	0.884		0.853	42
Total number of items on the walls	14.483**		0.001	42
Have professionally printed items with text	3.333		0.087	42
Have professionally printed items with text in Kinyarwanda	10.805**		0.004	42
Have professionally printed items with text in English	1.390		0.684	42
Have teacher made items with text	2.166		0.447	42
Have teacher made items with text in Kinyarwanda	5.202		0.099	42
Have teacher made items with text in English	4.600**		0.001	42
Have alphabet letters on the walls	7.367		0.131	42
N of alphabet letters on the walls	9.272**		0.007	37
Have syllables on the walls	3.333		0.122	42
N of syllables on the walls	0.807		0.859	20
Have words, phrases, or sentences with no picture on the walls	20.247**		0.008	42
N of only words, phrases or sentences with no pictures on walls	7.078*		0.012	34
Have individual words with illustrations on the walls	14.999*		0.022	42
N of individual words with illustrations on the walls	13.092*		0.018	35
Have phrases or sentences with illustrations on the walls	14.999*		0.022	42
N of phrases or sentences with illustrations on the wall	9.516*		0.031	35
Have words and numbers on the walls	6.253*		0.030	42
N of words and numbers on the walls	5.186*		0.046	32
Have numbers/math only on the walls	2.751		0.113	42
N of words and numbers on the walls	3.773		0.248	16
Have songs/poems/stories on the walls	18.541**		0.009	41
N of songs/poems/stories on the walls	16.248		0.115	19
N of teacher manuals in Kinyarwanda	1.200		0.826	42
N of teacher manuals in English	0.600		0.494	42
N of student's textbooks in Kinyarwanda	1.840		0.285	42
N of student's textbooks in English	3.792		0.138	42
N of other teacher manuals in Kinyarwanda	0.720		0.650	42
N of other textbooks in Kinyarwanda in the classroom	1.540		0.445	42
N of other textbooks in English in the classroom	1.000		1.000	42
N of storybooks in Kinyarwanda in the classroom	23.406***	*	0.000	42
N of storybooks in English in the classroom	0.795		0.830	42
Newspapers/magazines in Kinyarwanda in the classroom	1.039		0.975	42
Newspapers/magazines in English in the classroom	0.481		0.613	42
N of religious books in Kinyarwanda in the classroom	1.000		1.000	42
N of dictionary in English in the classroom	2.166		0.525	42
Where books are stored	0.564		0.354	39
During class, student can access the books independently	3.999*		0.026	42
After school, student can access the books independently	1.000		1.000	42
The textbooks for instruction students use in the classroom	2.192		0.308	41

Notes: standard errors clustered at the sector level; unadjusted sig: * p<0.05 ** p<0.01 *** p<0.001; adjusted sig. *p<0.0012

SC-Trained and Control teachers did not differ on their observed non-literacy related pedagogical practices, as shown in Table 33. Only the relative likelihood of promoting small group interactions among students is statistically significant at the 0.05 level. Once we adjust for multiple hypotheses testing and employ a more conservative criterion of 0.0025, the difference is no longer significant. <u>We therefore conclude that within the teacher observation sample, we do not observe any impact of LB teacher training on teacher's non-literacy related pedagogical practices. The effect of the teacher training was specific to literacy pedagogy.</u>

Table 33: Endline Observation Non-Literacy Related Pedagogy

	odds ratio	adj. sig	p-value	N
Whether the teacher provides students with clear instructions	1.303		0.659	42
Whether the teacher responds when the students are not paying attention	0.892		0.821	36
Whether the teacher uses positive disciplines (praise, discipline)	2.968		0.041	42
Whether the teacher uses negative discipline	0.462		0.447	42
Whether the teacher promotes small group interactions among students	6.234*		0.018	42
Whether students ask question during the lesson	0.510		0.641	42
Whether students actively participate during lesson activities	2.858		0.134	42
Whether students have opportunities to practice the skill / activity of the lesson	0.960		0.962	42
The number of questions or prompts for responses did the teacher say	2.077		0.613	42
Whether teacher asked questions close-ended and required short, right	0.951		0.968	42
Whether teacher asked questions close-ended and required long, right	1.255		0.754	42
Whether teacher asked open-ended questions various possible	2.052		0.529	42
Whether teacher asked open ended questions required longer explanation	0.205		0.193	42
Whether the teacher calls on another students providing no help	1.669		0.558	40
Whether the teacher provides the right answer providing no help	1.623		0.550	40
Whether the teacher says the answer is incorrect and ask to answer again	0.120		0.101	40
Whether the teacher provides clues in response to a student's wrong answer	0.510		0.254	40
The number of students called upon	1.377		0.667	40
Whether the teacher provides oral feedback to individual students	1.667		0.348	42

Notes: standard errors clustered at the sector level; unadjusted sig: * p<0.05 ** p<0.01 *** p<0.001; adjusted sig: * p<0.0026

The observers also recorded information about the teachers and their classrooms that were not incorporated in the above analysis. We had to exclude these items because logistic regressions require responses to have a certain degree of variation within a group. For some of the items, every teacher in the Control group received the same score (e.g. "none"). When this happens, we cannot effectively compare the relative likelihood of the two groups to receive higher or lower scores. The additional items that lacked sufficient response variation are included in the Appendix. We report the percentage of teachers observed to employ certain pedagogical practices during their lesson and the percentage of classrooms with certain numbers of print material displayed.

6.4.5   Relationship between Teacher Practices and Students' Literacy and Student Outcomes
Finally, we present the correlation between teacher practice across the entire sample and average student reading outcomes. We do not separate values by group, as the purpose of this analysis is to determine whether any specific teaching construct measured demonstrated a relationship with student outcomes.

Table 34: Zero-Order Correlations between Student Outcomes & Teacher Knowledge, Beliefs, & Practices

	Reached P.3	Oral Comprehension	Met the BLT	Reading Fluency	Reading Comprehension
Teacher Knowledge	-0.03	0.08	-0.03	0.02	-0.02
Teacher Beliefs	0.01	0.10	0.01	-0.07	-0.01
Teacher Strategies	-0.06	0.08	-0.03	-0.05	-0.02
Activities (some)	-0.05	-0.08	-0.07	-0.15	-0.13

Table 34 shows correlations between teachers' knowledge, beliefs, and reported practices and students' outcomes. Using endline survey data, we found each school's average scores on P.1, P.2, and P.3 teachers' knowledge, beliefs, strategies, reading activities used sometimes, and reading activities used daily. Then, we found each school's average test scores. As shown in Table 34, we do not observe any significant correlation between teachers' knowledge, beliefs, and reported practices, aggregated at the school level, and student outcomes, also aggregated at the school level.

6.5   Literacy Boost Teacher Training Impact on the Classroom Print Environment

During the midline and endline reading assessment, the team leader of each assessment team photographed the P.1 classroom, the P.2 classroom, and the P.3 classroom at the school. In the event that there was more than one classroom at any of the levels, a class was chosen at random. This section presents the analysis techniques to categorize those classroom photographs, and the findings regarding the difference between SC-trained classrooms and Control classrooms.

Before describing the methods and presenting findings of the photo analysis, we provide three examples of classrooms that were photographed during the endline assessment. The three photographs represent "no" print, "half" print covered, and "all print covered.

Image 6: An Example of a Wall with 0% Print Coverage

Photo Credit: Literacy Boost Reading Assessment Team Leaders

Image 7: An Example of a Wall with 50% Print Coverage

Photo Credit: Literacy Boost Reading Assessment Team Leaders

Image 8: An Example of a Wall with 100% Print Coverage

Photo Credit: Literacy Boost Reading Assessment Team Leaders

6.5.1   Methods

The methods used for sampling the classrooms for photographing and actually capturing the image are described in Chapter 4. The system developed for scoring photos based on the amount of print materials posted on the wall is described in the Appendix. We now turn to the statistical methods used to compare groups.

A member of the Stanford research team rated a total of 1,106 classroom photos. A second member of the research team rated a sample of 120 photos randomly selected from the 1,106. The sub-sample of 120 included 60 from Control classrooms and 60 from SC-trained classrooms. Inter-rater agreement on the 120 photos was 82.5 percent. Cronbach's alpha and Cohen's Kappa were 0.987 and 0.831, respectively.

Numerical ratings of the 1,106 photos by the first rater ("0", "0.125", "0.25", "0.5", "0.75", and "1") were used to estimate the impact of LB teacher training on print material coverage of classroom walls. Analyses were performed for primary levels 1, 2, and 3 together as well as each primary level separately. The mean percentage of wall coverage of the SC-trained group was compared to the mean percentage of the Control group using a t-test.

6.5.2   Findings

Table 35 and Figure 10 show the print coverage of Control and SC-Trained teachers' classrooms for the overall sample as well as broken down by primary level. Table 35 also provides the sample size, average percent of wall coverage within each group, the difference between groups as estimated by OLS regressions, and the effect size difference. As the figure shows, more than 73 percent of Control classroom walls overall were either completely bare or had minimal print display. Less than one percent of Control classroom walls were completely covered in print. In contrast, only 28 percent of the walls in SC-Trained teachers' classrooms had no or minimal coverage and 18 percent were completely covered in print materials. When we statistically compare the average print coverage of

the two groups using a t-test, we find that SC-Trained teachers' classroom walls had 38 percent more coverage than Control classroom walls. This difference is significant at the 0.001 level.[40]

Figure 10: Percentage of Classroom Walls Covered in Different Amounts of Print

Classroom Wall Covered in Print in Control & Treatment Classrooms, Overall & by Primary Level
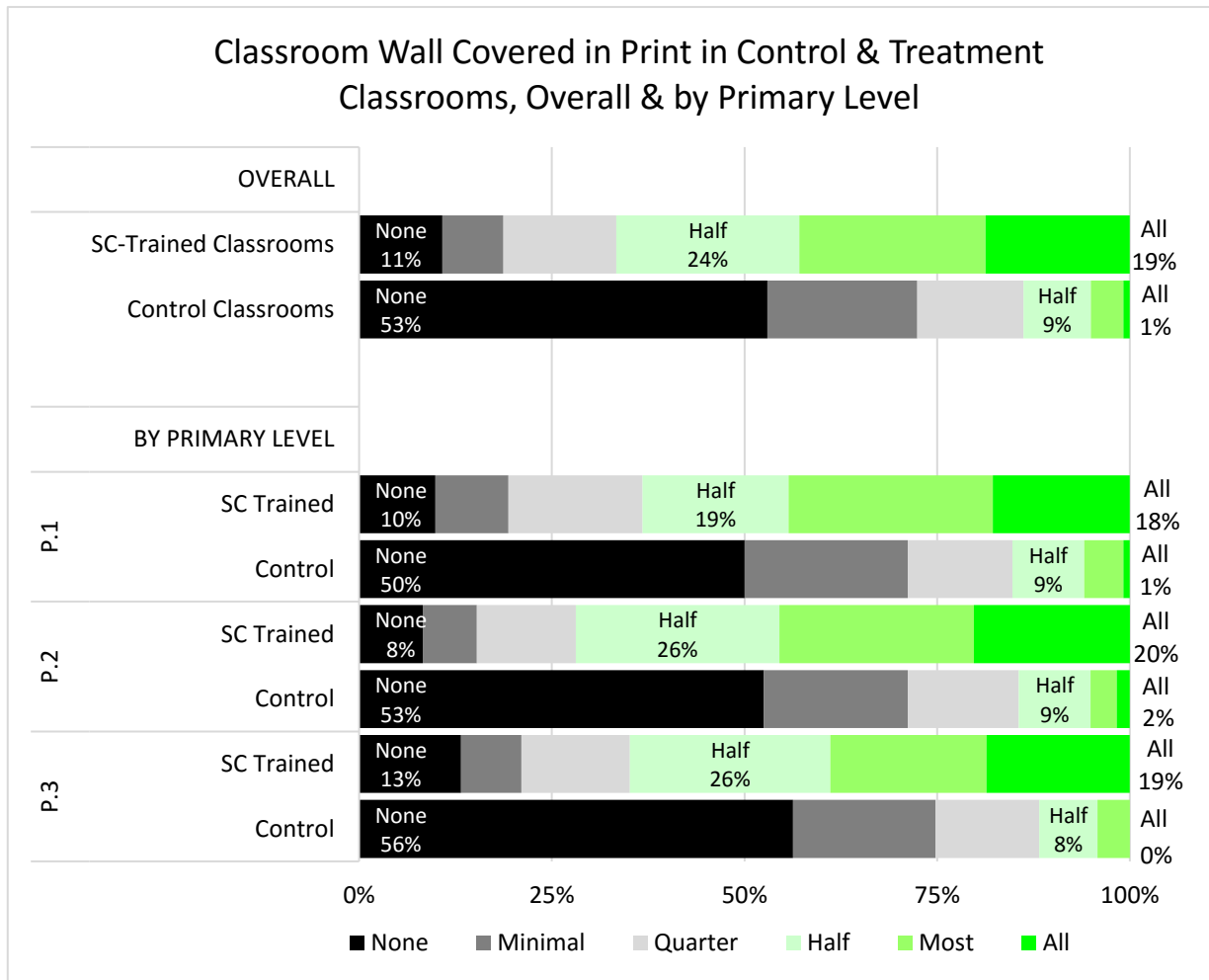
When we examine print environment by primary level, a similar picture emerges. As shown in Figure 10 and Table 35, P.1 classrooms of SC-Trained teachers had 36 percent more print materials on their walls than P.1 Control classrooms. The between-group differences are 40 percent and 38 percent for P.2 and P.3, respectively. All differences are statistically significant at the 0.001 level.

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[40] Since our scores only took on six discrete values (e.g., 0.25 or 0.5 but no value in between), we also fit logistic regressions to estimate the likelihood that the two groups' print coverage differ. We find that SC-Trained teachers' classroom walls have consistently higher wall coverage, both overall and within each primary level.

Table 35: Average Print Coverage by Treatment Group and Primary Level

Primary Level	Treatment Group of School	N of Walls	Avg. % Print Coverage	SD	OLS-Estimated Difference between Control & Treatment Walls (se)	Effect Size (in units of SD)
P.1 Classrooms	Control	112	16.2%	22.7	36.3 *** (3.8)	1.6
	LB or TT	250	53.1%	33.0		
P.2 Classrooms	Control	109	15.9%	22.0	40.4 *** (3.8)	1.8
	LB or TT	244	56.9%	31.7		
P.3 Classrooms	Control	109	13.8%	20.1	38.1 *** (3.5)	1.9
	LB or TT	238	52.4%	33.3		
All Lower Primary (P.1, P.2, & P.3)	Control	330	15.3%	21.6	38.4 *** (3.1)	1.8
	LB or TT	747	54.2%	32.7		

*** indicates p<0.001. SD = Standard Deviation; se = Standard Error
Note: Ordered logit models confirm OLS regressions, all differences significant at p<0.001

6.6   Discussion

Our analysis of the survey data suggested that LB Teacher Training had a significant impact on the knowledge and beliefs of the teachers in our cross-sectional endline sample and a significant impact on the growth of knowledge and beliefs over time for the longitudinal sample. These results are generalizable to the extent that the teachers who responded to the surveys represent all teachers in Gicumbi. We therefore conclude that LB's Teacher Training model is effective at changing the beliefs and knowledge of teachers in regard to reading pedagogy and practices in the classroom.

From classroom observations, we also found significant impact on the classroom environment of students, suggesting that teachers followed up on suggestions for increasing the types and amount of reading-related stimuli (e.g. storybooks and wall decorations with print) to which children had access. However, this impact was observed using the less conservative criteria of significance. Using solely the lesson observation data, we cannot conclude with confidence that there was significant impact on teachers' display of many types of print material. This is partially due to the small sample size and the limitations of statistically testing many hypotheses. Data from the endline observation supports our assertion of impact on the classroom environment. We found quite a few endline differences in the observation records, which is an indication that impact may have been detectable had our sample been larger.

Classroom photo analysis confirms that LB Teacher Training significantly changed the classroom print environment to which children had access. At endline, SC-Trained teachers displayed print materials on a significantly larger portion of their classroom wall space than Control teachers did. This finding supports our conclusion that LB Teacher Training not only impacted teachers' knowledge and beliefs, but also pedagogical practices, including their design of the classroom print environment.

Our attempts to link teacher knowledge, beliefs, and practices with student level outcomes did not yield significant findings. This can be attributed to a number of factors but most likely is the fact that teachers within school may vary significantly, and average values at the school level for both student outcomes and teacher knowledge, beliefs, and practices obscure the relationship between individual teaching practices and student outcomes. It is also possible that certain practices help certain students to grow more, a relationship which is impossible to determine in an aggregated school level analysis.

Our analysis separated teachers into two groups: Control and SC-Trained. This was an Intention to Treat analysis. That is, it only looks at the impact of *assigning* teachers to a specific treatment, but ignores whether teachers

actually received the treatment or how much treatment they received. Future analyses of these data should look at reported and actual attendance to training sessions, and how teacher attendance may explain the lack of certain changes or enhance the values for other variables in the study.

Finally, LB Teacher Training was implemented at the same time that the L3 initiative was being introduced in schools. The L3 initiative specifically targeted many of the same knowledge, beliefs, and practices that LB Teacher Training sought to address. The L3 initiative was implemented uniformly across the SC-Trained group and the Control group. It is possible that any lack of significant difference we see between groups on some of the items is a result of the effects of L3 on classroom practices. Further research into the impact of L3 on teacher knowledge, beliefs, and practices is necessary before claims about the differential benefit of LB teacher training on teachers can be asserted. Nonetheless, given that both the Control and SC-Trained groups received L3 training and materials, and we detected differences in favor of the SC-Trained group on teacher knowledge, beliefs, reported and observed practices, and classroom literacy environments, we can conclude that the SC teacher training had an impact on what teachers thought, believed, and did in their classrooms with respect to literacy instruction. However, the lack of association between any of these variables and student outcomes might suggest that the teacher and classroom variables we measured do not explain the effects of LB or SC-Trained on students' reading development. We will return to this issue in general discussion in the final chapter of this report.

6.7   Limitations

There are a few limitations to the findings from teacher surveys and observations. The survey findings may have been restricted by the scope of the survey and the representativeness of the respondent population. The surveys asked teachers about their content knowledge, beliefs about literacy instruction, expectations for students and parents, and teaching practices. It is possible that other constructs relevant to literacy teaching were not measured or were not measured well by the survey items. As mentioned in Section 6.2.3, teachers answered the surveys on a voluntary basis. About a third of the teachers in Gicumbi responded to each survey, and teachers who responded to both surveys constituted 18.3 percent of the total number of teachers in Gicumbi. Respondents from the SC-Trained group and Control group were similar in observed characteristics such as sex and the primary levels taught, but did differ in average age and the number of years taught. The two groups may have differed in characteristics that were not captured by the survey items, such as motivation, mindset, or attitude toward professional development. Future research might consider adding items that measure these constructs.

The observation findings may have been limited by the cross sectional nature of the data. Only two out of the 82 teachers observed were observed both at baseline and at endline. We did not set out to chart longitudinal changes in teachers, only in students. The basic concern with teachers was what reading instruction was like before and after teachers received SC training. Baseline observations served to provide a picture of what instruction was like prior to LB Teacher Training. Endline observations provided a picture of instruction after the teacher training.

We did not find any association between teachers' knowledge, beliefs, and self-reported practices to students' literacy outcomes. This may partly be because we were not able to link teacher data to the test scores of their own students. Matching teachers and their students may yield more informative findings on the relationship between the impact of SC-Trained on teachers and on students.

Teachers responded to surveys on a voluntary basis. Surveys were administered on Saturdays and Sundays at easily accessible school sites to avoid any interference with teacher's responsibilities in schools. (No classes are held on Saturdays and Sundays, and teachers were not required to travel distances that would require an overnight stay.) All teachers who responded to the survey did so in their free time, and some had to travel a considerable distance to reach a survey site. It is possible that teachers who answered the surveys differed from those who did not respond in one or more dimensions, such as motivation and attitude toward professional development. However, at this time it is not possible to estimate the degree to which, if any, teachers in the sample represent the entire population of

teachers in Gicumbi. According to the available data last reported in 2014, there were 1434 teachers in all Primary schools (P.1 through P.6) employed in Gicumbi according to statistics reported (Rwanda Ministry of Education, 2015), indicating that slightly more than one third of all teachers filled out the survey.

Since we lack information on teacher characteristics in all of Gicumbi, it is not possible at this point to know from which part of the observed characteristic distribution the Control and SC-Trained respondents were drawn. This assumption means that our findings are generalizable to the teachers who filled out the survey and who were observed, and any attempts to make claims about teachers in Gicumbi overall, or teachers in all of Rwanda, should be made with caution if at all.

6.8   Next Steps

The Stanford team will continue to explore the impact of LB Teacher Training on pedagogical practice. Future analyses of the data will expand on the adequacy of teaching practices, comparing the pedagogy of SC-Trained and Control teachers (see Appendix for a summary of these practices). Other topics worth investigating include the effect of treatment dosage (the number of training sessions teachers attend) on knowledge, beliefs, and practices and teacher peer effects (knowledge-sharing within teacher networks), and an analysis of how Literacy Boost Teacher Training affects the "child-centered practices" of a teacher. New waves of data collection will allow the linking of teacher data to student outcomes and teachers' pedagogical development over repeated classroom observations.

Chapter 7   Literacy Boost Impact on Homes and Communities

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CHAPTER ABSTRACT

PURPOSE OF THE CHAPTER

In this chapter we first establish whether LB community activities took place in sectors assigned to receive them. Following this, we test the impact that LB had on five factors of the Literacy Ecology. We then look to see whether improvement in the home Literacy Ecology led to better reading outcomes for students.

DATA COLLECTED

- 344 Surveys of the Literacy Ecology of different families in 2013 & 2015
- Student Reading Skills from the 344 families in 2013 & 2015

KEY FINDINGS

- Assignment to the LB group demonstrated statistically significant impact on the Reading Habits in the Home factor, the Reading Materials factor, and the Child Interest / Engagement factor.
- The Literacy Competency of the Caretaker factor significantly explains variation in the likelihood that a student would attrit from the Reading Assessment sample, oral comprehension scores, the likelihood that a student met the BLT, and the fluency scores of students who met the BLT.
- Religious related Reading Activities factor predicts oral comprehension and the probability that a student met the BLT at endline.
- Except for attrition from the reading assessment sample, the Child Interest / Engagement factor significantly predicts every student outcome.
- The only factor associated with children's repetition is the child's interest or engagement in reading. The more interested children were in reading based on respondent report, the less likely was it that those children would have repeated a Primary school year.

DISCUSSION & IMPLICATIONS

- Families and communities, even those individuals who cannot read, play an important role in children's literacy development.
- We must continue looking for, and evaluating the effects of, strategies to keep children regularly engaged in reading activities throughout their day and life.

This chapter examines the longitudinal results from a survey of the literacy practices and materials in the home. Following the baseline reading assessment, the research team visited approximately a quarter of the homes of students assessed during the baseline reading assessment, to interview students' parents, caretakers, or other adults at home concerning the knowledge, attitudes, and practices of families around reading and learning outside the school walls. By visiting the homes of students who had been assessed in the reading assessment, student reading skills could be explicitly linked with data on the home literacy ecology.

Only homes of students who lived in sectors assigned to the Literacy Boost treatment condition and the Control condition were visited. The Teacher Training treatment condition was excluded as it was assumed that, since no

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Literacy Boost related activities were occurring outside the school, that the Control sample was sufficient to represent the counterfactual to the Literacy Boost group. For more on the tools used to collect the data, see Chapter 4 and the Appendix.

In November 2015 the research team returned to the Literacy Boost and Control sectors and sought out the same 458 families who participated in the October 2013 baseline survey. Just over 75 percent of families were located and interviewed during the endline. The analytic sample for this chapter includes 344 of the 458 original respondents in October 2013. Table 36 shows the N of families interviewed.

Table 36: Literacy Ecology Survey Sample at Baseline and Endline

	Control	LB	Overall
Interviewed at Baseline	233	225	458
Interviewed at Endline	185	159	344
% of Baseline families interviewed at Endline	79.3%	70.6%	75.1%

At both baseline and endline, respondents were predominantly parents: 86 percent of the longitudinal sample at baseline, and 87 percent of the sample at endline.

This chapter will review the findings from the longitudinal sample of families surveyed. The findings are grouped according to the following questions:

What attrition bias, if any, existed in the Home Literacy Ecology survey sample?
Were respondents aware of activities occurring in the community to support reading? How did this differ by group?
How did assignment to LB predict Literacy Ecology Factor scores?
How did group assignment and the Literacy Ecology factors predict student outcomes?
What kind of knowledge and beliefs about reading do families possess, and how has this changed over time?
What barriers to participation in community activities exist?

Prior to delving into the findings to answer these questions, we review the data and characteristics of the sample included in the baseline dataset.

7.1   Review of Baseline Findings and the Factors of the Literacy Ecology

In order to better contextualize findings from the endline, we provide a broad overview of characteristics of the home in the baseline dataset. At the end of 2013, families reported very few reading materials in the home, with the most common type of material being a religious book (e.g. a Bible) only one in ten homes reported any children's reading materials at home. Despite the relatively rare presence of reading materials, individuals capable of reading seemed to be common across the sample. There was a person who could read in more than 90 percent of homes at baseline, however only 50 percent of each family, on average, was reported as being able to read. Nonetheless, 99.8 percent of respondents at baseline agreed that every child should learn to read and that many benefits came from knowing how to read.

In a secondary analysis of the baseline data, five distinct factors of the home literacy ecology emerged: 1) reading habits and interactions at home, 2) the literacy competency of the caretaker, 3) reading materials, 4) religiously motivated reading activities, and 5) child interest / engagement (Friedlander, 2015). Four of the five factors positively correlated with children's end of Primary 1 reading achievement. The fifth, religious-related reading activities, did not demonstrate a significant relationship with reading achievement. This secondary analysis supports the hypothesis that what happens at home matters for children's reading development, and hence efforts to encourage home literacy activities should improve student's reading abilities. These five factors will be explored in more detail in the report of qualitative findings in Chapter 8.

7.2   Attrition Analysis and Findings

In any longitudinal study, it is necessary to assess whether attrition happened significantly differently in the treatment and control groups, to understand whether there is attrition bias in the impact estimates.

7.2.1   Methods

We fit multi-level mixed effect logistic regression models predicting family attrition from the endline Literacy Ecology survey sample. The model includes fixed effects for randomization blocks and includes random sector effects to replicate the structural features of the outcome models and dummy variables for program assignment (Literacy Boost group or Control group). In order to better interpret the figures, we translate the results into percentage points to describe the predicted probability of attriting from the sample for an average family in the LB group. We compare the LB group to the Control group.

7.2.2   Findings: Attrition

Due to the attrition of approximately 25 percent of the original baseline sample, logistic regressions were fit to see whether the groups experienced differential loss. The multi-level mixed effect logistic regression revealed that there was no significant differential attrition between groups, meaning that <u>we do not observe any attrition rate bias in the longitudinal Literacy Ecology sample.</u>

7.3   Similarity of the Literacy Ecology Analytic Sample at Baseline

Multilevel regression models were fit to test whether there were observable differences between students and their families at baseline according to which group (LB or Control) they were assigned. The characteristics included in this analysis were the same ones that were tested in the previous sub-section.

Two marginally significant differences existed between students in the Control and LB groups at baseline. Children in the LB group lived in homes with fewer family members (a difference of 0.58 people), and had higher scores on their interest and engagement in reading at baseline (a difference of 0.27 of a standard deviation). <u>The family's size and individual child interest and engagement in reading may indicate an underlying difference in the groups at baseline in the analytic sample.</u> We therefore control for these baseline characteristics in all subsequent analyses.

7.4   Creation of Implementation Indicators and Literacy Ecology Factors

The Literacy Ecology survey measured a broad range of characteristics, knowledge, beliefs, and practices in an attempt to understand the overall, broad impact of Literacy Boost. To best explore the impact of LB in this large data set, we reduced the data in the Literacy Ecology Survey into seven factor scores. Using a statistical package (Stata), we predicted factor scores for a range of relevant variables. The first two factor scores, which we call the Workshop Indicator and the Community Activities Indicator, measure the degree to which respondents were aware of and participated in the two central components of LB Community Action, namely the Reading Clubs for village children and the Reading Awareness Workshops for the older family members of primary school-aged children. We refer to these together as the Implementation Indicators. The remaining five factors are those first put forth by Friedlander (2015) and that constitute the Literacy Ecology[42]. These factors are described further in Table 37.

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[42] In Friedlander's 2015 thesis, he labels the fifth factor as Child Interest / Motivation. In this report, we rename this as Child Interest and Engagement in reading, as we feel it better reflects the variables that make up the factor.

Table 37: Description of Implementation Factors and Literacy Ecology Factors

Factor Grouping	Factor Name	What the Factor Measures	Selected Variables Used to Create the Factor
Implementation Factors	Workshops	Respondent awareness of workshops and/or trainings offered in the village for adults	Were workshops offered? Did family members attend the workshops? What, if any, were the benefits of attending the workshops?
	Community Activities	Respondent awareness of reading activities for children which take place in the village	Were there reading activities? What occurred during the activities?
Literacy Ecology Factors	Reading Habits	Characteristics, Habits, and Interactions related to literacy development in the home	Who can read at home? Who reads to the child? Who helps the child to study? Who talks to the child? How frequently are books used in the home?
	Caretaker's Literacy Competency	Respondent's comfort with reading and writing	How well do you read? How well do you write?
	Reading Materials	The availability of different sorts of reading materials in the home and village	What reading materials are available in the home? What materials are available in the community? Are there any home-made reading materials at home?
	Religious related activities & materials	Materials and activities that involve literacy and that involve religious materials	Are there bibles in the home? Why does the caretaker read? What does the child read?
	Child Interest / Engagement	Caretaker perception of child's interest and engagement in read	Is child interested in reading? Why / Why not? How frequently does the child read?

Once the factor scores were generated, we fit 7 multi-level regressions, using group assignment to predict factor scores while controlling for family size and child interest, and including fixed effects for randomization blocks and random sector effects. The coefficient of the group assignment indicates whether (a) respondents were aware or participated in LB activities indexed in the Implementation Factors and (b) LB had impact on the Literacy Ecology factors also shown on Table 40. In section 7.5, we report our findings on evidence of LB implementation; in 7.6 we report LB impact on children's literacy ecologies.

7.5   Relationship between Literacy Boost Assignment and the Implementation Indicators
Assignment to Literacy Boost in both regressions predicting the two implementation factors show up as statistically significant at a $p < 0.001$ level (see the Appendix for the regression model). This first finding provides initial evidence that LB Community Action was indeed implemented as perceived by community members.

These findings do not provide a great deal of detail; instead they provide a broad overview of how LB influenced home and community literacy ecologies. The next sections will explore in more detail the differences we observed between the LB and control groups at endline for each of factors associated with parents' participation in LB. These analyses are only exploratory; because of the large number of comparisons they cannot be used to make any firm claims about which of these variables were the result of LB implementation. But they can suggest which aspects of the activities were most salient to participants.

7.5.1   Exploring the Implementation Factors
We asked respondents whether they were aware of the two central components of Literacy Boost Community Action in Rwanda, namely reading activities for children and workshops for adults. We did not ask specifically about Reading Clubs and Reading Awareness workshops, but rather general questions concerning the presence of *any*

workshops provided for adults and *any* activities at the village level provided for children. This section details the methods we use to analyze this data, as well as the findings of this analysis.

7.5.2   Methods

We asked respondents a broad range of questions regarding the types of activities occurring in the village. In particular, we asked whether they knew of any trainings or workshops for adults in the village. If the respondent said that there was such an activity, we asked a series of follow-up questions regarding the content of the training, whether the respondent or others in the family attended, what was learned in the training, who sponsored the training, etc. To see the full list of questions, refer to the Appendix and the Report Annex.

7.5.3   Findings: Exploring the Workshops Factor

Significantly more respondents in the Literacy Boost had higher scores on both the Workshops and the Community Activities factor than did respondents in the control group. This finding suggests that Umuhuza successfully included the families of students in their Reading Awareness workshops. A closer look at the variables used to create the Workshop factor will help us understand which aspects of these trainings and workshops respondents were most aware of. Table 38 displays selected variables to illustrate respondents' awareness of the village workshops.

Table 38: Findings Related to the Workshop Factor

Variable	Control (N=185)		LB (N= 159)		Sig. Diff.
	Mean	SD	Mean	SD	
There have been workshops or trainings in the village	13%	0.34	32%	0.47	***
Someone in the family attended these workshops	4%	0.19	20%	0.40	***
Do you think there have been positive changes in the family from participating in the workshops	3%	0.16	17%	0.38	***
Topic of workshop: Child Learning/Development	0%	0.00	12%	0.33	***
Topic of Workshops: Adult Literacy Skills	2%	0.15	4%	0.21	
Topic of Workshops: Other (not child focused or literacy focused)	2%	0.13	5%	0.22	
Workshops supported by: Save the Children or Umuhuza	0%	0.00	8%	0.28	***
Workshops supported by: Local People in the Village	1%	0.07	4%	0.21	~
Workshops supported by: Local Government	2%	0.13	3%	0.18	
Workshops supported by: L3	0%	0.00	1%	0.08	

~ $p<0.10$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

As Table 38 indicates, approximately one third of LB respondents knew about the workshops and one out of five LB families reported participating in these workshops. Not surprisingly respondents in the control condition were far less likely to report any such activities. The biggest differences between the groups were in the three items that asked in more general terms about the workshops. Respondents were less likely to report awareness of any specific workshops. This would suggest that participating in the workshops overall made more of an impression on participants rather than participating in any particular workshop.

However, as the table also illustrates, a much larger percentage of LB families did not report that workshops were occurring (68%) than did (32%). At this point it is not possible to determine whether this is because the time that had elapsed between the end of the workshop and the endline data collection was too long, or because the information about the workshops really only reached one third of the sample, or whether other reasons might have caused the majority of LB families not to report awareness of the workshops. We expect that further analysis of monitoring data will produce better understand these findings.

Respondents were asked whether they would attribute any positive changes in the family to the workshops. Of the LB respondents who indicated that someone in their family had attended the workshops (N = 32), 78 percent of

those respondents (N = 25) attributed some positive change to the workshops. While we cannot perform more statistical tests on these responses due to the small number of respondents, many of the respondents mentioned an increase in knowledge and in children's learning and development.

7.5.4   Findings: Exploring the Community Activities Factor

At endline, we asked respondents whether they were aware of any regularly occurring village reading activities for children. While only 3 percent of the Control group (6 out of 183 respondents) responded that they knew of activities, 54 percent of the LB group reported that there were regular reading activities occurring for children in the village. Because so few Control respondents replied that they knew of Community Activities, we do not present these variables in a table as it will yield little useful information.

Of the 86 respondents in the LB group who spoke of community reading activities, 91% of them (N=79) specifically mentioned Reading Clubs without prompting from the assessor, the activity implemented by Umuhuza as part of the randomized control trial. A significantly higher number of respondents in the LB group knew about these community reading activities in comparison to the number of respondent who knew about the workshops (presented above). Further investigations could research the reason why families know more about the village reading activities than the workshops.

In terms of precisely *what* was occurring during these Reading Clubs, we asked respondents what occurred during the village reading activity. Figure 11 shows the frequency of different activities that LE respondents reported.

Figure 11: Percentage of Respondents who Reported a Specific Activitity Occurring in LB Villages
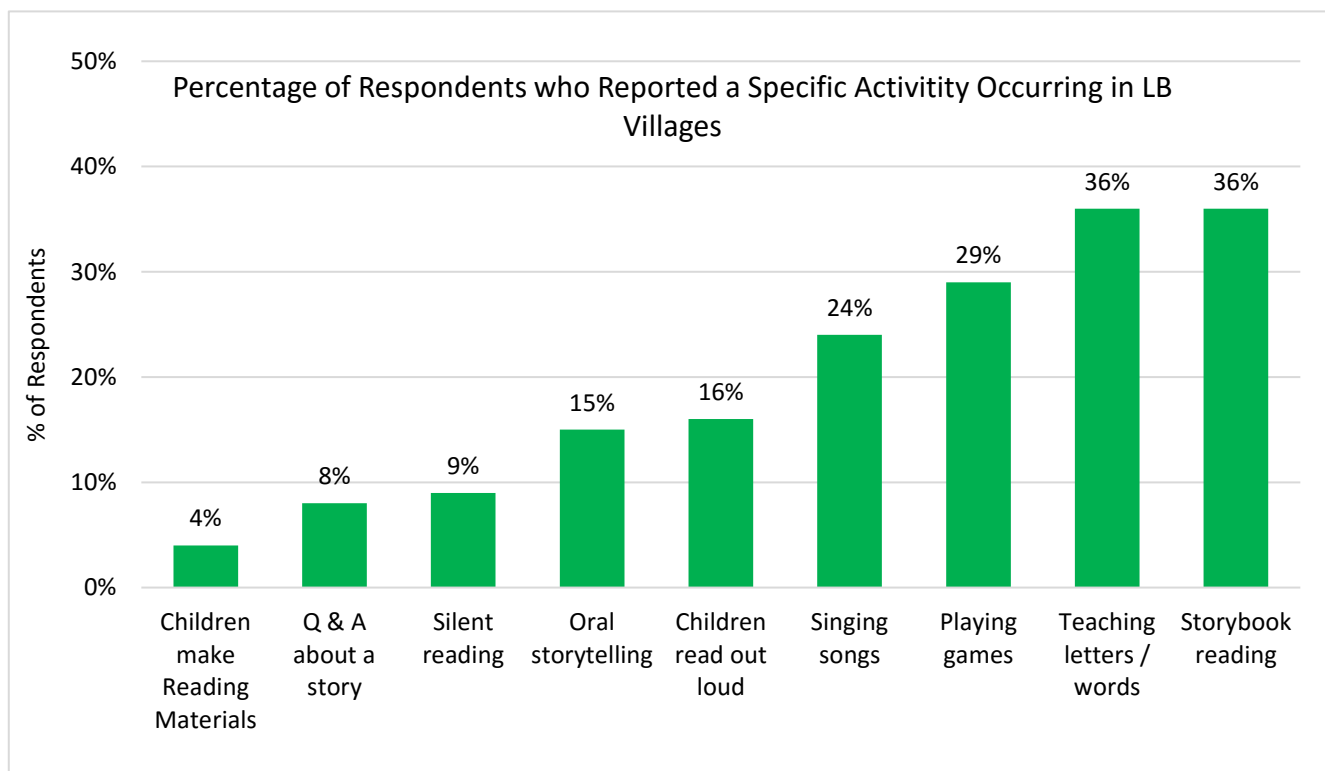
All of the activities in Figure 11 are those that are part of regular Umuhuza-sponsored Reading Clubs. Storybook reading, teaching children letters and how to read words, and playing games were the most common responses. Only four respondents mentioned that children participate in the Make-and-Take activity, where children create their own reading materials to bring home with them. Future implementation efforts may do well to encourage this activity, as it is one method to increase the number of print materials to which a child has access.

7.6 LB Impact on the Literacy Ecology Factors

One of the key purposes of this study was to test whether interventions in the home and community serve to change children's Literacy Ecology. We structure the rest of this section according to the five factors of the Literacy Ecology that emerged from the baseline analysis of the Literacy Ecology survey (Friedlander, 2015), and for which new factor scores were generated at endline.

7.6.1 Methods

During both surveys, we asked respondents a number of questions that together represented the five factors of the literacy ecology of the home and village.

As with the implementation data, we fit regressions using treatment assignment to predict each Literacy Ecology factor while controlling family size and child interest and engagement in reading and clustering standard errors at the village level. In the instances where assignment to LB predicts a factor, we break the factor down into the relevant variables that make up the factor and examine exactly how LB worked to change the literacy ecology factor.

The relation between assignment to LB and the Literacy Ecology at endline is shown below in Table 39. Assignment to the LB group demonstrated statistically significant impact on Reading Habits in the Home, Reading Materials, and Child Interest /Engagement when controlling for Interest/Engagement and family size at baseline. The positive coefficients suggest that LB activities worked to improve these three home literacy ecology factors for LB-assigned students. We did not see any statistically significant effect for neither the Literacy Competency of the Caretaker factor nor for the Religious-related Reading Activities factor.

Table 39: Assignment to Literacy Boost and the Literacy Ecology

Variables	Literacy Habits & Interactions Factor	Literacy Competency of Caretaker Factor	Reading Materials Factor	Religious Related Activities Factor	Child Interest / Engagement Factor
Assigned Group	0.354*	0.134	0.986***	-0.046	0.397*
(0=Control, 1= LB)	(0.172)	(0.160)	(0.142)	(0.162)	(0.156)
Interest/Engagement	0.231***	0.179***	0.117*	0.061	0.234***
Factor (base)	(0.052)	(0.054)	(0.048)	(0.054)	(0.053)
Constant	-0.166~	-0.062	-0.456***	0.021	-0.183*
	(0.098)	(0.091)	(0.081)	(0.092)	(0.089)
Observations	344	342	344	344	341

Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.10

As with the implementation factors, we conducted exploratory analyses to see if they suggested which aspects of the community activities were most salient to participants.

7.6.2 Literacy Habits and Interactions in the Home

The notable differences between LB and Control groups on the several dozen variables that constitute the literacy habits and interactions factor were very few. For those interested in the variable-by-variable comparisons, refer to the Appendix.

There were only two statistically significant differences between Control and LB groups in the variables that make up the Literacy Habits and Interaction factor: Mother's reported reading to children and frequency of story book use.

7.6.3 Literacy Competency of the Caretaker

There is no indication in Table 39 that Literacy Boost worked to change the Literacy Competency of the Caretaker. This is not surprising, as the program did not seek to improve parental reading skills. We do not delve further into this factor.

7.6.4 Availability of Reading Materials

We see a strong effect of LB on the reported availability of reading material in Table 39. The variables used to compute this factor gauged reading materials at home and reading materials in the community. We analyze these two groups of variables (home materials and community materials) separately to see whether any patterns emerged.

In Table 40, we see that families in the Literacy Boost group were not significantly different from their Control counterparts at baseline, but at endline <u>the most noticeable differences were in the presence and the number of storybooks reported in children's homes.</u>

While the difference of storybooks in the home is encouraging, the absence of differences is also important and has important programmatic implications. We do not see a difference in the family made materials or the student made materials in the home. This finding corroborates data in Figure 11 concerning the very small number of respondents who knew about the make-and-take activity of Reading Clubs. This suggests several possibilities, for example that future efforts should empower families and children to make their own reading materials and games from locally available resources. We also find there were very few reading corners in the home of Literacy Boost students. Assuming this is a reliable finding, it could be explained in at least two ways. First, these homes may not have sufficient space to dedicate a place specifically to reading, and it is therefore an unrealistic expectation. An alternate explanation is that the training that occurs on reading corners needs to be revised or more strongly emphasized during the implementation of workshops.

Another group of variables that make up the Materials factor concerns with the availability of reading materials at the village level. At baseline, there was no difference between groups in terms of knowledge about where to find reading materials. However, as seen in Table 41, at endline, nearly half of all respondents in the Literacy Boost group reported that they knew where to find materials, versus four percent of the Control group respondents. These findings triangulate the findings regarding the implementation of Literacy Boost: the efforts put in by Umuhuza and Save the Children to increase the availability of reading materials in the LB sectors has been noticed by the communities in those sectors.

Table 40: Types of Reading Materials in the Home at Baseline & Endline, By Group

Data Source	Variable	Control (N= 185) % of homes or average value	SD	Literacy Boost (N=159) % of homes or average value	SD	Sig. Diff.
Base-line	Adult Books at home	22%	0.41	22%	0.42	
	Storybooks at home	10%	0.30	8%	0.27	
	Textbooks at home	38%	0.49	37%	0.49	
	Newspapers & Magazines at home	11%	0.32	14%	0.35	
	Posters/Wall hangings at home	27%	0.45	22%	0.42	
	Religious Materials at home	60%	0.49	62%	0.49	
	N of Reading Material Types	1.7 types	1.47	1.6 types	1.50	
End-line	No materials at home	47%	0.50	37%	0.48	~
	Adult Books at home	7%	0.25	6%	0.24	
	Storybooks at home	4%	0.19	18%	0.39	***
	Textbooks at home	24%	0.43	34%	0.48	~
	Newspapers & Magazines at home	3%	0.16	2%	0.14	
	Posters at home	2%	0.13	6%	0.23	~
	Religious Materials at home	37%	0.49	38%	0.49	
	Booklets at home	4%	0.20	10%	0.30	*
	Dictionary at home	2%	0.15	0%	0.00	
	N of Reading Material Types	0.8 types	0.87	1.0 types	1.02	*
	Family made materials at home	1%	0.07	3%	0.18	
	Student made materials at home	5%	0.22	8%	0.27	
	Reading Corner at home	10%	0.30	14%	0.35	
	Student Desk at home	58%	0.49	68%	0.47	
Base-line	N of adult books	1.10	3.10	1.25	4.69	
	N of Storybooks at home	0.27	1.02	0.19	0.84	
	N of Textbooks at home	1.21	2.49	1.37	2.83	
	N of Newspapers/Magazines at home	0.69	3.16	0.80	4.35	
	N of Posters/Wall hangings at home	1.65	4.00	1.07	3.18	
	N of Religious Materials	1.37	1.92	1.58	2.64	
End-line	N of adult books	0.58	4.73	0.24	0.95	
	N of Storybooks at home	0.07	0.46	1.70	8.20	**
	N of Textbooks at home	0.78	1.88	2.61	16.18	
	N of Newspapers/Magazines at home	0.07	0.49	0.08	0.67	
	N of Posters/Wall hangings at home	0.05	0.45	0.48	3.12	~
	N of Religious Materials	1.17	4.75	2.70	16.37	
	N of Booklets	0.14	0.89	0.25	0.84	
	N of Dictionaries at home	0.04	0.34	0.00	0.00	

~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

Table 41: Availability of Reading Materials in the Village

Data Source	Variable	Control (N= 185)		Literacy Boost (N=159)		Sig diff.
		% of homes	SD	% of homes	SD	
Baseline	Village reading materials available	30%	0.46	35%	0.48	
Endline	Village reading materials available	4%	0.19	47%	0.50	***
	Types of Materials: Storybooks	2%	0.13	30%	0.46	***
	Types of Materials: Textbooks for school	2%	0.13	13%	0.33	***
	Types of Materials: Books for Adults	2%	0.13	6%	0.23	*
	Types of Materials: Booklets / Official Papers	1%	0.07	4%	0.19	*
	Types of Materials: Charts/Posters/Wall hangings	0%	0.00	2%	0.14	
	Village Materials from: Umuhuza / SC	0%	0.00	38%	0.48	
	Village Materials from: Government Sources	2%	0.13	1%	0.11	
	Village Materials from: REB/MoE/Schools	1%	0.07	1%	0.08	
	Where Materials kept: Chief's home or other important villager	1%	0.07	9%	0.29	**
	Where Materials kept: Umuhuza Book Bank	0%	0.00	9%	0.29	
	Where Materials kept: At school	2%	0.13	6%	0.23	~
	Where Materials kept: (head)teacher's house	1%	0.07	5%	0.22	*
	Where Materials kept: Umuhuza staff house	0%	0.00	3%	0.18	
	Where Materials kept: Village library	0%	0.00	2%	0.14	
	Where Materials kept: Respondents home	0%	0.00	1%	0.08	
	Who uses materials regularly: Primary Students	3%	0.18	30%	0.46	***
	Who uses materials regularly: No one	0%	0.00	8%	0.28	
	Who uses materials regularly: Adults	1%	0.07	4%	0.19	
	Who uses materials regularly: Secondary Students	1%	0.07	4%	0.21	~

~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

7.6.5 Religious Related Reading Materials and Activities

There is no indication in Table 39 that Literacy Boost worked to change Religious Related Reading Materials and Activities factor. This is not surprising, as the program implementers do not have any religious affiliation and the program did not feature any religious themes or materials. We do not delve further into this factor.

7.6.6 Child Interest and Engagement

This final factor in the Literacy Ecology was significantly related to group assignment, even when controlling for the baseline Interest/Engagement factor, as seen in Table 39.

We decompose the factor into its component variables, seen in Table 42, we see that the largest contributor to the significant differences observed is the respondents' report of child interest in reading, the frequency in which the child engages in reading activities, and the type of materials (storybooks specifically) that is mentioned by the respondent as being read by the child. These are consistent (see above) with respondents' reports of increased access to storybooks and greater variety of materials. As a result of LB, it appears that children have more storybooks to read, greater variety of reading materials, and children engage in more reading and show more interest in reading. Again, these results are speculative, but do suggest a likely pathway of influence from family reading activities participation to child reading experiences in the home.

Table 42: Child Interest and Engagement in Reading

Variable	Control (N = 185) Avg.	SD	LB (N=159) Avg.	SD	Sig. diff.
[Baseline] Does child like to read?	91%	0.28	93%	0.25	
[Baseline] Does child ever see writing and ask what it says?	67%	0.47	64%	0.48	
How interested is the child in reading?	1.98	0.78	2.16	0.79	*
Why do you say he or she is interested?					
-- child reads a lot / likes storybooks/ asks for things to read	24%	0.43	35%	0.48	*
-- likes reading / spends time reading	10%	0.30	10%	0.30	
-- child revises notes at home/gets good grades/ studies a lot	10%	0.30	9%	0.28	
-- always wants to go to school	8%	0.27	8%	0.27	
-- child tries to read / is interested / courageous	10%	0.30	5%	0.22	
-- is / wants to be intelligent / successful / gain knowledge	4%	0.19	4%	0.21	
-- child is learning more and more/ talks to me about what he/she read	1%	0.10	3%	0.18	
-- knows how to read	1%	0.07	1%	0.08	
-- teaches young sibling/asks for help/reads to me	2%	0.15	1%	0.08	
-- caretaker encourages child	2%	0.13	1%	0.11	
Why do you say he or she is not interested?					
-- doesn't take time to read /doesn't like to/won't read independently	17%	0.37	13%	0.34	
-- reads occasionally	3%	0.16	1%	0.11	
-- receives no encouragement / has too much work at home	3%	0.18	1%	0.08	
-- is not a good reader	2%	0.13	1%	0.11	
-- has repeated a lot / doesn't like school	2%	0.15	1%	0.11	
-- no materials	0%	0.00	1%	0.11	
Child reading frequency (0-Never – 4-All the time)	2.27	1.12	2.49	1.06	*
Child reads books (not specified type)	24%	0.43	25%	0.44	
Child reads school notebooks	25%	0.44	22%	0.42	
Child reads school books (not textbook specified)	18%	0.38	24%	0.43	
Child reads storybooks	8%	0.27	19%	0.39	*
Child reads textbooks	8%	0.27	11%	0.32	
Child reads religious material/books	9%	0.29	9%	0.29	
Child reads various material	1%	0.07	4%	0.19	*
Child reads maths	1%	0.07	3%	0.16	
Child reads newspaper / Hobe magazine (a children's magazine)	0%	0.00	3%	0.16	
Child reads letters	2%	0.13	1%	0.11	
Child reads signs	1%	0.07	1%	0.08	
Child reads materials posted on the wall	1%	0.07	0%	0.00	

~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

7.7 Impact of LB Assignment & Literacy Ecology Improvements on Reading Outcomes

The preceding section established that assignment to Literacy Boost impacted three of the five Literacy Ecology factors: Reading Habits in the Home, Availability of Reading Materials, and Child Interest / Engagement. The theory of change underlying LB is that improving children's Literacy Ecology[43] (often referred to as Home Literacy Environment) will in turn improve student's reading skills and associated school outcomes. This section tests the

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[43] The term Literacy Ecology is intended to replace an older term of the Home Literacy Environment. This older term has two drawbacks: First, it ignores the individual child within its conceptualization of a culture of literacy, and therefore is limiting in its usefulness. Second, it ignores the existence of learning opportunities outside of the home, much in the same way that many education interventions ignore the existence of learning opportunities outside the school.

relationship between LB assignment and the factors of the Literacy Ecology with students reading and school-related outcomes.

7.7.1   Methods
To assess the impact of LB and the Literacy Ecology on student outcomes, we used multi-level mixed effect models. These models include fixed effects for randomization blocks and random sector effects, dummy variables for program assignment (Literacy Boost group or Control group). Since we found the longitudinal students in the control group and LB group are significantly different on the family's size and individual child interest engagement in reading, we controlled these two variables in our multi-level mixed effect model.

We estimated the impact of LB assignment and Literacy Ecology Improvements on the following outcome variables: whether students in the families attrited from the endline reading assessment survey, whether students were held back at least once, whether students met the BLT, the composite score of oral comprehension, and for the students who met the BLT at endline, the composite fluency and accuracy scores. The latter three outcomes were standardized.

We first fit regressions predicting students' outcomes based solely on assignment to LB and baseline control covariates. Then, we fit five more sets of regressions. Each set of regressions controls for LB assignment and relevant baseline variables while testing the relationship between each individual factor of the Literacy Ecology with the specific outcome.

7.7.2   Impact of Assignment to LB on Student Outcomes in the Literacy Ecology Survey Sub-Sample
Table 43 shows the results of the first set of regressions. In the sample included in the Literacy Ecology survey, <u>there is no statistically significant impact of assignment to LB on student related outcomes.</u> This contrasts with findings from Chapter 5, where we had a much larger sample to determine the effects of LB (and TT) on student achievement and will be discussed in greater detail in the discussion section in this chapter.

Table 43: Treatment Effect on Reading Outcomes in the LE Sample

Variable	Student attrited from Reading Assessment	Student reached P.3 in 2015	Oral Compre-hension (End)	Met the BLT (End)	Reading Fluency (End)	Reading Compre-hension (End)
Assigned Group (0=Control, 1= LB)	-0.090 (0.614)	0.560 (0.513)	0.229 (0.226)	0.734 (0.740)	0.180 (0.268)	0.175 (0.227)
Interest/Engagement Factor (base)	-0.015 (0.177)	0.252~ (0.131)	0.186*** (0.055)	0.282* (0.141)	0.156* (0.065)	0.115~ (0.066)
Constant	-2.167*** (0.336)	-1.022*** (0.302)	-0.108 (0.132)	0.649 (0.426)	-0.062 (0.157)	-0.086 (0.134)
Observations	344	307	306	306	219	219

Standard errors in parentheses; ~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

7.7.3   Impact of the Reading Habits Factor on Student Outcomes
Students with a higher factor score for the Reading Habits and Interactions at Home factor had higher Oral Comprehension scores at endline, and made up a higher percentage of the students who met the BLT at endline. When controlling for assignment to treatment and baseline interest/engagement, the Reading Habits factor significantly predicts students' oral comprehension score at endline as well as whether the student met the BLT, as seen in Table 44. The reading habits factor also marginally predict fluency and comprehension, significant at a p<0.10 level. The Reading Habits factor does not predict the likelihood that a student attrited from the endline reading assessment sample nor whether a student reached P.3 by endline.

Table 44: The Relationship between the Reading Habits Factor and Reading Outcomes

Variables	Student attrited from Reading Assessment	Student reached P.3 in 2015	Oral Compre-hension (End)	Met the BLT (End)	Reading Fluency (End)	Reading Compre-hension (End)
Reading Habits Factor	-0.186	0.171	0.174**	0.553***	0.124~	0.136~
	(0.179)	(0.137)	(0.057)	(0.151)	(0.072)	(0.074)
Assigned Group (0=Control, 1= LB)	-0.023	0.502	0.176	0.629	0.145	0.134
	(0.618)	(0.512)	(0.233)	(0.766)	(0.270)	(0.223)
Interest/Engagement Factor (base)	0.025	0.205	0.141*	0.172	0.128~	0.085
	(0.184)	(0.135)	(0.056)	(0.150)	(0.067)	(0.068)
Constant	-2.211***	-0.997***	-0.082	0.759~	-0.044	-0.066
	(0.341)	(0.300)	(0.136)	(0.442)	(0.158)	(0.131)
Observations	344	307	306	306	219	219

Standard errors in parentheses; ~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

7.7.4   Impact of the Literacy Competency of the Caretaker factor on Student Outcomes

In spite of the fact that our analyses did not reveal any significant relationship between the Literacy Competency factor and assignment to LB, the Literacy Competency of the Caretaker factor significantly explains variation in half of the outcomes tested, including the likelihood that a student would attrit from the Reading Assessment sample, oral comprehension scores, the likelihood that a student met the BLT, and the fluency scores of students who met the BLT, as seen in Table 45. Furthermore, it is marginally associated with students' fluency scores for students who met the BLT.

Table 45: Relationship between Caretaker Competency and Reading Outcomes

Variables	Student attrited from Reading Assessment	Student reached P.3 in 2015	Oral Compre-hension (End)	Met the BLT (End)	Reading Fluency (End)	Reading Compre-hension (End)
Caretaker Competency Factor	-0.358*	0.030	0.109*	0.329*	0.125~	0.105
	(0.174)	(0.129)	(0.055)	(0.138)	(0.067)	(0.068)
Assigned Group (0=Control, 1= LB)	-0.065	0.537	0.236	0.685	0.169	0.164
	(0.617)	(0.509)	(0.221)	(0.732)	(0.269)	(0.223)
Interest / Engagement Factor (base)	0.039	0.247~	0.171**	0.237	0.140*	0.102
	(0.186)	(0.134)	(0.056)	(0.146)	(0.065)	(0.067)
Constant	-2.221***	-1.002***	-0.116	0.710~	-0.054	-0.080
	(0.343)	(0.300)	(0.129)	(0.422)	(0.157)	(0.132)
Observations	337	302	301	301	217	217

Standard errors in parentheses; ~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

7.7.5   Impact of the Availability of Reading Materials Factor on Student Outcomes

The Reading Materials factor did not significantly associate with any of the student level outcomes, as seen in Table 46.

Table 46: Relationship between Reading Materials Factor and Reading Outcomes

Variables	Student attrited from Reading Assessment	Student reached P.3 in 2015	Oral Compre-hension (End)	Met the BLT (End)	Reading Fluency (End)	Reading Compre-hension (End)
Reading Materials Factor	-0.167 (0.230)	0.093 (0.128)	-0.064 (0.055)	-0.022 (0.140)	-0.026 (0.066)	0.003 (0.067)
Assigned Group (0=Control, 1= LB)	0.077 (0.647)	0.455 (0.545)	0.300 (0.229)	0.759 (0.754)	0.212 (0.280)	0.172 (0.242)
Interest / Engagement Factor (base)	-0.001 (0.178)	0.238~ (0.133)	0.196*** (0.056)	0.285* (0.142)	0.160* (0.066)	0.114~ (0.067)
Constant	-2.255*** (0.358)	-0.974** (0.315)	-0.143 (0.132)	0.637 (0.432)	-0.078 (0.162)	-0.084 (0.140)
Observations	344	307	306	306	219	219

Standard errors in parentheses; ~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

7.7.6 Impact of the Religious related Reading Activities & Materials Factor on Student Outcomes

Despite no significant difference between Control and LB on this factor at endline, the Religious related Reading Activities factor predicts oral comprehension and the probability that a student met the BLT at endline, as seen in Table 47.

Table 47: Relationship between Religious Related Reading Activities and Reading Outcomes

Variables	Student attrited from Reading Assessment	Student reached P.3 in 2015	Oral Compre-hension (End)	Met the BLT (End)	Reading Fluency (End)	Reading Compre-hension (End)
Religious Factor	0.069 (0.190)	0.064 (0.140)	0.193** (0.060)	0.593** (0.206)	-0.007 (0.068)	0.029 (0.069)
Assigned Group (0=Control, 1= LB)	-0.087 (0.614)	0.565 (0.510)	0.241 (0.212)	0.776 (0.731)	0.180 (0.268)	0.175 (0.226)
Interest/Engagement Factor (base)	-0.019 (0.177)	0.248~ (0.131)	0.177** (0.055)	0.289* (0.144)	0.155* (0.065)	0.116~ (0.066)
Constant	-2.170*** (0.337)	-1.025*** (0.300)	-0.114 (0.124)	0.693 (0.423)	-0.062 (0.157)	-0.086 (0.133)
Observations	344	307	306	306	219	219

Standard errors in parentheses; ~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

7.7.7 Impact of the Child Interest and Engagement Factor on Student Outcomes

Table 48 shows the outcomes of the regressions using the Child Interest/Engagement factor to predict student outcomes. Except for attrition from the reading assessment sample, the Child Interest /Engagement factor significantly predicts every student outcome.

Table 48: Relationship between Interest / Engagement and Reading Outcomes

Variables	Student attrited from Reading Assessment	Student reached P.3 in 2015	Oral Compre-hension (End)	Met the BLT (End)	Reading Fluency (End)	Reading Compre-hension (End)
Child Interest/Engagement Factor	-0.038 (0.185)	0.469** (0.147)	0.167** (0.056)	1.022*** (0.168)	0.240** (0.079)	0.199* (0.081)
Assigned Group (0=Control, 1= LB)	-0.071 (0.620)	0.353 (0.531)	0.144 (0.222)	0.364 (0.806)	0.114 (0.274)	0.130 (0.237)
Interest/Engagement Factor (base)	-0.079 (0.188)	0.161 (0.137)	0.148** (0.056)	0.073 (0.158)	0.114~ (0.065)	0.081 (0.067)
Constant	-2.212*** (0.341)	-0.951** (0.311)	-0.066 (0.130)	0.977* (0.468)	-0.028 (0.160)	-0.064 (0.139)
Observations	341	306	305	305	218	218

Standard errors in parentheses; ~ $p<0.10$, *$p<0.05$, **$p<0.01$, ***$p<0.001$

7.7.8   Impact of the Overall Literacy Ecology on Student Outcomes

Finally, Table 49 shows how the Literacy Ecology, taken as a whole, predicts reading achievement and other outcomes. The only factor that consistently and positively predicted endline outcomes was child interest/engagement.

Reading habits positively predicted the probability that a child met the BLT and marginally predicted oral comprehension.

Caretaker literacy competency was the only variable to marginally predict whether a child attrited from the Reading Assessment sample. The more competent the caretaker, the less likely a student was to attrit from the sample. However, this was only significant at the $p<0.10$.

The religious factor positively predicted oral comprehension and marginally predicted the probability that a child met the BLT.

Table 49: Using All Factors to Predict Student Outcomes

Variables	Student attrited from Reading Assessment	Student reached P.3 in 2015	Oral Compre-hension (End)	Met the BLT (End)	Reading Fluency (End)	Reading Compre-hension (End)
Assigned Group (0=Control, 1= LB)	-0.001 (0.652)	0.295 (0.554)	0.295 (0.213)	0.764 (0.827)	0.200 (0.283)	0.162 (0.242)
Reading Habits Factor	0.073 (0.256)	0.168 (0.185)	0.132~ (0.074)	0.466* (0.220)	0.078 (0.093)	0.103 (0.096)
Caretaker Competency Factor	-0.469~ (0.243)	-0.138 (0.170)	0.002 (0.068)	0.006 (0.198)	0.108 (0.083)	0.058 (0.086)
Reading Materials Factor	-0.085 (0.238)	0.012 (0.138)	-0.138* (0.056)	-0.414* (0.166)	-0.087 (0.067)	-0.050 (0.069)
Religious Factor	0.278 (0.213)	0.017 (0.152)	0.147* (0.063)	0.423~ (0.231)	-0.074 (0.071)	-0.030 (0.073)
Child Interest/ Engagement Factor	-0.013 (0.193)	0.445** (0.151)	0.168** (0.056)	1.041*** (0.181)	0.237** (0.079)	0.187* (0.082)
Interest/Engagement Factor (base)	-0.041 (0.198)	0.141 (0.141)	0.133* (0.056)	0.010 (0.174)	0.098 (0.067)	0.062 (0.069)
Constant	-2.315*** (0.365)	-0.919** (0.320)	-0.146 (0.123)	0.895~ (0.474)	-0.069 (0.163)	-0.080 (0.140)
Observations	339	304	303	303	218	218
Number of groups	14	14	14	14	14	14

Standard errors in parentheses; *** $p<0.001$, ** $p<0.01$, * $p<0.05$, ~ $p<0.10$

Surprisingly, the reading materials factor *negatively* predicted two outcomes, oral comprehension and the probability of meeting the basic literacy threshold (BLT). A likely explanation for this negative relationship is that the reading materials in the home factor was highly correlated with other factors that were positively associated with oral comprehension and meeting BLT. As a result, when all factors are entered into a regression equation predicting these two outcomes, the remaining variation in home reading materials is reduced, and within this narrow range, children with more reading materials at home had lower oral comprehension scores. One possible explanation for the negative associations, therefore, is that this is a statistical artifact resulting from "multiple collinearity"—the presence of several inter-correlated variables—rather than negative effects of reading materials on oral comprehension. Another explanation could be that as parents learn about the importance of reading materials in the home, parents whose children seem to be having more difficulty in school might increase reading materials at home more so than do parents of children not perceived to be having difficulties. This would lead to a negative correlation between reading materials and child outcomes, particularly when controlling for other variables that are correlated with both reading materials and child outcomes.

All these relationships will be discussed in greater detail in the discussion section.

7.8 Impact of LB Assignment on Familial Attitudes & Beliefs about Reading
We examined how groups differed on a range of a range of questions concerning their beliefs and attitudes about learning and literacy. We do not find any significant impact of LB on attitudes and beliefs, which we discuss in more detail in the discussion section. To see the variable by variable comparisons, refer to the Appendix.

7.9 Discussion
This chapter presented the findings of quantitative analysis of the results from a survey of the Literacy Ecology of the Home and Community. The chapter sought to answer three overarching questions:

1) Did assignment to LB change Literacy Ecology of the homes and communities?
2) Did students from homes that scored highly on the Literacy Ecology factors have better student outcomes?
3) Did assignment to LB lead to improvements in the Literacy Ecology, which in turn led to better student outcomes?

Evidence presented in this chapter demonstrated that LB did positively impact the Literacy Ecology of the homes and communities. It also showed that the LE significantly predicted student outcomes. However, the data and analyses do not permit us to confirm or deny the proposition that LB led to better LEs, which in turn improved student outcomes.

LB respondents reported more community literacy activities. This finding provides evidence of program implementation and that the activities were perceived by villagers. LB respondents also reported increases in at least 3 of the 5 LE factors measured in the survey, specifically Reading Materials, Child Interest/ Engagement, and Reading Habits and Interactions in the Home)

Closer analyses of the implementation indicators and Literacy Ecology factors reveal several important findings. Despite the fact that respondents in LB communities know about the community activities occurring in significantly greater numbers than control respondents, the knowledge of these activities was not widespread. Around 60 percent of respondents in LB were not aware of or hadn't attended community activities. This finding suggests that LB implementers were unable to reach the entire population in the communities. It also suggests that program implementers did not target students sampled to participate in the longitudinal data collection, suggesting increased internal validity for the findings[44].

One possible reason for the 60 percent of respondents with no knowledge of LB activities may stem from the implementation model of the RAWs. The implementing organization invited caretakers to RAWs, but not the wider community. However, the practices, knowledge, and behaviors that are covered during the workshops can be learned and used by any adult in the community. The apparent focus on parents or caretakers, to the exclusion of other family members who may spend more time with the child, may have reduced the observed impact.

In terms of the LB activities (see Figure 11), the Make and Take activity listed in the LB toolkit was very rarely reported as occurring. Furthermore, there were few or no home-made reading materials that assessors could see and photograph. Also, there was no report of Reading Buddies taking place.

We now discuss the findings for each of the LE factors.

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[44] The fact that only 40 percent of respondents in the Literacy Boost group spoke about Literacy Boost activities adds to the validity of findings, because it suggests that implementers did not specifically target their activities to students who had participated in the program. Researchers who argue against following students longitudinally often cite the possibility that by following students longitudinally, the students who are followed will receive disproportionate attention versus those not included in the longitudinal sample. If LB students had received disproportionate attention from Umuhuza and Save the Children staff, we would expect that caretaker awareness of Literacy Boost activities would be much higher than 40 percent.

Reading Interactions in the Home
The overall impact of LB on this factor was statistically significant. However, once we dug into the variables, we saw that the only variable that showed evidence of LB impact was the frequency of storybook use in the household. While this is indeed an important finding, the lack of other significant differences in other variables that make up this factor is disappointing, as LB focuses much of its resources on changing the reading habits and interactions in the home. How to change reading habits and interactions in the home remains a topic for future research program development.

The lack of significant findings may also reflect measurement error. It is unclear whether respondents understand 'reading' and 'reading to children' in the way that the research team intended. There is some evidence suggesting that this misalignment in meaning does exist. When asked to elaborate on what they read to children, some respondents reported reading "Mathematics".

Literacy Competency of Caretaker
There was no evidence of LB impact on the literacy competency of the caretaker. This is not surprising, given that LB is a child-focused intervention. The factor was marginally related to a lowered probability that a student was to leave the sample, indicating a possible role that parent literacy competency might play in stabilizing children's school attendance even if not specifically related to their literacy development. However, the weak significance limits further interpretation of this finding.

Reading Materials
The largest impact of LB was on the Reading Materials factor, and specifically on storybooks. Although this is an encouraging finding in one sense, it is tempered by the facts that (a) the reading materials factor did not account for differences in reading outcomes when used alone in the regression model, and (b) in the model that uses all five factors of the LE to predict reading achievement, there was a negative relationship between reading materials in the home and reading outcomes. We believe this negative outcome was probably, at least in part, a statistical artifact resulting from multiple collinearity. Improving children's access to literacy materials in the home is clearly one of the goals of Literacy Boost, and there is no reason to expect a negative effect on any child outcomes. Whether this finding is spurious, the result of statistical quirks or parents of children having difficulty bringing home additional reading materials, or if in fact additional reading materials produces activities and interactions that somehow undermine some aspects of literacy growth, requires further exploration.

Religious related Reading Activities and Materials
There was no significant LB impact on the religious factor. This is not surprising given that the implementing organization of the program, and the program itself, are not affiliated and do not endorse any particular religions and hence do not incorporate religious themed material or activities into LB.

In predicting student outcomes, the relationship with oral comprehension makes sense – individuals who attend church are likely to spend more time critically listening to messages in sermons, to sing more songs, and have more opportunities for exposure to language in general. The significant relationship with the predicted probability that a student met the BLT is more difficult to offer explanations for, and needs to be studied in more detail.

Child Interest/Engagement in Reading
LB appears to have a positive impact on this factor. Respondents report more interest, especially around story books, which is consistent with LB influencing the amount of storybooks in the home. Children also reported reading more, especially (again) story books. As for Primary repetition, this was the only factor included in our analysis that was associated with a lowered likelihood of children's repeating grades. This finding is consistent with findings regarding literacy interactions and reading materials. When there is more child interest and engagement with literacy, there are more literacy interactions, reading materials, and a diminished likelihood of grade repetition.

Other Points of discussion

Despite the random assignment of sectors, there were baseline differences between the LB and Control groups in the longitudinal analysis; therefore, analyses gauging LB impact control for child interest and engagement in reading at baseline.

Ten percent of respondents were from families whose child did not participate in the endline reading assessment. Though admittedly small, these few dozen students could provide greater insight into absenteeism in future analyses.

Overall, although Literacy Boost helped improve various factors of the Literacy Ecology, the materials and activities that did occur were still rather limited. Nonetheless, almost every home (90%) reported having at least one person who was literate, and virtually every single respondent said they believed every child should learn to read and there were benefits from being literate. The challenge going forward is figuring out how to use the scarce resources and the readers who are in the homes and communities to support all children learning.

7.10   Limitations

The biggest challenge in interpreting the data involves the cultural knowledge and meaning that the respondents and the researchers bring to the questions. That is to say, do respondents understand "reading to children" in the same way that the researchers who created the questions do? There is some evidence to suggest not – one respondent reported reading "mathematics" to their child, while other reported reading "English" and "Kinyarwanda". This is simultaneously an issue of translation and of cultural knowledge. In the project district, reading to children seemed to involve checking their school notebooks for the marks that teachers give to students.

Chapter 8   The Literacy Ecology of Four Rwandan Children

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CHAPTER ABSTRACT

PURPOSE OF THE CHAPTER

The purpose of the chapter is to examine the culture of reading in villages in Rwanda and see whether the impact of LB could be observed in the lives of three families living in the LB sectors. The chapter further explores why some children did not become readers after assignment to LB. and what enabled other students to make significant gains in their reading skills.

DATA COLLECTED

- Qualitative Observations, Interviews, Conversations in 4 communities in Rwanda.

KEY FINDINGS

- Poverty is not an insurmountable barrier to providing children time to engage in reading.
- Caretaker and family attitudes and habits play a critical role in student's interest and engagement in reading.
- Religious motivations for reading can be important drivers for the spread of literacy.
- The impact of Literacy Boost was most obvious in the increase of reading materials.
- Challenges to sustainability, specifically in the provision of reading materials and the continuation of community activities, exist even before the phase out from LB sectors.

DISCUSSION & IMPLICATIONS

- Community activities are important to address learning issues.
- Systematic investments that involve multiple actors/agencies are recommended to address the issue of a lack of readers.

Secondary analysis of the baseline data collected in the homes and communities of children participating in the reading assessment found that children's reading skills and the 'Literacy Ecology' of children were significantly intertwined (Friedlander, 2015). The Literacy Ecology encompasses the physical spaces in which a child lives, the beliefs, expectations, and practices around reading and writing of people in the child's daily life, and the child herself.

The five factors of the Literacy Ecology emerged from a host of variables gauging the literacy environment of the child, the interactions that child had with reading materials and/or other readers, and the child's own interest in reading. In rural Rwanda, those five factors are

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1) Literacy Interactions in the Home,
2) Literacy Competency of the Caretaker,
3) Reading Materials,
4) Religious-related Reading Activities and,
5) Child Interest/ Engagement in Reading Activities

Using qualitative data collected in homes and communities, this chapter serves to enrich our understanding how LB impacted children's Literacy Ecology. Through the analysis of data generated from observations and interviews gathered and conducted in November 2013 and December 2015, this chapter will answer the following questions:

- What were the reading abilities of the children participating in the ethnography?
- What culture exists in homes and communities around reading in Rwanda two years into Literacy Boost intervention?
- If the culture of reading observed in homes and communities at endline is qualitatively different, is there evidence that Literacy Boost encouraged that change?
- What other interesting factors or trends emerged from the data that had to do with literacy and learning?

We answer these questions with the help of four Rwandan children: Jolly, Flora, Marie, and Daniel (all pseudonyms). These four children all participated in the LB reading assessment in Primary 1 in 2013 and again in 2015. Jolly did not experience any of the LB activities as she lived in a sector assigned to the Control group. The other three children lived in LB sectors. Jolly and Flora were randomly selected to participate in the baseline reading assessment, and their families agreed to participate again at endline. Daniel and Marie were purposively selected at endline. The purpose of the new endline sample was to explore why one of these children demonstrated noteworthy gains in reading skills over the course of two years while another continued to struggle to read. All of these details, and more information about the procedures used in this sub study, are described in much greater detail in Chapter 4.

We organize the very complex qualitative dataset primarily around the five factors of the Literacy Ecology. We first begin with a brief review of the findings from baseline. We then give an overview of the children's families and homes as well as the reading abilities of the children. Following student reading abilities, we look for evidence of the five factors of the Literacy Ecology in the lives of Jolly, Flora, Marie and Daniel. The evidence concerning each factor is presented in separate sections. Each of the five sections about the LE factors is organized as follows:

1) Factor description and baseline findings,
2) Evidence of the factor
    a. from Jolly's home,
    b. from Flora's home,
    c. from Marie's home,
    d. from Daniel's home,
    e. in the wider community.
3) Summary and discussion of the factor findings,
4) Evidence of LB impact on the factor.

Following the review of the factors, we present additional trends or interesting observations that do not fit neatly into the factors of the Literacy Ecology, again highlighting areas of probable LB impact. Finally, we synthesize and discuss all the findings, summarizing and incorporating them into the existing research literature. We conclude with some final reflections and suggestions for further study.

8.1   Overview of Baseline Findings

Findings from the baseline ethnography highlighted two very different roles that literacy played in the lives of Flora and Jolly, two children living in rural areas of the Gicumbi district in Rwanda. In Flora's household, the observer, MT, did not observe literacy and learning as high priorities for Flora's family. Despite emphasizing that literacy could improve their lives and the lives of their children, there was little overt evidence that Flora's parents, neither of whom progressed past the lower primary levels, supported Flora's learning. This was evident in the lack of literacy materials in Flora's household, and the fact that Flora spent most of her free time performing chores to help the family survive. Reading was generally thought of as an activity limited to school, and was never observed during MT's observation at baseline.

In contrast to Flora, Jolly lived in a household that clearly placed great value on the ability to read and the improvement of reading skills. Jolly's father was a primary school teacher and her mother consistently encouraged Jolly to read. The value placed on education was evident by the number of educated older siblings Jolly had, some of whom had finished University. Through the regular employment of her father, Jolly's family had enough spare resources to invest in reading materials. Given both the materials to read and older readers to emulate, reading played a larger role in Jolly's life than in Flora's life. During the weeklong observation, MT observed that Jolly had multiple opportunities for interaction with reading, through exposure to print material in the home, reading and writing with family members and playing games that required literacy skills. Older family members, as well as the children themselves, discussed higher aspirations for the future.

Aside from Flora and Jolly, one noteworthy observation occurred in the communities surrounding the girls' home. MT noted that an alternative system of communication, one that did not use letters and words, was in use and widely understood in the community. This system consisted of symbols and memorization and was used in lieu of conventionally printed signs and announcements during daily activities. One example of this system was a particular variety of leaf, attached to the exterior wall of a home. This leaf could be 'read' as 'Banana Brew for Sale: Inquire Within'.

8.2   Participants' Families, Homes, and Time Usage

Before launching into the findings of the factor-by-factor analysis of the ethnography data, we provide a broad overview of the participants' lives and surroundings.

Jolly & Her Family

Jolly and her family lived in a sector assigned to the Control group, and was one of the two girls randomly selected to participate at baseline. Jolly's father was a teacher, and her mother engaged in subsistence farming. Jolly was the sixth of seven daughters. Her two eldest sisters had graduated from university. Living in her home at the time of endline observation were nine people: Her parents, sisters, and one person who provided domestic help to the family.

The house was located in the center of an *Umudugudu*[46], and was accessible by a drivable-road so a car was able to stop in front of the house. The distance from Jolly's home to her school was about half a kilometer and it took Jolly less than 10 minutes to walk to school.

It was a wooden house plastered with clay soil and appeared clean. Behind the main house was another separate house that was not inhabited. Jolly's mother explained that they built it to store crops during harvest or to house

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[46] *Umudugudu* is a Kinyarwanda word that means a planned settlement.

visitors. The rooms in which Jolly's family lived and used day-to-day were well lit and spacious in comparison with the average dwellings in the village.

The house was surrounded by fruit trees, and had a rain-water catchment system. The family had built this system to collect rainwater in underground cisterns where it could be used as necessary for the family and the cattle that the family owned.

Jolly spent the majority of her time during the observations in play, with MT estimating that about six hours per day were spent in leisure activities while four were spent in chores. Jolly's playmates included her sisters as well as children from the *Umudugudu*. Jolly was responsible for washing dishes, cleaning, and helping her mother and family to harvest vegetables they had grown. As of December 2015, Jolly had completed the Primary 3 school year.

Flora & Her Family
Flora and her family lived in a sector assigned to participate in Literacy Boost, and was the other girl who was randomly selected for the baseline ethnography. Flora's father and mother provided for their family through subsistence farming, and at times Flora's father would buy crops locally to resell at the market and make some profits. Flora was the eldest of three children, and was the only daughter (i.e. she had two younger brothers). Flora lived with her with parents, her grandmother, an aunt, and her two little brothers.

Flora's home was situated on a steep hill. It took a fifteen-minute walk from the nearest drivable road through a narrow, steep trail to reach Flora's home. Her home was very isolated in comparison to Jolly's home. The distance from Flora's home to her school was approximately 2.4 kilometers, and takes her about 40 minutes to walk

The home comprised three rooms, the parents' bedroom, a living room, and a small room that served as the children's bedroom. The living room in Flora's home doubled as a storage room. However, at the time of endline observation, the house was in a bit of disrepair, due to a fire that had occurred previously during the year. The wood used to construct the house still bore the scorch marks of this fired and reeds were being used to temporarily cover the house until a more permanent roof could be purchased and installed.

Flora's home had an avocado tree growing in the yard and also had a shed, where they kept her grandmother's cow.

During the baseline, it was clear that Flora had a lot of work to do: she fetched water from down in the valley, collected firewood, gathered grass for her grandmother's cow, and cooked. A day prior to the endline observation, Flora had gone to the dentist to have two teeth extracted. During the observation period, her family reduced the chores she normally performed. MT estimated that she spent about six hours a day doing chores. As of December 2015, Flora had completed the Primary 3 school year.

Marie & Her Family
Marie and her family lived in a sector assigned to the Literacy Boost treatment. She was one of the two new students included for observation at endline. She was selected because her endline reading assessment showed very little improvement in her reading abilities after two years, despite being assigned to Literacy Boost. Her parents provided for Marie and her siblings through brewing local beer and running a bar out of their home. Marie was the fourth of five children. The two eldest children in the family were boys, followed by three girls. Marie's older sister was in upper primary, and she also had a little sister.

Marie's home was located in the center of an *Umudugudu*. As such, there were many neighbors in close proximity, similar to Jolly's *Umudugudu*. She lived less than a kilometer from her school.

Her home had five rooms, with cement floors, wood ceilings, and electricity. The rooms were well lit and considered spacious by local standards. Marie's family was one of the richer families in her *Umudugudu*.

Banana trees surrounded the house, and the home had a water catchment system to collect rainwater, similar to Jolly's home. As mentioned earlier, the home also doubled as a bar. During MT's first observation, there were around 20 patrons in the bar at MT's arrival. Many of the patrons also had children with them, providing a very lively/noisy atmosphere to Marie's living room. The TV contributed to the noise, and played music videos with adult themes that MT judged inappropriate for many of the younger children, including Marie. MT also noted that, judging by the clothing and cleanliness of the children, the poverty levels in the *Umudugudu* seemed high. Children wore ragged clothing and appeared to be unwashed, even early in the morning when typically children in rural areas do not look so unkempt.

The home also had a water catchment system (similar to Jolly's) and electricity.

Marie had considerable free time. MT estimated that she played about 6 hours a day, and did chores for another four. Those chores included harvesting food from the family garden and cooking with her sister.

MT noticed that Marie, who was nine years old, played with children who were a few years younger than she was. MT noted that children usually played with their age mates. However, when talking to Marie, MT did not notice anything unusual that might suggest she was developing more slowly than her age mates. As of December 2015, Marie had completed the Primary 2 school year.

Daniel and his family
Daniel and his family lived in a Literacy Boost sector, and was the other child newly sampled to participate in the endline assessment. He was purposively selected as he showed solid improvement in his reading skills between baseline and endline. His parents provided for their family primarily through subsistence farming, which his father supplemented with basic shoe and electrical repair work. Daniel was the youngest of five brothers. The three eldest brothers had dropped out of primary school before P.6; two lived in another district of Rwanda, and one lived in a separate house that Daniel's father had built for him. Daniel's fourth brother lived with Daniel and their parents in the same home. This brother had just finished P.6 and was waiting for the results from the National Primary Leaving Exam, which he had taken two months prior to the observation period.

Daniel lived on a hillside, just outside an *Umudugudu*. His home therefore was not as centrally located in relation to his village as was Jolly's home and Marie's home. However, his home was not as isolated as Flora's home. He lived less than 0.5 kilometers to his school, and his home was easily accessible by car.

Daniel's home was simple, with mud walls and a corrugated iron roof. The rooms in his home were small, with small windows that did not provide much light.

Daniel's home had a shed where the family kept cattle that were zero-grazed, meaning that Daniel and his brother were responsible for collecting all the food and water that the cow would eat. Daniel spent about 4 hours a day performing chores, including cooking and cleaning, and had about 5 hours of leisure time. As of December 2015, Daniel had completed the Primary 2 school year.

Image 9: Daniel's Home

Photo credit: Dr. Michael Tusiime

All of the information above is displayed in tabular form below. Table 50 describes the four children who participated in the endline ethnography, basic features of the children's family, home, and how the children spend their time.

Table 50: Tabular comparison of the 4 families: LB Participation, Family, SES, and Time Usage

Name of Focal Child	Jolly	Flora	Marie	Daniel
Age (years)	9	~10	9	9
2015 Primary level	P.3	P.3	P.2	P.2
LB or Control	Control	Literacy Boost	Literacy Boost	Literacy Boost
RAW attendance	No RAWs in Jolly's sector	Mother: Yes; Father: a few	Mother: Yes; Father: No	Mother: Yes; Father: Yes
RC attendance	No RCs in Jolly's Sector	Yes	Yes	Yes
Last RC Attended?	No RCs in Jolly's Sector	Data not collected	Data not collected	1 month prior to the observation
Number of Siblings	6	2	4	4
Persons living at home	Total: 9 -- Parents (2); Big Sisters (5), Little Sister (1); Domestic Help	Total: 6 -- Parents (2); Younger Brothers (2); Grandmother; Aunt	Total: 6 -- Parents (2); Older Brothers (2); Older Sister; Younger Sister	Total: 4 -- Parents (2); Older Brothers (2);
Source of Family Income	Farming; Primary Teacher Salary; National Examiner	Subsistence Farming; Buying & Reselling Crops	Subsistence Farming, Beer Vendor, Bar keeping, Construction	Subsistence Farming; Side work in radio/shoe repair
SES comparatively	Rich	Poor	Rich	Poor
Play & Work time	~6 hours play; ~4 hours work	~4 hours play; ~6 hours work	~6 hours play; ~5 hours work	~5 hours play, ~4 hours work
Type of Chores/Work	Washing dishes, cleaning harvesting farm produce	collecting grass for livestock, cooking, fetch water, collect firewood	Collecting food from the garden, cooking with elder sister	Fetching water, collecting grass for livestock, cooking, cleaning
Physical Location	Rural Umudugudu	Rural, isolated hillside	Rural Umudugudu	Rural hillside close to *Umudugudu*
Distance to School	~0.5 km	~2.4 km	~0.8km	~0.4 km
Distance to Market	~1 km	~2.5 km	~1 km	~1 km
Distance to Town	~3 km	~30 km	~6 km	~5 km

Table 50: Tabular comparison of the 4 families: LB Participation, Family, SES, and Time Usage (continued)

Name of Focal Child	Jolly	Flora	Marie	Daniel
Access to Home	Very easy – car can drive directly to it	Difficult – requires a 15-minute walk uphill from the main road	Car can drive directly to it but road is difficult to drive, & slippery during the rainy season	Easily accessible by road
Features of the home	Fruit trees. Rainwater catchment system. Cows are fed, not grazed.	Avocado fruit tree below the house. House had caught fire prior to visit.	House surrounded by banana trees. Home has a television. Living room is also a local bar. Rainwater catchment system.	The home is not as central as Marie and Jolly, but not as isolated as Flora
N of structures at home	4	3	3	2
Use of Structures at home	1) Family Home, 2) Kitchen, 3) Cow Shed, 4) Guest House	1) Main House & Kitchen, 2) Grandmother's home, 3) Cow Shed	1) Main House, 2) Cow Shed, 3) Kitchen	1) Main House, 2) Kitchen
Roof & Walls	Iron Sheets; Wood and Clay	Iron Sheets; Mud	Iron Sheet; Sun-Dried Bricks	Iron Sheets; Mud
N of Rooms	8	4 (main house only)	5	4
Room Usage	Living Room, Parent Bedroom, Girls' Bedroom; Storage; Kitchen	Living Room, Parent Bedroom, Children's Bedroom, Kitchen	Living Room, Parent Bedroom, Boys' Bedroom, Girls' Bedroom, Storage, Kitchen	Living Room, Parent Bedroom, Children's Bedroom, Kitchen
Lighting	Well-lit	Poorly lit	Well-lit with electricity	Poorly lit. Windows very small
Floor	Cement	Mud. Dry and well maintained.	Cement	Mud. Dry and well maintained.
Room Size	Spacious	Small	Spacious	Very Small
Ceiling	Cardboard	Reeds (temporary due to a fire)	Wooden	None

RAW = Reading Awareness Workshop; RC = Reading Club; SES = Socioeconomic Status; ~ = estimated; km = kilometers

8.3   Literacy Skills of the Observed Children

Jolly's Literacy Abilities

Jolly's reading and writing skills were strong in 2013, and have improved since then. She does not make mistakes in her spelling, and can even write out the words one to ten in English (see Image 10). She also wrote out random words and sentences, like *abana* [children] and *gusabana* [to socialize]. She uses a cursive script but with characters that stand upright rather than slanting forward[47]. Jolly also demonstrated her reading abilities, unprompted, within the first few minutes of MT's arrival on the first day. As MT and her mother were discussing the research and informed consent, Jolly insisted on reading the consent form aloud. Though she read slowly, she read the first paragraph of the consent form correctly.

Image 10: Jolly Writing in MT's Book in 2013 (left) and Jolly's Writing Sample in 2015 (right)
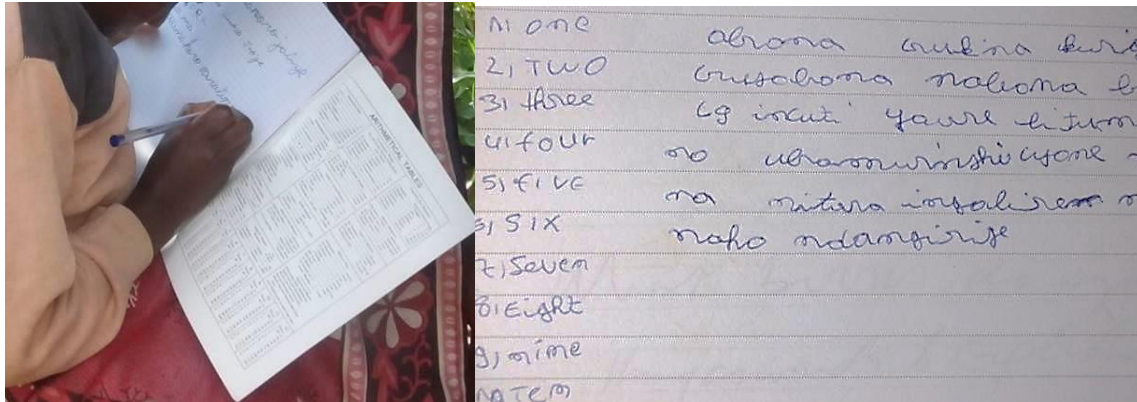
Photo credit: Dr. Michael Tusiime

Flora's Reading Abilities

There were marked improvements in Flora's reading and writing ability in 2015 when compared to 2013. At baseline, Flora did not read any text aloud. At endline, when asked to read a few lines of a storybook that she showed to MT, she read two pages. Her writing also improved: at baseline, she tried to write the alphabet but clearly mixed up or did not understand the distinction between certain letters. Image 11 provides side-by-side samples of Flora's writing during baseline and endline observations. In the endline data, she wrote complete words and sentences at endline such as "Ibisuguti biraryoshye. (*Biscuits are very tasty.*)" and "Imbwa yawe iraryana. (*Your dog bites.*)". Flora uses a cursive, slanting handwriting that was the norm for students just a few years ago, with small letters that are at times hard to decipher.

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[47] According to MT, during recent curriculum revisions, a debate in Rwanda has emerged about the proper way for children to learn to write. Current thought is to move away from a slanting cursive script towards a more legible, upright script.

Image 11: Flora's Writing Sample in 2013 (left) and in 2015 (right)
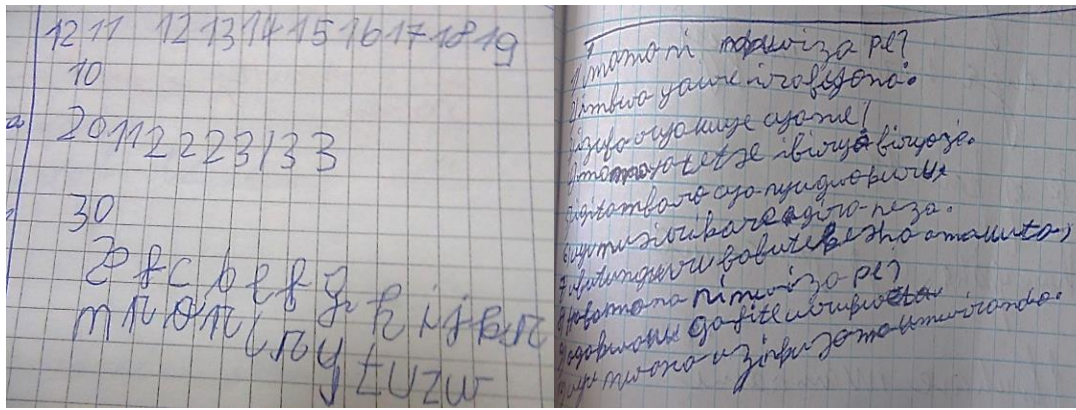
Photo credit: Dr. Michael Tusiime

Marie's Reading Abilities

Marie's reading and writing skills were well below the expected level of a student who had just completed P.2. Marie could not read or write basic words nor differentiate between letters of the alphabet. When asked to read one line on the consent form, Marie seemed shy and looked away, never reading a word. Image 12 displays the difficulties Marie encountered in her attempt to write the letters 'a', 'b', 'k', and 'n'.

Image 12: Marie's Writing Sample
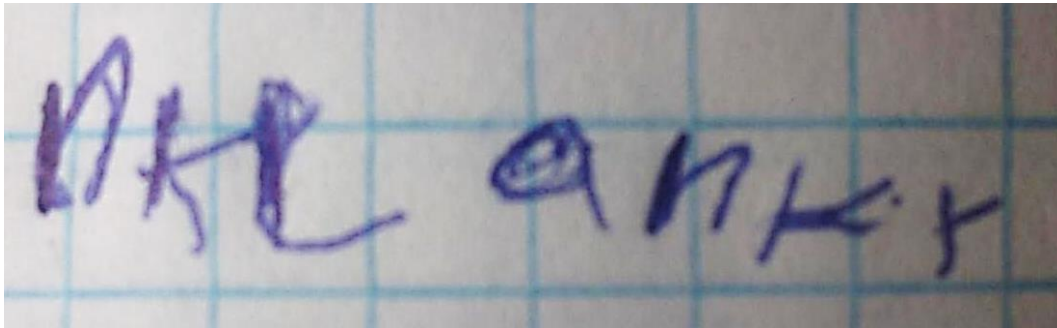
Photo credit: Dr. Michael Tusiime

Daniel's Reading Abilities

Daniel's reading and writing skills were reasonable for his age and primary level. He was observed reading pages from the Bible silently (hence fluency could not be gauged). When MT asked him to write, he produced the text seen in Image 13. Daniel is able to form clear letters of the alphabet and though the words are not spaced correctly and he does not use capital or lowercase letters consistently or according to normal usage, his spelling is mostly accurate and he uses the upright style of writing letters.

Image 13: Daniel's Writing Sample[48]
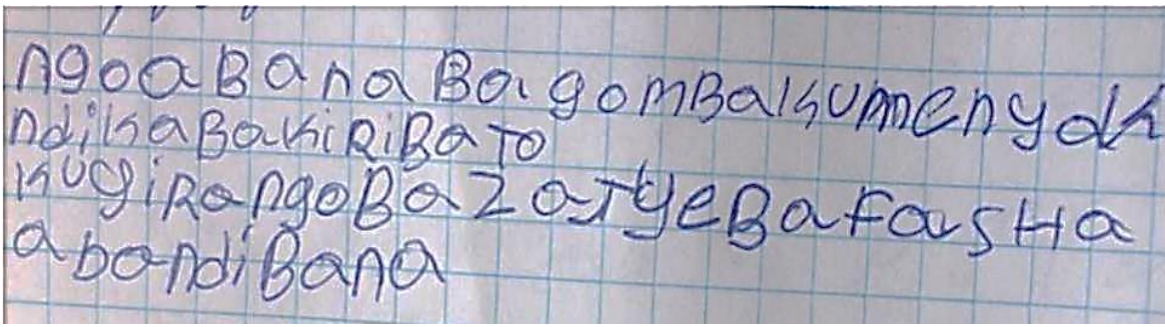
Photo credit: Dr. Michael Tusiime

8.4   Literacy Interactions in the Home

8.4.1   Description of the Factor and Baseline Findings

The factor of Literacy Interaction in the Home indexes the various oral language and text based habits and interactions in which a child is engaged in with his or her family members. This includes reading with other family members as well as the independent reading, conversations that build oral language abilities and vocabulary, and help with homework or encouragement to study.

In the baseline, Jolly's home ranked highly on the literacy interactions factor; her family was constantly in conversation and did not tolerate laziness in regards to reading.

Flora's home, on the other hand, ranked extremely low, with no conversations between adults and children. It seemed that the lack of literacy activities observed in the home in 2013 was due to a combination of three factors: low literacy skills of both parents, a lack of time to participate in literacy activities due to household work, and a lack of resources to purchase reading materials.

For more on the baseline findings, refer to Tusiime, Friedlander, & Malik (2014) and Friedlander (2015).

8.4.2   Literacy Interactions in the Home at Endline

Jolly's Home

Similar to 2013, Jolly's family engaged in many literacy activities in 2015. Literacy rich experiences such as storytelling, and high expectations from her parents and elder siblings continued to influence Jolly's perception of literacy and learning in general. Jolly joined her family members in discussions and games that involved literacy skills. Jolly specifically mentioned how she and her family members all read books together. And Jolly's parents maintained their pressure on Jolly and Jolly's siblings to succeed in school.

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[48] When MT asked Daniel to write something, Daniel hesitated. MT suggested he write the answer to the question, "Kuki abana bakagombye kumenya gusoma bakiri bato? (*Why do you think young people should know how to read when they are still young*?". Daniel wrote, "Abana bato bagomba kumenya gusoma bakiri bato kugira ngo babashe gufasha abandi bana kumenya gusoma. (*Young children should know how to read when they are still young so that they can help other children.*)"

Flora's Home
At endline, there was evidence of at least some literacy related interactions. During the observations, Flora's grandmother told many stories, displaying her talent for storytelling, and told MT many stories. Her stories ranged from her glorious past as a daughter of a village chief, to weaving mats as a past time when they were teenagers, to her current state as *"u*mukyecuru ushaje utabasha kugenda ahantu harehare *(an old woman who cannot travel long distances)".*

MT observed Flora reading a book aloud, but this was likely inspired by MT's presence and Flora's desire to show off her new skills. After Flora finished reading aloud from a book that she borrowed from the Umuhuza Book Bank, her mother stated,

> Sinigeze ngira impungenge igihe wamusabaga gusoma kiriya gitabo. Aragikunda kandi rimwe na rimwe agisomera musaza we mutoya.
> *(I was not worried when you asked her to read that book. She likes it and sometimes reads it to her young brother.)*

The last few words of this quote suggest that significantly more interactions were taking place in the home. Later, Flora's mother told MT about how excited Flora was to attend the Reading Clubs that Umuhuza supported in the villages, and to borrow books. This had an impact on the home because Flora brought the books home, even during school holidays, and was constantly relating the stories in those books to her family. Her mother, grandmother, and aunt enjoyed the stories as well and joined in the children's laughter, inspired by the books.

> Baraseka cyane iyo barimo gusoma ndetse natwe bikadusetsa iyo batubwiye kuri utwo dukuru.
> *(They laugh a lot when they are reading and we also laugh when they tell us about those stories.)*
> - Flora's Mother

Marie's Home
Marie's home had very few positive habits or interactions related to literacy that MT could observe. The conversation and interactions in which MT engaged did not suggest that Marie's father was concerned with her learning. When asked how he interacted with Marie during reading tasks, Marie's father responded*:*

> Uruhare rwange ni ukubagurira ibitabo. Inshingano y'abalimu ikaba kubigisha.
> *(My role is to buy them books. The responsibility for the teachers is to teach them.)*

Unsurprising given her writing abilities and her refusal to read, Marie did not read any books during the home visits. She told MT that previously she had borrowed books from Umuhuza, but when MT asked her parents about the book borrowing, they had no knowledge of it. This was further proof that Marie's parents did not engage in literacy interactions with Marie.

Although he did not witness any literacy-related interactions himself, MT did find evidence of literacy interactions occurring between Marie and her siblings. However, the evidence was rather negative. Marie's sister reported that Marie resisted her sister's help. The only individuals who could teach Marie, according to Marie sister, were her older brothers.

> Iyo mwigisha, arabyanga akavuga ko ntari umwalimu we. Ababyeyi bange bahitamo ko bakuru bange baba ari bo bamwigisha kuberako bo bamukanga.

(When I teach her, she refuses and says I am not her teacher. My parents decided that my elder brothers should teach her instead because they threaten her.)

- Marie's Sister

While this quote suggests that there are at least some interactions going on (under threat of violence), no literacy related interactions, negative or otherwise, were observed during the home visit.

Daniel's Home

Literacy activities are given great importance and occur frequently in Daniel's home. One of the family's positive literacy routines was setting aside a specific time to spend together on important activities, including reading and literacy related activities.

> Tugira igihe cyo gukora ibintu tubona ko ari ingirakamaro muri uru rugo. Tugomba gukora nibyo, ariko nanone tugira igihe cyo kwicara hamwe tukajya inama.
> *(We normally have time to do things we consider to be important in this home. We have to work but we also have time of sitting together and sharing ideas.)*

- Daniel's Father

Daniel's mother helps in their learning by encouraging "gusuzuma amakayi yabo nyuma yo kuva kwishuri (*them to check their books after they have returned from school*)".

Interestingly, 'checking their books' does not have the same meaning as 'checking homework'. Rather, it seems to mean 'looking for the marks that the teacher has given the child'. This was evident in his mother's later comment:

> Ndetse Daniel we njya namukanga cyangwa hakaba n'ubwo mukubita iyo mbona ko we na mukuru we barimo gutakaza igihe mu masaha ya nimugoroba. Simbasha gufasha Daniel gukora umukoro we wo murugo ariko mbasha kubashishikariza kwiga iyo mbagabanyiriza imirimo yo mu rugo bityo bakagira igihe gihagije cyo gusoma.
> *(Sometimes I even threaten or actually spank Daniel when I realize that he and his brother are wasting time during evening hours. I am not able to assist [Daniel] with his homework but I am able to encourage them by reducing their workload at home so that they have enough time for reading.)*

Therefore, while she checks his books regularly, Daniel's mother assists her children learn by primarily by reducing their workloads at home or through corporal punishment. As MT observed, this extra time in Daniel's day was put to good use. They usually spent their leisure time reading or rehearsing answers from religious books.

Daniel's 17-year old brother, who dropped out of school, recalled having observed literacy activities in the home growing up and the positive impact that this had on him.

> Papa arasoma cyane. Ntari nava mwishuri yajyaga ampa ibitabo byo gusoma ndetse, nashoboraga kwiha ibitabo yabaga yarasomye kugirango nange mwereke ko nzi gusoma bityo, buhoro buhoro niga gusoma amagambo amwe n'amwe.

(My father reads a lot. Before I dropped out of school he used to give me books to read or I could also pick books that he had already finished reading to impress him and slowly I learned how to read some words.)

- Daniel's Brother

Daniel's home was the only one of the four participating families where three people were observed reading simultaneously: one evening Daniel read a Bible silently while his 17-year-old brother leafed through a pamphlet from a local church and his 13-year-old brother rewrote questions and notes from school, despite the school year having finished (see Image 14). This brother, who was awaiting results from the national Primary School Leaving exam, explained that he was copying the questions for Daniel's use in the future and also said that he regularly helps Daniel with reading tasks.

Image 14: Daniel's 13-year-old Brother Copies Questions into Daniel's Notebook
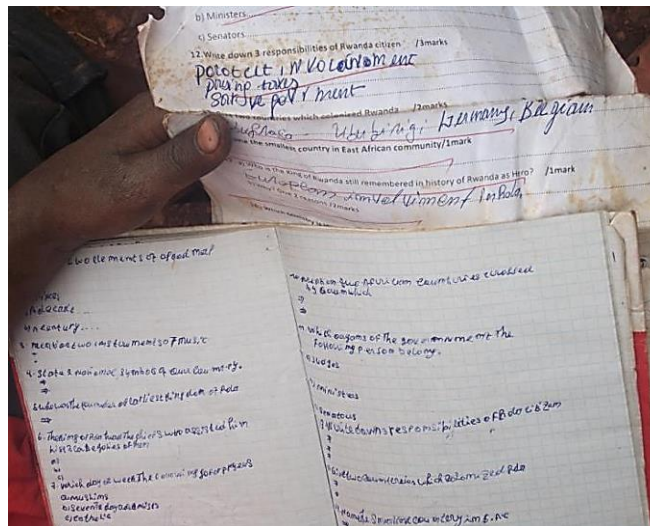
Photo credit: Dr. Michael Tusiime

Daniel's father reported that the boys have regular routines and time set aside for reading. However, it is not clear how *much* time the boys read each evening; without electricity to power lights by which to see, reading may be difficult. Indeed, Daniel reported that the family sometimes went without lighting fuel for two days. And, added Daniel, even when there was fuel, the light generated from the kerosene lamps did not provide enough light to read by.

In the Wider Community

A few of the conversations MT had indicated that Literacy Interactions were taking place in other homes and in some communities. Focusing first on the Interactions in other homes, there is conflicting evidence of the quality or amount of interactions occurring around literacy. The Reading Club Volunteer in Flora's community spoke of the importance of good modeling for children's learning to read.

Iyo umwana wange ambona nsoma bibiliya I Muhira, nawe azana bibiliya maze akamera nk'urimo gusoma. Icyo rero nicyo gihe imyifatire nyayo n'amatsiko yo gusoma bitangirira.
(When my child sees me reading the Bible at home, she also holds the Bible and pretends to read. That's the time when a positive attitude and curiosity for reading begins.)

- Reading Club Volunteer

While this Reading Club Volunteer mentioned the positive role that parents play, Daniel's brother discussed how some parents' negative attitudes actually reduced the amount of reading or reading interactions in the community.

> Hari ababyeyi nzi babaza abana babo niba nta kindi kintu bagira cyo gukora cyaruta guta igihe mu gusoma ibitabo gusa.
> *(I know parents who ask their children if at all they don't have anything else to do which is better than wasting time in reading books only.)*
>
> - Daniel's Brother

Turning our focus to Literacy Interactions in the community, there was little to say about reading habits or interactions in the wider community within the dataset. The exceptions to this are the Reading Clubs within the Literacy Boost villages, and religious reading activities described below. This lack of regular activities, broadly accessible to the community at large, speaks to the need for Literacy Boost in the project areas, if not more broadly across Rwanda. If children are to learn to read, they need positive role models and fun activities to engage them in reading.

8.4.3   Literacy Interactions Factor: Summary of Findings and Evidence of LB impact
Summary
The evidence gathered at endline presents a wide range in terms of literacy interactions in the homes of participants. As MT observed in Jolly's home, her family continues to enjoy a high degree of literacy interactions. In the sample of three Literacy Boost families, the findings were somewhat more mixed. First, there are the longitudinal observations that show Flora engaging in a few literacy-related interactions over the course of the three-day observation. This is a positive change from baseline, when MT did not observe any literacy related interactions over the course of an entire week.

For the new students included in the endline observations, the interactions at home offer possible explanations as to why one remained a struggling reader while the other was quickly becoming a skilled reader. The father of Marie, the struggling reader, actively espoused the belief that the teacher is the only one responsible for teaching Marie, and the only interactions reported (those happening with her siblings) occur under the threat of violence. Conversely, the interactions observed in Daniel's home correlate very well with the improvement in his skills over time.

Evidence of Impact
For Marie and Daniel, the impact of Literacy Boost is somewhat ambiguous. Daniel was observed reading religious materials, not materials procured from the village Book Banks. And the strong press for achievement exerted by his parents was not overtly tied to lessons the parents had learned from Umuhuza.

For Flora, the positive impact of LB is remarkable. She borrows books, brings them home, reads them to her brother, discusses them with her mother and grandmother, and the whole family derives great satisfaction from the books. Without LB, and the access to materials that she can freely take home, none of these reported interactions would have occurred.

8.5   Literacy Competency of the Caretaker
8.5.1   Description of the Factor and Baseline Findings
The second factor, Literacy Competency of the Caretaker includes, among others, two observed variables on whether the responder is literate enough to read and sign the informed consent form. Competency also includes whether the caretaker reported that he/she learned to read from his/her teacher.

At baseline, Jolly's father ranked highly on the competency factor, despite the fact that MT only met him for a few brief minutes in 2013. He ranked highly because he was a teacher, and evidence suggested that he required that his children learn to read from young ages. In addition to the literacy activities required of a teacher, he also served on the national examination board, marking national exams for students around the country.

Jolly's mother was reasonably competent in literacy, as she read and signed the consent forms provided without assistance. Another indication of her competency was the fact that she served on the Sector committee in charge of social affairs (see Chapter 2 for more on the Sector Council).

Both of Flora's parents reported that they can read and write. But the observational and interview data suggest that they possess a meagre competency in literacy at best. In 2013, although Flora's mother signed the consent form, she was unable to spell her daughter's name correctly on the cover of her notebook. Speaking of her ability to help her children with homework Flora's mother said:

> Biga ibintu byisnhi ntazi. Ntagigiransa cyngwa ikyongereza nzi.
> *(They study a lot of things that I don't know. I don't know French or English.)*

When MT suggested that she help Flora when they work in Kinyarwanda, a language she spoke fluently, Flora's mother said:

> Hashize igihe kirekire mvuye mwishuri. Hari amagambo ankomerera kuba nayasoma.
> *(It has been long since I dropped out of school. There are some words that are difficult for me to read.)*

Her father told MT in 2013 that his children had never seen him read anything, and that he had only completed P.2.

For more on the baseline findings, refer to Tusiime, Friedlander, & Malik (Tusiime et al., 2014) and Friedlander (Friedlander, 2015).

8.5.2   Literacy Competency of the Caretaker at Endline
Jolly's Home
No new data was explicitly linked to the literacy competency of the caretaker at endline in Jolly's home.

Flora's Home
Some new data suggests that Flora's father's claims of attending school through P.2 may not be totally reliable. During conversations at endline, he reported that he attended some primary school, at one point reporting that he completed P.2, and at another pointing claiming he completed P.4, and at yet another point stating he only attended through P.1. Data from 2015 did not provide any indication of literacy competency of Flora's father, who avoided any writing opportunities that arose during the observation.

Marie's Home
Both of Marie's parents can read and write. Her mother and father studied up to P.3 and P.8, respectively. There was only a little evidence that they possess any competency in literacy. That evidence was the bar tab that her parents kept to track customer payments and debts. However, since no literacy interactions were observed between family members in Marie's home during the observer's visits, and there was no other evidence to suggest that Marie's caretakers possess a high degree of literacy competency.

Daniel's Home
Daniel's mother did not show any real evidence of any degree of competency in literacy herself. Although she claimed to know how to read, she did not sign the informed consent form herself. In fact, when MT asked Daniel's mother to sign the consent form, she in turn asked him to sign it for her. She told him later that that she learned how to write back in 1985 in *Ikibeho*, a women's non-formal school. However, very similar to Jolly's mother, Daniel's mother did report that she exerted significant pressure on Daniel and his brother's to succeed in school.

Daniel's father, meanwhile, could read and write in Kinyarwanda, and also reported that he knew how to read French.

> Nzi gusoma igifaransa kandi mbasha kwigisha abana banjye gusoma amagambo amwe n'amwe y'igifaransa. Vuba aha, Baherutse kumbwira ko batangiye kwiga igifaransa kandi nabashije kubafasha gusoma amagambo amwe n'amwe mu gifaransa.
> *(I know how to read French and I am able to teach my children to read some French words. Recently they told me that they started learning French and because of that I managed to help them read some words in French.)*
>
> - Daniel's Father

Daniel's 17-year-old brother confirmed his father's competency in literacy, discussing how he remembers how his father was always reading throughout the 17-year-old's childhood.

In the Wider Community
The Head Teacher at Marie's school reported that extremely low numbers of parents can read:

> Hafi 90 ku ijana y'ababyeyi bacu ntibazi gusoma kandi dufite gusa 10 ku ijana y'abize neza. Ababyeyi bize neza bashobora gufasha abana gusoma no kwandika umukoro, mugihe kandi baba bahuze, bakaba bashora nibura kubagurira ibikoresho by'ishuli. Abo bagize 90 ku ijana biragoye kubumvisha ibyiza biva mu burezi, ndetse no mu gusoma no kwandika by'umwihariko.
> *(Almost 90 percent of our parents don't know how to read and we only have 10 percent who are literate. The literate parents can help children to read and write their homework, even when they are busy, they can at least buy scholastic materials. For those who make up the 90 percent, it's hard to convince them about the benefits of education and particularly reading and writing.)*

This Head Teacher said that most parents in his community consider themselves as providers of scholastic materials at best and consider teachers as the only individuals responsible for their children's learning. This all points to rather low literacy competency of caretakers in the wider community.

MT heard something similar from Flora's father at endline. MT asked about how parent's difficulty to read or inability to read may affect children. Her father responded that such inability to read has a negative impact, and that most parents regret it. According to him, children feel bad when their parents are unable to help them with minor literacy activities like homework and parents may feel inferior about their inabilities, especially in comparison to other parents who may know how to write.

There was another suggestion that parents' lack of competency in reading prevented them from fully participating in community reading activities. According to one person interviewed,

Hari ababyeyi batitabira gahunda zogusoma nokwandika zazanywe muri aka gace dutuyemo kubera ko nabo ubwabo batazi kwandika nogusoma.

(There are some parents who do not attend the reading and writing program that was introduced in our home area because themselves they don't know how to read and write.)

A Reading Club Volunteer also discussed a rather low literacy competency of caretakers, as she discovered when some unexpected individuals asked to attend the Reading Clubs.

Kuberako abana benshi bigiye gusoma no kwandika mu masomero y'umuhuza, dufite abantu bakuru nabo basaba kuza ariko ntidushobora kubashyira hamwe nabanyehshuri. Iyo abakuru baza kugira ibyumba byabo by'amashuli, byari kurushaho kuba byiza ku batuye muri aka gace.

(Because many children have learned how to read and write from Umuhuza reading clubs, we have adults also requesting to come but we can't mix them with children. If adults had their own reading classes, that would be better because they live in the same area.)

- Reading Club Volunteer

8.5.3   Literacy Competency of the Caretaker Factor: Summary of Findings and Evidence of LB impact
Summary
Caretakers demonstrated different levels of competency in regards to their literacy skills. On the one hand, the children with at least one caretaker who demonstrated high literacy competency were Daniel and Jolly, the two students that read with the most ease. On the other hand, Marie and Flora's parents did not demonstrate great competency. For Marie, this explains in part her struggles to read. Flora, however, was reading despite persistent evidence of a lack of literacy competency of her caretakers.

Evidence of Impact
There was no observable or suggestive evidence of any impact of LB on the Literacy Competency of Caretakers in this sample. This is actually an expected finding: LB provides children with support in the reading development, and only offers parents the knowledge and skills to support their children learn. Without direct instruction of the caretakers in literacy, it is not reasonable to expect a change in caretakers' Literacy Competency.

Nonetheless, there are suggestions that LB may have helped to offset the negative consequences that may result from a lack of caretaker competency in literacy. Flora made clear and definite progress in her reading. MT's discussion with her father provides some illumination behind possible reasons for her improvement. He reported that he attended some RAWs and that, as a result of the RAWs, parents like himself in the community generally know what they are expected to do for their children. The expectations on parents that Flora's father listed – providing them materials, checking their homework, and reading with them – are messages that Umuhuza spreads through its RAWs.

However, MT noted that this portion of the discussion seemed inauthentic, having a rehearsed feeling to it. MT's impression was that Flora's father was giving the 'correct' response, rather than what he actually believed. In other words, his knowledge had changed, but his attitudes and practices had not. MT's impression was reinforced by the fact that Flora's father did not report practicing the actions that he listed as important. For example, he said,

Nkunze kugira akazi kenshi kuburyo ntabasha kuba ndi na Flora iyo akora imyitozo bamuhaye kwishuri.

(I am always too busy to be with Flora when she is doing her school work.)

While one would hope that he would read to Flora every night following the RAWs, the rehearsed conversation described above is nevertheless a marked improvement from baseline, when he said that it is only the teacher's job to help the child to learn. The knowledge is getting out there; the trick is using that knowledge to change attitudes and practice.

In and of themselves, Flora's improved reading ability, and her father's endorsement of supportive practices for children's learning, are not enough to state categorically that LB can solve the challenges children face who have parents who lack competency in literacy. However, these two facts (Flora's improvement and her father's endorsement) do suggest that LB may provide support from skilled and knowledgeable readers in the community that Flora otherwise does not have at home, and helps parents to better know what children can do and how parents, regardless of their literacy competency, can help their children.

8.6   Reading Materials

8.6.1   Description of the Factor

The third factor, Reading Materials indexes the total amount of different types of reading and writing materials available at home, excluding religious print materials.

8.6.2   Reading Materials at Endline

Jolly's Home

At baseline, Jolly's home did not lack for literacy materials. There were books, photocopied books, chalk to write with and a smooth space at children's height for them to draw and write with the chalk. There was even a pile of papers on the floor of the family's latrine, although whether they were used for reading purposes or other purposes (or both) is unclear.

In 2015, her home continued to be relatively full of things to read. Jolly's parents, particularly her father, created a print-rich environment for his children. The same books and chalk and other materials were still present in Jolly's home.

It was clear that Jolly's father continued to bring home reading materials for his children in 2015. However, Jolly expressed a desire for books with images, indicating a need for developmentally appropriate reading materials for children in the community:

> Nsoma ibitabo by'icyongereza n'iKinyarwandarwanda. Papa anzanira ibitabo byo gusoma. Ariko amashusho nkunda ibitabo birimo.
> *(I read English and Kinyarwanda books. My dad brings me books to read. But I mostly like books with pictures.)*

It is important to remember that Jolly family resides in a sector assigned to Control, and hence Jolly did not have access to Umuhuza-supplied Book Banks.

Jolly's father spoke about the importance of reading materials to the development of literacy skills among children:

> Nk'umwalimu n'umubyeyi, nagira inama ababyeyi yo gushyigikira abana babo babagurira ibitabo, udutabo duto two gusoma.
> *(As a teacher and a parent, I would advise parents to support their children by buying books, small books for them to read.)*

Jolly's father's advice was simple and straightforward, but the advice did not acknowledge the poverty in which many of his neighbors live. A teacher's salary alone is not enough to provide funds for discretionary spending on books. Jolly's mother said this explicitly:

> Mu byukuri ngurisha bimwe mu byo nsarura kugirango mbashe kugura bimwe mu bitabo bakenera ku ishuli. Umushahara w'umugabo wange ntabwo uhagije kugirango ibitabo.
> *(I actually sell some of the produce that I grow to buy some of the books they need at school. My husband's salary is not sufficient for the books. I try to save him the burden of worrying too much for family food and school requirements.)*

Flora's Home
Even if Flora could read at baseline, and even if she had time to read at baseline, she would not have read.

> Niyo bakagize umwanya wo kuruhuka ntabitabo babaga bafite ngo basome. Iyo biza kuhaba Flora yakabaye asoma nyuma yokuvoma.
> *(Even if they had ample time to rest, they would not have books to read. If books were available, she would be reading after bringing water.)*
>
> - Flora's Mother, 2013

In 2013, when asked if she had anything she could read, Flora needed several minutes to frantically search her home. After combing through every square inch of the house, she found what she was searching for wedged between two sacks of grain: her school notebook. This notebook, dusty, yellowing with age, wrinkled from the rain that fell during Flora's hour walk to school, and held together by some thread her father used after the cover fell off, was the lone reading material that Flora owned or had access, apart from her grandmother's Bible and a prayer printed on a sheet of paper.

When asked again, two years later, if she had anything to read, it took Flora a few seconds to run into her room and return with her book. This time, there was no faded, dusty notebook. In her hands was Igitambaro Cya Ngogokuru *(Grandmother's Scarf),* a brightly colored children's book that she was eager to read.

Image reproduced with permission from Furaha Publishers

Flora's parent had not purchased this book. Flora had borrowed it from a Literacy Boost Book Bank that Umuhuza had placed in her village.

Her mother believes that the newfound availability of reading materials have been essential to Flora's development of reading and writing abilities. This book's cover is shown in

.

> Mu gihe cyashize ntamwana waha wagiraga icyo asoma mu biruhuko. Ubu yabashije gutira kandi asoma ibitabo byinshi birimo udukuru duteye amatsiko ariko tutagira icyo twungura. Birirwa baseka iyo barimo gusoma ndetse natwe bikadusetsa iyo batubwiye kuri utwo dukuru.
> *(In the past, none of our children here had anything to read during holidays. At the moment, she has managed to borrow some books and reads many books with interesting and funny stories but she does not benefit otherwise from the reading. They keep laughing when they are reading and we also laugh when they tell us about those stories.)*
>
> - Flora's Mother, 2015

Marie's Home

Marie had access to books through Umuhuza and religious organizations. Marie's father noted,

> Imiryango nk'Umuhuza igenera abana ibitabo bibashishikariza gusoma.
> *(Organizations like Umuhuza provide children with books that encourage them to read.)*

---

[49] Igitambaro Cya Nyogokuru was written by Françoise Mukagatera, illustrated by Felix Seminega, and published by Furaha Publishers, with the guidance and assistance of the Rwandan Children's Book Initiative.

Despite her father's knowledge of the Book Banks available in the community, he was not aware whether Marie had borrowed any. Marie herself reported that she borrowed two books from a Book Bank, but could not remember the titles of the books. Asked whether she read the books, Marie responded that she only enjoys looking at the pictures.

Daniel's Home

Daniel had a good number of reading materials in his home. The majority of books were given to him by his church, which is discussed in greater detail, below.

Image 16: Daniel Reads his Bible at Home
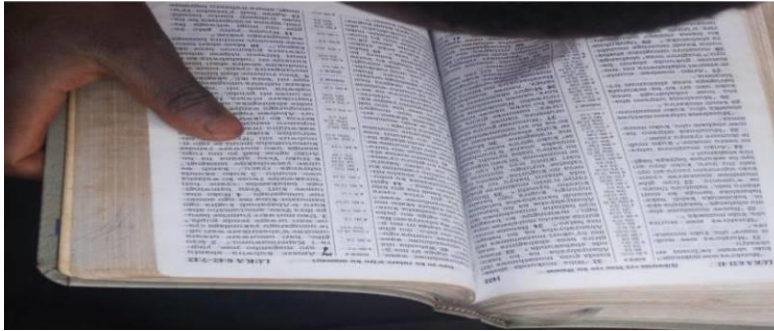
Photo credit: Dr. Michael Tusiime

Daniel's mother also noted that an organization named Umuhuza had made storybooks available locally.

In the Wider Community

In 2013, the lack of materials was felt at the community level; a local leader had mentioned the lack of reading materials as a big challenge. He explained that an adult literacy school initiative had ended shortly after it began due to a lack of books. Similarly, there had been only two copies of the Bible visible during observations in the church.

A primary school teacher interviewed in 2013 explained that the presence of literacy materials was an important factor in children's learning. However, he hastened to add that reading materials, in and of themselves, were not sufficient to support literacy growth.

> Kuboneka kw'Ibikoresho ntibizateza imbere gusoma no kwandika niba ababyeyi badashishikarije abana babo gusoma. Nzi umuryango ukize ufite ibya ngombwa bihagije.
> *(Availability of literacy materials will not foster literacy if parents don't encourage their children to read. I know a rich family that have sufficient reading materials but do not encourage children to read… it is not the availability of materials but rather, encouraging children to use them.)*

At endline, the presence of Book Banks was mentioned among community members. The Head Teacher of Marie's school noted that the school had recently increased the quality and quantity of reading materials, especially with the Book Banks and the books provided by REB. However, the Head Teacher was concerned the books were not managed properly and were poorly maintained, especially when students took them during holidays or weekends. He mentioned a need for parents to teach children how to read and store books.

The Reading Club Volunteer in Daniel's neighborhood had a chalkboard in her living room. This room served as meeting place for Reading Clubs. The Reading Club Volunteer expressed how helpful the reading material had been.

Mbere y'uko mbona uru rubaho n'ibi bitabo by'Umuhuza, umukobwa wange ntiyari azi gusoma ariko ubu noneho ashobora gusoma. Iyo ntari mu rugo, umukobwa wange akoresha ikibaho kugirango yimenyereze kwandika. Mu myaka ibiri ishize, twateye intambwe mu ngano n'ireme ry'ibyifashishwa mu gusoma hano i wacu.

(Before I got this board and Umuhuza books, my daughter did not know how to read but she can now read. My daughter uses the chalkboard when I am not at home to practice her writing skills. For the past two years, we have had improvements in the quantity and quality of reading materials here in our neighborhood.)

- Reading Club Volunteer

The presence of religious related reading materials helped augment the lack of other materials. In Flora's community operated a catholic organization called *Enfance Missionaire*. According to an Umuhuza teacher volunteer this organization distributes child-friendly books at a cost of 500 RWF (less than $1.00 USD still relatively high for most poor families to pay). And Daniel's church distributed materials free of charge.

8.6.3   Reading Materials Factor: Summary of Findings and Evidence of LB Impact
Summary
The availability of reading materials was clearly an inhibiting factor to children's literacy development in 2013. Though a few families, like Jolly's, had found creative ways to provide materials or had the means to afford materials, they were the exceptions rather than the rule in the broader community. More the norm was Flora's family, whose sole printed book was a small Bible kept by Flora's grandmother.

The situation had changed by 2015 – there were developmentally appropriate children's books available in the broader LB community due to the efforts of Umuhuza. Daniel, Flora, and Marie all mentioned these Umuhuza books. However, as several individuals pointed out, the presence of one Book Bank was likely not enough, particularly when factoring in the rate at which books go missing or get destroyed. And in the Control sector where Umuhuza had no presence, the lack of materials was still present. Even Jolly, with the cache of materials provided by her father, lamented the fact that he books did not have better illustrations.

Evidence of Impact
Of the three factors reviewed so far, the impact of LB was most clearly seen in the provision of reading materials. Community members across the LB sectors spoke of the improvement in the quantity and quality of reading materials in their neighborhoods over the past two years. This was an expected finding – of all the factors, the reading materials factor is the only one that can always be observed.

Both Daniel and Marie spoke of books provided by Umuhuza. In Daniel's home, the impact was hard to tease apart from the impact that the church-provided materials may have had. And Marie's inability to read also makes it difficult to assess the degree of impact, if any, that LB had.

For Flora, the impact of LB is remarkable. Two years ago, a Bible and a paper containing a prayer were the only permanent reading materials in Flora's family. Apart from not being appropriate to her age, her Aunt believed that these were her "sacred" pieces of writing and thus kept the materials out of Flora's reach. Two years later, Flora had access to books she loved and loved to share with her family. The presence of one book is a small step, but also represents significant progress. She has more storybooks (1 book) than she did at baseline (0 books). More importantly, Flora can interact with child-friendly books that, according to her, "bisekeje, bifite amashusho, kandi bishimisha iyo ubisoma (are

funny, have pictures, and are enjoyable to read)". Furthermore, Flora can trade this one book for another each time she visits the Book Bank.

8.7   Religious-Related Reading Activities at Home

8.7.1   Description of the Factor and Baseline Findings

Religious reading materials load most highly onto the fourth factor, Religious Reading Activities. The Religious factor includes items that relate both to the own respondents use of literacy for religious purposes as well as whether the respondent engages the child with religious reading materials.

At baseline, Jolly's home did not provide evidence of any religious related reading activities. And in Flora's home, the only thing suggestive of religious related reading activities was the presence of a Bible and a one-page prayer. However, during the observation at baseline no one was seen engaging in Religious Related Reading Activities at Flora's home.

8.7.2   Religious Related Reading Activities at Endline

Jolly's Home

At endline, Jolly's father mentioned the important influence that the church had on children's reading development. He reported that he actively encouraged his children to serve as ushers or help with readings during services. He knew when they were assigned readings in church, because they would practice the reading relentlessly until they could read the passage perfectly. However, this religious related motivation for reading may not apply to Jolly's broader community. Jolly's father said that there were many other children who attend the same church but have not been encouraged by their parents to participate to this extent.

Flora's Home

In 2015, no religious related reading activities were observed in Flora's home.

Marie's Home

There were no religious related reading activities observed in Marie's home during the endline observations.

Daniel's Home

Religious motivations for reading underlay many of the activities that MT witnessed during his visit with Daniel's family.

This family was somewhat unusual when compared with other families in the community, because Daniel and his 13-year-old brother attended a church belonging to a different denomination than their parents. His parents accepted and respected their sons' decision as long as they received "*practical benefits"* from it*.*

> Daniel yambwiye ko yatangiye gusenger amu Bahamya ba Yehova kubera ko batangaga ku buntu ibitabo byo gusoma. Mbere ntabwo nabyishimiye ariko ngezaho ariko ndamwihorera. Sinakamubujije kujya mu runsengeo nkuru.
> *(Daniel told me he had started attending a Jehovah's Witness church because they were providing free reading materials. At first I felt uncomfortable but I would never stop him from attending this church.)*
> -   Daniel's Father

There was a good deal of evidence that Daniel did receive 'practical benefits'. His initial motivation to attend stemmed from the promise of a free Bible, offered to him by the daughter of the Church leader. Joining the Jehovah's Witness congregation meant that, for Daniel and his brother, not only was reading important in completing school assignments, it was needed to actively participate during Sunday's religious services (more on this participation below). The church

encouraged children to read by giving them questions every Sunday that required them to read the Bible during the week to search for answers, and then to share the answers the following week. Having access to reading material at church appeared helpful to Daniel as well: to demonstrate his reading abilities to MT, Daniel read five verses from a Bible given to him by his church (see Image 16).

The fact that parents and children belonged to different denominations did not impede the religious-related reading activities that Daniel's parents shared with their children. Daniel's father related to MT how on some nights, the family stayed up late, sitting around after dinner reading the Bible. The boys often would lose track of time until about 21:00., when Daniel's parents sent them to bed. Daniel's father also mentioned the pleasure he received personally when he read or helped others to read in church.

Image 17: Daniel and His Brother on Their Way to Church

Photo credit: Dr. Michael Tusiime

In the Wider Community

Given that congregations meet outside the home, it is not surprising that the majority of religious related reading activities participants discussed occurred outside their home and applied to the broader community. The church in both Flora and Marie's community had a strong influence on children's literacy development by requiring that children pass written exams before they received sacraments. Even children who had dropped out of primary school were expected to pass this exam prior to receiving sacrament, giving them a religious motivation to learn to read and write.

The literacy support or encouragement provided by the parish priest in Marie's community did not stop with the written exam requirement. The priest assigned the catechist (a local church position, appointed by the parish priest) to teach children who wanted to take the written exam how to read and write. However, these literacy classes were only provided to children studying to receive sacraments.

According to the catechist, as Marie's school was a Catholic school, the Head Teacher has to attend the Parish council meetings where messages about the importance of literacy were communicated. He explained that in its own internal evaluations, children's literacy rates are one of the key performance indicators by which his church gauges its impact. The catechist expressed his belief that the church played a central role in literacy in the community. This assertion is somewhat corroborated by the Head Teacher at Marie's school, who mentioned that children have access to religious booklets, particularly those students taking baptism classes.

The Reading Club Volunteer in Flora's village added some nuance to the assertions of Marie's Head Teacher and catechist in regards to religion's role in children's reading. The Reading Club Volunteer explained that churches (as well as families and other organizations) have norms and ideal models of behavior, such as expectations on when and where

children should express themselves as opposed to stay quiet or not participate. Hence, children from different churches have different opportunities to develop literacy skills depending on the norms and practices of their particular church.

At baseline, MT observed a church in Flora's community where very few members of the 300-strong congregation who held Bibles were seen to open them. However, in Daniel's church, MT observed a very different scene. By the entrance of the church sat five large boxes filled with reading materials provided by international and local donors. These materials, according to a church leader, are distributed to the congregation free of charge. When MT attended, all congregants held three reading materials: A Bible, a Hymn book and a Gazette. Even children who were too young to carry church books were encouraged to carry Bibles as soon as they are able.

> Ntabwo ari ngombwa ko bakenera kumenya gusoma, kugirango batangire kugendana ijambo ry'Imana [Bibiliya] mu biganza byabo… Kugira ubushake bw'umwuka bwo gufungura Bibiliya ni ikimenyetso cy'ukudatezuka ku ijambo ry'Imana. Icyakora kugira ngo nshyigikira umuco wo gusoma, nsura ingo ndetse nkigisha abana n'abakuru gusoma kugirango n'imigisha y'Imana, babafashe kumenya ijambo ryayo.
> *(They don't necessarily need to know how to read to start carrying the word of God (Bible) in their hands…Having the spiritual will to open the Bible is a sign of commitment to God's word. However, to encourage reading, I visit homes and teach children and adults how to read so that in addition to God's blessings, they also master His word.)*
> - Church Leader in Daniel's Community

As MT observed and as others reported to him, each Sunday mass in Daniel's church included an almost hour-long question-and-answer session. During these sessions the Pastor asks for volunteers to read specific passages, either from the Bible or a church gazette. Adults and children alike raise their hands to read aloud, and other members read along silently in their own Bibles. MT observed that this process mimicked a typical classroom, with the pastor in the role of teacher, and the entire congregation, both children and adults, the students.

8.7.3   Religious Related Reading Factor: Summary of Findings and Evidence of LB Impact
Summary
Religious related reading activities and the materials needed for those activities formed an important piece of the Literacy Ecology, both at home and in the wider community. Much of the religious related activities observed at endline occurred in Daniel's home, suggesting that there is a good amount of variance in the religious related reading activities in homes in Gicumbi.

Depending on the denomination and the specific parish, religion played a more outsized role in the Literacy Ecology of the community. In some instances, churches required students to read in order to participate in baptism and receive the sacrament. In others, churches assigned homework much like a school would and offered home tutoring in literacy upon request. And at least one church evaluated itself and its work by the literacy rates of its members.

Evidence of Impact
There was no observable impact of Literacy Boost on the religious related reading activities factor. This is not surprising, given that none of the organizations involved in the implementation of the randomized control trial of Literacy Boost are religiously affiliated. Further, none of the materials had religious themes to them.

8.8 Child Interest / Engagement

8.8.1 Description of the Factor and Baseline Findings

The fifth factor, titled Child Interest / Engagement, consists primarily of observations of the focus child's interest in and habits around reading, as reported by the caretaker. Also included in this factor is a variable indicating that a caretaker reported not helping his/her child to learn.

At baseline, Jolly and her siblings exhibited a keen interest in reading and writing. She also had high aspirations of finishing university and mentioned a number of careers she might pursue.

Flora, on the other hand, did not exhibit any interest in reading and writing at baseline. Two years ago, when asked what she wanted to do when she completes school, Flora responded that she would fetch water, collect firewood and cut grass to feed her grandmother's cows.

8.8.2 Child Interest/Motivation at Endline

Jolly

At endline Jolly clearly retained a high degree of interest in reading and motivation to read. Evidence of Jolly's motivation occurred from very beginning of MT's return to Jolly's home. Jolly interrupted MT and her mother during the informed consent discussion by asking to read the consent out loud for her mother (she read the first paragraph slowly, but correctly).

Jolly's motivation to read appeared multi-faceted. First, she explicitly linked her reading to the positive role models she sees at home.

> Kenshi na kenshi, iyo mbona abantu bo mu muryango wange basomera I muhira, binshishikariza gusoma, nange ngafata ibitabo byange maze ngasomera hamwe nabo.
> *(Mostly, when I see my family members reading at home, I am motivated to read and I also get my own books and read together with them.)*
>
> - Jolly

Her motivation to read was not solely to emulate her family. Jolly seemed driven by the pleasure she experienced in school success. She attributed her success to being able to revise her lessons, thereby understanding what her teachers taught and scoring well on tests. She was keenly aware of her position in her school and was intent on maintaining it.

Gusoma mbikora mu gihe cy'ibiruhuko cyangwa rimwe na rimwe igihe ndi I muhira kugirango mbashe gusubiramo ibyo tuba twigiye ku I shuli. Urabona, ushobora kwiga ibintu ukabyibagirwa, ariko iyo ugeze I muhira ugasubiramo, bituma ubyibuka kandi ugatambuka neza mu ibazwa... Nari uwa gatanu (5) mu banyeshuli 53 mu ishuli icyo gihe mwalimu wange ambwira ko nzakomeza kuba umunyeshuli mwiza nindamuka nkomeje gusoma no gusobanukirwa ibibazo byabajijwe mu kizamini. Kuba mbasha gusoma, bituma umenya ibyo abandi batazi... Iyo umwalimu abajije ibibazo abandi baratsindwa wowe ugakomeza.

(I read during holidays or sometimes at home to revise what we studied at school. You see, you may study things and forget but when you reach home and revise, then you remember and pass the tests…I was the 5th out of 53 students in class and my teacher told me that I will continue being a good student if I continue to read and understand the questions asked during the exam. Being able to read allows me to know what others don't know…when the teacher asks questions, others fail and you pass.)

- Jolly

Jolly bragged of her new ranking in school, and described her secret strategy for maintaining it: she would continue her friendship with a high performing girl with whom she shared a desk in class. Mentioning such a strategy indicates some level of maturity and self-efficacy in regards to her own learning.

Jolly's explicit linking of reading abilities and success in life extended beyond report cards and class rankings.

Gusoma bishobora kumfasha kubona akazi, urugero, iyo ubasha gusobanukirwa n'ibyo umwalimu yigisha, nawe ushobora kuba umwalimu kandi ukabona amafaranga. Nifuza kuba umwalimu najnye nkigisha abandi ibyo batazi… Byongeye kandi, nkura ubumenyi mu gusoma, hanyuma nkabona umurimo ndetse ngahembwa amafaranga, kandi igihe mfite amafaranga, nshobora kugura imyambaro mishya nkayisimbuza ishaje.

(Reading can help me get a job. For example, if you understand what the teacher teaches, you can also become a teacher and get money. I wish to become a teacher and teach others what they don't know… in addition to that I gain knowledge through reading, and you finally get a job and get paid with money, and when I have money, I can buy new clothes to replace the old worn-out clothes.)

- Jolly

Jolly's interest in reading was further fueled by extrinsic factors, particularly her father. Her father mentioned how it would shame him, given his work as a primary teacher, to have a child who could not read or write, or who performed badly in school.

Flora
Two years after first meeting Flora, MT saw dramatic difference in her motivation to read. When she heard MT discussing her reading skills with her mother and grandmother, Flora actively volunteered to show MT how well she wrote. And she explained that she loved the storybooks she read, particularly the pictures. Flora even mentioned that she teaches other children some of the things that she learns from Umuhuza.

The ability to read seems to have boosted Flora's confidence. As opposed to the shy girl she was two years ago, MT described her as outspoken and assertive. Her aspirations at endline had extended beyond feeding grandmother's cows. When asked what she wants to do when she finishes school, she immediately responded: *"Ndashaka kuzaba umuyobozi. (I want to become a leader.)".*

The excited way that Flora's mother and grandmother discussed her reading also seemed to reinforce Flora's interest in and ability to read, which likely reinforced the excitement expressed by Flora's mother and grandmother.

Marie
Marie had no interest in or motivation to read. When MT asked Marie to write, she did so reluctantly. When he asked if she and her friends wanted to read a book, Marie declined the request but her friends were eager to read. Instead of participating in reading, she pulled her friends back into a game that did not involve literacy.

She also was not enthusiastic about school. Unlike other children who randomly talk about their school, Marie did not. She rarely asked any questions even when encouraged to do so.

One word in Kinyarwanda may explain why Marie dislikes reading so much. The word is *Umuswa*. No single word in English quite carries the meaning of *Umuswa*, but similar words include dull, stupid, mentally deficient, or incapable of learning. According to her family, Marie is *Umuswa.*

Her family uses this slur unendingly to refer to Marie. In the first four sentences that Marie's father uttered to MT, he labeled Marie *Umuswa* twice:

> Urakaza neza, ariko se kuki mutahisemo umukobwa mukuru wa Marie? Ni we w'umuhanga. Marie ni umuswa ku ishuli. [*Turns to the man next to him*] … Ni Umuswa. Sinzi impamvu ariwe bahisemo.
> *(You are most welcome, but why didn't you select Marie's elder sister? She is the one who is bright. Marie is dull at school. [*Turns to the man next to him*] She is dull. I don't know why she is the one they selected.)*

Marie's parents were busy with the patrons at their bar and did not speak much with MT. Despite the relatively short conversations that he managed to have, they used the term *Umuswa* 22 times over the course of three days in reference to Marie. Her father used the slur 17 times, and her mother used it five times.

Marie clearly accepted and internalized her parents' labelling of her as *Umuswa*. When MT asked her what she wanted to become when she finished school, she responded:

> Ariko sinzarangiza. Ndi Umuswa.
> *(But I will not finish. I am dull.)*

When asked why she thought reading and writing was important, she responded:

> Kumenya gusoma biguhindura umuhanga.
> *(Knowing how to read makes you clever.)*

When asked why it is important to be clever, Marie responds:

> Urekeraho kuba Umuswa.
> *(You stop being dull.)*

Marie's comments easily explain the absence of motivation or interest on her part. She is *Umuswa*. People stop being *Umuswa* by learning to read. But someone who is *Umuswa* cannot read. With these messages internalized, it is no wonder that her writing was illegible and her interest non-existent.

Her mother provided more explanation behind Marie's lack in motivation.

> Ntabwo azi gusoma. Atinya ko abandi bana bashobora kumuseka.
> *(She doesn't know how to read. She is afraid that other children may laugh at her.)*
>   - Marie's Mother

True to form, her playmates poke fun at her while she struggled to write the letters of alphabet.

On top of referring to Marie as *Umuswa*, her father was probably inhibiting her motivation to read and learn in other ways.

> Papa hari ubwo ankubita iyo ashaka ko niga kwandika. Yambwiye ko umwana atangira kwiga igihe ari umuswa, yaba adakubiswe ntagire ikyo amenya.
> *(Dad sometimes spanks me when he wants me to learn how to write. He told me that a child starts schools when she is dull, and if she is not spanked, she can't know anything.)*
>   - Marie

Marie's father told MT that "Umwana kugira ngo amenye gusoma biravukwa *(a child's ability to read is inborn),"* and that fostering "umwana kumwenya gusoma kyangwa kuba yabinanirwa byakabajijwe mwarimu *(a child's ability to study or failure to read should be accountable to the teacher.)*". Her father does not follow up on Marie's studies, instead tasking her elder brothers to do so. Following their father's example, they also threaten her with spankings to get her to learn, according to Marie's sister.

Daniel
In stark contrast to Marie, Daniel constantly demonstrated interest and excitement about reading and learning. When MT shared some English nursery rhymes, Daniel got excited and promised that by the P.4, he will know enough English to be able to communicate. Daniel was observed reading silently, and actively volunteering in church to read passages. It was clear he possessed a high degree of both reading abilities and interest in reading.

Daniel's motivation to read, like Jolly's seems multi-faceted. He acknowledges that reading can help him find a job, specifically mentioning teaching. Yet he pointed out that employment was not guaranteed to those who finished school.

> Urabona, bakuru bange babiri barangije kwiga ubu bakora uturaka ariko nta mafaranga bafite.

(You see, my two brothers finished school and they are doing part-time jobs but they don't have money.)[50]

- Daniel

There was also the religious motivation underlying Daniel's reading, clear from his independent reading of the Bible and his participation in church services and activities.

His motivation was encouraged by or even started with his parents, particularly his father. Daniel's father praises him as a *"umwana w'umuhanga (clever boy)".* His father also reported that he used the negative examples set by Daniel's eldest brothers to emphasize to Daniel the importance of reading and finishing school: their poor living conditions could be avoided by staying in school.

In the Wider Community
To positively impact student motivation to read, Jolly's father and sister emphatically recommended that parents provide rewards to students to better motivate them.

Ababyeyi bagombye guteza I mbere irushanwa nyaryo mu banyeshuli bahemba abakoresha ingufu zidasanzwe… uduhembo duto ni ingenzi mu gutuma abana bahora bashishikaye.
(Parents should promote positive competition among children by rewarding children who put in extra efforts… small rewards are important in keeping children motivated.)

- Jolly's Father

Jolly's sister echoes this, and explicitly links the early use of rewards to her later love of reading.

Ntaragera mu mwaka wa kabiri sinarinzi gusoma neza. Ndibuka Papa anyemerera ko mbonye umwanya wa mbere cyangwa uwa kabiri, yangurira imyambaro mishya. Naje kubona umwanya wa kabri, nuko angurira imyambaro mishya kandi narishimye cyane. Kuva icyo gihe nasomaga kuko nabaga ntegereje igihembo ariko nanigiyemo amagambo mashya ndetse nsoma n'udukuru dusekeje, narushijeho gukunda gusoma udukuru tutari tujyanye n'ibyari biteganyijwe kwigwa mu ishuli.
(I was not a good reader until Primary 2. I remember my father promised me that if I got the first or second position, he would buy me new clothes. I got the second position and he bought me new clothes and I was very happy. Since then I could read because I expected a reward but also learned new words and read funny stories, I developed the love for reading stories that were not part of the classroom curriculum.)

- Jolly's Sister

In her views, motivating children through rewards should be easy, even for poor parents: It is just a matter of withholding what you would usually buy them and providing it as a gift. Telling children that you will buy them sugar

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[50] All of Daniel's employed older brothers dropped out of school before the end of primary. Daniel uses the word 'finished', implying that his brothers completed school. Yet in other discussions that MT had with Daniel and his family, Daniel was aware that the brothers had dropped out, and not 'finished' school.

when they read and write well motivates them. Rewards for reading was repeated by one of the P.1 teachers at Jolly's school who is also a neighbor to Jolly's family.

> Ni gake cyane ababyeyi bashyigikira babo kugira ubushobozi bwo gusoma bakoresheje igihembo. Ni ingenzi cyane guhemba abanyeshuli ukoresheje isuguti, I bombo, cyangwa igitabo gishya. Ntekereza ko usibye guha abana ibihembo, tugomba no gutanga ubutumwa buremamo abana icyizere kandi tugahora twibutsa abana abantu bantu b'intangarugero nk'abalimu, abapolisi, abayobozi n'abandi. Uko tuvuga kuri aba bantu cyangwa tukabatumira kuganira n'abana, niko abana barushaho kubona akamaro nyako k'uburere muri rusange, ndetse no gusoma by'umwihariko
>
> *(Parents rarely reinforce their children's reading abilities through rewards. It's important to reward students with a cookie, a sweet, or a new book. I think that, apart from rewarding children, we should also communicate positive messages that build children's hope and regularly talk about positive role models like teachers, policemen, leaders and others. The more we talk about these people or invite them to talk to children, the more they see the practical importance of education in general and reading in particular.)*
>
> - *Teacher at Jolly's School*

She notes that the rewards may help keep more children in school, particularly because many children come from poor families and they have elder siblings who have dropped out of school, a de-motivating situation for young children and parents alike.

One Head Teacher emphasized how messages the child learns from parents, whether they are explicitly told to the child or simply overheard, interferes with children's motivation. This Head Teacher recounted how one rebellious nine-year-old student said *"*Papa ntiyigeze yiga ariko abasha kutubonera ibyangombwa dukenera *(My father didn't go to school but he is able to provide for us scholastic materials)".* The Head Teacher interpreted this as something the child had overheard his father say, and had internalized its message.

This Head Teacher also pointed to the 26 children who dropped out of school this year as evidence of a lack of parental involvement or parental interest in the education of their children. "Nzi neza ko aba atari ababyeyi baha agaciro gusoma no kwandika cyangwa bizera ko ejo h'abana hazaba heza, (*I am sure these are not parents who value reading and writing or even have hope that their children's future will be bright),*" he said. A former village leader in Daniel's community corroborated this by stating that the children who are most motivated to read are those with educated parents and older siblings, those with the right attitude towards education.

A village leader who also served as a Reading Club Volunteer related the messages he tries to send to parents in his community.

> Nk'umushefu w'umudugudu, nanagerageje gukanga ababyeyi bavana abana babo mu mashuli mbabwira ko nzabatanga mu buyobozi bwo hejuru. Ni ngombwa kurekera abana bose mu ishuli kugeza bagize gushaka no gusobanukirwa icyo uburezi ari cyo. Ni ngombwa ko hatagira umuntu uha abana ubutumwa bubaca intege. Mwibabwira ko ntacyo bazamara, mwibabwira ko badashoye.

(As a village chief, I even threaten parents who get their children out of school that I will refer them to higher authorities. It's important to keep all children in school until they have the motivation and appreciation of what education is. It's important that no person conveys negative messages to children. Don't tell them they won't be of any use, don't tell them they are incapable.)

- Reading Club Volunteer / Village Leader

Another leader the MT interviewed noted that the word *Umuswa* is strictly forbidden in his village. He said he could even impose a social sanction on any community member who used '*Umuswa*' during the monthly *Umuganda* meetings. He also stated that school authorities advise parents and communities to remove the word from their vocabularies.

His exhortations to shield children from negative messages seem to be targeted directly at families like Marie's.

One Reading Club Volunteer linked children's motivation to read with the materials at their disposal.

Abana bagira ubushake igihe basoma udukuru duteye amatsiko dukinwa n'inyamaswa. Ndetse ubumva babara inkuru ku nyamaswa zitandukanye zivugwa mu bitabo by'udukuru (intwari, umunyabwenge, umunebwe, n'ibindi). Iyo abandi bababajije aho bakuye utwo dukuru, bihutira kuvuga ko ari mu bitabo maze ibi bigatuma barushaho bakomeza gusoma.

(Children get motivated when they read interesting stories with animal characters. You even hear them tell stories about the different animal characters in the story books (the brave, the clever, the lazy, etc.). When others ask them where they got such stories, they are quick to say it's from books and this leads to further reading.)

- Reading Club Volunteer

According to the village chief who also serves as a Reading Club Volunteer, there are many ways to create desire for reading and writing:

Mugihe ubonye indege iciye mukirere ujye ubwira abana ko nabo bashobora kuzavamo abapilote nibakomeza kwitabira kwiga gusoma no kwandika. Niwumva amakuru kuri Radiyo, ujye ubabwira ko abavuga amakuru bamenye gusoma no kwandika mbere y'uko baba abasoma amkuru. Mpora nkangurira ababyeyi kugira iyi myifatire igihe cyose mbahamagaye mu nama z'umudugudu.

(If you see a plane flying over, always tell children that they can also become pilots if they continue to engage themselves in learning how to read and write. If you hear news on the radio, tell them that news presenters knew how to read and write before they became news presenters. I often sensitize parents about this type of attitude every time I call them for village meetings.)

- Reading Club Volunteer / Village Leader

8.8.3   Child Interest/Motivation Factor: Summary of Findings and Evidence of LB impact
Summary
The four children showed differing degrees of motivation to read. Perhaps the most disheartening case was Marie, who referred to herself as *Umuswa*. Her lack of reading abilities and her fear of ridicule for that lack of abilities drove her away from those who wanted to help her or engage in reading activities with her: her sister, and MT. While the future is difficult to predict, Marie is likely to continue having difficulties in reading and learning. The reverse case of Marie is Daniel. His father describes Daniel as clever, and by all accounts he is. Religion has a large role to play in his motivation to read, both at home with his family and in the church itself.

As in 2013, Jolly showed a lot of motivation. At endline, her motivation was fueled both by her family's own habits of reading as well as Jolly growing sense of her own self as a learner and he abilities to succeed in school. Flora echoed this to some degree, mentioning how her newfound reading skills enabled her to better understand lessons and to teach her friends who had trouble understanding.

There are many diverse factors that either increase or decrease children's motivation to learn at the community level. The observation and interview data collected in 2015 suggest that the reading ability and competency of parents, the role models to whom children look up to, the messages children receive directly or that they overhear, the materials at hand, and children's own self-concept of themselves as learners and their concept of self-efficacy all seemed to play a role in defining children's motivation to and interest in reading.

Evidence of Impact
Similar to the evidence of impact on the reading materials factor, Daniel and Marie do not provide any conclusive evidence, either in direct observation, or from interviews and conversations, that LB had a direct impact on student motivation.

Flora, meanwhile, does explicitly link her newfound reading abilities to her attendance to Reading Clubs.

> Nitabira umuhuza buri wa kane. Umuhuza yamfashije kurushaho kumenya no kwandika.
> *(I attend Umuhuza Reading Clubs every Thursday. Umuhuza Reading Clubs has helped me to improve my reading and writing skill.)*
> - Flora

Alone, this does not provide evidence of impact. However, she continued that those skills have increased her confidence and motivation to attend school.

> Ku muhuza tuhigira ibintu bishya twagera kwishuri tukabasha gusobanurira abandi batabishoboye. Abanyeshuri bigira ku muhuza bamenye gusoma no kwandika. Nishimira kuba mbasha kuba nasobanurira abandi banyeshuri.
> *(At Umuhuza, we learn new things and when we reach at school, we are able to explain to other students who have difficulties. Students who attend Umuhuza reading clubs have improved their literacy skills. I love it when I am able to explain things to other students.)*
> - Flora

The newfound reading skills, which Flora attributes to Umuhuza Reading Clubs, have created a self-perpetuating cycle where Flora learns new things, gains pleasure in teaching those things to other people, and is then further motivated to continue attending Reading Clubs and to continue to learn new things. This is direct evidence of Literacy Boost's impact on student interest and engagement, working primarily through the community action component. The fact that Flora's mother reported that she is always sharing stories from the storybooks gives further credence to this impact.

8.9   Additional Themes
As the ethnographic data was analyzed, some additional themes emerged as important to children's literacy development. This section provides some evidence from the data regarding each of these themes.

MT observed in 2013 how community members found ways to communicate messages publicly without using printed words. At baseline, it was a banana leaf or a sorghum plant, attached to a wall or a pole that indicated a particular type of homemade alcoholic brew for sale. At endline, there was more evidence of these non-textual forms of literacy more.

Similar to the banana leaf, MT passed by a home in one community with a Styrofoam plate conspicuously impaled on a makeshift pole, as seen in Image 18. The Head Teacher with whom MT was walking with at the time declared this restaurant sign as "ikimenyetso nyakyo kigaragaza ko muri aka gace hari ababyeye benshi batazi gusoma no kwandika (*A clear indication which shows that in this area there are many illiterate parents)"*.

Image 18: A Plate on a Pole Advertises a Local Restaurant

Photo credit: Dr. Michael Tusiime

The importance of non-text based forms of literacy was further highlighted in MTs observations thanks to a scheduling oversight. The morning of the first day MT was scheduled to visit one of the children, a village leader stopped MT's car as it drove down the dirt path. This village leader was expecting monitoring officials for the referendum voting event that was taking place that same day, and mistook MT for that official. MT quickly explained the situation, and the leader advised him to 1) wait until midday so that the family members could fulfill their civic duty, and 2) to vote himself. MT followed the leader's advice and went to the nearest polling station.

According to MT, in Rwanda individuals have two options to cast their ballot. First, they may use a pen to simply place a check mark if they agree with a specific issue. Second, for individuals who do not feel comfortable writing, there is also the option to press their thumb to an inkpad and then apply their thumbprint to the box that corresponds with their vote. See Image 19 for a sample ballot.

MT, a university professor, was quite comfortable using a pen to place a check mark in the appropriate box. However, the local polling official was quite insistent that MT use his thumbprint to vote. MT did not argue but politely told the polling official that he would check his choice using a pen. Especially in areas where literacy rates are low, he reflected, the democratic voting process relied critically on these unwritten symbols of participation. . In such communities,

stained thumbs could be interpreted as a sign that one has participated in a voting exercise. Conversely, unstained thumbs could be interpreted as non-participation. Because of these pre-conceived notions, even people who know how to write tend to conform to using thumb print than write on the ballot.

Image 19: Sample Ballot from a National Referendum in Rwanda
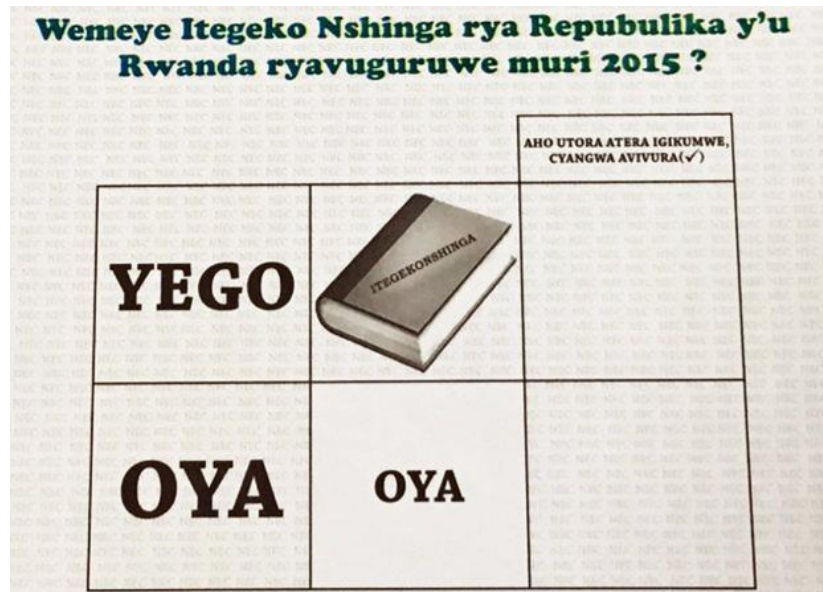
8.9.2   Student Repetition and Drop-Out

Student Repetition of Primary Levels

Interesting findings emerged from the interviews and observations regarding repetition and dropout of students in early primary. The fathers of Marie and Flora expressed to MT, unprompted, that they wanted their respective daughters to repeat the Primary level that had just concluded, or even to go back a year rather than be promoted to the next Primary level.

In Marie's case, she is expected to enroll in Primary 3 in 2016, but her father said that she never should have been promoted to P.2 in the first case. The only reason she enrolled in P.2 was not because she possessed the competencies required for a beginning P.2 student. Rather, the school she attended had too many students in P.1 and too few students in P.2.

Flora's father also wanted Flora to repeat the year she had just completed, in her case P.3, as she performed poorly in class. MT followed up with a question regarding her performance, but her father was unable to say anything more regarding Flora's learning.

From this small sample size of two fathers, we gain insight into some possible contributing factors to the problem of repetition. First, Marie and Flora's fathers possessed the least literacy competency of the four fathers in the sample. Not coincidentally, they also spent the least amount of time engaging in reading and learning activities with their children. At baseline, Flora's father indicated that it was the job of teachers to teach children, and Marie's father echoed the same thoughts at endline. Neither of the fathers checked the students' work, but both of them thought their children should repeat.

Reasons behind Early Primary Drop-Out

During the observation, MT recorded a lot of conflicting information regarding the amount and causes of students dropping out of school. In one community, MT asked a group of children who had gathered about their school, class, and grade. Two of the children remained silent, and eventually responded that their parents had made them drop out because the parents could not support them to go to school. Another child, however, chimed in stating that is was not the parent but the two children who had made the decision to drop out.

According to MT, under normal circumstances, a P.2 student does not drop out unless the conditions at home do not favor school attendance. Parents in this particular region may not directly take their children from school but may create situations- knowingly or unknowingly that make their children drop out. For example, a child may drop out from school because of too much domestic work or just due to lack of parental guidance and motivation. These children were about eight years old and they have dropped out after the first semester of P.2.

A Head Teacher that MT interviewed reported that around 25 students had dropped out during the 2015 school year. The Head Teacher attributed the cause behind the drop out to parents who did not value education or who fail to support children to read.

However, other individuals with whom MT spoke did not think there was a problem in their specific community regarding dropouts. In the same community where the Head Teacher reported around 25 students had dropped out, the village leader stated,

> Mu byukuri dufite abana bacye bavuye mu mashuri. Nka bayobozi dukora uko dushoboye kurwanya iki kibazo.
> *(We really have very few children who dropout out of school… We leaders have tried our best to fight the dropout problem.)*

These conflicting statements by a Head Teacher and a village leader illustrates the complex problem that confronts families, teachers and the education system in Rwanda as a whole. A lack of solid data and careful research into the prevalence and cause of dropout, as well as unclear incentives for schools and communities to report on the problem of drop out, makes the issue of early Primary drop outs an important topic for future research.

8.9.3   Role of Siblings

In each family, brother and sisters played an important role in literacy development. It was not solely the responsibility of parents to educate their children. More often than not, it was the older brother and sisters who at least tried (in the case of Marie) or actually helped the child to learn. Siblings played an essential role by either providing practical assistance with reading and writing to their younger sibling or simply by serving as positive role models, or in the case of Daniel, negative models to avoid following.

In the case of Jolly, her elder sister was not only a positive role model but also helped her with her work when their father was unable to do so.

> Tuba duhari igihe Jolly adukeneye kugirango tumufashe kubijyanye nogusoma nubwo we atekereza ko ubu ashobora gusoma ku bwe. Nanone tumukundisha gusoma tumubwira udukuru tw'inyamaswa dusekeje cyangwa tw'abana bakoranye umurava bakavamo abantu bakomeye.

(We are there for Jolly wherever she needs us to help on reading tasks, although she now thinks she can read by herself. We also inspire her by telling her positive stories of funny animal characters or hardworking children who became great people.)

- Jolly's Sister

Jolly's father mentioned the role that elder siblings played as well.

Abana bange bakuru bafasha abatoya kuri bo. Nababibyemo kwiyumvamo iyo nshingano kandi nejejwe no kuba barafashije murumuna wabo kurusha uko jyewe nabitekerezaga.
(My elder children help the younger ones. They have inherited the sense of responsibility and I am glad they have helped their young sibling better than I ever thought.)

- Jolly's Father

A village leader in Marie's community summed this point up nicely.

Imiryango ifite abandi bana ibyungukiramo kuko abana bakuru bashobora kwigisha abato.
(Families that have other children are privileged because elder children can teach young ones.)

- Village Leader

8.9.4   *Perceived Purpose of Literacy Skills*

The ethnographic data revealed a range of beliefs regarding the benefits and purpose of literacy skills.

Daniel's mother believed that reading was helpful in gaining knowledge for directions and recognition of places in society as well as in order to gain knowledge and later get jobs. His father feels that reading will help children to know how to read books and Bibles and gain more knowledge and information. A church leader in Daniel's community expressed the idea that literacy skills helped children to understand religious teachings, saying:

Abana bize neza, basobanukirwa kurushaho n'ubutumwa bw'itorero kubera ko bashobora kwisomera igitabo bo ubwabo.
(Educated children understand church messages better because they can read the book themselves.)

Jolly's sister feels that reading can help children in many different ways:

Kubasha kumenya ndetse no gusobanura ibyapa n'ibimenyetso biri ahantu mu ruhame nk'ibitaro, n'amasoko, gushakashaka ubumenyi binyuze mu kwiga ukamenyekana kubera kuba uwambere mu ishuli, kumenya neza ibyo wiga, gutsinda ibizamini, gukomeza masomo ndetse kumenya gusoma binatuma abantu babona imirimo ihemberwa neza. Kubera kumenya gusoma, abanyeshuli bashobora kubona amakuru atandukanye akomoka ahantu hanyuranye nko kuri murandasi, ndetse no mu bitangazamakuru. Umuco wo gusoma ushobora gutuma umuntu amenya ibibera muri sosiyete urugero binyuze mu mpapuro z'ubutumire, amatangazo ndetse no muzindi nzira z'ihererekanyamakuru.

(To be able to recognize and interpret sign posts in public places like hospitals and markets, to seek knowledge through studying and become famous like being the first in class, to master what you are learning, passing exams, go for further studies and also knowing how to read increases people's access to well-paying jobs…As a result of reading, learners are able to get different information from various sources like internet and newspapers.... The culture of reading can allow someone to be aware of what is happening in society for instance through invitation cards, announcements and other channels of communications.)

- Jolly's Sister

A Reading Club Volunteer in Flora's village explained that being able to read and write is helpful because it allows children to do at least some small scale trade if they drop out of school, read road signs and be confident to go to towns where employment opportunities are available, write notes and gain new knowledge from reading different books and that their chances of passing national exams increase and therefore their chances for higher studies increases.

8.9.5   A Lack of Adequate Family Resources

The role of poverty and low resources consistently emerged as a major challenge to the acquisition of literacy skills, both directly and indirectly.

Flora's grandmother explained that their family is too poor to be able to educate the children past primary school. Soon after arriving at Flora's home in 2013, MT realized that this was a poor family desperately trying to put food on the table by tilling fragmented pieces of land. At that time, Flora's father expressed the challenge he faced daily,

> Umunsi wose mba ndimo ngerageza kubashakira ibibatunga byibanze. Biba ngombwa ko nkoresha amafaranga make mba nabonye kubagurira ibiryo kurusha uko nayakoresha kubagurira ibinyamakuru byo gusoma.
> *(During the whole day, I am struggling to get what will satisfy their physical needs like food. I end up spending the little money I earn to buy their food rather than buying for them reading materials.)*

Flora's grandmother explained that in the absence of electricity all activities in the home must necessarily end as soon as it gets dark, which occurs around 18:00 all year around due to Rwanda's proximity to the equator. The scarcity of water is such a big problem in the area and it takes children several hours to gather water, time that could otherwise be used engaging in literacy activities at home. In fact, Jolly's family says that they invested in the water tanks specifically so that children could have ample time "to play and read".

Jolly's mother explains that because parents are unable to meet the demands of schools, when the school asks for anything parents discourage their children from going to school. She recalls speaking with a child who told her that he had dropped out of school because he *"yabuze amakayi (failed to get books)".*

A schoolteacher in Jolly's community explains some factors linked to poverty and that deter children from performing well in school. He explains that physical exhaustion causes absenteeism, tires the body so much so that the child has no morale to read after working the entire day.

Abana babakene ntamwanya uhagije babona wogukora imyotozo bigatuma bahora batsindwa. Nanone, imiryango ikennye ntigira ibiryo bihagije byo gutunga abana babo... Akenshi, bene abo bana baza ku ishuli bashonje maze bagasinzirira mu ishuli. Nk'umwalimu, ntushobora kwigisha gusoma no kwandika uko bikwiye umwana nk'uwo.
(Children from poor families have no time to do homework, which leads to their poor performance... Poor families also don't have enough food to feed their kids... often, such children come to school hungry and fall asleep in class. As a teacher, you cannot effectively teach reading and writing to such a child.)

- Primary School Teacher

A lack of appropriate infrastructure often leaves the children without a proper place to study. For example, in Daniel's house the children read with their books on their laps, bent over the books because there are no tables in the house. They only have very short wooden benches in the house. Outside the house, Daniel's brother uses the wooden bench as a desk while kneeling in the dirt when he is writing notes for his brother.

A lack of money also drives children away from school and in the search of alternatives that may bring them some income. For instance, in Marie's village some children are tempted to leave school because they earn a living by re-selling sugar cane they buy from the village. Similarly, three of Daniel's brothers dropped out of school because they were tempted by the possibility of earning money by working.

8.10 Additional Indications of Literacy Boost Impact

During the interviews and casual conversation between MT and both the family and community members, the name of the organization Umuhuza springs up in every community that was assigned to Literacy Boost. This section will review the impact that Umuhuza had on parent knowledge for supporting learning, creating positive & supportive learning environment, and children's reading skills.

Parent Knowledge
Daniel's mother seemed to have taken many lessons learned from the RAWs to heart. She mentioned attending RAWs, where

Abakozi bo ku muhuza badukangurira kudakura abana bacu mu mashuri, bakanatwibutsa kubaasha gusoma ibitabo baba batahanye.
(Umuhuza staff encourage us to keep our children in school and they remind us to always read to them the books they bring home.)

- Daniel's Mother

MT noted that, despite not being able to read, she is quite outspoken at home. MT posits that the RAWs have given her the knowledge to better support her children to learn.

MT also pointed out that Flora's father's knowledge about how to help his daughter learn had changed over the course of two years. However, this improvement was tempered by the lack of action her father takes to support her to learn.

Positive Learning Environments & Improved Reading
One of the Reading Club Volunteers pointed out how children enjoy Reading Clubs. The children learn in a more conducive and loving environment than at school where they fear teachers who spank them when they fail to read or write correctly.

A different Reading Club Volunteer echoed this point.

> Abana batwisanzuraho kubera ko tubigisha indirimbo kandi tukabigisha nta gitsure. Ntibadutinya nkuko batinya abarimu babo basanzwe. Abananyeshuri benshi bagiraga ibibazo byogusoma ubu babasha gusoma bitewe nuburyo tubigisha. Biga ntagitutu bityo bakatwisanzuraho.
> *(Children are … free with us because we teach them songs in a non-strict manner. They don't fear us as they fear some of their teachers…Most children who used to have reading and writing difficulties are now doing well because of the way we teach them. They learn in a more relaxed environment and this helps them relate to us.)*
>
> - Reading Club Volunteer

One of the Reading Club volunteers that MT interviewed noted that the children who attend Reading Clubs sessions are increasingly getting better marks at school than their counterparts who don't go to the Reading Clubs and that *"bamwe muribo babashije gutindira ibihembo (some of them have managed to win prizes)".*

Another Volunteer stated

> Hari abanyeshuri benshi batari bazi gusoma bakiza ku muhuza ariko ubu babasha gusoma. Na barimu babo basanzwe barabitubwira.
> *(There are many children who did not know how to read by the time they enrolled in our reading program (Umuhuza) but now they can now read. Even teachers at their school mention this to us.)*

Since both sources that spoke of positive learning environments and improvement in reading were Reading Club Volunteers, it is probable that their opinions reflect the training they received and the impact that they want to see. That training likely included creating relaxed environments for learning. Even if this is the case, the acknowledgement of two community members of the importance of child-centered, fun, engaging activities was an impact itself. As for the improved reading, Flora does provide some further evidence that LB had an impact on students' reading abilities in the community.

8.11 Limitations

The most obvious limitation in a qualitative study is the small sample size. We are unable to say how well each family represents the larger population of Gicumbi or of Rwanda. However, the families represent a broad range of experiences that children may have at home. In that sense the observations are useful in detailing the strengths that the Rwandan population already contains, as well as some of the challenges it will face in its quest to create a culture of reading.

Another limitation is the biases that the authors bring to the data. MT entered the communities with ideas of what he wanted to observe, and hence he may have missed out on recording important observations because they did not fit neatly into preconceived ideas of what he should observe. Also, the two co-authors who coded the data and wrote up the findings may have not fully understood important nuances in the data.

Finally, respondents may have provided MT information that they thought he wanted to hear, rather than actual information reflecting their experiences. For instance, Flora's father's declaration about how parents need to support their children did not feel genuine, and there was no evidence of him supporting his own daughter. Nonetheless, just his knowledge of ways to support children's learning are an improvement.

8.12 Discussion

This chapter set out to explore the culture of reading in Rwanda, and to explore what impact of Literacy Boost, if any, could be observed. The findings herein should be interpreted in the light of the larger randomized control trial, which tested the additional impact of supporting families and communities to encourage and engage children in reading and learning activities outside of the school.

The evidence from the observations, interviews, and casual conversations that MT collected point to the very important role that the family plays in the learning trajectories of children, over and above merely sending the student to school. From the beginning of the study, Jolly's family exemplified a family that embraced a culture of reading, and prioritized education over other concerns. And Jolly's family stood in stark contrast to the home of Flora at baseline. Flora's parents supported Flora by feeding her, clothing her, and sending her to school. They did not see a role for themselves in Flora's education beyond providing for her most basic needs. Nor did they express much hope that anything could change. Flora's workload seemed insurmountable, and even her mother seemed to suggest that Flora did not have time for relaxation and reading practice (see section 8.6.2).

The situation was remarkably changed in 2015. Flora's family still struggled with poverty, and Flora still was fetching water and performing other chores. But despite these obstacles, she diligently attended Reading Clubs and was proud of her emerging skills. Even her father had taken away some important messages about supporting Flora's learning, even if he was not observed to be following through on the messages.

Though Flora's home Literacy Ecology improved, some of her peers in the LB sectors were not so fortunate. The insights yielded from MT's observations of Marie and her family illuminate the importance of spreading knowledge about all children's innate capacity to learn and the most effective methods to support them to do so. Marie's family provided her little support, seeming to entirely reject the possibility that Marie could learn. Even though Marie's mother had attended some of the RAWs, her father's belief that Marie was *Umuswa* seemed to taint the entire family's dealings with Marie and Marie's own self image.

Marie's was purposively sampled to investigate why some children did not respond to LB intervention, and Daniel was purposively sampled to investigate the opposite: why some children responded very well to LB activities. Fascinatingly, though Daniel and his family attended LB activities, Daniel's reading growth was spurred by his religion. In a rare occurrence in Rwanda, Daniel attended a different church from his parents. That church provided Daniel with reading materials, and, possibly more importantly, activities that required Daniel to engage in reading activities at least two times a week: once during Sunday mass, and at least one more time to read biblical passages to prepare for the discussion in church the following week.

It is interesting to note the similarities between the Church that Daniel attended and a normal lesson taught by teachers in Primary schools. In both the Daniel's church and in an average classroom, the learned individual (the pastor or teacher) stands in front of the group (the congregation or a class of students), asks questions, and calls on individuals to answer those questions. Despite the fact that the Reading Clubs described in Chapter 4 were not meant to follow this pattern, Flora reported a very similar set-up in the Reading Club she attended. As the concept of learning and education seems to default to this didactic model, further research is needed to see whether this is the most efficient model for learning in these contexts and, if not, how to better encourage learning practices that meet the needs of the learners.

When asked why it is important to read, many individuals spoke of the importance of reading for finishing school and finding a good job. They also spoke about the need to read road signs and, in general, reduce ignorance. There were also the religious motivations. Daniel's parents, for instance, were subsistence farmers, with little 'need' for literacy in their

day to day lives. Yet their religious beliefs provided Daniel, his father, and his older brother a 'latch' upon which to fix their motivations to read. The role of religion, particularly religions that encourage reading, should not be discounted in efforts to create a culture of reading.

The fathers of Flora and Marie also provided some insight into causes of repetition in Rwanda. Both fathers expressed their desire for their children to repeat or even be sent back a primary level. Flora's father could not exactly express why he wanted this, but Marie's father felt she was promoted too quickly to make way for new P.1 students. In both these cases, there seems to be a fundamental disconnect between the schools and parents. The current USAID-funded Mureke Dusoma project initiated in 2016 in Rwanda is a timely intervention that may help to address this issue.

The efforts of MINEDUC and REB to improve reading skills in school have been extensive. However, as this chapter demonstrated, many of the root causes for lackluster reading skills begin in the homes and communities, long before children reach Primary 1. A culture of reading cannot be created by focusing solely on the time a child spends in school. Multi-sectoral approaches, involving other government agencies and Ministries, are needed to create the desired culture of reading that Rwanda pursues.

Chapter 9   Overall Discussion & Conclusions

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This longitudinal randomized control trial of Literacy Boost in Rwanda set out to determine the impact of (a) the Literacy Boost program as a whole and (b) the teacher training component alone on students, teachers, families, and communities. The measures that gauged student impact included assessments of reading skills such as fluency and comprehension that are common and familiar to ministries of education and education professionals. But to better understand how the interventions influenced children's literacy experiences both in and out of school, we also gauged impact on children's experiences in school—as indexed by teacher knowledge, beliefs, and classroom practices—and outside of school—as indexed by the literacy materials in the home and community and the attitudes and practices of families and children.

The motivation for this diverse data collection was to capture the Life-wide learning possibilities and opportunities Literacy Boost could make to promoting children's literacy development. In Chapter 2, we saw that schools were open for 780 hours a year—less than 9 percent of a child's year or less than 14 percent of a child's waking hours in a year (assuming 10 hour of sleep per day, on average – see Figure 2 in Chapter 2). *How can we take better advantage of children's time both in and out of school to expand literacy learning opportunities and maximize literacy development?* This final chapter synthesizes the findings of the previous four chapters and helps us understand the contribution Literacy Boost can make to answer this question.

9.1   Summary of Findings

Figure 12, "Paths of Possible Influence between Interventions and Student Outcomes," summarizes the study's quantitative findings, providing a broad overview of what was reported in Chapter 5, Chapter 6, and Chapter 7. As shown in the figure, both the total Literacy Boost program and the Teacher Training component alone produced significant effects on children's promotion rates and measures of reading and comprehension. The effects of the total Literacy Boost program were more pronounced than that of teacher training alone.

The interventions also produced effects on children's literacy experiences in and out of school. The teacher training intervention affected teachers' literacy knowledge, skills, and pedagogical behaviors and the literacy environments in their classrooms. The home and community intervention, part of the total Literacy Boost program, had a significant effect on children's out of school Literacy Ecologies, specifically, reading activities and materials in the community, reading habits and materials in the home, and child interest and engagement in reading.

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Figure 12: Paths of Possible Influence between Interventions & Student Outcomes

Paths of possible influence between interventions and student outcomes
(documented associations for at least one cohort or sample in the study)
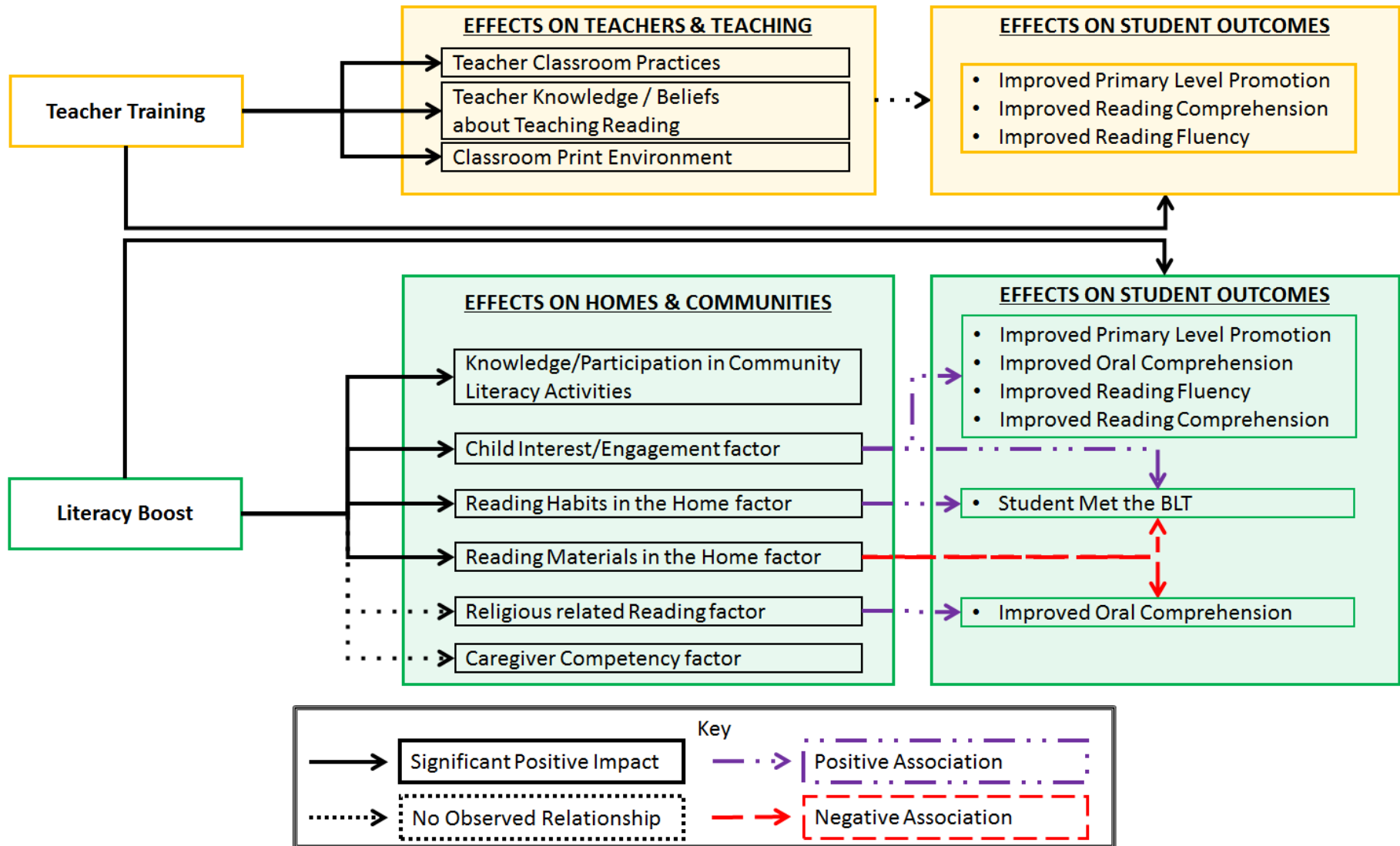
Less certain, however, is how the changes we observed both in and out of school explain the impact on student outcomes that we also observed. None of the teacher and classroom variables affected by the teacher training were associated with the students' outcomes (see dotted arrow in upper right quadrant of figure, labeled "no observed effect"). One possible explanation is that we did not measure effects on teachers and teaching precisely enough to detect correlations with student outcomes. Another possibility is that we did not correctly measure the changes caused by the training that actually had an impact on student outcomes. Further inquiry is needed to explore these and other possible explanations.

The role of the home and community effects is more complex (see arrows in lower right quadrant of figure). Although Literacy Boost had a positive impact on both the implementation factors and three of the five Literacy Ecology factors that we investigated, only one—child interest and engagement—had a demonstrable and robust association with student outcomes. One factor—reading materials in the home—had a possible *negative* effect on oral comprehension. And one Literacy Ecology factor that was not affected by Literacy Boost—religious related reading activities—was associated with improved student oral comprehension.

In the discussion below, we elaborate on these findings and weave in key findings from the ethnographies reported in Chapter 8 to further interpret the results shown in Figure 12.

9.2   Explaining Student Outcomes

9.2.1   Primary Level Repetition

In Chapter 5, we presented evidence of a clear reduction in repetition rates based on assignment to treatment groups. The annual repetition rate in the control group was 43.7 percent, versus a rate of 36.8 percent in the two treatment groups. The repetition rate in the Control group was therefore 19 percent higher (43.7% / 36.8%) than in treatment groups.

It not clear exactly how this finding regarding repetition fits into the larger Gicumbi or even national Rwandan context. This is because the promotion and repetition rates we have calculated for our control group, and even for the treatment groups which did significantly better than the Control, do not align with national statistics on overall primary school repetition and promotion. Our calculations indicate that annual repetition in the <u>lower</u> primary grades may be more than double the latest reported statistics on overall repetition across the P.1 to P.6 years, as reported in the latest Education Statistical Yearbook (Rwanda Ministry of Education, 2016).

The early primary repetition rate we calculated is supported by statistics from different government sources, including MINEDUC and NISR (National Institute of Statistics of Rwanda & Ministry of Finance and Economic Planning, 2012; National Institute of Statistics of Rwanda et al., 2015; National Institute of Statistics of Rwanda, 2016; Rwanda Ministry of Education, 2016)[52]. Across all available data sources, the average primary school Gross Attendance Ratio is 142.9 percent in the Northern Province. The Net Attendance Ratio, which measures the number of age appropriate children in primary school, is 93.0%. After subtracting the Net Attendance Ratio from the Gross Attendance Ratio, we are left with 49.9 percent. The interpretation of this 49.9 percent is that nearly 1 out of every 2 students in Primary school is either too young or too old for Primary school. As Crouch (2015) points out, if the Gross Attendance Ratio were the result of a sudden, one-time influx of students following the abolition of primary school fees, the Gross Attendance Ratio should

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[52] Refer to the Appendix for a tabular comparison of educational statistics published by different government sources.

even out. As in many other developing countries, the Gross Attendance Ratio in Rwanda has not reduced in the decade or so since the introduction of free primary education, indicating that students are getting trapped in cycles of drop out and/or repetition.

Literacy Boost intervention techniques serve to reduce repetition, at least in part. When students' improved reading fluency and reading comprehension are taken into account (see discussion below), this is indeed an encouraging finding. These data suggest that teachers in the LB and TT treatment groups did not simply promote students to drive down repetition rates. Rather, children exposed to the LB and TT treatments are progressing through primary school and are gaining reading skills. Further, the impact on repetition is likely underestimated. Children were assessed at the end of P.1 in 2013. Program activities did not begin until 2014, after children had either been promoted to P.2 or were placed again in P.1 to repeat the 2013 school year. The impact of the program, therefore, would not be observed until the end of the 2014 school year, indicating an underestimation of the impact of treatment.

The repetition rates we observed does not take into account the 18 percent of the baseline sample who could not be located during the endline assessment. Data from the Literacy Ecology survey indicates that at least one of the 40 students (3 percent) who were not assessed during the endline had stopped attending school. We suspect that the repetition rate among the 18 percent of students who attrited is higher than what we observed in the endline sample, but we do not have enough responses at endline to permit a credible estimate. The 43.7 percent repetition rate of the Control group also does not take into account the presumed 7 percent of the population that is not enrolled in Primary school at all (figure is derived from the Net Attendance Ratio of 93.0 percent, reported above).

In any event, we are confident the interventions were responsible for significant reduction in the annual repetition rate compared to that of students in the Control condition. This leads us to two questions:

(1) What is driving the high repetition rates?
(2) What feature(s) of the TT and LB interventions led to a substantial reduction repetition rates?

The broadest evidence we collected to answer the first of these repetition questions relates to the large number of students who failed to meet the BLT by endline, equal to 31 percent of the sample. If students cannot identify most letters of the alphabet nor read and write a single word after two years of primary school, we should expect very high repetition rates. This is likely to operate through the teacher, as teachers are more likely to retain students with exceedingly low academic skills. But we also found evidence suggesting that parents might also play a role in the high repetition rates. Marie's father didn't want her to repeat P.2, but rather to return to P.1. He felt that Marie was promoted due to overcrowding in P.1 but that she did not have the skills to progress to P.3 or even to repeat P.2. Flora's father also wanted her to repeat P.3 although he was unable to provide a reason when asked to explain why.

In contrast to factors keeping repetition rates high, students assigned to either TT or LB groups were significantly less likely to repeat a primary year and therefore reach Primary 3 at higher rates than the Control group (there was no difference between TT and LB groups). Students in the two treatment groups received one common benefit: school supports for reading (i.e. trained teachers and access to school-based Book Banks). Therefore, the answer to the second question posed above is that the improved learning environments and reading outcomes produced by both interventions helped students pass their end-of-year exams and be promoted to the next Primary level.

9.2.2   Reading Skills
At a very fundamental level, children attending school should learn to read. Reading is the foundation without which students cannot continue in their studies. But what is meant by reading? Is it merely the ability to read quickly?

Automatic reading, the ability to read quickly, is certainly important. However, as Bartlett & Dowd (2015) point out, merely focusing on fluency is not sufficient. Reading is not a unitary skill; rather it is cluster of skills that must function together in order for a person to be a competent reader. A competent reader reads fluently and with good comprehension.

Home/Community Level Evidence

The findings for the Literacy Boost group show that assignment to LB significantly impacted children's reading, both in terms of increased reading fluency and better reading comprehension. This is perhaps the most important finding – by supporting children's learning in the home and the community, while also improving reading pedagogy and the classroom print environment, more children in Literacy Boost read fluently and understood what they were reading when compared to the Control group. This finding was true across both cohorts, and was even stronger in Cohort 2.

Findings from the Literacy Ecology survey provide other reasons why we see the consistent findings on reading fluency and reading accuracy solely in the LB group. In Chapter 7, we first found that students in LB sectors scored higher on the Interest / Engagement in Reading than the Control group. We then found that the only factor of the Literacy Ecology that predicted reading fluency and comprehension was the Child Interest/Engagement factor. There is some suggestion here that the materials and activities that occur in the village serve to increase children's interest in reading, which in turn is highly predictive of their reading fluency and accuracy. However, we did not collect Literacy Ecology survey data in TT sectors, so we cannot claim that community activities were the sole contributor to children's increased interest and motivation.

Whilst the significant, positive effects of Literacy Boost on fluency and accuracy are exciting, we failed to find any differences between any of the groups on the probability that students could meet a very basic literacy threshold. That is, nearly one third of students did not acquire rudimentary reading skills after three or more years in school. In Cohort 1, 31 percent of all students, regardless of group assignment, still could not identify 75 percent of their letters *and* read one decodable word *and* write one dictation word. This indicates that there are many children in Rwanda still struggling to master basic literacy skills, and despite targeted interventions such as LB, there are still many children whose learning is suffering from a lack of reading skills.

Of the 31 percent of learners who failed to meet the threshold, there are a few who likely have learning disabilities. Others may have physical disabilities, such as poor eyesight or hearing, that interfere with their ability to process language or the printed word. The ethnography findings offer another possible explanation for the 31 percent who failed to meet the Basic Literacy Threshold. Some portion of this 31 percent of students may resemble Marie. It is possible that Marie has some learning disability – without a professional diagnosis, we cannot be certain. What is certain is that the Literacy Ecology of Marie's home is not supportive of her learning. Marie is told she is *Umuswa* (a fool), and even refers to herself as *Umuswa*. She has no interest in reading, and her father displayed no interest in attending RAWs where he might learn to support her. With drunken patrons of her parents' business filling Marie's living room, it is easy to see how the school and community components of LB were not sufficient to help Marie meet the BLT. More intensive activities, interventions, and messaging are probably necessary. As with most children, Marie would likely benefit greatly from a child-friendly, supportive atmosphere, with many reading materials and even more fun opportunities to read. Unfortunately, it is unlikely that she will find that atmosphere and opportunities in her current home situation.

School level evidence

The findings of reading improvement for the TT group were less robust than for the LB group. In both Cohort 1 and Cohort 2, the TT group failed to make significant gains in Fluency and Comprehension simultaneously. These inconsistent

results could be the result of inadequate statistical power, a relatively weak effect, or a combination of the two. It is impossible to say.

What we can say is that teacher training alone is a relatively weak intervention. The combination of teacher training and community action, which constitute the full Literacy Boost program, produces stronger positive effects on children's early literacy development than does the teacher training component alone.

9.3 Findings & Discussion on Implementation and Sustainability

The tools used for data collection were designed to measure changes in student reading skills, teachers' knowledge, belief, and practice, and the broader Literacy Ecology. We collected limited data on implementation directly, and most of this was collected through the Literacy Ethnography. Therefore, most of our discussions regarding implementation and sustainability refer to the community action portion of the Literacy Boost intervention. The next cycle of data collection in 2017 will focus entirely on sustainability issues.

9.3.1 Implementation

We observed at least three positive aspects of the LB implementation. First, based on the Literacy Ecology Survey and the Literacy Ethnography, activities clearly *were* implemented. Respondents consistently referred to the books and reading materials that Umuhuza had placed in communities, and the Reading Club activities that occurred. Parents also referred to attending the RAWs.

Second, books *were* being used. Flora had one of the books that she borrowed from the Book Banks in her home, and Marie reported that she liked looking at the pictures in the books she brought home.

The third positive aspect revolved around Reading Club Volunteer selection. One respondent thought that the request for volunteers, rather than assigning individuals, led to higher quality interactions in the Reading Clubs. Another respondent thought that the selection of a village leader to lead a Reading Club was also a good choice, in that the knowledge that the volunteer learned could be more easily spread through the village. Indeed, one of the interviews that MT conducted was with a Reading Club Volunteer who was also a village leader. He told MT that he convened a series of meetings to sensitize parents about what they should do to help their children learn to read. The village leader reported using his dual position as Reading Cub Volunteer and Village Leader to take ownership of the messages Umuhuza was communicating and to spread the message wider than might have been reached by just the one-time implementation of RAW workshops alone.

On the other hand, there was also some evidence pointing to challenges in program implementation. . First, some respondents differed on whether allowing village leaders to act as Reading Club Volunteers is a good idea. They felt that the village leader was too busy, and at times would not fulfill the responsibilities of a Reading Club Volunteer due to other commitments.

Many respondents also mentioned that they felt better guidance on procedures were needed to prevent the loss or the destruction of the reading materials. As one respondent said, *"Hari ababyeyi batigusha abana babo gosoma ndetse ntibanabashe kuba bakangurira abana babo kuba babika ibitabo ahantu bitakwangirika (Some parents do not teach kids how to read books or even keep them in a safe place)".* This finding came from the Literacy Ethnography, but was reported by a Head Teacher, so it likely applies to more than just isolated families.

Overcrowding in the Reading Clubs was yet another challenge. Flora told MT that she enjoyed school better than the Reading Clubs because the Reading Clubs was very crowded. She said that they sometimes seat seven children on a

wooden bench that would usually be used by only three children at school. Crowding notwithstanding, Flora said she would still attend Reading Clubs because they have helped her improve her reading and writing skills that made both her and her mother happy.

In the roster of RAWs is a session entitled 'Reading Corners', where parents learn how to set up a dedicated space for children to sit, relax, and enjoy reading, and to store their reading materials. However, in none of the homes in the LB sector did MT see any reading corners. Some of this may be due to physical limitations of the homes. In Daniel's home, for instance, rooms were dark and small, which probably explains why MT observed the children always reading outside.

Another implementation issue concerned the reading competitions that occurred in the Reading Clubs. Apparently some of the children who attended Reading Clubs were not allowed to participate in reading competitions, but the reason was not immediately clear. Parents and their children were discouraged by this and discontinued attending the reading clubs. A Reading Club Volunteer mentioned this herself. She reported that children stopped attending the Reading Clubs after being barred from participating in reading competitions. The Volunteer attributed this to misunderstanding or misinterpreting the rules of the competition that Umuhuza set.

One final implementation challenge involved the way children and families regarded the community activities. Many participants in the study referred to the activities as "Umuhuza" activities. This may point to a marketing/messaging issue about the activities and source of the materials and books, as well as indicate a threat to ownership of these activities by the communities themselves. For the activities to be self-sustaining, the community members must take ownership of the activities. Villagers' naming of the activities as 'Umuhuza' classes suggests that the activities may stop once Umuhuza phases out of the village and communities.

9.4   Limitations

There are limitations at each level of data that rein in the claims we can make concerning impact and next steps. At the student level, four central limitations stand out.

First, there is an ambiguity on *when* students had repeated a primary level. We are unable to determine whether students repeated the 2013 Primary year, which would have occurred prior to the program being implemented. This may have reduced the estimates of impact that the intervention had on student repetition.

Second, by not including the TT sectors in the Literacy Ecology survey, we cannot say for certain whether the LB treatment, and not the TT, improved student interest/engagement in reading. Although we believe it unlikely, it is possible that the teacher training component alone has improved student engagement and motivation. We believe it unlikely because the effects on reading outcomes were weaker among students in the TT condition.

Third, we were not able to obtain reliable and comprehensible information on children's attendance to pre-primary, nursery, ECD, or other education centers prior to the P.1 enrollment. Based on the ethnographic observations, it was clear that Flora's early years did not provide her with stimulating environments that would spur her cognitive growth and make learning easier for her. The access to pre-primary, or lack thereof, may have been a contributing factor to the large number of students who failed to meet the BLT.

Fourth, the extent to which findings from this study can be generalized to the entire population in the district, the province, the country, the region, or the developing world is unknown.

9.4.1   School Level Findings

Assessing the full impact of LB and Teacher Training in this randomized control trial is difficult due to the concurrent implementation of the USAID-funded L3 initiative across the country, involving every primary school in Rwanda. L3 curricular materials were found in every school the teams visited, in accordance with the plans of REB. The presence of properly scoped and sequenced material in the hands of teachers and learners, and decodable texts available to all students, is certainly an achievement and one that has contributed to improved reading across the country.

The presence of L3, however, makes it hard to ascertain the impact of Literacy Boost and Teacher Training on student outcomes. Similar to Literacy Boost's Teacher Training component, L3 helped teachers to teach the fundamentals of reading. Unlike Literacy Boost, it provided meticulously designed materials and lesson plans for teachers to follow. We have no way of knowing what the effect of LB and TT would have been in the absence of L3.

We can say, however, that in the presence of student books and teacher materials provided by L3, TT and especially LB made meaningful contributions to children's early literacy development.

9.4.2   Home and Community Level Findings

Another limitation in the home and community findings regards the representativeness of Literacy Boost in Rwanda, one portion of the Advancing the Right to Read program, and the Literacy Boost approach implemented in other countries. In Literacy Boost sites in other countries, researchers at Save the Children found that children who participated in the Reading Buddies activity had the strongest reading skills at endline. While this research by Save the Children does not claim a causal relationship between Reading Buddies and reading skills due to self-selection biases, it is reasonable to hypothesize that regular exposure to books and practice with reading under the supervision of a skilled reader will help young learners master their reading skills. In our data, the students had little long-term exposure to regular Reading Buddies activities. How this activity might have altered students' reading scores if implemented from the beginning of the program, therefore, is hard to determine.

A final limitation was the community members invited to participate in the RAWs. According to our discussions and the data we collected, implementers specifically targeted parents of children in the early primary levels[53]. There seems to be two reasons for this. First, the implementing partner had a rich foundation of knowledge in engaging parents, as their previous work had been in training new parents in positive child-rearing practices. Second, the conception that parents are children's sole or primary caretakers is a common conception in the developed world, particularly in urban metropolises where neighbors, extended family, and other community members are rarely involved in taking care of children.

The context is different in rural villages in Rwanda. Take the example of Flora. Flora's father, who works in fields or in the market to sustain his family, often leaves home before Flora wakes, and returns after she has gone to bed. Flora's mother, similarly, works long hours in the fields tending to the crops to provide food for the family. The adults that spend the most amount of time with Flora seem to be her aunt and grandmother. By specifically targeting Flora's parents, it is possible that an important opportunity was missed to spread knowledge about positive habits and practices

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[53] Based on the data and conversations the research team had with Save the Children and Umuhuza, parents were targeted for attendance, but other individuals did attend the RAWs. Our central point here is that the targeting of parents in the first place may have excluded others that would have otherwise attended.

to a wider audience, and an audience with whom Flora interacts more frequently. Further, the Reading Club Volunteers were drawn from the regular attendees of the Reading Club. It is possible that much more effective and/or enthusiastic individuals would have been selected if the RAWs had been made more broadly available.

9.5   Preliminary Findings and Discussion on Sustainability

Hints about the potential sustainability of the project, and challenges to sustainability, were found in data collected during the Literacy Ecology survey and the Ethnography. Observations pointed both to positive indications of sustainability and challenges that might prevent community activities from continuing.

Two positive indications stood out in the data. One Reading Club Volunteer mentioned an expectation for more children to be enrolled over time in Reading Clubs, indicating that these activities would continue after Umuhuza had phased out. Others spoke of a high demand for books.

Unfortunately, there seemed to be more obstacles than positive indications. One Head Teacher said that staff at his school could *"*hari igihe dutiza abanyeshuri ibitabo nki 100 tukabona hagarutse 70 byonyine mugihe cy' icyumwru *(lend out 100 books and receive only 70 after one week)".* While he was referring to Book Banks placed in the school, other respondents mentioned similar issues with books disappearing.

Another challenge was that some families or even the wider community did not value education or prioritize their children's learning. For example, Marie's parents were not aware that Marie had borrowed books from Umuhuza.

Finally, there was some indication that Reading Club Volunteers may not be well motivated. The low motivation is mainly due to insufficient incentives rather than the Volunteers not wanting to conduct their assigned duties. That is, without receiving tangible benefits beyond the health insurance coverage that Volunteers received, some expressed doubt as to whether the Reading Clubs could be maintained in the long-term.

Perhaps the largest potential obstacle to sustainability is whether the project has really altered the culture of reading in the intervention sectors. That is, has Literacy Boost permanently shifted the reading culture of the homes and communities in Gicumbi? Though we hope this is true, we are skeptical. At the time of this writing, the research team was not provided with any clear plan to replenish the supply of reading materials that originally filled the Book Banks. Any attempt to create a culture of reading must assume that homes and communities will need a steady supply of reading materials delivered on a regular basis. If this is not established, one of two things may happen: the person overseeing the books could be reluctant to give them out as they are precious resources, or the books may go missing or get destroyed over time as more and more children discover the joy of reading.

The latter possibility is preferable – presumably books that go missing are books that are loved and that children do not want to return, or they become destroyed because children love them so much, carry them everywhere and eventually wear them out. Regardless, the presence of reading materials and how children families, and communities do (or do not) engage in reading activities will be the true test of sustainability.

9.6   Recommendations

We conclude this chapter and the overall report with a final table of recommendations. We place it in a table to clearly link the findings with the issues at play and the recommended actions.

Table 51: Recommendations

#	Finding	Broader Issue	Relevant to	Recommendation	Why we recommend this
1	LB had significantly positive, but modest, effects on children's literacy outcomes and primary level promotion.	Improving reading outcomes & primary level promotion	Policy Makers, Schools & Communities	• Consider modifications, per rows 2 to 6 below and others, to increase LB impact on student outcomes and address needs of students at risk for very low literacy skills. • After modifications, consider plans to scale up LB to the northern Province or possibly the entire country. • Further efforts should continue to incorporate planned program variation to continue learning more about the Literacy Boost and the best way to support students.	Reading achievement is poor and early primary level repetition is high. LB has demonstrable if modest effects on each.
2	Annual early primary repetition rates estimated at 44%.	Resource wastage	Schools & Communities	Conduct studies to understand why children in lower primary are repeating at such high rates. Collect data on possible causes both within school and outside of school.	More research is needed to understand why children repeat at such high rates. Causes both within school and outside of school should be pursued.
3	Some families unaware of events at school.	Lack of communication between schools & communities	Schools & Communities	Increase communication and linkages between homes and communities.	We found instances of mis-communication, which if remedied could have had a positive impact on student learning.
4	Depletion of the provided reading materials.	Book supply and access to reading materials	Schools & Communities	• Increase the availability of print materials in Kinyarwanda. • Every literacy program should plan for replenishment of reading materials as frequently as possible and as far into the future as possible, even beyond the end of the program.	• There are insufficient print materials for families and children to read and share. • Books are frequently lost or damaged. This not only depletes the supply but also makes teachers and local volunteers reluctant to loan them out.

#	Finding	Broader Issue	Relevant to	Recommendation	Why we recommend this
5	Learners face diverse obstacles both within and outside of schools in their learning.	Equity in education and learning	Schools & Communities	Different government ministries, NGOs, and other public service providers should collaborate to reduce obstacles and provide children with learning opportunities throughout their day and life. (e.g. place storybooks in every clinic; include the construction of libraries in village development plans).	In and out of school obstacles that block children's access to literacy learning and impede their reading development must be identified and eliminated or minimized. The problem is complex, and creating a culture of reading requires efforts by everyone.
6	A common perception that "it is the teacher's job to make children learn".	Lack of community understanding how to support learners to learn	Communities	Provide better education / access to information on the importance of learning opportunities outside of school.	Children benefit from enriched learning experiences throughout their days and lives.
7	Early primary repetition rates from the study differ to official repetition rates across all primary levels.	Discrepancy in repetition and promotion rates	Policy Makers and those interested in Quality Assurance	The methods used to calculate and report on repetition and promotion could be strengthened to ensure that a) reported data are reliable & valid, b) statistics can be triangulated from a variety of sources, and c) data are actionable. The research team at Stanford is very interested to support REB and other interested parties to explain our data collection procedures and strengthen capacity in whatever way possible.	Higher quality data provides policy makers with better options to address challenges. Disaggregated repetition rates for each primary year would better enable policy makers to identify the key challenges of repetition that different students face.
8	31% of students in Cohort 1 did not meet a very basic literacy threshold.	Children are struggling to read even after 3 years in primary	Schools	Further research to understand what the issues are that prevent children from acquiring basic skills is needed.	Diagnostic tools to identify students at risk of reading difficulties, and the sources of those difficulties, can be developed from this research.

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Appendices

Glossary of Terms

Kinyarwanda Measures	
Receptive Vocabulary	The number of Kinyarwanda words (out of 5) correctly identified by the child when the child heard the name of an object and was presented with an image of that object among a group of other objects
Productive Vocabulary	The number of words (out of 20) correctly named by the child when presented with an image of that object
Listening Comprehension	The number of questions (out of 5) correctly answered by the child following listening to a story
Letter Identification	The number of letters (out of 31) correctly identified by the child. The child may have provided the sound in Kinyarwanda, or the sound or name of the letter in English, or a word that they knew that began with the letter
Basic Literacy Threshold	A composite indicator that identifies students who identified more than 75% of the Kinyarwanda alphabet, scored at least 1 point on the decoding subtest, and scored at least 1 point on dictation subtest.
Dictation	The number of Kinyarwanda words (out of 15) correctly spelled by the child in writing after hearing the word
Decoding	The number of nonsense words (out of 15) the child was able to read correctly (based on the conventions and rules of Kinyarwanda) out loud
Reading Comprehension	The number of questions (out of 10) the child responds to correctly after reading a preceding sentence
Cloze	The number of items (out of 10) where the child is able to provide an appropriate word missing from a sentence written in Kinyarwanda
Fluency and Accuracy	The number of words read per minute (fluency) and the number or words read correctly per minute (accuracy) for a passage at the Primary 1, Primary 2 and Primary 3 levels
English Measures	
Receptive Vocabulary	The number of English words (out of 20) correctly identified by the child when the child heard the name of an object and was presented with an image of that object among a group of other objects
Most Used Words	The number of English word (out of 12) identified correctly by the child from a list of words
Decoding	The number of nonsense words (out of 12) the child was able to read correctly (based on the conventions and rules in English)
Cloze	The number of items (out of 10) where the child is able to provide an appropriate word missing from a sentence written in English

Declaration of Potential Conflicts of Interest

Elliott Friedlander is Stanford University's Research Director of the Literacy Boost in Rwanda project. His prior relationship with Save the Children was disclosed to all ethical review and funding bodies prior to the commencement of research activities. At the time of writing this report, Friedlander had no professional or financial ties to Save the Children US, Save the Children UK, or Save the Children International, or any other Save the Children-related organization.

Claude Goldenberg is Principal Investigator on this project. He had no prior relationship with Save the Children at the time the award was made. During the current academic year (2015-16), Goldenberg has been on sabbatical and working as a paid consultant to Save the Children US, as they revise Literacy Boost. Goldenberg is also helping to develop a training program for LB trainers and has traveled to Ethiopia to observe and advise Save the Children's early education programs there. Goldenberg has disclosed to Stanford University his relationship with Save US.

Michael Tusiime teaches at the University of Rwanda-College of Education. He had no prior relationship with Save the Children when he was first hired as a consultant to conduct the Baseline Ethnography study. Tusiime was re-hired to conduct the endline ethnography based on the quality of his previous work with SC and his overall understanding of the assignment from the baseline study. Tusiime's spouse was hired to work in the Human Resources department after the baseline report was finalized. Tusiime's relationship with Save the Children did not play any part in his spouse's obtaining of the HR position, nor did his spouse's role at Save the Children play any part in the decision to re-hire Tusiime to conducted the endline study. His relationship was disclosed to Stanford and Save the Children in Rwanda prior to the assignment.

Saima Malik acted in the role of Project Manager and Research Assistant during different periods of the project. She did not have a relationship with Save the Children at the time the award was made. From June through December 2015, she worked as a paid consultant with the Monitoring, Evaluation, Accountability and Learning (MEAL) team in Kigali, assisting with evaluations of several other projects. In this consultancy, Malik did not conduct analyses for the Literacy Boost project and her work with LB consisted mainly of logistics management and training of assessors. Malik's relationship with Save the Children was disclosed to Stanford University prior to accepting the consultancy. She did not have a relationship with Save the Children at the time of the writing of this report.

Teacher Training Quality Checklist Used by SCI

TEACHER TRAINING QUALITY CHECKLIST

General

1. Number of participants: 5-25
2. A Training agenda is developed prior to the training and shared with participants
3. Objectives of the training are clear and shared with participants
4. Information about Save the Children work is provided to participants, if first time
5. Participants should be invited at least a week prior to the training
6. Ground rules should be set in a participatory way before the training starts

Logistic

7. The training environment is conducive to learning (seating arrangement, lighting, temperature, hygiene facilities)
8. The language of instruction is appropriate for the participants
9. The amount of time allocated for the training agenda is appropriate and well managed
10. Refreshments are of good quality and provided in a timely manner
11. Training materials are used adequately and provided to all participants

Methodology

12. A reflection of the previous session is conducted
13. The trainer possesses strong knowledge of the subject
14. The trainer attempts to build rapport with, and draw experiences from the participants
15. The trainer is a facilitator rather than a lecturer
16. Trainees are actively participating, engaged in activities such as group work, brainstorming, strategizing, problem solving…
17. There is enough time for questions and comments from participants

Evaluation

18. The facilitator employs strategies to assess participants' understanding of the content delivered
19. An end of training evaluation is conducted
20. A homework is given to participants at the end of the training
21. A training report is prepared and shared with relevant people within a week after the training.

Power Analysis

To calculate the minimum detectable effect size for the experiment, we use an estimated sample of 20 students (n=20) per school, 4 or 5 schools (clusters or J) per sector in 14 sectors. Since randomization was conducted at the sector level, we use 14 as our number of sites. While the project district is made up of 21 sectors, the comparison between 2 of the three groups (LB, TT, and Control) will always be a comparison of 14 units (in this case, sectors) We plot power against the effect size we need to detect a statistically significant difference in mean outcomes between the two groups at the 95% confidence level (α=0.05). We set intraclass correlation at the school level and at the sector level (ρ_π and ρ_β) to be 0.10, the average across different skills from other countries where SC had done assessments.

Figure 13 below shows the power we have to detect various effect sizes given our sample size of 20 students per school, five schools per sector. This was the power estimate prior to the start of the trial, when we estimated that we would visit all schools. To detect impact at a minimum of 80 percent power, we would need to observe approximately an effect size difference of 0.56.

Figure 13: Power Analysis with 5 Schools per Sector
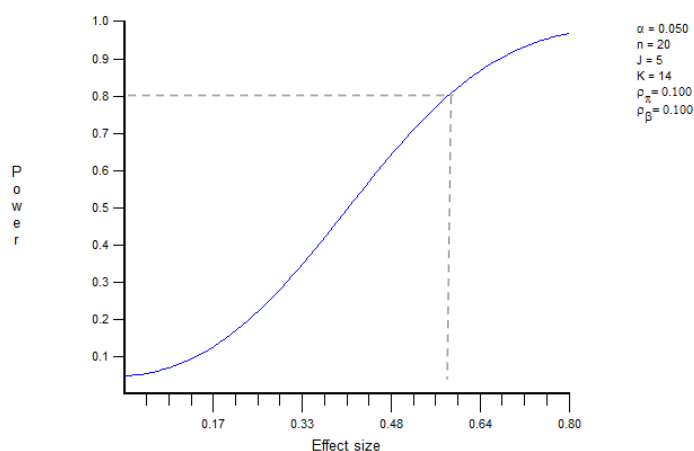
Due to limitations in time and resources, we only averaged visiting four schools per sector. We run the same power analysis as above, except with the change of 4 schools per sector rather than 5, keeping 20 students each. When we do this, the effect size we need to detect differences with 80% power is approximately 0.60 (see Figure 14 below). This is because randomization and treatment were both done at the sector level. As a result, power is largely determined by the number of sectors and to a much smaller extent by the number of schools and students in each sector.

Figure 14: Power Analysis with 4 Schools per Sector
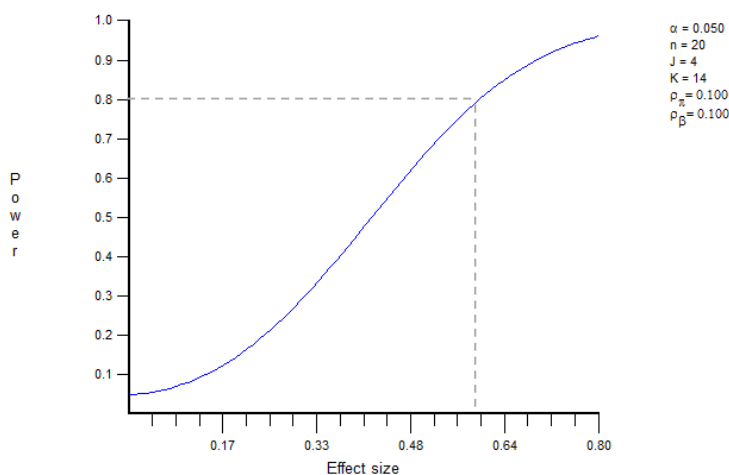
Overview of Sample and Data Collected

Table 52: Overview of Sample and Data Collected

Study	Details		Baseline Sample	Midline Sample	Endline Sample	N of Unique Participants	N of Observation/ Surveys / Assessments Collected
Reading Skills Study	Cohort 1: Students Assessed	N	2041	1712	1668	2041	5421
		Longitudinal : N (% of baseline)	-	1712 (84%)	1668 (82%)		
	Cohort 2: Students Assessed	N	1926	-	-	1926	1926
		Longitudinal : N (% of baseline)	-	-	-		
Teacher Study	Teachers Surveyed	N	452	-	561	750	1013
		Longitudinal : N (% of baseline)	-	-	263 (58%)		
	Teachers Observed	N	42	-	42	82	84
		Longitudinal : N (% of baseline)	-	-	2 (5%)		
Literacy Ecology Survey Study	Families Surveyed	N	463	-	526	640	989
		Longitudinal : N (% of baseline)	-	-	349 (75%)		
Literacy Ethnography Study	Families Observed	N	2 families / 14 days	-	4 families / 13 days	4 families	6 families / 27 days
		Longitudinal : N (% of baseline)	-	-	2 families (50%)		

At baseline, the original sample comprised 2118 students. Seven of these students were excluded from the sample as students' names were different in the baseline, midline and endline survey, leaving 2111 students. In order to conduct the Intention-to-Treat analysis, it is necessary to know the sector in which a child lives. Using all the data sources available (student report, teacher report, school register reports, and parent reports for those families who participated in the Literacy Ecology sub-study), we determine the home sector of 97 percent of the sample with reasonable confidence. The remaining 3 percent (70 students) for whom a home sector could not be reasonably determined, were excluded from the analysis, leaving a sample of 2041 students in the baseline for analysis. Of these original 2041 students assessed at baseline and for whom we could identify the sector in which they lived, we assessed 1668 of these students at endline.

Reading Assessment Reliability

Table 53: Reading Assessment Internal Reliability

	Sub-Test	Cronbach's α
Baseline Reading Assessment	Phonological Awareness Items	0.60
	Student Met BLT	0.77
	Reading Fluency	0.97
	Reading Comprehension	0.94
Endline Reading Assessment	Oral Comprehension	0.46
	Student Met BLT	0.88
	Reading Fluency	0.89
	Reading Comprehension	0.94

Table 53: Reading Assessment Internal Reliability

	Sub-Test	Cronbach's α
Baseline Reading Assessment	Phonological Awareness Items	

Table 54: Reading Assessment Inter-rater Agreement and Reliability

Time	N double rated & % double rated	Sub Tests	Inter-rater Agreement	Kappa	ICC (Inter-rater Reliability)
Baseline	N: 162 Percent: 7.65%	Kinyarwanda Phonemic Awareness	91.36%	0.895	0.987
		Kinyarwanda Syllabic Awareness	87.65%	0.844	0.981
		Kinyarwanda Alphabet	84.57%	0.834	0.998
		Kinyarwanda Dictation	96.91%	0.948	0.983
		Kinyarwanda Decoding	95.68%	0.925	0.994
		Kinyarwanda Reading Comprehension	98.77%	0.963	0.997
		Kinyarwanda Cloze	99.38%	0.981	0.998
		Accuracy: Passage 1	96.77%	0.952	0.995
		Accuracy: Passage 2/3	76.92%	0.743	0.983
		Fluency: Passage 1	87.10%	0.864	0.992
		Fluency: Passage 2/3	76.92%	0.750	0.994
		OVERALL BASELINE AVERAGE:	90.27%	0.882	0.991
Midline	N: 140 Percent: 8.24%	Kinyarwanda Receptive Vocabulary	98.57%	0.881	0.882
		Kinyarwanda Productive Vocabulary	75.71%	0.734	0.980
		Kinyarwanda Listening Comprehension	95.71%	0.944	0.978
		Kinyarwanda Alphabet	88.57%	0.876	0.998
		Kinyarwanda Dictation	96.43%	0.952	0.998
		Kinyarwanda Decoding	95.71%	0.941	0.997
		Kinyarwanda Reading Comprehension	94.29%	0.924	0.993
		Kinyarwanda Cloze	96.43%	0.952	0.998
		Accuracy: Passage 1	93.57%	0.909	0.999
		Accuracy: Passage 2/3	86.43%	0.782	0.997
		Accuracy: Passage 4	87.14%	0.764	0.977
		Fluency: Passage 1	61.43%	0.485	0.993
		Fluency: Passage 2/3	65.00%	0.445	0.998
		Fluency: Passage 4	Insufficient observations		
		OVERALL MIDLINE AVERAGE:	86.12%	0.790	0.984
Endline	N: 156 Percent: 9.21%	Kinyarwanda Receptive Vocabulary	98.08%	0.824	0.850
		Kinyarwanda Productive Vocabulary	83.97%	0.828	0.960
		Kinyarwanda Listening Comprehension	87.82%	0.835	0.895
		Kinyarwanda Alphabet	90.38%	0.890	0.981
		Kinyarwanda Dictation	89.74%	0.880	0.963
		Kinyarwanda Decoding	89.74%	0.883	0.931
		Kinyarwanda Reading Comprehension	91.03%	0.891	0.940
		Kinyarwanda Cloze	92.95%	0.908	0.945
		Accuracy: Passage 1	94.23%	0.929	0.946
		Accuracy: Passage 2/3	89.10%	0.866	0.931
		Accuracy: Passage 4	85.26%	0.796	0.930
		Fluency: Passage 1	48.72%	0.433	0.923
		Fluency: Passage 2/3	53.21%	0.438	0.922
		Fluency: Passage 4	60.26%	0.460	0.930
		OVERALL ENDLINE AVERAGE:	82.46%	0.776	0.932

Additional Information and Tables on Primary Repetition & Promotion

Table 55: Official Reported Statistics on Enrollment, Promotion, Repetition, & Drop-out

Applicable Year	Source of Data	Publication for Reported Statistics	National Average					Northern Province Average				Gicumbi			
			GAR	NAR	Pro-motion	Repe-tition	Drop-out	GAR	NAR	Pro-motion	Repe-tition	GAR	NAR	Pro-motion	Repe-tition
2010	MINEDUC	Education Statistical Yearbook 2011	127%	95%	76%	13%	11%	.	.	.	.	.	.	.	.
2010 - 2011	EICV3	EICV3 Main Report + Gicumbi Profile	148%	92%	.	.	.	153%	96%	.	.	.	98%	.	.
2010 - 2011	EICV3	EICV4 Main Report	144%	90%	69%	30%	.	146%	93%	71%	29%	154%	96%	71%	30%
2011	MINEDUC	Education Statistical Yearbook 2015	127%	96%	76%	13%	11%	.	.	.	.	.	.	.	.
2012	4th PHS	4th PHS, Education Thematic Report	136%	91%	.	.	.	142%	92%	.	.	144%	92%	.	.
2012	MINEDUC	Education Statistical Yearbook 2015	123%	97%	76%	13%	11%	.	.	.	.	.	.	.	.
2013	MINEDUC	Education Statistical Yearbook 2015	139%	97%	68%	18%	14%	.	.	.	.	.	.	.	.
2013 - 2014	EICV4	EICV4	135%	88%	71%	26%	.	137%	92%	75%	23%	139%	93%	71%	28%
2014	MINEDUC	Education Statistical Yearbook 2015	134%	97%	69%	21%	10%	.	.	.	.	.	.	.	.
2014 - 2015	DHS	DHS 2014-2015	136%	92%	.	.	.	137%	93%	.	.	133%	93%	.	.
2015	MINEDUC	Education Statistical Yearbook 2015	135%	97%	76%	18%	6%	.	.	77%	16%	.	.	72%	23%
Average across years for which data are available:			135%	94%	73%	19%	11%	143%	93%	75%	23%	143%	94%	71%	27%

DHS = Demographic and Health Survey; EICV = Integrated Household Living Conditions Survey; GAR = Gross Attendance Ratio or Gross Admission Rate (terms vary between sources; MINEDUC = Ministry of Education; NAR = Net Attendance Ratio; PHS = Population and Household Survey; . = data not available or not located during time of writing.

All statistics in the table reported above available at the following links (active as of June 2016):
4th Population and Household Census: http://www.statistics.gov.rw/datasource/42
Education Statistical Yearbook 2011 through 2015/: http://www.mineduc.gov.rw/resources/statistics/.
EICV 3: http://statistics.gov.rw/datasource/66
EICV 3 Gicumbi District Profile: http://statistics.gov.rw/publication/eicv-3-gicumbi-district-profile
EICV 4: http://www.statistics.gov.rw/publication/rwanda-poverty-profile-report-results-eicv-4
Statistical Yearbook: http://www.statistics.gov.rw/publication/statistical-yearbook-2015

Repetition Rate Calculations

To calculate the repetition rate that we observe in our data, we first need to explain the variables we are using. Then we explain the data, and perform step-by-step calculations of the overall sample and the sample for each treatment group.

Explanation of Repetition Rate Calculation

The only data we use for this analysis is the N of students observed in P.1 in September 2013, and the N of those same students observed in P.3 in September 2015, following two full years of school. <u>We ignore students who were not assessed at endline, as we do not have reliable data on the primary level in which these students were enrolled, or if they had truly dropped out of school.</u>

Before describing the formulas used to calculate repetition rates, we define terms we will use in Table 56.

Table 56: Definition of Terms Used in Repetition Rate Calculation

Variable	Definition
Subscript & Superscript Variables	
^{y} or $_y$	The number of academic years that elapse between data collections. 0 represents baseline data collection
$_{PL}$	Primary Level, where L represents a number from 1 to 6. (E.g. P.1, P.2, P.3)
$_{PL+y}$	Primary Level after *y* years
Student Population Variables	
Pop	The population of students
Pop_{PL}	The population of students in a specific Primary Level
Pop_{PL}^0	The population of students in PL at the time of baseline data collection
Pop_{PL+y}^y	The population of students observed in a Primary Level after *y* years
Pop_{PL+2}^2	The population of students observed in a Primary Level after 2 years
Pop_{P3}^2	The population of students assessed who were in P.1 at baseline and were observed in P.3 when the endline assessment occurred 2 years later
Promotion Rate Variables	
$\textbf{PromRate}$	The percentage of students who are promoted each year
$\textbf{PromRate}^y$	The promotion rate over *y* years
$\textbf{PromRate}^1$	The annual promotion rate
$\textbf{PromRate}^2$	The promotion rate over 2 years (i.e. the % of students who were promoted to the next level in Primary School each year, over the course of 2 years)
Repetition Rate Variables	
RptRate	The percentage of students who do not drop out but who are not promoted
$\textbf{RptRate}^y$	The repetition rate over *y* years
$\textbf{RptRate}^1$	The annual repetition rate (i.e. the % of students who repeat the same level of Primary School each year)

The promotion rate over a timespan of y years [PromRate^y] is the percentage of students in a given primary level in year 0 [Pop_{PL}^0] who are promoted to the Primary Level [PL+ *y*], *y* years following the baseline assessment. This is expressed algebraically in Formula 1.

Formula 1: $\quad \textbf{PromRate}^y = \left(\dfrac{\textbf{Pop}_{PL+y}}{\textbf{Pop}_{PL}^0} \right)^y$

In our data, we know the following:

The denominator in Formula 1: Students were assessed in September 2013 during baseline reading assessment while enrolled in Primary 1. Therefore, the denominator in the parentheses of Formula 1 is equal to the population of students in P.1 at baseline.

$$\text{Pop}_{PL}^0 = \text{Pop}_{P.1}^0$$

The numerator in Formula 1: Students were assessed again in September 2015, 2 academic years following the baseline. Therefore, **y** is equal to 2, and we can express the numerator in the parentheses of Formula 1 as follows:

$$Pop_{PL+2} = Pop_{P.1+2} = Pop_{P.3}$$

Two-year promotion rate: We combine the numerator and denominator for Formula 1, shown above, to solve the formula, which provides us the promotion rate over two years, as shown in Formula 1.1:

Formula 1.1: $\textbf{PromRate}^2 = \left(\dfrac{Pop_{P3}}{Pop_{P1}^0}\right)^2$

Point 4: To calculate the annual promotion rate from the two-year promotion rate, we simply take the square root of all the terms.

Formula 1.2: $\sqrt{\textbf{PromRate}^2} = \sqrt{\left(\dfrac{Pop_{P3}}{Pop_{P1}^0}\right)^2} = \textbf{PromRate}^1$

But how does the annual promotion rate help us to know the repetition rate? Well, first remember that we ignore students who dropped out, moved away, or who were otherwise not located during the endline assessment for various reasons.

Following the baseline assessment, in the beginning of the school year in 2014, all students experienced one of two possibilities:

1) they were promoted to P.2, or
2) they were held back in P.1 and repeated the P.1 school year.

The same thing is true in 2015 – students were either promoted to P.3, or were held back in P.2 or P.1[54]. Since there are only 2 options, when we add the percentage of Primary students who are promoted and the percentage of students who are not promoted (that is, who repeat) each year, we get a total of 100%. This is expressed in formulate below.

Formula 2: $\textbf{PromRate}^y + \textbf{RptRate}^y = \textbf{1.00} = \textbf{100\% of Pop}_{PL}^0$

Using simple algebra, we set **y** equal to 1 and create an equation where can solve for the annual repetition rate by subtracting the annual promotion rate from 1, as seen in Formula 2.1

Formula 2.1: $\textbf{RptRate}^1 = (\textbf{1} - \textbf{PromRate})^1$

Calculating hypothetical repetition rates with an invented sample for demonstration purposes
Before we present the actual repetition statistics, we calculate a hypothetical example. Suppose at baseline (year 0) there are 100 P.1 students and a repetition rate of 10%.

In Year 1, we would expect that of the 100 P.1 students from Year 0, 10% would repeat P.1 and the other 90% of them (90 students) would be promoted to P.2.

---

[54] A 3rd option does exist in theory for 2015: Students who were promoted to P.2 for 2014 were returned to P.1 for 2015. We did not collect data on this possibility, and for the purpose of this analysis, any such cases are included in the group of students who are held back. For qualitative evidence regarding this possibility, see Chapter 8.

In Year 2, with the same repetition rate of 10% annually, we expect that 9 of the 10 P.1 students would be promoted to P.2, and 81 of the 90 P.2 students would be promoted to P.3. So we would observe that 81 students are in P.3, 18 are in P.2, and 1 student remains in P.1.

In Table 57, we see whether Formula 1.1, Formula 1.2, and Formula 2.1 match our expectations – that 100 students in P.1 in Year 0 and 81 of those students in P.3 in Year 2 should equate with a 10% repetition rate annually.

Table 57: Hypothetical Promotion and Repetition Rate Calculation

Hypothetical Example	Sample	*Baseline*: 100 P.1 students | *Endline*: 81 P.3 students N of years between assessments: 2
	Formula 1.1	$\text{PromRate}^2 = 81/100 = 0.810$ = 81.0% Promotion rate over 2 years
	Formula 1.2	$\sqrt{\text{PromRate}^2} = \sqrt{0.810} = 0.900 = \mathbf{90.0\%}$ **Annual Promotion Rate**
	Formula 2.1	$\text{RptRate}^1 = (1 - 0.900)^1 = 0.100 = \mathbf{10.0\%}$ **Annual Repetition Rate**

In the hypothetical example described above and in Table 57, we see that the formulas work to predict repetition rates annually using samples size at baseline and sample size at endline. We now turn to the actual calculations of repetition that we observe in our sample.

Calculating actual repetition rates with actual sample sizes

In Table 58, we present the step by step calculations for the samples observed in the Literacy Boost baseline and endline reading assessments.

Table 58: Promotion and Repetition Rate Calculation

Overall Sample	Sample	Baseline: 1665[55] P.1 students | Endline: 623 P.3 students
	Formula 1.1	$PromRate^2 = 623/1665 = 0.374 = 37.4\%$ Promotion rate over 2 years
	Formula 1.2	$\sqrt{PromRate^2} = \sqrt{0.374} = 0.611 = \mathbf{61.1\%}$ **Annual Promotion Rate**
	Formula 2.1	$RptRate^1 = (1 - 0.611)^1 = 0.389 = \mathbf{38.9\%}$ **Repetition Rate**
Control Group Only	Sample	Baseline: 518 P.1 students | Endline: 164 P.3 students
	Formula 1.1	$PromRate^2 = 164/518 = 0.317 = 31.7\%$ Promotion rate over 2 years
	Formula 1.2	$\sqrt{PromRate^2} = \sqrt{0.317} = 0.563 = \mathbf{56.3\%}$ **Annual Promotion Rate**
	Formula 2.1	$RptRate^1 = (1 - 0.563)^1 = 0.437 = \mathbf{43.7\%}$ **Repetition Rate**
TT Group Only	Sample	Baseline: 545 P.1 students | Endline: 221 P.3 students
	Formula 1.1	$PromRate^2 = 221/545 = 0.406 = 40.6\%$ Promotion rate over 2 years
	Formula 1.2	$\sqrt{PromRate^2} = \sqrt{0.406} = 0.637 = \mathbf{63.7\%}$ **Annual Promotion Rate**
	Formula 2.1	$RptRate^1 = (1 - 0.637)^1 = 0.363 = \mathbf{36.3\%}$ **Repetition Rate**
LB Group Only	Sample	Baseline: 602 P.1 students | Endline: 238 P.3 students
	Formula 1.1	$PromRate^2 = 238/602 = 0.395 = 39.5\ \%$ Promotion rate over 2 years
	Formula 1.2	$\sqrt{PromRate^2} = \sqrt{0.395} = 0.628 = \mathbf{62.8}\ \%$ **Annual Promotion Rate**
	Formula 2.1	$RptRate^1 = (1 - 0.628)^1 = 0.372 = \mathbf{37.2\%}$ **Repetition Rate**
LB & TT Groups	Sample	Baseline: 1147 P.1 students | Endline: 459 P.3 students
	Formula 1.1	$PromRate^2 = 459/1147 = 0.400 = 40.0\%$ Promotion rate over 2 years
	Formula 1.2	$\sqrt{PromRate^2} = \sqrt{0.40} = 0.632 = \mathbf{63.2\%}$ **Annual Promotion Rate**
	Formula 2.1	$RptRate^1 = (1 - 0.632)^1 = 0.368 = \mathbf{36.8\%}$ **Repetition Rate**

To summarize these Promotion and Repetition rates, refer to Table 17 in Chapter 5.

---

[55] The total analytic sample reported in Chapter 5 is 1668 at endline. Three of these students were reported to be found in P4. We exclude them from our analysis, as we cannot be sure whether they skipped a year of Primary, or whether the assessor made an error in the data entry, or some other issue. The loss of 3 students will not affect the conclusions in any substantial way.

Data on ECD Schooling and Early Childhood Development Center Attendance

According to the National Institutes of Statistics in Rwanda, access to ECD schooling is very low in Rwanda. The image below, published in the 2014 Educational Statistical Yearbook, shows general statistics regarding ECD for the first five years of this decade.

Image 20: MINEDUC Statistics on ECD Education in Rwanda

3 PRE-PRIMARY EDUCATION

Pre-primary education aims to enhance the school readiness of children aged 3-6 years. Most of pre-primary schools are community-based and located within public schools. The community provides salaries for teachers and the government offers teaching learning and play materials like ECD Kits, books and chalk.

Table 3.1: Pre-primary profile from 2010 to 2014[4]

Year	2010	2011	2012	2013	2014
Total (Pupils)	96,934	111,875	130,403	142,471	159,291
Boys	47,034	54,378	63,161	69,418	77,872
Girls	49,900	57,497	67,242	73,053	81,419
% of Boys	48.52%	48.61%	48.44%	48.72%	48.89%
% of Girls	51.48%	51.39%	51.56%	51.28%	51.11%
GER (Overall)	9.9%	11.6%	12.9%	15.7%	17.5%
Boys	9.6%	11.2%	12.4%	15.3%	17.2%
Girls	10.3%	11.9%	13.3%	16.0%	17.9%
NER (Overall)	6.1%	10.1%	12.7%	12.7%	13.3%
Boys	5.9%	9.7%	12.3%	12.5%	13.0%
Girls	6.3%	10.4%	13.2%	13.0%	13.5%
Pupils in public schools	565	343	362	363	93,499
Boys	247	151	183	198	45,524
Girls	318	192	179	165	47,975
Pupils in Private schools	96,369	111,532	130,041	142,108	65,792
Boys	46,787	54,227	62,978	69,220	32,348
Girls	49,582	57,305	67,063	72,888	33,444
Total (Staff)	Data not available for this period	2,941	3,247	3,808	4,671
Male		587	642	714	921
Female		2,354	2,605	3,094	3,750
% of Male		20.0%	19.8%	18.8%	19.7%
% of Female		80.0%	80.2%	81.3%	80.3%
Pupils: Teacher Ratio		38:1	40:1	38:1	34:1
Total number of schools	1,369	1,471	1,870	2,076	2,431
Public[5]	2	2	2	2	1,420
Private	1,367	1,469	1,868	2,074	1,011
Used Classrooms		2,273	2,677	3,064	3,648
Pupil Classroom Ratio		49	49	46	44

Most of the pre-primary schools are located within public schools and, starting in the 2014 school year onwards; those schools have been classified as public. This caused the increase of public pre-primary schools from 2 in 2013 to 1,420 in 2014. It also explains the decrease in the number of private pre-primary schools from 2,074 in 2013 to 1,011 in 2014. The school readiness program is designed to promote preschool children's school readiness, by availing a pre-primary classroom at every public and government aided primary school for one year before the child's entry to primary.

[4] This table relates only to preschool centres and pupils, day care centres (crèches) are not included.
[5] For 2014 this category includes public and government aided schools.

(reproduced from Rwanda Ministry of Education, 2015, p. 7)

Enrollment and attendance in ECD is an important variable to measure, as presumably children who attended ECD education would be more 'ready' for school. For that reason, both students and their familiess were asked whether children attended ECD education during the reading assessment and the Literacy Ecology Survey, respectively. The question that was asked at every point of data collection (baseline and endline, as well as during the reading assessment midline). The question we asked was:

Waba warize amashuri y'incuke ? *[Did you attend nursery school?]*

During the endline, we also included instructions to the assessor:

Kurikirana umenye neza niba umwana yasobanukiwe koi bi bisobanura ko yigeze agira ahandi yiga mbere yo gutangira umwaka wa mbere w'amashuri abanza.
[Check well to make sure, the child understood that this means if he/she has attended any other class before primary school]

The data that was collected contradicted the data reported in the Educational Statistical Yearbook, reproduced above. we collected was somewhat puzzling. The percent of children and their family members who responded yes to attending ECD was fairly consistent over time, as seen in the table below

Table 59: Student & Caretaker Reports of ECD Attendance

% of students who reported attending ECD	R.A. Baseline 2013 (Cohort 1)	71.6%
	R.A. Midline 2015	65.1%
	R.A. Endline 2015	65.7%
	R.A. Baseline 2015 (Cohort 2)	69.1%
% of caretakers who reported that child attended ECD	Baseline L.E. Survey (2013)	72.3%
	Endline L.E. Survey (2015)	72.2%

R.A. = Reading Assessment. L.E.= Literacy Ecology

We also examined the rate of agreement between what students reported at baseline and what they reported at endline, as well as the agreement between what students reported and what their family member reported, shown in the table below.

Table 60: Rates of Agreement between Data Sources

% of sample that responded the same at baseline and endline	R.A. (students)	81.47%
	L.E. Survey (caretakers)	78.49%
% of agreement between students and caretakers about ECD attendance	R.A Baseline & L.E. Survey Baseline	74.89%
	R.A. Endline & Endline L.E. Survey	69.53%

R.A. = Reading Assessment. L.E.= Literacy Ecology

From both of these tables we notice several important things. First, students and their families report that between 65 percent and 72.3 percent of students attended ECD. This is a stark contrast to the enrollment ratios shown in Image 20.

The second point to notice is the relatively tight range of the percentage of the sample that attended ECD. If students were answering randomly, we would expect the percentage to be closer to 50 percent.

Third, approximately three out of every four responses that a student gave was that same response given by his or her family. Remember that data collection for the Literacy Ecology Survey occurred four to eight weeks following the Reading Assessment data collection, and students were not always present while their family members were

interviewed for the Literacy Ecology, so there is little likelihood that students were coaching parents to supply identical answers.

The discrepancy between the official, reported numbers of ECD enrollment across Rwanda and the data we collected led the research team to investigate the data further. First, we examined the officially reported data and discovered one possible contributor to the discrepancy.

Image 20 contains a footnote that notes that the data presented in the image do not include daycare/crèche services that families may use.

We need further information, and turned to the assessors who collected the data. The following explanation is based on the input of various members of the assessment team, but does not represent any official data collection.

1) The assessors who responded to our questions about the ECD discrepancy first mentioned that crèche or daycare centers or services don't really exist in rural areas, casting doubt on our first explanation on the discrepancy.
2) Many of the data collectors for the Literacy Ecology Survey mentioned that the respondents would clarify their response to the ECD question. Respondents reported that some Head Teachers or other school officials strongly urged, or even required, that students complete at least one year (of the normal three years) of ECD to be admitted into P.1.
3) The ECD education to which parents reported sending their children were not always well established nursery schools or ECD centers. Many of them were informal, occurring in an unused building near a church, or in a village, or even in individual's home.
4) Assessors were unable to give any indication of the quality of these ECD education centers.
5) Assessors confirmed that the percentages of ECD attendance that we see in the data agree with their recollection of the answers provided to them by parents and students.

Because we do not have any further information on the ECD experiences of the children in our sample, we make the decision to set the data we collected on ECD education aside, and not include it in our analysis.

Additional Reading Assessment Tables & Figures

Table 61: Kinyarwanda Reading Skills Descriptive by Group

Measure	Overall			Control			TT Only			LB		
	N	Avg.	SD	N	Avg.	SD	N	Avg.	SD	N	Avg.	SD
# - Productive Vocab Correct	1650	10.7	4.0	518	10.5	3.9	533	10.1	3.9	599	11.3	4.2
# - Listen Comp Correct	1650	3.4	1.1	518	3.3	1.1	533	3.2	1.1	599	3.5	1.0
# - Alphabet Correct	1650	19.6	6.8	518	19.5	6.7	533	19.3	7.0	599	20.0	6.6
# - Decoding Correct	1650	8.2	6.3	518	7.9	6.3	533	7.9	6.3	599	8.8	6.4
# - Dictation Correct	1650	9.8	6.8	518	9.5	6.8	533	9.4	6.9	599	10.3	6.8
% Productive Vocab Correct	1650	49%	0.2	518	48%	0.2	533	46%	0.2	599	51%	0.2
% Listening Comprehension Correct	1650	68%	0.2	518	66%	0.2	533	64%	0.2	599	70%	0.2
% Alphabet Correct	1650	82%	0.3	518	81%	0.3	533	81%	0.3	599	83%	0.3
% Dictation Correct	1650	57%	0.4	518	56%	0.4	533	56%	0.4	599	60%	0.4
% Decoding Correct	1650	48%	0.4	518	46%	0.4	533	46%	0.4	599	52%	0.4
% who IDed ≥ 18 letters	1650	74%	0.4	518	73%	0.5	533	73%	0.5	599	77%	0.4
% scoring ≥ 1 on Decoding	1650	73%	0.5	518	72%	0.5	533	71%	0.5	599	75%	0.4
% scoring ≥1 on Dictation	1650	74%	0.4	518	74%	0.4	533	72%	0.5	599	75%	0.4
% who met the Basic Literacy Threshold	1650	69%	0.5	518	67%	0.5	533	67%	0.5	599	72%	0.5
Words Correct per Minute on P.1 text	1135	32.2	18.2	348	31.2	18.1	357	31.0	17.7	430	34.1	18.7
Words Correct per Minute on P.3 text	1039	28.3	15.1	316	26.4	14.6	323	27.7	14.3	400	30.4	15.9
Words Correct per Minute on P.4 text	825	28.7	11.8	237	27.8	11.2	257	28.0	10.7	331	29.9	12.8
# - Reading Comprehension Correct	1134	8.2	3.5	347	8.0	3.5	357	8.1	3.7	430	8.5	3.4
# - Cloze Correct	1134	6.6	3.9	347	6.0	3.8	357	6.6	3.8	430	7.1	3.9
% - Reading Comprehension Correct	1134	68%	0.3	347	67%	0.3	357	68%	0.3	430	71%	0.3
% - Cloze Correct	1134	55%	0.3	347	51%	0.3	357	55%	0.3	430	59%	0.3

Table 62: Family Demographics and Literacy Characteristics†

Time	Measure	Overall			Control			TT Only			LB		
		N	Avg.	SD	N	Avg.	SD	N	Avg.	SD	N	Avg.	SD
End	Student = Female	1668	48%	0.50	521	46%	0.50	545	50%	0.50	602	49%	0.50
Base	Age	1527	7.69	1.54	477	7.84	1.55	504	7.65	1.57	546	7.60	1.50
End	Age	1660	9.55	1.37	517	9.69	1.40	542	9.52	1.45	601	9.47	1.26
Base	Family SES Index	1668	6.45	2.17	521	6.24	2.00	545	6.50	2.30	602	6.59	2.19
End	Family has Radio	1668	70%	0.46	521	69%	0.46	545	70%	0.46	602	71%	0.45
End	Family has Electricity	1668	18%	0.38	521	15%	0.36	545	19%	0.40	602	20%	0.40
End	Family has Computer	1668	4%	0.21	521	3%	0.17	545	5%	0.22	602	5%	0.22
Base	Family has Storybooks	1668	22%	0.42	521	22%	0.41	545	22%	0.41	602	23%	0.42
End	Family has Storybooks	1668	35%	0.48	521	31%	0.46	545	33%	0.47	602	40%	0.49
Base	Family has Textbooks	1668	41%	0.49	521	40%	0.49	545	38%	0.49	602	45%	0.50
End	Family has Textbooks	1668	57%	0.50	521	56%	0.50	545	56%	0.50	602	58%	0.49
Base	N of Reading Material Types (Range: 0 to 6)	1668	2.01	1.71	521	1.98	1.71	545	1.98	1.71	602	2.08	1.70
End	N of Reading Material Types (Range: 0 to 6)	1668	2.18	1.46	521	2.09	1.36	545	2.08	1.47	602	2.37	1.52
Base	% of Family who can read	1668	54%	0.33	521	53%	0.34	545	55%	0.33	602	54%	0.33
End	% of Family who can read	1668	62%	0.33	521	60%	0.34	545	61%	0.32	602	63%	0.32
Base	% of Family who help you study	1668	59%	0.35	521	57%	0.36	545	59%	0.34	602	60%	0.34
End	% of Family who help you study	1668	71%	0.33	521	69%	0.34	545	71%	0.33	602	72%	0.32
Base	% of Family who read to you	1668	45%	0.35	521	42%	0.36	545	45%	0.35	602	46%	0.34
End	% of Family who read to you	1668	54%	0.34	521	51%	0.35	545	55%	0.34	602	55%	0.34
Base	% of Family talk to you	1668	87%	0.29	521	87%	0.32	545	88%	0.27	602	85%	0.27
End	% of Family talk to you	1668	80%	0.30	521	77%	0.33	545	81%	0.30	602	83%	0.27
End	Family Size	1668	3.96	1.48	521	3.90	1.47	545	3.92	1.47	602	4.05	1.49

†All data reported herein comes from the endline reading assessment data collection unless otherwise noted.

Table 63: Raw Standardized Differences in Baseline BLT

		Group Average			Pooled Std. Deviation		Effect Size Difference	
	N	Control	TT	LB	Control plus TT	Control plus LB	TT minus Control	LB minus Control
All students assessed at baseline	2041	0.27	0.31	0.37	0.45	0.47	0.09	0.21
All students assessed at both baseline and endline	1668	0.26	0.32	0.37	0.46	0.47	0.13	0.23

Table 64: Impact on Reading Skills at Endline Controlling for BLT– Cohort 1

Outcomes	Control		LB			TT			
	N	Avg	N	Avg	Sig?	N	Avg	Sig?	Total N
Composite: Kinyarwanda Oral Comprehension	**518**	**-0.12**	**599**	**0.18**	******	**533**	**-0.09**		**Students: 1650 Sectors: 21**
Subtest: Kinyarwanda productive vocabulary	*518*	*-0.07*	*599*	*0.12*	***	*533*	*-0.07*		*Students: 1650 Sectors: 21*
Subtest: Kinyarwanda listening comprehension	*518*	*-0.12*	*599*	*0.16*	***	*533*	*-0.07*		*Students: 1650 Sectors: 21*
Composite: Student Met Basic Literacy Threshold	**518**	**88%**	**599**	**88%**		**533**	**88%**		**Students: 1650 Sectors: 21**
Subtest: Student identified ≥ 18 of 24 letters	*518*	*64%*	*599*	*63%*		*533*	*64%*		*Students: 1650 Sectors: 21*
Subtest: Student read ≥ 1 decoding word	*518*	*92%*	*599*	*91%*		*533*	*91%*		*Students: 1650 Sectors: 21*
Subtest: Student wrote ≥ 1 dictation word	*518*	*91%*	*599*	*89%*		*533*	*90%*		*Students: 1650 Sectors: 21*
Composite: Reading Fluency	**348**	**-0.10**	**430**	**0.10**	*****	**357**	**-0.02**		**Students: 1135 Sectors: 21**
Subtest: P.1-levelled Passage	*348*	*-0.06*	*430*	*0.08*	*~*	*357*	*-0.03*		*Students: 1135 Sectors: 21*
Subtest: P.2 / P.3-levelled Passage	*316*	*-0.13*	*400*	*0.10*	****	*323*	*0.00*		*Students: 1039 Sectors: 21*
Subtest: P.4-levelled Passage	*237*	*-0.16*	*331*	*0.14*	****	*257*	*-0.03*		*Students: 825 Sectors: 21*
Composite: Reading Comprehension	**347**	**-0.14**	**430**	**0.09**	*****	**357**	**0.02**	**~**	**Students: 1134 Sectors: 21**
Subtest: Kinyarwanda Reading Comprehension	*347*	*-0.08*	*430*	*0.06*		*357*	*0.00*		*Students: 1134 Sectors: 21*
Subtest: Kinyarwanda Cloze	*347*	*-0.16*	*430*	*0.10*	****	*357*	*0.03*	***	*Students: 1134 Sectors: 21*

Note: All comparisons & significant differences are between the Control group and the indicated treatment group.

~ p<0.10, *p<0.05, **p<0.01, ***p<0.00

Figure 15: Predicted Percentage of Students Promoted to P.3 Controlling for BLT

Predicted % of 2013 Baseline Students Promoted to P3 in 2015 controlling for BLT at Baseline

Control: 28%
LB: 35%
TT: 42% *
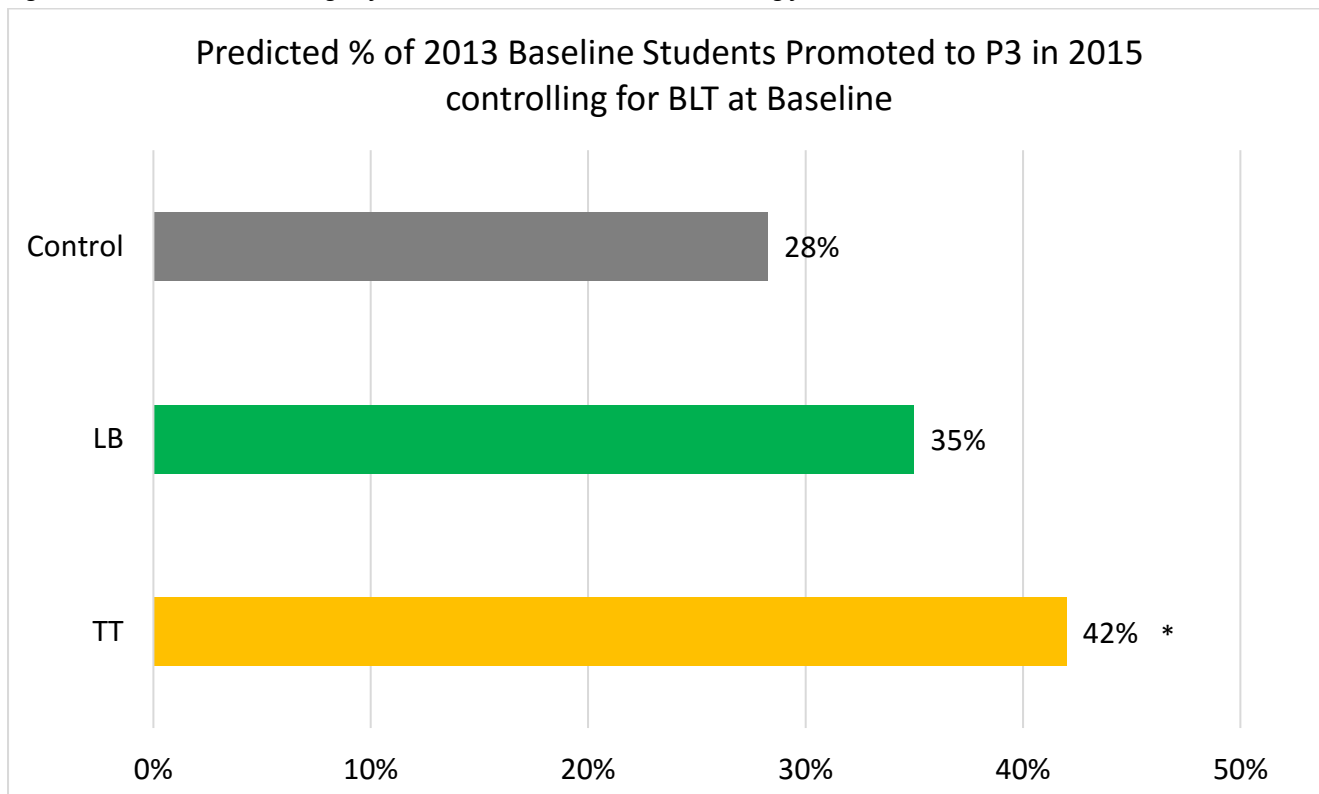
Figure 16: Literacy Outcome Differences between Groups, Controlling for BLT

Cohort 1: Differences between Control and Treatment Groups on Literacy Measures when controlling for BLT

Measure	TT	LB
Oral Comprehension	0.03	0.30 **
Met the BLT	0.00	0.00
Reading Fluency	0.08	0.20 *
Reading Comprehension	0.16	0.23 *

Effect Size Difference between Treatment Groups versus Control for Cohort 1 when controlling for Baseline BLT

Table 65: Equity Analysis Regression Results for Binary Outcomes – Cohort 1

Interaction Group	Meaning of Variable (Sub-Group Specification)	Cohort 1 – P.A. Control		Cohort 1- BLT Control	
		Reached P.3	BLT	Reached P.3	BLT
Sex	LB Boys	32%	71%	28%	85%
	LB Girls	48%	72%	42%	85%
	TT Boys	35%~	71%	42%	90%
	TT Girls	47%	75%	39%*	88%
	Control Girl	32%	78%**	46%	87%~
	Control Boy	25%***	67%*	32%	91%*
Repeaters	LB Non-Repeater	35%**	77%	31%~	89%
	LB Repeater	43%~	76%	38%	87%
	TT Non-Repeater	34%**	70%	36%**	87%
	TT Repeater	48%	76%	49%	88%
	Cntrl Non-Repeater	35%***	73%	36%***	89%
	Cntrl Repeater	19%***	70%**	19%***	88%***
BLT	LB Non-BLT	19%	60%	17%	55%
	LB BLT	75%	omitted	80%	omitted
	TT Non-BLT	26%**	59%	24%**	55%
	TT BLT	77%	99%	81%~	99%
	Cntrl BLT	72%***	99%***	77%***	99%***
	Cntrl Non-BLT	14%***	62%~	13%***	56%
Reading Materials (Rd. Mats)	LB w/ avg. Rd. Mats	38%*	75%	32%	86%
	LB w/ 95%ile Rd. Mats	43%	80%	38%	89%
	TT w/ avg. Rd. Mats	40%**	71%	39%*	86%
	TT w/ 95%ile Rd. Mats	40%	73%	39%	86%
	Cntrl w/ 95%ile Rd. Mats	29%	73%	29%	89%~
	Cntrl w/ avg. Rd. Mats	27%***	71%**	26%***	87%***

"Omitted" indicates that the variable was dropped from the regression due to collinearity

Table 65: Equity Analysis Regression Results for Binary Outcomes – Cohort 1 (Continued)

Interaction Group	Meaning of Variable (Sub-Group Specification)	Cohort 1 – P.A. Control		Cohort 1- BLT Control	
		Reached P.3	BLT	Reached P.3	BLT
Reading Habits (Rd. Habs)	LB w/ avg. Rd. Habs	46%*	67%	41%	79%
	LB in the 95%ile of Rd. Habs	48%*	76%	44%*	87%
	TT w/ avg. Rd. Habs	48%**	62%	48%*	78%
	TT in the 95%ile of Rd. Habs	44%	66%	43%	81%~
	Cntrl w/ 95%ile Rd. Habs	30%	70%~	30%	87%*
	Cntrl w/ avg. Rd. Habs	34%*	62%	34%*	80%**
Phono-logical Awareness (P.A.)	LB w/ avg. P.A.	39%*	77%	35%	89%
	LB w/ 95%ile P.A.	45%	85%	36%	92%
	TT w/ avg. P.A.	41%**	73%	42%**	88%
	TT w/ 95%ile P.A	43%	80%	41%	90%
	Cntrl w/ 95%ile P.A.	36%***	76%***	32%***	90%**
	Cntrl w/ avg. P.A.	28%***	71%**	28%***	89%***
Socio-economic Status (SES)	LB w/ avg. SES	32%*	76%	34%	88%
	LB w/ 95%ile SES	31%	78%	35%	90%
	TT w/ avg. SES	33%**	72%	41%*	88%
	TT w/ 95%ile SES	31%	76%	40%	90%
	Cntrl w/ 95%ile SES	23%	71%	28%	89%
	Cntrl w/ avg. SES	22%***	71%*	28%*	89%***
Home Language	LB Kinyarwanda speaker	38%~	77%	33%	88%
	LB Non-Kinyarwanda speaker	47%	61%	51%	83%
	TT Kinyarwanda speaker	43%**	75%	43%*	88%
	TT Non-Kinyarwanda speaker	35%	64%	38%	84%
	Cntrl Non-Kinyawanda speaker	29%	69%	28%	84%
	Cntrl Kinyarwanda speaker	29%***	73%***	29%***	89%***

Table 66: Equity Analysis Regression Results for Continuous Outcomes – Cohort 1

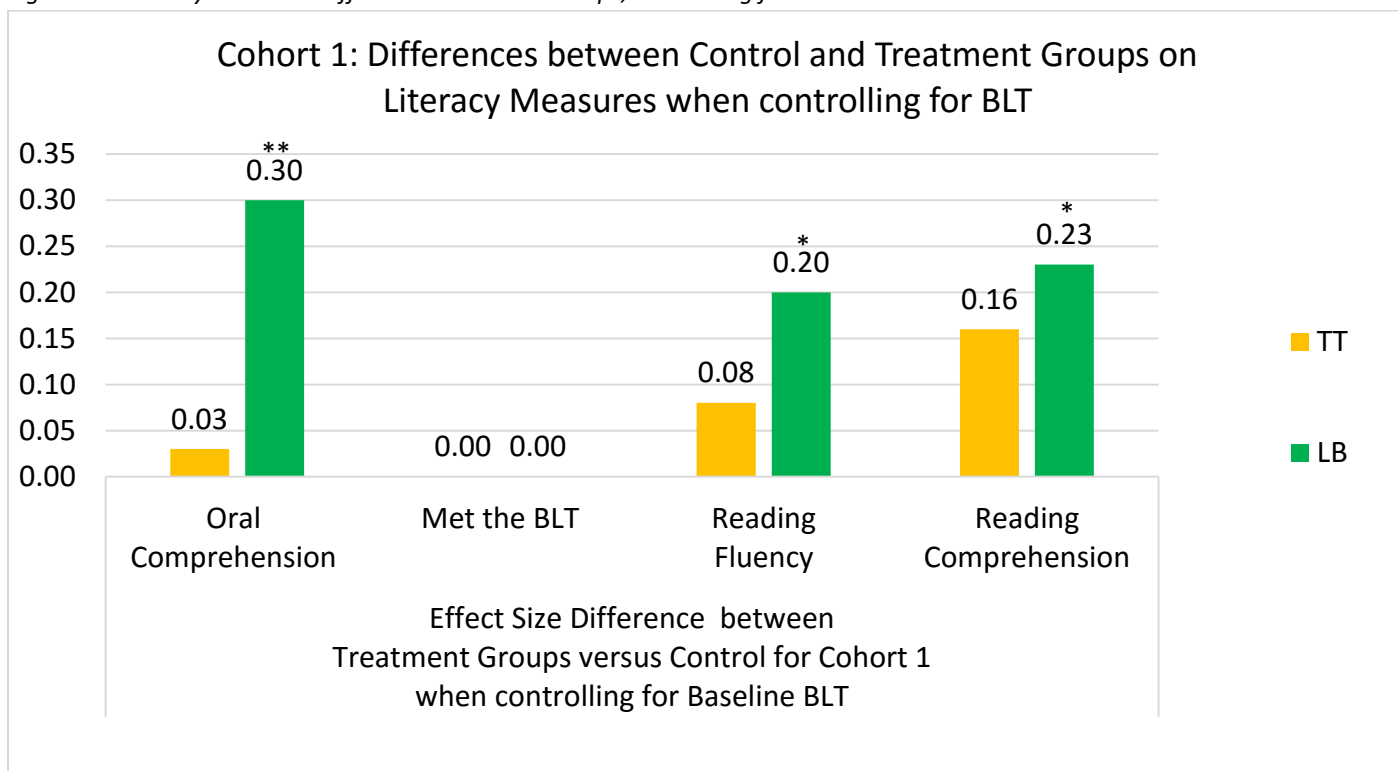| Interaction Group	Meaning of Variable (Sub-Group Specification)	Cohort 1 – P.A. Control			Cohort 1 - BLT Control		
		Oral Comp	Reading Fluency	Reading Comp	Oral Comp	Reading Fluency	Reading Comp
Sex	LB Boys	0.27*	-0.18	-0.05	0.27*	-0.20	-0.08
	LB Girls	0.14	0.42**	0.30*	0.09	0.37**	0.24*
	TT Boys	0.04	-0.28	-0.17	0.08	-0.23	-0.11
	TT Girls	-0.21	0.24*	0.20**	-0.25	0.19~	0.15~
	C Girls	-0.32***	-0.05*	-0.17	-0.29***	-0.01*	-0.13
	C Boys	-0.01	-0.26***	-0.19*	0.03	-0.20**	-0.14~
Repeater	LB Non-Repeater	0.15*	0.16**	0.14**	0.14~	0.15*	0.13
	LB Repeater	0.25	0.13	0.14	0.21	0.06	0.06
	TT Non-Repeater	-0.06	0.03~	0.10*	-0.04	0.07	0.15~
	TT Repeater	-0.10	-0.06	-0.06	-0.13	-0.10	-0.10
	C Non-Repeater	-0.18	-0.14	-0.19	-0.15	-0.11	-0.17
	C Repeater	-0.12	-0.18	-0.17*	-0.07	-0.08	-0.06
BLT	LB non-BLT	-0.04*	-0.28*	-0.33*	-0.10*	-0.36*	-0.41*
	LB met BLT	0.63*	0.52	0.55	0.76~	0.62	0.65
	TT Non-BLT	-0.28	-0.36	-0.40	-0.33	-0.43	-0.47
	TT met BLT	0.32	0.38	0.50	0.42	0.45	0.57
	C BLT	0.15***	0.33***	0.32***	0.30***	0.44***	0.43***
	C Non-BLT	-0.27***	-0.49***	-0.53***	-0.34***	-0.58***	-0.63***
Reading Materials (Rd. Mats)	LB w/ avg. Rd. Mats	0.14**	0.12***	0.05***	0.09**	0.04*	-0.03*
	LB w/ 95%ile Rd. Mats	0.50	0.47*	0.26	0.36	0.33*	0.16
	TT w/ avg. Rd. Mats	-0.16	-0.03~	-0.06*	-0.18	-0.07	-0.09~
	TT w/ 95%ile Rd. Mats	-0.10	0.24	0.16	-0.15~	0.10	0.03
	C w/ 95%ile Rd. Mats	-0.02*	-0.13	-0.05~	-0.03**	-0.06	-0.04**
	C w/ avg. Rd. Mats	-0.21**	-0.17*	-0.26***	-0.20**	-0.15*	-0.24***

Table 66: Equity Analysis Regression Results for Continuous Outcomes – Cohort 1 (continued)

	Meaning of Variable (Sub-Group Specification)	Cohort 1 – P.A. Control			Cohort 1 - BLT Control		
		Oral Comp	Reading Fluency	Reading Comp	Oral Comp	Reading Fluency	Reading Comp
Reading Habits (Rd. Habs)	LB w/ avg. Rd. Habs	0.33***	0.04***	-0.03***	0.26**	-0.08*	-0.15*
	LB w/ 95%ile Rd. Habs	0.53***	0.20	0.19	0.41***	0.07	0.04
	TT w/ avg. Rd. Habs	0.04	-0.12~	-0.14*	-0.01	-0.19	-0.21
	TT w/ 95%ile Rd. Habs	-0.02	0.01	0.02	-0.04	-0.12	-0.12
	C w/ 95%ile Rd. Habs	-0.21	-0.11	-0.11	-0.11	-0.12	-0.16~
	C w/ avg. Rd. Habs	-0.03	-0.25~	-0.34*	-0.05	-0.27*	-0.36**
Phono-logical Awareness (P.A.)	LB w/ avg. P.A.	0.20**	0.07***	0.05***	0.17**	0.07*	0.05**
	LB w/ 95%ile P.A.	0.96	1.23*	0.71	0.36	0.40**	0.21
	TT w/ avg. P.A.	-0.08	-0.07~	-0.06*	-0.08	-0.03	-0.01*
	TT w/ 95%ile P.A	1.28**	1.21 *	1.01	0.28**	0.31*	0.25
	C w/ 95%ile P.A.	0.24***	0.24***	0.34***	-0.07*	-0.08~	-0.08***
	C w/ avg. P.A.	-0.16*	-0.22***	-0.26***	-0.12~	-0.13*	-0.16**
Socio-economic Status (SES)	LB w/ avg. SES	0.00**	-0.23**	-0.32***	0.03**	-0.14*	-0.21*
	LB w/ 95%ile SES	0.75	-0.44	-0.99*	0.18	-0.11	-0.25
	TT w/ avg. SES	-0.28	-0.38~	-0.43**	-0.23	-0.25	-0.28~
	TT w/ 95%ile SES	0.17	-0.38	-0.50	-0.15	-0.20	-0.23
	C w/ 95%ile SES	-0.05 ~	0.03**	0.05**	-0.24	-0.29~	-0.37*
	C w/ avg. SES	-0.36*	-0.53***	-0.65***	-0.27*	-0.34*	-0.44**
Home Language	LB Kinyarwanda	0.18*	0.13**	0.12**	0.14*	0.09*	0.07~
	LB Non-Kinyarwanda	0.32*	0.21	0.24	0.33**	0.18	0.21*
	TT Kinyarwanda	-0.02	-0.01	0.05*	-0.02	-0.02	0.03
	TT Non-Kinyarwanda	-0.40	-0.07	-0.14	-0.40	-0.02	-0.09
	C Non-Kinyawanda	-0.39*	-0.21	-0.37	-0.38**	-0.22	-0.38~
	C Kinyarwanda	-0.07	-0.14*	-0.15*	-0.04	-0.09	-0.08

Table 67: Equity Analysis Regression Results for All Outcomes – Cohort 2

Interaction Group	Meaning of Variable (Sub-Group Specification)	Binary Outcomes		Continuous Outcomes		
		Repeated P.1	BLT	Oral Comp	Reading Fluency	Reading Comp
Sex	LB Boys	58%	33%	0.19	0.05*	0.21**
	LB Girls	49%	38%	-0.07	0.15	0.24
	TT Boys	55%	37%	0.04	-0.11	-0.18
	TT Girls	54%	39%	-0.13	0.30	0.13
	Control Girls	59%	36%	-0.23***	-0.14	-0.24
	Control Boys	53%	35%**	0.07	-0.35**	-0.28*
Socio-economic Status (SES)	LB w/ avg. SES	50%	34%	-0.12	-0.05 **	-0.01 **
	LB w/ 95%ile SES	50%	37%	-0.11	0.07	0.01
	TT w/ avg. SES	51%	36%	-0.23	-0.05 **	-0.26
	TT w/ 95%ile SES	49%	38%	-0.19	0.04	-0.19
	Cntrl w/ 95%ile SES	54%	34%	-0.21	-0.35	-0.43
	Cntrl w/ avg. SES	53%	34%~	-0.26	-0.39	-0.50 *
Home Language	LB Kinyarwanda speaker	52%	36%	0.09	0.13**	0.25***
	LB Non-Kinyarwanda speaker	69%	35%	-0.34	-0.21	-0.19
	TT Kinyarwanda speaker	53%	38%	-0.02	0.13**	0.00~
	TT Non-Kinyarwanda speaker	65%	38%	-0.32	-0.25	-0.23
	Cntrl Non-Kinyawanda speaker	70%~	33%	-0.29	-0.34	-0.12
	Cntrl Kinyarwanda speaker	55%	36%**	-0.06	-0.23**	-0.27*

Note: In the interaction tables above, the numbers are predicted values. The stars in the shaded rows indicate whether the shaded rows are significantly different from the white rows in the same group. In other words, the stars in the shaded rows indicate whether the LB and TT treatment significantly differently benefit some subgroups.

Table 68: Mixed Effects Model for Dosage – Cohort 1 controlling for Phonological Awareness

	Student reached P.3	Oral Comp (End)	Student met BLT (End)	Fluency (End)	Reading Comp (End)
N of Days of Reading Awareness Workshop Implementation	0.006 (0.011)	-0.009~ (0.004)	-0.011 (0.012)	0.004 (0.005)	-0.005 (0.005)
Baseline Phonological Awareness	-0.305*** (0.040)	0.091*** (0.012)	0.362*** (0.047)	0.117*** (0.013)	0.109*** (0.014)
Observations	590	587	587	426	426

Standard errors in parentheses. ~ indicates p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 69: Mixed Effects Model for Dosage – Cohort 1 controlling for BLT

	Student reached P.3	Oral Comp (End)	Student met BLT (End)	Fluency (End)	Reading Comp (End)
N of Days of Reading Awareness Workshop Implementation	0.007 (0.013)	-0.005 (0.004)	-0.001 (0.012)	0.010~ (0.005)	0.001 (0.005)
Baseline BLT	3.058*** (0.250)	0.857*** (0.080)		0.974*** (0.091)	1.062*** (0.089)
Observations	590	587	366	426	426

Standard errors in parentheses. ~ indicates p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 70: Mixed Effects Model for Dosage – Cohort 2

	Student repeated P.1	Oral Comp	Student is a Decoder	Fluency	Reading Comprehension
N of Days of Reading Awareness Workshop Implementation	-0.014~ (0.009)	-0.005 (0.004)	0.017~ (0.009)	0.006 (0.006)	-0.004 (0.006)
Constant	-0.198 (0.259)	0.159 (0.120)	-0.599* (0.276)	-0.221 (0.202)	-0.054 (0.218)
Observations	672	660	660	245	245

Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.10

Descriptive Statistics from Teacher Survey and Observation in Narrative Form

Table 71: Descriptive from Teacher Survey and Observation (Narrative Form)

EXPERIENCE OF LEARNING TO READ		
Data from	Control Schools	SC-Trained Schools
READING ACTIVITIES		
survey	There was not a clear pattern for the most commonly used reading activities. Only four activities were cited in the top 5 most frequent reading activities by more than 10% of control teachers. • The most frequently used reading activities were: ○ Practicing drawing letters in the air with fingers, ○ copying letters from the board to notebooks, ○ blending letters to form syllables, and ○ individual students reading aloud to the whole class.	Teachers' most commonly used reading activities align with an understanding of skills students need to become good readers • The most frequently used reading activities were: ○ identifying letters and sounds, ○ copying letters into notebooks, ○ blending letters to form syllables, ○ clapping to count syllables, ○ teaching meaning of words related to a text, ○ modeling reading out loud, ○ asking students questions during / after reading a text, ○ asking students to link events to their own lives.
survey	Most teachers read out loud daily, with a focus on textbooks or words they write on the board. • Most teachers (90%) read aloud from a textbook and from words they have written on the board daily • About half of teachers (56%) read aloud from storybooks at least once a week	Teachers read out loud daily, with a focus on textbooks or words they write on the board. They focus less on storybooks. • Most teachers (89%) read aloud from textbooks or from words they have written on the board daily. • About half of teachers (55%) read aloud from storybooks at least once a week.
observation	All teachers were observed using activities to teach reading, with 100% covering at least 2 components of literacy in their lesson. Some teachers used audio to teach reading. Again, it is not necessary—or desirable—for teachers to cover all 6 components of literacy in one lesson. • 7% of teachers were observed doing a phonological awareness activity, ○ A further 14% of teachers using audio for a phonological awareness activity • 36% teachers were observed doing a letter/sound knowledge activity, ○ A further 7% observed doing this using audio • 85% of teachers were observed doing a decoding/encoding activity • 21% teachers were observed doing a vocabulary activity, ○ A further 7% teachers were observed using audio for a vocabulary activity • 71% teachers were observed doing a reading fluency activity • 50% teachers were observed doing a reading comprehension activity	All teachers were observed using activities to teach reading, with 100% covering at least 2 components of literacy in their lesson. It is not necessary—or desirable—for teachers to cover all 6 components of literacy in one lesson • 57% teachers were observed doing a phonological awareness activity • 46% teachers were observed doing a letter/sound knowledge activity • 75% of teachers were observed doing a decoding/encoding activity ○ 10% of teachers using audio for a decoding/encoding activity. • 75% teachers were observed doing a vocabulary activity • 82% teachers were observed doing a reading fluency activity • 82% teachers were observed doing a reading comprehension activity

EXPERIENCE OF LEARNING TO READ		
Data from	Control Schools	SC-Trained Schools
TEACHER KNOWLEDGE		
survey	Teachers have a somewhat accurate perception of key skills students need to become good readers. • Teachers think the following are the top 5 key skills that help students become better readers: o identifying letters and sounds, o phonemic awareness, o reading accurately, o reading comprehension, and o good grammar and pronunciation	Teachers have an accurate understanding of key skills students need to become good readers • Teachers think the following are the top 5 key skills that help students become better readers: o identifying letters and sounds, o phonemic awareness, o reading accurately, o good vocabulary, and o reading comprehension
MATERIALS USED		
observation	Teachers did not use a range of texts to teach reading. No teachers used storybooks, poems, or songs, or textbooks, student notebooks, magazines or newspapers • 50% teachers used L3 textbooks • 0% used other textbooks • 0% used storybooks, poems, or songs • 71% teachers used text they wrote on the blackboard	Teachers used some a small variety of types of text to teach reading. Most teachers used textbooks or text they wrote on the blackboard, with some using storybooks, poems, or songs. • 57% teachers used L3 textbooks • 17% used other textbooks • 14% used storybooks, poems, or songs • 57% teachers used text they wrote on the blackboard
observation	Teachers employed some techniques to ensure students were engaged, with many providing clear instructions, asking students questions frequently, and giving them opportunities to practice new skills. Few teachers encouraged small group interaction, and few teachers asked open-ended questions. • 71% teachers always provided clear instructions • 63% teachers were observed taking action always when students weren't paying attention • 21% teachers were observed always using positive discipline • 86% teachers were not observed encouraging small group interaction at all, o 14% were observed doing this a few times • Students in 92% of lessons observed did not ask any questions during teacher-led session • Students in 28% of the lessons observed always actively participated during teacher-led session, o 50% observed mostly doing so • Students in 85% lessons observed always had the opportunity to practice skill from lesson • 79% teachers mostly asked closed-ended, short answer questions • 85% teachers never asked students open-ended questions • Responding to students' wrong answers, o 57% teachers mostly then called on another student, o 93% teachers mostly or a few times provided clues or hints to help him/her answer the question.	Teachers employed some techniques to ensure students were engaged, providing clear instructions, asking students questions frequently, and giving them opportunities to practice new skills. Some teachers encouraged small group interaction. Most teachers did not ask open-ended questions. • 78% teachers always provided clear instructions • 50% teachers were observed taking action a few times when students weren't paying attention • 50% teachers were observed always using positive discipline • 50% teachers were not observed encouraging small group interaction at all, o 39% were observed doing this a few times • Students in 96% of lessons observed did not ask any questions during teacher-led session • Students in 57% of the lessons observed always actively participated during teacher-led session • Students in 85% lessons observed always had the opportunity to practice skill from lesson • 92% teachers mostly asked closed-ended, short answer questions • 75% teachers never asked students open-ended questions • Responding to students' wrong answers, o 57% teachers mostly then called on another student, o 85% teachers mostly or a few times provided clues or hints to help him/her answer the question.

EXPERIENCE OF LEARNING TO READ		
Data from	Control Schools	SC-Trained Schools
LANGUAGE USE		
observation	Many teachers report using languages other than Kinyarwanda in their classrooms, with the most common other language being English. • About half of teachers (53%) used languages other than Kinyarwanda to teach their students in the classroom • Of the teachers who use other languages, about half (52%) use English. • 52% of teacher report never teaching English in their classroom • 31% report using it daily.	Many teachers report using languages other than Kinyarwanda in their classrooms, with the most common other language being English • About half of teachers (53%) used languages other than Kinyarwanda to teach their students in the classroom. • Of the teachers who use other languages, about half (49%) use English. • 54% of teachers report never teaching English in their classroom, • 33% report using it daily
observation	All teachers used Kinyarwanda as the language of instruction for the whole class	96% teachers used Kinyarwanda as the language of instruction for the whole class
USE OF TEACHING STRATEGIES		
observation	The majority of teachers use a range of strategies to teach reading comprehension, including many teacher-centric activities as well as student questions before, during, and after reading the text. • 62% teachers report reading the passage aloud to students multiple times • 64% teachers tell students the meaning of the story, • 68% ask students to answer questions about what is happening in the text, • 66% of teachers report asking students to summarize a text, • 60% of teachers report asking students to express their opinions about a text.	Teachers use a range of strategies to teach reading comprehension, with almost equal attention paid to building comprehension before, during, and after reading a text • 76% report asking students to make predictions about a text, • 74% report asking students questions about a text, • 72% report asking students to summarize a text.
observation	The majority of teachers report using strategies covering a wide range of literacy skills. • 77% teachers reported using activities that covered all 6 components of teaching reading	Most teachers report using strategies that cover a wide range of literacy skills • 86% teachers reported using activities that covered all 6 components of teaching reading
FORMATIVE ASSESSMENT		
survey	Teachers assess students using a wide variety of strategies that would allow them to track the development of students' different literacy skills. • Almost all teachers (99.3%) report assessing students' literacy skills/progress, with at least half reporting each strategy: o written exercises, o dictation, o asking them to read out loud, o arranging words in sentences, o completing sentences, o checking responses for text comprehension, o writing words or sentences on the board or in their notebooks.	Teachers assess students using a wide variety of strategies that would allow them to track the development of students' different literacy skills. • Almost all teachers (99.8%) report assessing students' literacy skills/progress, with at least half reporting each strategy: o written exercises, o dictation, o asking them to read out loud, o arranging words in sentences, o completing sentences, o checking responses for text comprehension.

EXPERIENCE OF LEARNING TO READ		
Data from	Control Schools	SC-Trained Schools
survey	Teachers assign reading homework on a regular basis • Half of teachers (50%) report giving students writing or reading homework daily, • 39% of teachers report giving it 2-4 times per week.	Teachers assign reading homework on a regular basis • Just over half of teachers (53%) report giving students reading or writing homework daily • 33% report giving it 2-4 times per week.

Observation	All teachers were observed assessing students informally, meaning they checked as students worked and/or asked students questions to see if they understand. They used different techniques at times.
	
	• 64% teachers were observed giving oral feedback to individual students a few times,
	   o 29% were observed doing this frequently.
	• 21% teachers were observed providing oral feedback to a small group of students either frequently or a few times
	• 64% teachers provided oral feedback to the entire class a few times,
	   o 7% teachers were observed doing this frequently.
		All teachers were observed assessing students informally, meaning they checked as students worked and/or asked students questions to see if they understand. They used a variety of techniques.
		
		• 46% teachers were observed giving oral feedback to individual students frequently,
		   o 43% were observed doing this a few times.
		• 36% teachers were observed providing oral feedback to a small group of students either frequently or a few times
		• 32% teachers provided oral feedback to the entire class frequently,
		   o 46% teachers were observed doing this a few times.

Teacher Sub-study: Additional Tables & Information

Breakdown of Surveyed Teachers who Volunteered for Teacher Observations

Table 72: % of Teachers who Volunteered for Observation

Time	Group	N who consented	% who consented	N who did not consent	% who did not consent	N who did not reply	% who did not reply	Total N
Baseline	LB & TT	292	95%	8	3%	6	2%	306
	Control	135	92%	5	3%	6	4%	146
	Overall Total	427	94%	13	3%	12	3%	452
Endline	LB & TT	376	91%	23	6%	13	3%	412
	Control	135	91%	11	7%	3	2%	149
	Overall Total	511	91%	34	6%	16	3%	561

Classroom Photo Scoring and Inter-rater Reliability Procedure

To score each photo, we first estimate the amount of space that can reasonably be used to hang print material, posters, student created work, flyers, etc. The term "reasonably be used" encompasses wall space that is not obstructed by furniture and is easy for children to see. It does not include windows, doors, walls that are behind furniture, or chalkboards. We do not include furniture, either, in the available space to hang print materials.

Once we make a mental estimate of the amount of available space to hang print material, we visually assess what percentage of the available space in the photo actually contains print materials. Print material is defined as any piece of paper, cloth, or other material that contains at least one letter of the alphabet on it[56].. A score, in the form of a ratio, is then assigned to each photo. Mathematically, the score is

$$\text{Photo Score} = \frac{\text{Amount of Wall Space Covered by Print Materials}}{\text{Total Amount of Space Available}}$$

A score of zero indicates that there are no print materials visible in the picture at all. Photos with a few pieces of print material hanging on the walls, but not enough to cover one quarter of the available space in the photo, automatically receive a score of 1/8. Scores of ¼, ½, ¾, and 1 are assigned to photos where we estimate that ¼, ½, ¾, or all of the available wall space is covered with print, respectively.

Most photos captured most of, if not the entire, wall. But some photos only captured a small part of the wall. Regardless of how much total space is captured, we treat the visible wall space in the photo as "1". If Photo X only captured ¼ of the actual wall, then that ¼ of a wall is a 1 for the analysis. In Photo X, if wall postings cover ½ of the space in the photo, Photo X would receive a score of ½ . Since we do not have a photograph of the remaining ¾ of the wall that was not captured in Photo X, we do not try to guess what may have been on other parts of the wall that were not photographed.

If a school has particularly high ceilings, and/or if the photo captures a large space above the chalkboard, then we do not score the space that sits approximately 1 meter above the blackboard. The logic behind this is that it is not reasonable to expect print to be hung in these very hard to reach places, because teachers may have trouble posting material that high, and children will likely have trouble reading any material posted in that location anyways. There were very few photos for which we had to exclude space above a blackboard or otherwise out of reach. In the instances where print material had been posted over windows or on doors, we mentally 'rehang' those postings on to an available wall space and then calculate the photo score.

For classrooms that had books or flyers hanging on strings across the room or note cards hanging in midair, not attached to a wall, we mentally calculate the wall space those postings would have occupied and add that amount of coverage to what is actually posted on the wall. At times these hanging items are visible in more than one photo from the same classroom. In this case, the item is counted in the first photo that it appears and is ignored in subsequent photos in which it appears again. Photos within each classroom are numbered 1 through 4, so raters follow the same order of photos to make sure that items that may appear twice are counted in the same first photo. The numbers 1 through 4 correspond to the number of walls in the classroom (all classrooms had four walls).

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[56] A very small percentage of the print materials contained only images without print

A few photos were poorly lit, blurry, or difficult to discern details in. If the print material was legible in these dark or unclear photos, the photo was scored. If the walls were too dark to discern the posting, the photo was not scored and was instead removed from the set of photos for analysis, with a record kept of the number of photos removed.

Though classroom photos were captured during both the midline and endline reading assessment, in this report we only report the scores the endline photos, for two reasons. First, the midline data was collected at the start of the 2015 school year, and we theorized that teachers early on in the academic year may not have had sufficient time to create materials and or decorate their classroom. The second reason was simply a lack of sufficient time and resources to process another 1000 photos.

Raters did not know to which group (treatment schools with SC-Trained teacher or Control schools) the classrooms and photos belonged to prevent unconscious rating biases.

Procedure to establish photo scoring inter-rater reliability
Only using one rater to rate all the photos leaves the data open to individual biases that a single rater may have, and cannot counter the possibility that the single rater unintentionally drifts away from the scoring system originally established. To counter these possibilities, we establish the reliability of the photo scoring system by using two raters to score at least 10 % of the photos independently. To establish this reliability, we followed the procedures below.
1) Rater 1 (R1) devises a system for scoring the photos and codes ideally a minimum of 150 to 200 photos.
2) R1 creates a subset of approximately 20 photos for training Rater 2 (R2). This subset is made up of photos, from both Control classrooms and SC-trained teachers' classrooms, which R1 has already scored and that represent a range of possible scores that photos could receive. R1 then uses the subset of photos to train R2 according to the subsequent steps
3) R1 describes the scoring system she developed to R2 while showing R2 examples of photos and sharing their scores.
4) Both raters score a few photos together, and discuss the reasons for the scores they gave, reconciling any different interpretations that may arise along the way.
5) Once both raters feel as though they are both seeing the same coverage ratios and are likely to score photos similarly, R2 takes three photos from the training subset and codes the three photos independently.
6) Once R2 finishes coding the three photos independently, both raters check for agreement.
   a. If raters agree on the score for all three photos, go to step 7.
   b. If raters disagree on any of the scores, go to step 15
7) R2 scores five more photos from the subset of 20 training photos, again independently. After completing the ratings, both raters compare their scores.
   a. If agreement is 80% or greater, go to step 8
   b. If agreement is less than 80%, go to step 15
8) R2 scores five more photos independently from the subset of 20 training photos, and again both raters compare their scores.
   a. If agreement is 80% or greater, go to step 9
   b. If agreement is less than 80%, go to step 15
9) [*This step is optional—raters may skip to step 10 if desired*] For extra confidence in the interrater reliability and agreement, R2 scores another 5 photos from the subset of ~20 independently and again both raters compare their scores.
   a. If agreement is 80% or greater, go to step 10
   b. If agreement is less than 80%, go to step 15
10) R2 independently score 50 photos, randomly selected from among those that R1 had already scored but that were not included in the subset of ~20 used for training.

11) After R2 scores the 50 photos independently, calculate the percent agreement between the scores given by R1 and those given by R2. Record this number as "Agreement check 1".
12) After the rate of agreement is recorded, discuss any discrepancies, and try to reconcile them.
    a. If "Agreement Check 1" is equal to or greater than 80%, continue to step 13
13) R2 independently scores a new set of 50 photos, randomly selected from among those that R1 had already scored but that were not included in the subset of ~20 used for training nor included in the set of 50 photos from step 11.
14) After R2 scores the 50 photos independently, calculate the percent agreement between the scores given by R1 and those given by R2. Calculate the percent of agreement and record this number as "Agreement check 2". Then discuss the discrepancies and try to resolve differences.
    a. If agreement dips below 80%, both raters must really try to understand the underlying causes of the discrepancies, particularly for these items where there are consistent differences in ratings
    b. Repeat Step 14 until raters achieve 80% agreement or more on a set of 100 photos. Keep a record of each "Agreement check X."
15) If raters cannot agree on scores for the first set of 3 photos, raters should discuss and reconcile differences until they both agree on what the scores should be, then repeat Steps 5 through 14.
    a. If raters cannot establish good reliability, move to Step 16.
16) If both raters cannot progress past Step 5, (i.e. they can't reconcile differences or get strong agreement on at least 3 photos), there is likely a problem with the scoring system, or some part of it. In this circumstance, raters should try to identify what the problem is, and/or consider changing the scoring system. A lot will depend on how complex the system is and the level of inference required for making scoring decisions.

Literacy Ecology Survey: Descriptive Statistics & Regression Tables

Table 73: Descriptive Statistics from the Literacy Ecology Survey

	Overall			Control			LB		
Measure	N	Mean	SD	N	Mean	SD	N	Mean	SD
Student=Female	344	48.0%	0.50	185	46.5%	0.50	159	49.7%	0.50
% of Respondents = Mother	344	43.0%	0.50	185	45.4%	0.50	159	40.3%	0.49
% of Respondents = Father	344	44.2%	0.50	185	40.5%	0.49	159	48.4%	0.50
Mother's Education in Years	317	5.2	3.46	172	4.8	3.43	145	5.6	3.44
Father's Education in Years	277	5.5	3.61	149	5.4	3.65	128	5.7	3.58
% who Read Consent by Themselves	342	58.2%	0.49	184	60.3%	0.49	158	55.7%	0.50
% who Signed Consent by Themselves	344	69.5%	0.46	185	68.1%	0.47	159	71.1%	0.46
Family Size	344	3.8	1.51	185	3.9	1.58	159	3.7	1.43
% Consented to Participate in the Ethnography	329	96.7%	0.18	177	96.6%	0.18	152	96.7%	0.18
% of Sample Enrolled in P2 in 2014	344	47.7%	0.50	185	44.9%	0.50	159	50.9%	0.50
% of Sample Enrolled in P3 in 2015	344	34.9%	0.48	185	34.6%	0.48	159	35.2%	0.48
% of Sample Expected to Enroll in P4 in 2016	344	27.6%	0.45	185	25.9%	0.44	159	29.6%	0.46
N of Story Books at Home	344	0.8	5.63	185	0.1	0.46	159	1.7	8.20
% of Family Members that Talk to Child	344	78.9%	0.28	185	75.9%	0.30	159	82.4%	0.26
% of Family Members that can Read	344	79.1%	0.27	185	77.8%	0.27	159	80.6%	0.26
% of Family Members that Read to Child	344	50.5%	0.32	185	48.2%	0.32	159	53.1%	0.31
% of Family Members that Help Child Study	344	11.5%	0.20	185	10.7%	0.20	159	12.5%	0.20
Reading Habits Factor--Baseline	344	0.0	1.01	185	0.1	1.00	159	0.0	1.02
Caretaker's Literacy Competency Factor--Baseline	344	0.0	0.99	185	0.0	1.00	159	0.0	0.99
Reading Materials Factor	344	0.0	1.01	185	0.0	1.07	159	0.0	0.94
Religious Related Activities --Baseline	344	0.0	0.97	185	0.0	1.00	159	0.0	0.93
Child Interest/Engagement Factor--Baseline	344	0.0	1.00	185	0.0	1.02	159	0.1	0.97
Reading Habits Factor	344	0.0	1.01	185	-0.1	1.00	159	0.1	1.00
Caretaker's Literacy Competency Factor	342	0.0	1.01	184	-0.1	1.01	158	0.1	1.00
Reading Materials Factor	344	0.1	1.12	185	-0.3	0.48	159	0.7	1.37
Religious Related Activities and Materials Factor	344	0.0	0.89	185	0.0	0.92	159	0.0	0.86
Child Interest/Engagement Factor	341	0.0	1.02	182	-0.1	1.03	159	0.1	0.99

Table 74: Regressions Predicting the Implementation Factor by Treatment

Variables	Workshops Factor	Community Activities Factor
Assigned Group (0=Control, 1= LB)	0.554*** (0.157)	1.131*** (0.136)
Interest (base)	0.008 (0.053)	0.103* (0.046)
Constant	-0.256** (0.089)	-0.523*** (0.077)
Observations	344	344

Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05

Table 75: Percentage of family members interacting with children and literacy

Data Source	Variable	Control			Literacy Boost			Sig Diff
		N	Average	SD	N	Average	SD	
Base line	% of family that help child study	185	35%	0.30	159	38%	0.31	
	% of family that read	185	58%	0.27	159	60%	0.29	
	% of family that read to child	185	37%	0.29	159	39%	0.32	
	% of family that talk to child	185	78%	0.28	159	83%	0.23	
	% of family that write	185	57%	0.29	159	59%	0.29	
Endline	% of family that help child study	185	11%	0.20	159	13%	0.20	
	% of family that read	185	78%	0.27	159	81%	0.26	
	% of family that read to child	185	48%	0.32	159	53%	0.31	
	% of family that talk with child	185	76%	0.30	159	82%	0.26	~
	% of family that write	185	77%	0.27	159	79%	0.28	
Endline Frequency of Use	Adult Books Use Frequency (0-7 days)	185	0.09	0.51	159	0.16	0.87	
	Storybooks Use Frequency (0-7 days)	185	0.05	0.53	159	0.47	1.20	***
	Textbook Use Frequency (0-7 days)	185	0.60	1.61	159	0.81	1.69	
	Newspaper/Magazine Use Frequency (0-7 days)	185	0.05	0.53	159	0.05	0.56	
	Religious Materials Use Frequency (0-7 days)	185	1.01	1.89	159	1.26	2.23	
	Dictionary Use Frequency (0-7 days)	185	0.043	0.52	159	0	0.00	
Baseline Mother	Mama can read	173	65%	0.48	149	73%	0.45	
	Mama can write	173	63%	0.48	149	73%	0.45	
	Mama reads to child	173	45%	0.50	149	48%	0.50	
	Mama talks to child	173	94%	0.23	149	96%	0.20	
	Mama tells/helps child study	173	42%	0.50	149	49%	0.50	
Endline Mother	Mama read to child last week	174	55%	0.50	149	63%	0.48	
	Mama reads	174	70%	0.46	149	78%	0.42	
	Mama reads to child (ever)	174	47%	0.50	149	60%	0.49	*
	Mama talks to child	174	82%	0.39	149	89%	0.32	
	Mama told/helped child study	174	94%	0.24	149	95%	0.23	
	Mama writes	174	69%	0.46	149	76%	0.43	
Baseline Father	Papa can read	162	75%	0.43	134	72%	0.45	
	Papa can write	162	74%	0.44	134	71%	0.46	
	Papa reads to child	162	46%	0.50	134	38%	0.49	
	Papa talks to child	162	87%	0.34	134	90%	0.30	
	Papa's tells/helps child study	162	44%	0.50	134	39%	0.49	
Endline Father	Papa read to child last week	152	50%	0.50	131	60%	0.49	
	Papa reads	152	76%	0.43	131	77%	0.42	
	Papa reads to child (ever)	152	49%	0.50	131	55%	0.50	
	Papa talks to child	152	66%	0.47	131	75%	0.44	
	Papa told/helped child study	152	94%	0.24	131	99%	0.12	~
	Papa writes	152	75%	0.43	131	77%	0.42	

~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

Table 76: Variables that Form the Religious Factor

Baseline or Endline	Variable	Control			LB			Sig Diff
		N	Avg	SD	N	Avg	SD	
End	Why is it important for a child to read: for religious reasons	185	0.02	0.15	159	0.01	0.11	
	I read to the child for religious reasons	185	0.13	0.34	159	0.11	0.32	
	I read for religious reasons	185	0.18	0.39	159	0.21	0.41	
	Yes I read to child religious texts	185	0.27	0.44	159	0.23	0.42	
	Religious Books/Materials at home	185	0.37	0.49	159	0.38	0.49	
	N of religious books/materials at home	185	1.17	4.75	159	2.69	16.37	
	Reading Activities in the Community: Church Related	185	0.01	0.10	159	0.03	0.18	
	Workshops supported by a religious institution	185	0.01	0.10	159	0.02	0.14	

Table 77: Expectations, Aspirations, and Use of Child's Time

Baseline or Endline	Variable	Control			LB			Sig Diff
		N	Avg	SD	N	Avg	SD	
Base	Age for independent reading	185	10.0	2.42	159	9.6	2.20	
Base	Age for independent writing	185	10.2	2.39	159	9.9	2.45	
End	Age for independent reading	184	10.7	2.74	158	10.9	2.63	
End	Age child begins to learn	185	5.4	1.54	157	5.4	1.63	
Base	What is the highest level you **expect** your child to reach in school?	185	2.2	0.97	159	2.1	0.98	
End	What is the highest level you **expect** your child to reach in school?	178	1.4	1.03	152	1.3	0.97	
Base	What is the highest level you **want** your child to achieve?	185	2.9	0.51	159	2.9	0.59	
End	What is the highest level you **want** you child to achieve?	183	3.1	0.54	156	3.1	0.74	
End	During school days: Hours for work	183	1.8	1.076	156	1.7	1.081	
End	During school days: Hours for reading/playing	181	1.8	1.008	157	2.0	0.996	
End	During non-school days: Hours for work	184	3.5	2.052	157	3.1	1.779	*
End	During non-school days: Hours for reading/playing	178	3.6	2.172	154	3.5	1.865	

~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

Table 78: Attitudes and Beliefs about Reading at Baseline and Endline

Baseline or Endline	Variable	Control			Literacy Boost			Sig diff.
		N	Mean	SD	N	Mean	SD	
Base	There are many benefits to knowing how to read.	185	100%	0.00	159	100%	0.00	
Base	It is important for a child to be exposed to books and other writing from a young age	185	100%	0.00	159	100%	0.00	
Base	Children should learn to read from their older siblings or friends.	185	99%	0.10	159	99%	0.11	
Base	Every child should learn how to read.	185	100%	0.00	159	100%	0.00	
Base	People who can read have higher standing/status in your community	185	88%	0.32	159	94%	0.23	*
Base	Reading is an activity that is valued in your community	185	95%	0.22	159	98%	0.16	
Base	You **know how to help** your child learn to read.	185	91%	0.29	159	82%	0.38	*
Base	You **feel confident you can help** your child learn to read.	185	91%	0.28	159	98%	0.14	**
Base	Is it **difficult for someone like you** to help your child learn to read	185	30%	0.46	159	44%	0.50	**
Base	It is not worth teaching some children to read.	185	23%	0.42	159	21%	0.41	
Base	The **teacher is the only person responsible** for teaching children how to read.	185	18%	0.38	159	18%	0.39	
End	You **know how to help** your child learn to read. [Scale: 1 (strongly disagree) to 4 (strongly agree)]	183	2.9	0.65	158	3.0	0.57	
End	You **feel confident you can help** your child learn to read. Scale: 1 (strongly disagree) to 4 (strongly agree)]	184	2.9	0.70	157	3.0	0.62	
End	It is **difficult for someone like you** to help your child learn to read [Scale: 1 (strongly disagree) to 4 (strongly agree)]	184	2.5	0.80	158	2.4	0.80	
End	It is not worth teaching some children to read. [Scale: 1 (strongly disagree) to 4 (strongly agree)]	184	1.8	0.72	158	1.8	0.70	
End	The **teacher is the only person responsible** for teaching children how to read. [Scale: 1 (strongly disagree) to 4 (strongly agree)]	185	2.0	0.72	157	2.1	0.92	
End	BINARY: You **know how to help** your child learn to read.	183	79%	0.41	158	84%	0.37	
End	BINARY: You **feel confident you can help** your child learn to read	184	78%	0.41	157	83%	0.38	
End	BINARY: **It is difficult for someone like you** to help your child learn to read	184	50%	0.50	158	44%	0.50	
End	BINARY: It is not worth teaching some children to read.	184	11%	0.32	158	12%	0.33	
End	BINARY: **The teacher is the only person responsible** for teaching children how to read.	185	24%	0.43	157	26%	0.44	

~ p<0.10, *p<0.05, **p<0.01, ***p<0.001

Table 79: Correlations between of Literacy Ecology Factors and Student Outcomes

	Reading Habits	Caretaker Competency	Reading Materials	Religious Related Activities	Child Interest / Engagement	Workshops	Community Activities	Interest (b)	LB	Reached P.3	Oral Comp	Reading Comp
Reading Habits	1.00											
Caretaker Competency	0.63	1.00										
Reading Materials	0.25	0.22	1.00									
Religious	0.35	0.32	0.06	1.00								
Child Interest Motivation	0.26	0.18	0.22	0.11	1.00							
Workshops	0.09	0.09	0.25	0.00	0.10	1.00						
Community Activities	0.16	0.13	0.61	0.06	0.20	0.30	1.00					
Child Interest (base)	0.25	0.18	0.12	0.06	0.25	0.03	0.12	1.00				
LB	0.10	0.06	0.36	0.01	0.17	0.21	0.41	0.04	1.00			
Attrited from RA	-0.05	-0.10	-0.10	0.00	-0.03	-0.04	-0.10	0.01	-0.12			
Reached P.3	0.11	0.04	0.02	0.04	0.23	-0.04	0.02	0.10	0.03	1.00		
Oral Comp	0.21	0.13	-0.05	0.17	0.22	0.01	0.02	0.18	0.07	-0.35	1.00	
Reading Comp	0.25	0.19	0.02	0.15	0.41	0.05	0.02	0.17	0.11	-0.52	0.45	1.00
Fluency	0.23	0.20	0.03	0.12	0.40	0.05	0.03	0.18	0.11	-0.56	0.38	0.88

Green squares show a significant correlation at p<.05

REPUBLIC OF RWANDA/REPUBLIQUE DU RWANDA

NATIONAL ETHICS COMMITTEE / COMITE NATIONAL D'ETHIQUE

Telephone. (250) 2 55 10 70 04
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Web site: www.rnecrwanda.org

Ministry of Health
P.O. Box. 84
Kigali, Rwanda.

FWA Assurance No. 00001973
IRB 00001497 of IORG0001100

June 23, 2015
No.155/RNEC/2015

Dr. Claude Goldenberg
Principal Investigator

Your Project title **"Annual Renewal: Literacy Boost in Rwanda: A randomized control trial of an early grade reading intervention"** has been evaluated by the Rwanda National Ethics committee

Name	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Dr.Jean-Baptiste MAZARATI	Biomedical Services (BIOS)	X		
Prof. Eugène RUTEMBESA	University of Rwanda	X		
Dr.Laetitia NYIRAZINYOYE	University of Rwanda(school of public Health)	X		
Prof.Alexandre LYAMBABAJE	University of Rwanda		X	
Ms.Françoise UWINGABIYE	Lawyer at Musanze	X		
Dr. Egide KAYITARE	University of Rwanda	X		
Sr.Domitilla MUKANTABANA	Kabgayi Nursing and Midwife school	X		
Mr. David K. TUMUSIIME	Kigali Health institute	X		

Dr. Lisine TUYISENGE	Kigali Teaching Hospital	X		
Dr. Claude MUVUNYI	Biomedical Services (BIOS)	X		

After reviewing your protocol during the RNEC meeting of June 13, 2015 where quorum was met, **Continuation of Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months.**
You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.

2. Only approved consent forms are to be used in the enrollment of participants

3. All consent forms signed by subjects should be retained on file. The RNEC may conduct audits of all study records, and consent documentation may be part of such audits.

4. A continuing review application must be submitted to the RNEC in a timely fashion and before expiry of this approval.

5. Failure to submit a continuing review application will result in termination of the study.

6. Notify the Rwanda National Ethics committee once the study is finished.

Sincerely,

Prof. Eugène RUTEMBESA
Vice-chair

Date of Approval: June 13, 2015
Expiration date: June 12, 2016

Dr. Jean- Baptiste MAZARATI
Chairperson, Rwanda National Ethics Committee.

C.C.
- Hon. Minister of Health.
- The Permanent Secretary, Ministry of Health.

REPUBLIC OF RWANDA/REPUBLIQUE DU RWANDA

NATIONAL ETHICS COMMITTEE / COMITE NATIONAL D'ETHIQUE

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Ministry of Health
P.O. Box. 84
Kigali, Rwanda.

FWA Assurance No. 00001973
IRB 00001497 of IORG0001100

November24,2015
No.351/RNEC/2015

Dr Claude Goldenberg
Principal Investigators

Your Project" **Amendment: Literacy Boost Rwanda: A randomized control trial of an early grade reading intervention**. has been evaluated by the Rwanda National Ethics committee.

Name	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Dr.Jean-Baptiste MAZARATI	Biomedical Services (BIOS)	x		
Prof. Eugène RUTEMBESA	University of Rwanda		x	
Dr.Laetitia NYIRAZINYOYE	University of Rwanda(school of public Health)		x	
Prof.Alexandre LYAMBABAJE	University of Rwanda		x	
Ms.Françoise UWINGABIYE	Lawyer at Musanze	X		

Dr. Egide KAYITARE	University of Rwanda	X		
Sr.Domitilla MUKANTABANA	Kabgayi Nursing and Midwife school	X		
Mr. David K. TUMUSIIME	Kigali Health institute	X		
Dr. Lisine TUYISENGE	Kigali Teaching Hospital	X		
Dr. Claude MUVUNYI	Biomedical Services (BIOS)	X		

After reviewing your protocol during the RNEC meeting14 November,2015where quorum was met, and revisions made on the advice of the RNEC submitted on24November,2015, **Approval letter has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**.
You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.

2. Only approved consent forms are to be used in the enrollment of participants

3. All consent forms signed by subjects should be retained on file. The RNEC may conduct audits of all study records, and consent documentation may be part of such audits.

4. A continuing review application must be submitted to the RNEC in a timely fashion and before expiry of this approval.

5. Failure to submit a continuing review application will result in termination of the study.

6. Notify the Rwanda National Ethics committee once the study is finished.

Sincerely,

Date of Approval 24November2015
Expiration date:23November, 2016

Dr. Jean- Baptiste MAZARATI
Chairperson, Rwanda National Ethics Committee.

Rwanda National Ethics Committee
Approval Date:2.4.11.12.a.15.
Expiration Date:2.3.1.11.2016.

REPUBLIC OF RWANDA/REPUBLIQUE DU RWANDA

NATIONAL ETHICS COMMITTEE / COMITE NATIONAL D'ETHIQUE

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Ministry of Health
P.O. Box. 84
Kigali, Rwanda.

FWA Assurance No. 00001973
IRB 00001497 of IORG0001100

June 21, 2016
No.639/RNEC/2016

Claude Goldenberg
Principal Investigator

"**Annual Renewal and Amendments:** Literacy Boost Rwanda: A randomized control trial of an early grade reading intervention" has been evaluated by the Rwanda National Ethics committee.

Name	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Dr.Jean-Baptiste MAZARATI	Biomedical Services (BIOS)	X		
Prof. Eugène RUTEMBESA	University of Rwanda	X		
Dr.Laetitia NYIRAZINYOYE	University of Rwanda(school of public Health)	X		
Ms.Françoise UWINGABIYE	Lawyer at RUSIZI	X		
Dr. Egide KAYITARE	University of Rwanda	X		
Sr.Domitilla MUKANTABANA	Kabgayi Nursing and Midwife school	X		
Dr. David K. TUMUSIIME	University of Rwanda		X	
Dr. Lisine TUYISENGE	Kigali Teaching Hospital	X		
Dr. Claude MUVUNYI	Biomedical Services (BIOS)	X		

After reviewing amendments to your protocol during the RNEC meeting of June 11, 2016 where quorum was met, **Continuation of Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**. You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.

2. Only approved consent forms are to be used in the enrollment of participants

3. All consent forms signed by subjects should be retained on file. The RNEC may conduct audits of all study records, and consent documentation may be part of such audits.

4. A continuing review application must be submitted to the RNEC in a timely fashion and before expiry of this approval.

5. Failure to submit a continuing review application will result in termination of the study.

6. Notify the Rwanda National Ethics committee once the study is finished.

Sincerely,

Date of Approval: June 11, 2016
Expiration date: June 10, 2017

Dr. Jean- Baptiste MAZARATI
Chairperson, Rwanda National Ethics Committee.

C.C.
- Hon. Minister of Health.
- The Permanent Secretary, Ministry of Health.

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Approval from the DSTR: September 21, 2015

REPUBLIC OF RWANDA

Kigali,. *21.09.* 2015
N⁰ :. *2460.* /12.00/2015

MINISTRY OF EDUCATION
P.O.BOX 622 KIGALI

Re: Extension of Permission to carry out research in Rwanda.

The Permission is hereby granted to Stanford University researchers, namely **Professor Claude Goldenberg**; Principal Investigator, **Elliott Friedlander**; Co-Director, **Rachel Baker**; Research Assistant, **Saima Malik**; Research Assistant, to continue the research on: **"Literacy Boost Rwanda: a randomized control trial of an early grades reading intervention"** The project aims to investigate best practices in supporting early literacy and to contribute to general knowledge around supporting reading in Rwanda. This research will be conducted in all sectors of Gicumbi district, Northern. The researchers will need to interview Teachers and Students of the selected schools as well as the community Members.

The extended period of research is one year starting from **24ᵗʰ September 2015 to 23ʳᵈ September 2016** The research will continue to be carried out under affiliation of Rwanda Education Board (REB) in partnership with the Save the Children International, Kigali, Rwanda under supervision of **Mr. Gasana Janvier**, Director General, REB.

The reference number of this letter shall be cited in the final research report as "Research conducted under permission No: **MINEDUC/S&T/0143/2013"**. You are requested to submit the final report after completion of your research activities to the Ministry of Education of Rwanda

Please provide all mentioned above researchers any support they might require in the course of conducting this research.

Yours sincerely,

Marie-Christine GASINGIRWA, Ph.D
Director General of Science, Technology and Research
Ministry of Education

Approval from the Stanford IRB: January 29, 2016

STANFORD UNIVERSITY

Stanford, CA 94305 [Mail Code 5579]

Penelope D Eckert, Ph.D.

CHAIR, PANEL ON NON-MEDICAL HUMAN SUBJECTS   (650) 725-8013

Certification of Human Subjects Approvals

Date: January 29, 2016

To: Claude N. Goldenberg, PhD, Graduate School of Education
          Saima Sohail Malik PhD/5, Elliott Ware Friedlander PHD, Sen Zhou PhD6

From: Penelope D Eckert, Ph.D., Administrative Panel on Human Subjects in Non-Medical Research

Protocol   Literacy Boost Rwanda: A Randomized Control Trial of an Early Grades Reading Intervention

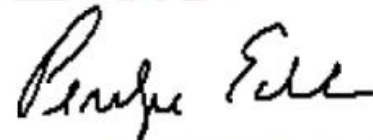Protocol ID: 26580   **IRB Number:**   349 (Panel: 2)

The IRB approved human subjects involvement in your research project on 01/29/2016. **'Prior to subject recruitment and enrollment, if this is: a Cancer-related study, you must obtain Cancer Center Scientific Review Committee (SRC) approval, and if a contract is involved, it must be signed.'**

The expiration date of this approval is 01/29/2019 at Midnight. If this project is to continue beyond that date, you must submit an updated protocol in advance for the IRB's re-approval. If this protocol is used in conjunction with any other human use it must be re-approved. Proposed changes to approved research must be reviewed and approved prospectively by the IRB. No changes may be initiated without prior approval by the IRB, except where necessary to eliminate apparent immediate hazards to subjects. (Any such exceptions must be reported to the IRB within 10 working days.) Unanticipated problems involving risks to participants or others and other events or information, as defined and listed in the Report Form, must be submitted promptly to the IRB. (See Events and Information that Require Prompt Reporting to the IRB at http://humansubjects.stanford.edu.)

All continuing projects and activities must be reviewed and re-approved on or before Midnight of the expiration date. The approval period will be less than one year if so determined by the IRB. It is your responsibility to resubmit the project to the IRB for continuing review and to report the completion of the protocol to the IRB within 30 days.

Please remember that all data, including all signed consent form documents, must be retained for a minimum of three years past the completion of this research. Additional requirements may be imposed by your funding agency, your department, or other entities. (See Policy 1.9 on Retention of and Access to Research Data at http://doresearch.stanford.edu/policies/research-policy-handbook)

This institution is in compliance with requirements for protection of human subjects, including 45 CFR 46, 21 CFR 50 and 56, and 38 CFR 16.

Penelope D Eckert, Ph.D., Chair

Approval Period: 01/29/2016 THROUGH 01/29/2019

Review Type: EXPEDITED - CONTINUING REVIEW

Funding: Save the Children UK , SPO: 108049

Expedited Under Category: 4, 5, 6, 7

Assurance Number: FWA00000935 (SU)