Introduction

Through the Guatemala Literacy Project (GLP), Rotary and partner organization Cooperative for Education (CoEd), work to break the cycle of poverty in Guatemala through education. The GLP, along with CoEd, is committed to evaluating its programs. Data from these evaluations help us to understand our programs' impact and continually improve them, while also being transparent with stakeholders. After about 10 years of implementing and evaluating the Spark Reading Program, in 2018 we were able to conduct a randomized control trial evaluation—the gold standard in program evaluation—so that we could have more confidence in the positive results we'd seen in less rigorous evaluation designs.

Spark Reading Program

The Spark Reading Program provides intensive training over 2 years for primary school teachers. Along with the training, teachers receive in-class coaching from CoEd trainers. They also receive a set of high-quality children's books and materials for use with the methodology. The methodology in the early grades, evaluated here, combines work on key pre-reading skills like alphabetic and phonological awareness, with activities to foster comprehension and a love of reading.

The "treatment" students and teachers for this evaluation are in year 1 of the 2-year Spark Program.

Evaluation Design

Evaluation Instrument

Students were evaluated with the *Evaluación de Lectura en Grados Iniciales* (ELGI), which is the Guatemalan adaptation of RTI and USAID's internationally-used Early Grade Reading Assessment (EGRA). The EGRA was designed based on research into how reading skills are actually developed, with the goal of informing reading interventions in low-income countries. The EGRA measures a set of basic literacy skills underpinning the reading process, which research shows can reliably help identify and address learning difficulties in the early grades.

The Guatemalan Ministry of Education has used the ELGI for their official testing of reading in the early grades. The test includes 14 sub-tests grouped into 8 areas:

Area	Sub-Test
Oral Language	Section 1: Comprehension of oral instructions
	Section 7: Listening comprehension
Alphabetic Principles	Section 2.1: Letter name recognition
	Section 3.1: Letter sound recognition
Decoding	Section 5.1: Reading short words
	Section 6: Speed for reading nonsense words
Phonological Awareness	Section 4.1: Initial phoneme identification

(table continues on next page)

Area	Sub-Test
	Section 4.2: Phoneme segmentation
Rapid Automatized Naming	Section 2.2: Speed for identifying letter names
	Section 3.2: Speed for identifying letter sounds
Reading Fluency	Section 5.2: Speed for reading familiar words
	Section 8.1: Speed for reading a passage
Reading Comprehension	Section 9: Reading comprehension
Writing (Dictation)	Section 10: Writing (Dictation)

Testing and data entry was conducted by the *Centro de Investigaciones Educativas* (CIE), or Educational Research Center, at Universidad del Valle de Guatemala. The evaluators have received training from the Ministry of Education and have been approved to administer the ELGI.

Random Assignment

By 2018, CoEd had identified 15 schools in the Tecpán, Chimaltenango, area of Guatemala as candidates to enter the Spark Program, but instead of bringing them all into the program in one year, we randomly selected 7 schools to enter in 2018 so that we could conduct a randomized control trial evaluation of the program. The remaining 8 schools served as our control group and waited to enter the program until 2019.

Sample

At least 10 students (selected at random) per classroom in 1st and 2nd grade classrooms in 7 treatment and 8 control schools were evaluated in the pre-test in February-March 2018, at the beginning of the school year and before the first training was conducted. We then followed the same students for the post-test in September-October 2018, at the end of the school year and after teachers in the treatment group had received 2 of the 3 trainings for the year and multiple classroom observation/coaching sessions. The total number of students that were evaluated is as follows:

	Treatment Students	Control students	Total
1st grade	113	120	233
2nd grade	94	92	186
Total	207	212	419

Analysis

Dr. Ben Kelcey, Associate Professor of Quantitative Research Methodologies in the Teachers College of University of Cincinnati, volunteered his time to conduct the analysis of the results data. Our analyses focused on two principal questions:

(a) Did participation in Spark improve early reading?

(b) To what extent did the improvements in early reading vary based on how students performed on the pretest?[1]

To address these questions, we analyzed the results of the experiment using multilevel models that nested students within schools. Multilevel analysis helps improve the quality of the results by

---

[1] In statistical terms - to what extent were improvements in early reading moderated by pretest? We wondered if the program is disproportionately helping those who start out with strong skills, and thus perhaps creating greater disparity. But we hoped that Spark actually works to help those students who start at a lower level gain the skills they need to catch up to their more-advanced peers.

acknowledging that the students are part of a school group whose results are linked to some degree, while other statistical models assume that they are completely independent.

Results

1st Grade

First-grade Spark students achieved more than their control counterparts and these differences were statistically significant[2] for 9 of the 14 sub-tests and 6 of the 8 areas: those highlighted in the table below.

Area	Sub-Test
Oral Language	**Section 1: Comprehension of oral instructions**
	Section 7: Listening comprehension
Alphabetic Principles	Section 2.1: Letter name recognition
	Section 3.1: Letter sound recognition
Decoding	**Section 5.1: Reading short words**
	Section 6: Speed for reading nonsense words
Phonological Awareness	**Section 4.1: Initial phoneme identification**
	Section 4.2: Phoneme segmentation
Rapid Automatized Naming	Section 2.2: Speed for identifying letter names
	Section 3.2: Speed for identifying letter sounds
Reading Fluency	**Section 5.2: Speed for reading familiar words**
	Section 8.1: Speed for reading a passage
Reading Comprehension	**Section 9: Reading comprehension**
Writing (Dictation)	**Section 10: Writing (Dictation)**

The results for the remaining sub-tests and areas (those not highlighted above) were not statistically significant, so there were no areas or sub-tests where control students outperformed Spark students.
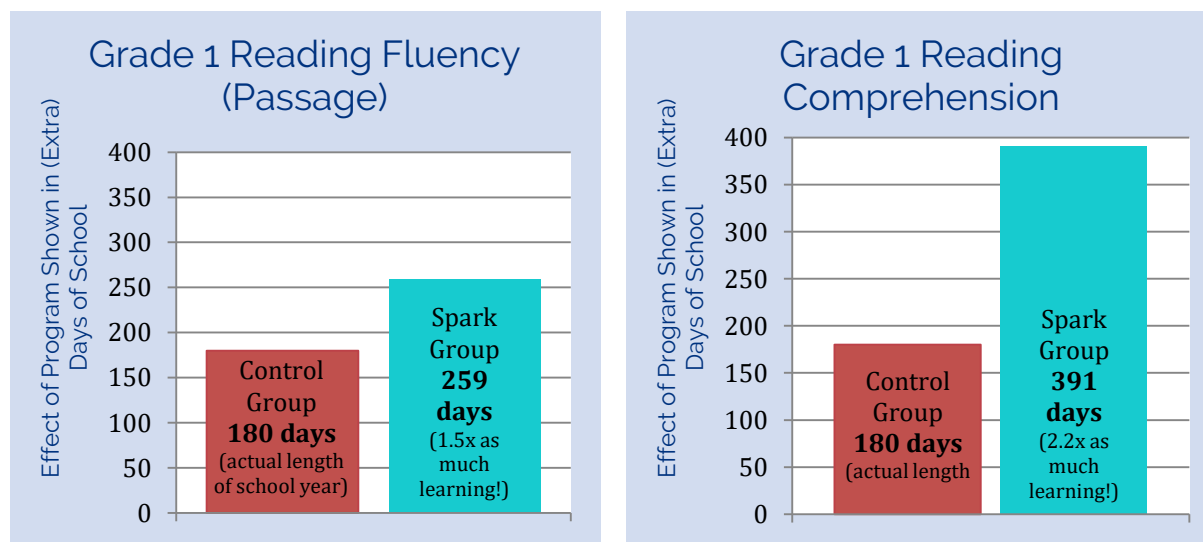
Effect Size

Looking at the key results of reading fluency and comprehension, the effect size[3] of the differences between the Spark and Control groups are .54 and .64 standard deviations, respectively. Typically .2 is considered to be a small effect size, .5 is medium, and .8 is large, so these results are in the medium to large range of effect size.

To translate those effect sizes into something a little bit easier to understand, we looked at the effect in terms of the amount of time it would have taken a student in a typical classroom to make the gains that Spark students did. **The Guatemalan school year is 180 days. So while the control students advanced according to those 180 days, in the same time Spark students leapt forward as if they'd received 259 days of school, in terms of their reading fluency of a passage.** In other words, they advanced about 1.5 times as much over the course of the school year. In reading comprehension, the difference was even more dramatic: **it's as if Spark students got 391 days of**

---

[2] Results for the writing sub-test were significant at the 90% confidence level. The other 8 sub-tests were at the 95% confidence level or above.
[3] Reported as standardized mean differences, similar to Cohen's *d.*

school in their 180 day school year—over the course of one school year, Spark students gained more than two times as much in reading comprehension as the control group did.

Grade 1 Reading Fluency (Passage)

Effect of Program Shown in (Extra) Days of School

Control Group **180 days** (actual length of school year)	Spark Group **259 days** (1.5x as much learning!)

Grade 1 Reading Comprehension

Effect of Program Shown in (Extra) Days of School

Control Group **180 days** (actual length	Spark Group **391 days** (2.2x as much learning!)

Which Students Benefited Most?

What's more, we were thrilled to find in further analysis that the impact of Spark was actually greatest on students who were lagging behind in the pre-test[4]. That is, **Spark helps struggling students catch up to their peers and become successful readers.**

Cost-Benefit Analysis

In 2018, the Spark Program cost less than $90/student for the year's intervention. Looking at the above numbers, we can say that **for every $1 invested in the program, it's like you're giving one student almost a whole extra day of learning[5] for reading fluency as well as more than 2 extra days of learning[6] for reading comprehension.**

$1 → 1 Extra day of learning for reading fluency

→ 2 Extra days of learning for reading comprehension
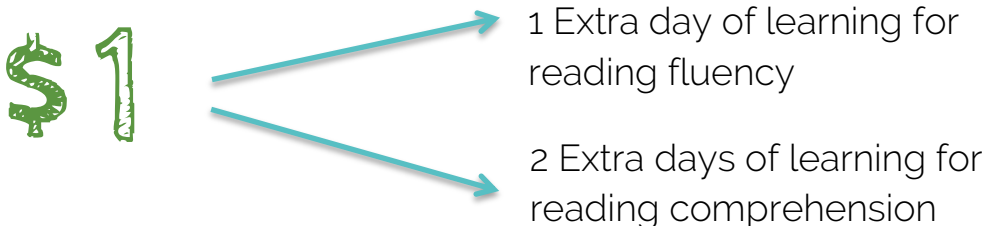
2nd Grade

In the analysis of 2nd-grade results, only differences in the Initial Phoneme Identification subtest and the Phonological Awareness area were statistically significant, [7] with Spark students outperforming control students in both. We are doing further analysis to understand what might be behind the more limited statistically significant results at this grade level.

---

[4] With statistically significant results at the 90% confidence level or above in the moderator analysis for 8 of the 14 sub-tests and at the 95% confidence level or above in 4 of the 8 areas.

[5] 0.9 days

[6] 2.3 days

[7] At the 90% confidence level or above.

Still, we were pleased to find that in analyzing the reading fluency of students in the program, we did make headway on one of our key targets in the program: increasing the percent of students **reading fluently at 60+ words per minute by the end of 2nd grade**. The graph below shows that this percent increased by 30 percentage points in the treatment group as opposed to only 16 percentage points in the control group.[8] In other words, **because of Spark, almost twice as many 2nd graders learned to read fluently by the end of the school year**. By the end of 2nd grade, 50% of the students in Spark classrooms had reached this benchmark as opposed to only 23% of students in control classrooms.
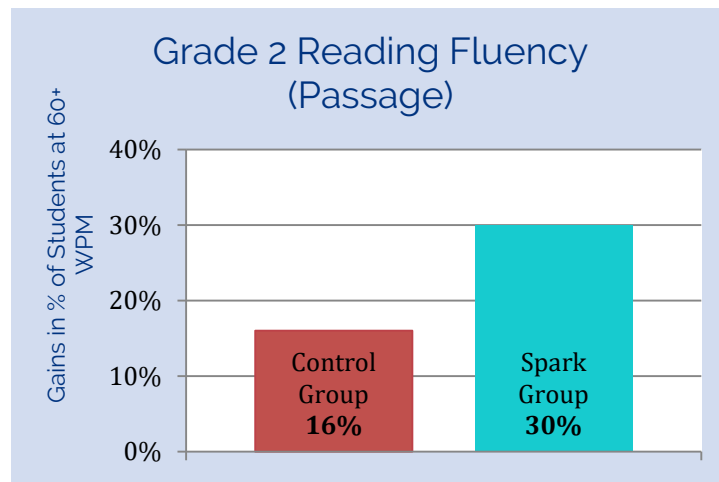
Conclusions

We are proud of the teachers and students in Spark who have stretched beyond their comfort zone to take advantage of the program's tools and training to make such great strides in their teaching and learning. The consistent positive results and large effect sizes seen in this evaluation are very encouraging.

We are still conducting further analysis to understand how different levels of teacher knowledge and implementation impact the students' results. This analysis will help us understand what areas we can strengthen in the program to have the most impact on student learning.

Also, in 2019, we are continuing this evaluation, doing pre- and post-tests with 1st and 2nd graders in the same schools. We will follow the 2nd graders we evaluated in 2018 in 1st grade, giving us longitudinal results over two years. With the new data, we will be able to compare results from the second year in the program with those of the control schools (which will now be in their first year of Spark training). So stay tuned for more results next year!

Acknowledgements

We would like to thank all those who made this report possible, primarily Dr. Ben Kelcey, Associate Professor of Quantitative Research Methodologies in the Teachers College of University of Cincinnati, for generously volunteering his time and expertise to conduct this evaluation. We would also like to thank the evaluators from the *Centro de Investigaciones Educativas* (CIE), or Educational Research Center, at Universidad del Valle de Guatemala, who administered the test.

---

[8] This result nearly reached statistical significance at the 90% confidence level, with a P-Value of 0.102

We are also grateful to the Ministry of Education and all the local and departmental staff that worked with us to bring the program to schools in their area. Thank you to all of our staff on the ground for their tireless work to design, improve, and carry out this program every day. And to the teachers who took the risk of implementing a new methodology, even when it felt overwhelming. Thank you to Carolyn Johnson, the Rotarian and lifelong educator whose vision more than 10 years ago launched this much-needed program. Finally, a profound thanks goes to the generous donors who make this program's work possible. You are transforming lives every day. Thank you.