ALL CHILDREN READING:
GRAND CHALLENGE FOR DEVELOPMENT

END-OF-PROJECT REPORT

Play.Connect.Learn

Implemented by Sesame Workshop India Trust in India

NOVEMBER 2017

Prepared by
School-to-School International (STS)
For All Children Reading: A Grand Challenge for Development

USAID FROM THE AMERICAN PEOPLE
World Vision
Australian Aid
SCHOOL-TO-SCHOOL INTERNATIONAL

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List of Acronyms

ACR GCD	All Children Reading: A Grand Challenge for Development
App	Application
CFWPM	Correct Familiar Words per Minute
CLNPM	Correct Letter Names per Minute
CSSPM	Correct Syllable Sounds per Minute
CWPM	Correct Words per Minute
EGRA	Early Grade Reading Assessment
EOP	End-of-Project
FOI	Fidelity of Implementation
GGSS	Galli Galli Sim Sim
GoI	Government of India
ID	Identification Code
IRB	Institutional Review Board
PCL	Play.Connect.Learn
M&E	Monitoring and Evaluation
NGO	Nongovernmental Organization
ORF	Oral Reading Fluency
PDF	Portable Document Format
SD	Standard Deviation
SES	Socioeconomic Status
STS	School-to-School International
SWI	Sesame Workshop India Trust
USAID	United States Agency for International Development

I. Executive Summary

All Children Reading: A Grand Challenge for Development (ACR GCD)—a partnership between the United States Agency for International Development (USAID), World Vision, and the Australian Government—is an ongoing series of grant and prize competitions that leverages science and technology to source, test, and disseminate scalable solutions to improve literacy skills of early grade learners in developing countries. Round 2 of ACR GCD, which started in 2014 and continues through 2017, supports technology-based innovations to improve early grade reading outcomes in developing countries.[1] These technology-based innovations concentrate on three focus areas:

1. Mother tongue instruction and reading materials
2. Family and community engagement
3. Children with disabilities

ACR GCD Round 2 increased its focus on the assessment of early grade reading skills to understand the ability of the technology-based innovations to improve the literacy skills of early grade learners. To measure this, ACR GCD uses the Early Grade Reading Assessment (EGRA) to systematically assess reading skills across all Round 2 grantees. The EGRA is an oral assessment that measures students' most basic foundational literacy skills in the early grades—specifically, recognizing letters of the alphabet, reading simple words, understanding sentences and paragraphs, and listening with comprehension. The EGRA methodology was developed under EdData II and has been applied in more than 30 countries and 60 languages.[2] The EGRA instruments used by ACR GCD grantees were adapted to reflect the specific context of each grantee's project, including adaptations for students who have low vision or are blind and students who are deaf or hard of hearing.

Sesame Workshop India Trust (SWI)—an ACR GCD Round 2 grantee—implemented the Play.Connect.Learn (PCL) project in Maharashtra, India, as part of the family and community engagement focus area. The PCL project aimed to improve children's early grade reading skills—specifically, foundational literacy skills and reading comprehension—in their mother tongue, Marathi, by creating and distributing a smartphone application (app) to families for use by their children outside of school. The app features self-paced, audio storybooks with accompanying comprehension games and quizzes that use characters from Galli Galli Sim Sim (GGSS), India's locally produced version of the Sesame Street television program.

The PCL project began on April 1, 2015, and concluded on August 11, 2017. To understand how the project impacted the reading skills of participating students, School-to-School International (STS) and SWI conducted EGRAs twice during the project. Baseline data were collected in June and August 2016; endline data were collected from April to June 2017.

During endline data collection, STS also conducted semi-structured, end-of-project (EOP) interviews with PCL project staff, parents, children, and team members from SWI's implementing-partner nongovernmental organizations (NGOs). Through the interviews, STS sought to explore any lessons learned from project implementation, better understand how the project impacted students and family members, and assess the potential scalability of the project.

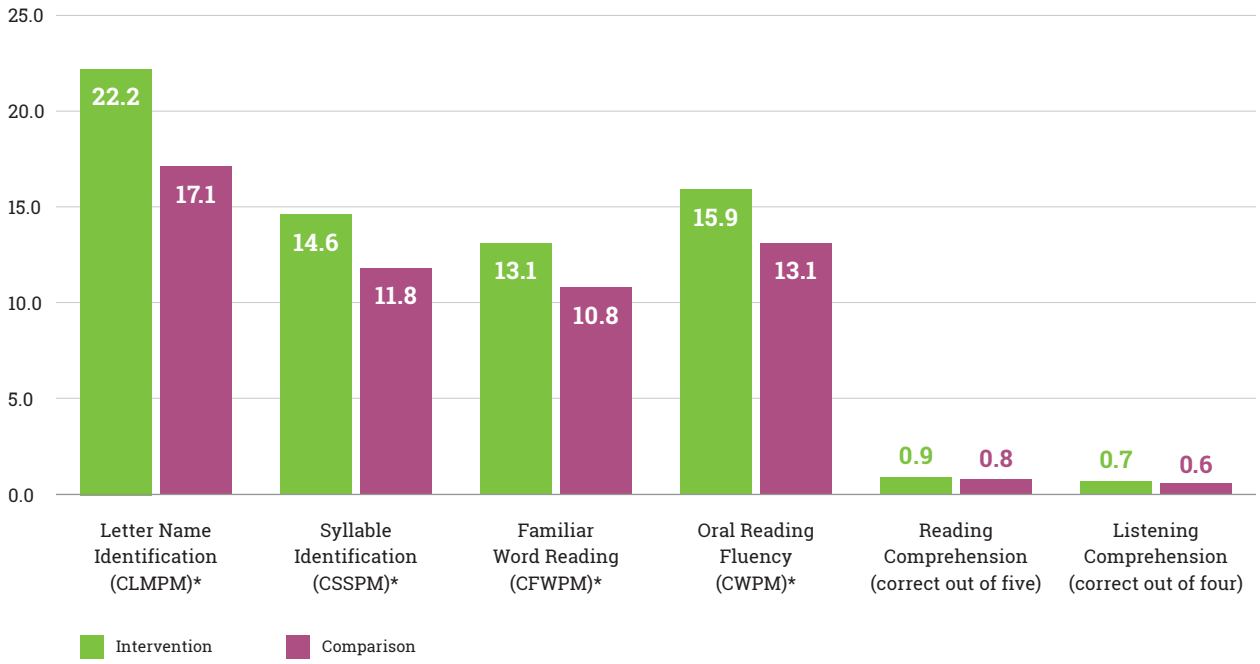
The following report presents a summary of lessons learned from project implementation, EGRA results, and scalability assessments.

1 All Children Reading. (2017). *About us*. Retrieved from http://allchildrenreading.org/about-us/

2 EdData II was a contract mechanism funded by USAID from January 1, 2004 to December 31, 2013. Implemented by RTI International, the purpose of EdData II was to improve the accuracy, timeliness, accessibility, and use of data for education policy and program planning. See http://www.rti.org/sites/default/files/brochures/eddataii.pdf for additional details.

Key Findings

Figure 1: **Average Gain Scores from Baseline to Endline by Subtask and Group**[3]



- **On average, students who received the PCL intervention had statistically significantly greater reading skills gains over the life of the project on the subtasks that measure pre-reading and foundational skills—namely, letter name identification, syllable identification, familiar word reading, and oral reading fluency (ORF)—than did students who did not have the intervention.** At endline, intervention group students gained 22.2 correct letter names per minute (CLNPM) over baseline, in contrast with 17.1 CLNPM by students in the comparison group on the letter name identification subtask, 14.6 correct syllable sounds per minute (CSSPM) versus 11.8 CSSPM on the syllable identification subtask, and 13.1 correct familiar words per minute (CFWPM) versus 10.8 CFWPM on the familiar word reading subtask. Furthermore, intervention group students improved their ORF rate by 15.9 correct words per minute (CWPM) at endline over baseline, while comparison group students improved their fluency rate by 13.1 CWPM. Students in both groups had comparable gains on the reading comprehension and listening comprehension subtasks.
- **The proportion of intervention group students who received zero scores at endline was statistically significantly lower than that of comparison group students on three subtasks: syllable identification, familiar word reading, and ORF.** On the syllable identification subtask, 17.3 percent of intervention group students were unable to correctly name a single syllable sound, compared with 24.2 percent of students in the comparison group. While 17.6 percent of intervention group students could not read a single familiar word at endline, 24.5 percent of comparison group students could not do the same. On ORF, 13.7 percent of intervention group students received zero scores, in contrast with 21.7 percent of comparison group students. For students in the intervention group, the largest percentage-point decrease in zero scores was observed on the familiar word reading subtask—a 50.5 percentage-point drop in zero scores.

4 An asterisk (*) indicates the gain scores for the intervention group were significantly higher than the gain scores for the comparison group at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=314$.

- **Although both boys and girls in the intervention group benefitted from the PCL project, intervention group boys had statistically larger gains over their peers in the comparison group from baseline to endline on more subtasks than did intervention group girls.** This indicates that boys may have benefitted differently than girls. Boys in the intervention group had statistically significantly greater gains than did boys in the comparison group on four subtasks: letter name identification, syllable identification, familiar word reading, and ORF. Girls in the intervention group had statistically significantly greater gains than did comparison group girls on only two subtasks: letter name identification and syllable identification.
- **The PCL project gave intervention group students access to an app with 12 interactive audio storybooks and 28 supplementary storybooks delivered in portable document format (PDF), though it is unclear how much content was used by students on average.** The audio storybooks were accompanied by comprehension games and quizzes that used characters from GGSS. Although the PDF storybooks were meant to be used by families and children as a supplement to the interactive audio storybooks—given the otherwise limited amount of content on the PCL app—feedback from the PCL team and participants indicate that the PDF storybooks were not widely used.

II. Project Description

SWI, the creator of the locally produced version of Sesame Street called GGSS, develops and distributes content through television, radio, print, and digital media to children up to eight years old. With support from ACR GCD, SWI implemented the PCL project to improve children's early grade reading skills in their mother tongue, Marathi. The project reached students in Grades 1 and 2 through a specially designed app. The PCL app features self-paced, audio storybooks with accompanying comprehension games and quizzes that use characters from GGSS. It serves as a supplementary learning tool for students who attend government schools. SWI distributed the PCL app to families whose children were expected to play with the app outside of school.

The PCL project had two key components:

1. Parents and caregivers shared a smartphone equipped with the PCL app with their child and ensure that the child spends at least 1.5 hours each week on the app. SWI instructed parents and caregivers to also engage children in discussions about the app storybooks and help answer the comprehension game questions.
2. Students read and listen to each audio storybook on the app and play the corresponding comprehension games.

SWI partnered with four local NGOs to distribute the PCL app, provide outreach and reading support guidance, and give technical assistance on the app to families (Table 1). NGOs distributed the app's content to participating families in three packages, each containing four audio storybooks so children could listen along as they read the stories. Each audio storybook was accompanied by a game that included comprehension questions related to the storybook. Children could access the next audio story only by scoring at least 70.0 percent on their current comprehension game. If a child scored less than 70.0 percent, he or she had to re-read the book and attempt the comprehension game again. In addition to the audio storybooks, each package included supplementary storybooks in a PDF to provide students with additional, appropriately leveled reading materials. NGOs distributed new packages every ten to 12 weeks throughout the project's implementation period.

Table 1: **SWI Implementing Partners**

Name of Organization	Target District
Vikas Sahyog Pratishthan	Amravati, Buldhana
Sangli Mission Society	Kolhapur, Sangli
Yuva Rural Association	Amravati, Buldhana
Gramin Samassya Mukti Trust	Chandrapur, Yavatmal

The PCL project reached approximately 12,000 students in Grades 1 and 2 in six districts in Maharashtra: Amravati, Buldhana, Chandrapur, Kolhapur, Sangli, and Yavatmal. The research study and the findings presented in this report apply to a randomly selected subset of the total program population (see Sample).

III. Research Purpose and Design

The goal of the PCL project was to improve children's early grade reading skills in their mother tongue, Marathi, through access to a smartphone app with a self-paced, storybooks and story-based game for use outside of school. The research conducted by STS and SWI sought to answer the following research question specific to the PCL project:

1. How effective is exposure to digital-GGSS content delivered through a smartphone app in improving early grade reading skills in Grade 1 and 2 students compared to their peers who do not receive exposure?

In addition, EOP research was conducted to answer the following supplemental questions common to all ACR GCD grantees:

1. How successful was the rollout of the project?
2. How did the project influence or impact adults' (teachers, parents, community members) knowledge, skills, or attitude regarding their role in helping children read?
3. How did the project influence certain subsets of the student population more than others based on identifiable contextual factors?
4. How much did the development, implementation, and management aspects of the project cost?
5. Are this project and technology suitable for scaling?

To answer these research questions, STS and SWI collected EGRA data twice during the project. Baseline data were collected in June and August 2016, and endline data were collected from April to June 2017. Qualitative and cost data were also collected to answer ACR GCD's supplemental questions.Qualitative and cost data were also collected to answer ACR GCD's supplemental questions.

Sample

SWI randomly selected children to participate in the research study and provided smartphones to any families who did not already own one. SWI conducted a pilot EGRA, during which it learned that only about eight to 12 percent of a randomly selected population of households in Maharashtra already owned smartphones, indicating the low levels of smartphone penetration in target areas. Those families also tended to have a higher socioeconomic status (SES), and their children had higher baseline early grade reading skills than did their peers. By randomly selecting children to participate in the research study, SWI eliminated some bias that would have existed had the SWI project required families to provide their own smartphones.[4] As a result, research findings have stronger external validity, in so far as the sample population better represents the general population in Maharashtra.[5]

STS and SWI worked with the Disha Research Group, a research company based in Western India that was contracted by SWI to support the PCL project, and determined that 400 students per group were needed to detect statistically significant improvements on the EGRA. Extrapolating from there, the team then set a target number of students per district proportional to the total number of students that the project would reach (Table 2).

Table 2: **Research Study Sample Size Per Group**

Target District	Percentage of Total Student Population (%)	Target Research Sample
Amravati	19.7	79
Buldhana	27.6	110
Chandrapur	5.5	23
Kolhapur	7.9	31
Sangli	23.6	94
Yavatmal	15.7	63
Total	**100.0**	**400**

SWI and Disha Research Group randomly selected clusters of villages from each district and randomly selected families with students in Grades 1 and 2 to participate in the sample. This process was repeated until each district reached its required sample size. The sampling process is detailed below:

1. SWI requested NGOs combine all villages in target districts into clusters. Each cluster was made up of villages situated geographically close to one another.
2. Within each district, SWI randomly assigned clusters as either intervention or comparison groups. This ensured that villages in the intervention and comparison groups were not too close to each other geographically, thus minimizing the risk of contamination.
3. SWI randomly assigned each cluster in the district a number from one to ten. Assessors visited the clusters in numerical order and recruited families with students in Grades 1 or 2 until each district's total sample size was reached. This ensured that there was no geographical bias in the data collection process.

4 It is possible that students of families who owned smartphones before the project had more familiarity with information and communications technologies and, as a result, may have used the app differently than students whose families received smartphones through the project.

5 The other approximately 11,200 students who received the PCL app—those whose families already had access to smartphones—are not representative of the students in the research study. The research findings presented in this report should not be generalized beyond the research sample.

The assessors engaged NGO staff members in each village to help coordinate the sample recruitment process. SWI contacted NGOs two days before assessors arrived in the village so that they could contact families who met the research sample selection criteria and arranged a time for SWI to conduct the assessment. Selection criteria included

1. Families should have a child in either Grades 1 or 2, and families should agree to participate in the study. Only one child per household could be included in the sample.
2. Families should have a monthly household income of INR 7,000 or less.

In total, 802 students were assessed at baseline, 648 students were assessed at endline, and 627 students were included in the final EGRA sample used for analysis.[6] The primary reasons for the attrition rate of 21.8 percent were temporary or permanent migration, or assessors' inability to locate children during their visit to their village. Table 3 provides characteristics of the student sample used in this final report.

Table 3: **EGRA Sample Characteristics**

Characteristic		Number of Students by Group		
		Intervention	Comparison	All Students
Gender	Boys	162	156	**318**
	Girls	151	158	**309**
Grade at Baseline	Grade 1	156	141	**297**
	Grade 2	157	173	**330**
Total: All Students		**313**	**314**	**627**

STS and World Vision, with support from SWI, conducted EOP interviews between April 23 and 29, 2017, during endline EGRA data collection. EOP interview details are provided in Table 4. STS and World Vision purposively selected three SWI and 13 NGO implementer team members for project management interviews. Furthermore, STS and World vision randomly conducted 66 home visits to interview parents and caregivers as well as the children in their households that used the app.

Table 4: **EOP Interview Sample**

Type of Interview	*N*	Description
Project management	16	Three SWI staff and 13 NGO staff members
Parent and caregiver	66	66 households from 17 different villages
Student	70	42 boys and 28 girls
Total	**152**	

6 As only students with data from baseline and endline were used for gain score analyses, the number of students assessed may differ from the number of students included in the analysis (see Data Analysis and EGRA Results sections).

IV. Fieldwork Preparation and Data Collection

EGRA Instrument

The Marathi-EGRA instrument used in the PCL project was developed during an adaptation workshop held from October 6 to 10, 2015. Members of the SWI team, representatives of Beneficent Technologies,[7] STS staff, a Marathi-language expert, and two instructional-design experts from the Maharashtra State Council for Educational Research and Training participated in the adaptation workshop.

The final EGRA instrument consisted of six subtasks: letter name identification, syllable identification, familiar word reading, ORF, reading comprehension, and listening comprehension. The same EGRA instrument was used at baseline and endline.[8]

Institutional Review Boards

Institutional review boards (IRBs) are responsible for ascertaining the acceptability of proposed research in terms of institutional commitments and regulations, applicable laws, standards of professional conduct and practice, and ethical and societal norms. IRBs examine subject recruitment procedures, proposed remuneration, and the informed consent process. IRBs also evaluate the potential risks and benefits to participants outlined in each protocol.

SWI did not request IRB approval for the PCL project at baseline.[9] Sigma-IRB, an India-based research and consulting organization, granted approval on March 20, 2017, for the endline data collection.

Baseline EGRA

STS conducted an initial assessor training from October 6 to 10, 2015, during the EGRA adaptation workshop and pilot test. STS, SWI, and Disha Research Group held an assessor training from February 1 to 5, 2016, and an assessor refresher training immediately prior to the operational baseline data collection on June 25 and 26, 2016.[10] During these training, assessors reviewed the EGRA principles and the instrument's components, practiced administering and scoring the EGRA on tablets, and underwent assessor-accuracy testing (Table 5). Assessor-accuracy testing is conducted to ensure consistency in scoring between assessors and to measure the degree to which assessors agree in their assessment decisions.[11] At least 90.0 percent consistency is considered the minimum requirement; this means that at least 90.0 percent of assessors' ratings must be consistent with the list of acceptable responses. All baseline assessors met the 90.0 percent threshold.

7 The Marathi EGRA instrument was also used by ACR GCD grantee Beneficent Technologies, Inc., for their Bookshare India project.

8 See the PCL Baseline Report for more detail on the EGRA adaptation process.

9 Permission to conduct research was granted by the Beed District Magistrate for the initial exploratory research; however, permission from the magistrates of the final implementation districts was not requested due to an oversight by SWI. SWI managed all baseline research in compliance with publicly available information on guidelines for conducting educational research in India.

10 The second assessor training was held before an initial baseline data collection, which was terminated due to the need to redesign the research sample as per findings described in the Sample section. See the PCL Baseline Report for more details.

11 Assessor-accuracy testing is similar to interrater-reliability testing. According to the *EGRA Toolkit (2nd Edition)*, assessor accuracy refers to the testing conducted during training, while interrater reliability is conducted during operational data collection.

Table 5: **Fieldwork Preparation and Data Collection Timeline**

Task	Dates
EGRA instrument adaptation workshop and assessor training	October 6–10, 2015
Baseline assessor training	February 1–5, 2016
Baseline assessor refresher training	June 25–26, 2016
Baseline EGRA operational data collection	June 26–August 3, 2016
Endline EGRA refresher training and operational data collection	April 17–July 1, 2017
EOP interviews	April 23–29, 2017

Following the assessor refresher training, assessors collected operational baseline EGRA data between June 26 and August 3, 2016.

Endline EGRA

The endline EGRA was conducted from April 17 to July 1, 2017. Before the endline operational data collection, SWI held a two-day refresher training for assessors, including assessor-accuracy testing and review sessions on the EGRA instrument and administration. The assessors from Disha Research Group who collected endline EGRA data also participated in the baseline operational data collection, and all assessors met the 90.0 percent consistency threshold on assessor-accuracy tests.

Endline data collection initially concluded on May 15, 2017. However, assessors were unable to locate a significant number of students from the research sample, particularly in four areas in which attrition rates were higher than 25.0 percent. Although the assessors were unable to identify the reasons for the high levels of attrition in those blocks, they speculated that it was primarily due to temporary migration. Disha Research Group returned to the four areas from June 27 to July 1, 2017, to conduct EGRAs on 69 students whom they were initially unable to locate.

End-of-Project Interviews

STS and World Vision conducted EOP interviews from April 23 to 29, 2017. The purpose of these interviews was to explore the contextual factors that may have impacted variations in implementation and results among children. They also explored the potential scalability of the project. EOP interviews were conducted with three groups of project participants: project management, parents and caregivers, and students.

Project management interviews consisted of 23 open-ended questions related to general information about the project and the intervention timeline, characteristics of the implementing organizations, perceptions of project design and implementation quality, and considerations for scalability. Parents and caregivers were asked 16 open-ended questions related to the PCL project, app, and smartphone; the reading support they provide their children; and their feelings about the project's impact on their children's reading skills. Children were asked ten open-ended questions related to their engagement in the PCL project, disposition to reading, access to reading materials, and attitudes towards learning with technologies.

V. Project Implementation

The PCL project began on April 1, 2015, and ended on July 30, 2017. This section presents implementation challenges, solutions, and successes that help answer the ACR GCD research question, *How successful was the rollout of the intervention?*

Development

The PCL project necessitated that SWI develop and roll out a new app. Although SWI had experience overseeing the design of simple apps, the app used in the PCL project was significantly more complex and required members of the team to expand their skill set. SWI finalized the app content and assessment plan and selected an app developer by June 2015. At that time, they expected to have a version of the app and the first package of content ready for beta testing by the end of 2015; this timeline was eventually extended through March 2016. SWI noted that the PCL project team faced a learning curve when working with the app developer to determine what was possible to include on the app, both in terms of content and functionality.

The literacy content for the PCL project app came from Hindi materials that had previously been produced by SWI. The PCL project translated all stories into Marathi and made any modifications to content and illustrations to ensure the storybooks were appropriate for Maharashtra's rural context.

SWI tested the app and the first content package through a formative pilot test study conducted from January 11 to 13, 2016. The primary objectives of the pilot test were to assess the overall appeal of the app and understand which books and games were more appealing to children. In total, 47 children from Maharashtra in Grades 1 and 2 who had smartphones at home were selected to test the app. Children played the app in groups of three or four and were observed by facilitators. Findings from this research were used to improve the app's content and user interface. These improvements included decreasing the length of the books, adding more games to the app, increasing the size of fonts and buttons, and disabling the "previous" and "next" buttons for a period of time to ensure children were reading content on the pages rather than simply advancing to the comprehension games.

After rolling out the first package, the PCL project team made several updates to the app to improve the user experience. These improvements included the addition of buttons to allow children to control audio, implementing a "hint" function to aid children as they completed the comprehension games, and changes to font sizes to make text easier to read. These improvements were carried over into the remaining packages.

Implementation

Whereas the project initially expected to roll out the app by March 2016, changes in the intervention areas and research design, as well as delays in the development of the app, pushed back the launch by several months.

SWI held multiple one-day trainings for NGO staff members on the PCL project in June and July of 2016. During the one-day training attended by NGO staff members responsible for disseminating the app and content packages to families, SWI provided general information on the PCL project, its purpose, and its intended reading outcomes; it also discussed staff roles and responsibilities. The PCL project team also trained NGO staff members on how to use the app and suggested techniques for engaging parents, caregivers, and children. Following the training, NGO staff members visited families to load smartphones with the app content for package 1, which included four audio storybooks with corresponding comprehension games and eight supplemental storybooks in PDF.

SWI provided additional one-day trainings to NGO staff members on package 2 contents and app updates, distribution plans for package 2, and best practices for downloading data on users' progress. These trainings took place in September and October 2016. NGO staff members began distributing package 2 at the beginning of November and finished by mid-December 2016. During these visits, NGO staff members provided brief orientations on the app updates and new content, downloaded user data for package 1, and provided feedback to families on children's progress. They were instructed to delete package 1 content from the families' smartphones if there was insufficient memory available to load package 2, which meant that children were often unable to use package 1 content after they received package 2. Package 2 contained four audio storybooks with comprehension games and ten supplemental storybooks in PDF.

One-day trainings on package 3 began in mid-December 2016 and continued through the end of January 2017. Package 3 contained four audio storybooks with comprehension games and eight supplemental storybooks in PDF. As with the delivery of package 2, NGO staff members made home visits to participating families to upload new app content, download backend data, delete previous package content if needed, and provide feedback to families on children's progress.

During EOP interviews, the PCL project management team cited several implementation challenges. First, the team noted that they had underestimated the amount of time it would take to distribute packages to all families. Whereas SWI had budgeted 1.5 months per package to complete the distribution, it actually took closer to 2.5 months per package due to weather, insufficient availability of NGO staff members, and requests from families to reschedule home visits. As NGO staff members were almost always in the process of distributing packages, they did not have time to conduct the intended routine monitoring visits to oversee and provide guidance on parent and caregiver engagement in children's reading development. For future iterations of the project, SWI suggested improving upon the distribution process, including engaging local community members as content distributors rather than relying on NGO staff members to distribute to all families.

Furthermore, throughout the PCL project, SWI faced a number of challenges with the technology—hardware and software—that may have impacted the project's implementation. As mentioned previously, SWI developed a new app for the PCL project; in addition to the challenges faced in developing and stabilizing the app before rollout, the project faced additional technology challenges once the app was in use by families. One major obstacle was the size of the app relative to the limited memory on the basic smartphones distributed by the project.[12] A member of the PCL project team noted that a key technological challenge was balancing what the project desired to include on the app versus what was possible to include given programming and memory limitations. An NGO staff member observed that the app would frequently freeze while children were using it. Similarly, the size of the app and content packages necessitated, in many cases, NGO staff members delete previous packages before installing new packages due to phones' storage limitations. This may have limited children's ability to utilize PCL content to maximum potential because they could not revisit previous packages. NGO staff members also said that, in some cases, they found that families had deleted the PCL project app to make room on the smartphone for content, such as personal photographs or videos; this issue occurred more frequently among families who had smartphones prior to the project.

Another key software problem was the inability of the PCL project app to capture backend user data reliably. Initially, the PCL project team had envisioned that the app would sync user data to a server, either through secure digital cards or an internet connection. This data would contribute knowledge about user experience on the app and provide key dosage data for analysis. However, the PCL project team uncovered a variety of challenges in capturing and collecting this data. First, the option for enabling data collection through apps was turned off on

12 Versions of the app and packages ranged in size; however, all were greater than 61 MB when installed, and most were greater than 105 MB when installed.

some of the smartphones, and the PCL project team did not discover this limitation until loading the second content package. Although NGO staff members were trained on how to enable this function upon loading package 2, this challenge meant that no user data were captured from some families for package 1. Furthermore, the PCL project team found that several different participants were using the same identification code (ID), meaning that the data for some IDs reflected usage of more than one user; for example, the equivalent of several years of time on the app were logged under one unique ID. There were also more general challenges regarding data loss during synching of data to the server. As a result of these limitations, the project did not have reliable usage data for monitoring or analysis purposes.

Other challenges with the smartphones were also observed by the PCL project management and NGO staff members. Because the project was implemented in private homes, there were no guarantees that children would have access to the smartphones and app at the level that was intended by the project. Among families who had smartphones prior to implementation of the project, the PCL project team noted that it was sometimes difficult to ensure that children had adequate access to the phone; for instances, some reported that fathers may take the phones with them when they traveled. Often, children could only use the smartphone and the app very early in the morning or late in the evening. Interestingly, those families who received smartphones directly through the PCL project appeared to provide their children with more regular and reliable access to the smartphone and app. The PCL project team observed that families who received smartphones via the project tended to view them as a tool specifically for the project—they cared for the phone, gave children access to the phone, and did not use the phone for personal needs as often as those families who were using smartphones that they owned before the project.

Although most families seemed to embrace the use of the app and smartphone, the additional PDF storybooks did not appear to be used as regularly as were the audio storybooks. When parents were asked whether they and their child used the additional PDF books, half responded that they did not use them, did not know the difference, or found the content too challenging for young children.

Despite these technical challenges, it is clear that the PCL project provided significant capacity building to both the NGO staff members—some of whom did not have experience implementing technology-based projects—and families—who often had never used smartphones for education.

Management

SWI, an established organization with a range of educational projects in its portfolio, had the human resources and management mechanisms in place to oversee implementation of the PCL project. SWI contracted a variety of institutional partners who developed the app, rolled out and implemented the PCL project in communities, and conducted monitoring visits to the families. In EOP interviews, SWI's team expressed several challenges in the management of the PCL project. They noted limitations due to the fact that the SWI office was located in New Delhi, while the project was implemented in Maharashtra—more than 1,000 kilometers away—which made it time-consuming and costly for staff based in SWI's office to reach implementation areas. It was also sometimes difficult to communicate with remote NGO staff members. Furthermore, SWI's team all expressed that NGO staff members were not able to deliver content packages as quickly as anticipated, which limited the amount of time available to conduct monitoring visits. SWI also noted the capacity building experienced by NGO staff members, in regard to the training on technology use and data collection provided by SWI. Overall, the management of the project did not present any major obstacles to the SWI team.

Fidelity of Implementation

By definition, fidelity of implementation (FOI) is the accurate and consistent application of an agreed-upon procedure. FOI research is used to assess the degree to which a project is implemented as intended. Measuring FOI helps implementers and researchers understand and differentiate between what was supposed to happen and what actually happened during the life of a project. When FOI is high and an intervention group experiences gains, then it is possible to associate gains with the intervention; this, in turn, makes it possible to recommend scaling the intervention. FOI research also makes it possible to identify which components of an intervention are most strongly associated with outcomes. When FOI is low and gains are low, it is impossible to know whether the reason for low gains is a poor design or poor implementation. FOI research can also be coupled with monitoring and evaluation (M&E) to provide feedback to implementers during the project cycle to improve adherence to project design in the case of low FOI.[13]

As part of their projects, all ACR GCD Round 2 grantees conduct FOI research during the implementation period. The primary objectives of FOI for grantees were to

1. Understand what FOI is and why it is important throughout the life of the project
2. Identify essential components, activities, and questions for each phase of project implementation
3. Create relevant, project-specific FOI tools to monitor registrants' adherence to the intervention plan

STS held a series of FOI meetings with each ACR GCD Round 2 grantee to develop project-specific FOI tools and an implementation plan for FOI research. After finishing the FOI sessions, ACR GCD grantees were expected to pilot test their FOI tools and collect data. Grantees were advised to collect a minimum of one round of FOI data; two or more rounds of data collection were considered ideal.

The collected data serve several purposes:

1. To indicate where revisions in data collection tools were necessary
2. To highlight where improvements in implementation were needed
3. When combined with assessment results, to provide evidence, if possible, that gains were associated with the intervention

SWI staff members involved in the PCL project participated in the FOI meetings with STS by phone between September and November 2016. The PCL project team developed FOI questions that were added to existing M&E tools and collected data during monitoring visits in February and March 2017. FOI data were primarily used to inform project management about implementation challenges; due to the limited number of respondents, FOI data were not used in the analysis of student reading outcomes.

13 Creative Associates International, Inc. (2015). Fidelity of implementation (FOI) how-to guide (unpublished). Washington, D.C.: USAID.

VI. EGRA Data Analysis

EGRA data were analyzed using Microsoft Excel and IBM SPSS Statistics. Only students who had data at both baseline and endline were included in the analysis. EGRA subtask results were matched by student and compared by time period to calculate reading gains over the life of the project.[14] Subtasks' mean fluencies and scores are reported, as are standard deviations (SD) relevant to the mean values.[15] Gain scores were computed as the difference between endline and baseline for each subtask, and student reading performance was calculated comparing gain scores for students in the intervention group to gain scores for students in the comparison group. Differences in gain scores between the intervention and comparison groups were tested for significance using independent samples t-test analysis.[16] Differences in the proportion of zero scores between the intervention and comparison groups were tested for significance using the chi-square test.[17] Results with statistically significant differences are reported throughout with an asterisk. Where results are not statistically significant, it is not possible to assume that there is any difference between the results of students in the intervention and comparison groups.

For each subtask, decision rules were applied to assess whether to remove outliers. For example, if the time remaining for a timed subtask resulted in a fluency rate that was outside a reasonable range, then that student's fluency rate was not included in the analyses. Reasonable ranges for the time remaining were based on multiple factors, including the rate at which letters or words in the language tested are typically read, the distribution—or relative performance—of students in the sample, and the mean fluency rate within and without the outlier data point(s). After considering reasonable ranges in the data, no outliers were removed.

Table 6 provides details on the EGRA subtasks, including how results were calculated.

14 Because of rounding, mean changes reported may not always equal endline value minus baseline value.

15 SD describes how much observed values vary from the mean. A smaller SD indicates that most of values are close to the mean; a larger SD indicates that values are further from the mean. This report provides mean fluencies and scores of the entire sample of students. SDs are listed to understand the variability of the scores within the sample.

16 The independent-sample t-test compares the difference between the means of two independent groups on the same dependent variable.

17 The chi-square test is a statistical test comparing the proportion of students with zero scores that were observed in the data against what was expected.

Table 6: **EGRA Subtask and Data Analysis Method**

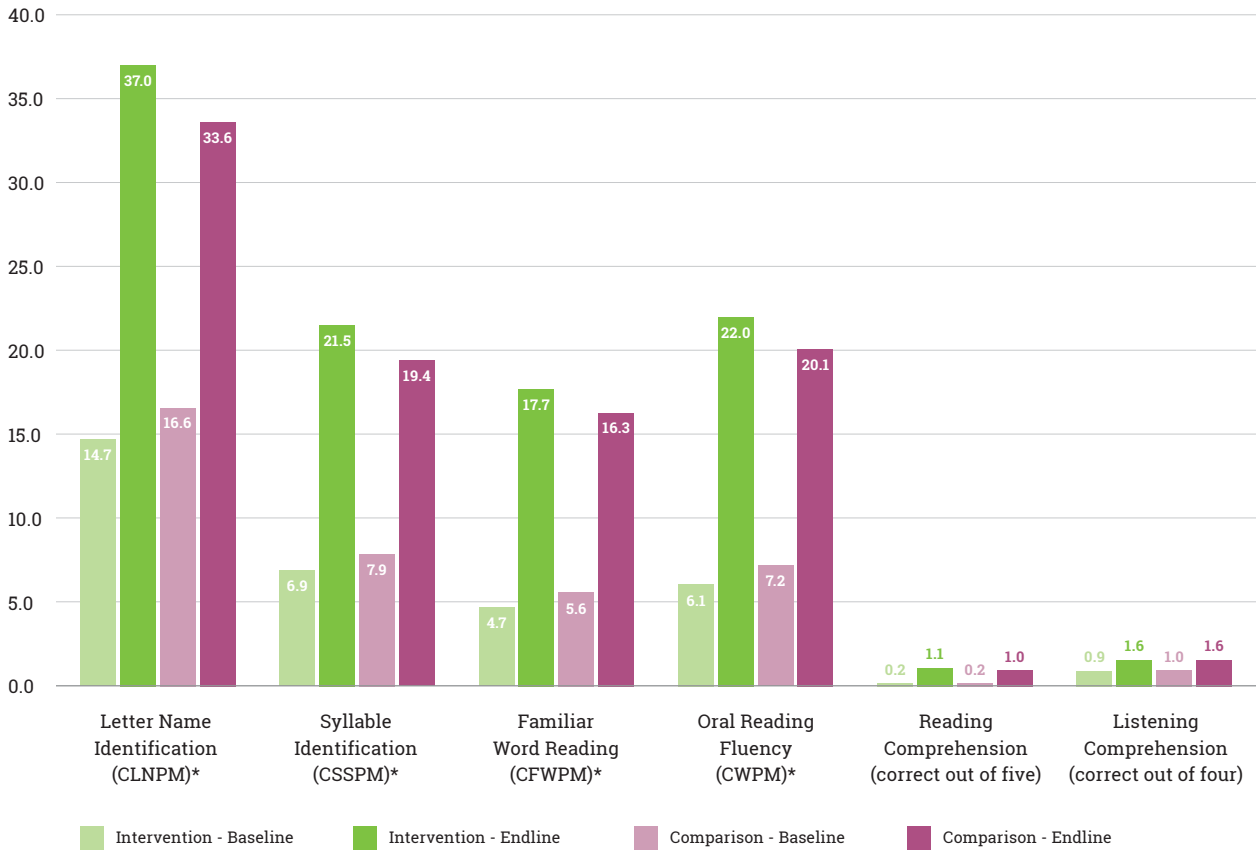
Subtask	Type	Analysis
Letter name identification	Timed	Letter name identification is measured as correct letters named per minute (CLNPM). Letter name identification is a measure of alphabet knowledge and is highly predictive of later reading achievement. Each student had one minute to name up to 100 letters.
Syllable identification	Timed	Syllable identification is measured as correct syllable sounds read per minute (CSSPM). Syllable identification is a measure of knowledge of the sounds of letter combinations and is a more advanced predictor of decoding ability. Each student had one minute to read up to 100 syllable sounds.
Familiar word reading	Timed	Familiar word reading is measured as the number of correct familiar words read per minute (CFWPM). Familiar word reading measures word recognition and decoding. Each student had one minute to read up to 50 high-frequency words.
Oral reading fluency	Timed	ORF is measured as correct words read per minute (CWPM). ORF is a decoding and reading fluency measure. Each student had one minute to read up to 59 words. The ORF passage formed the textual basis for the reading comprehension subtask.
Reading comprehension	Untimed	Reading comprehension is measured as the number of correct answers verbally delivered to the assessor based on questions asked about the passage read as part of the ORF subtask. Each student had the opportunity to answer four factual questions and one inferential question.
Listening comprehension	Untimed	Listening comprehension is measured as the number of correct answers verbally delivered to the assessor. Listening comprehension is a measure of vocabulary. Each student had the opportunity to answer three factual questions and one inferential question based on a passage read aloud by the assessor.

VII. EGRA Results

This section presents EGRA results to understand whether the reading skills of children in the PCL project increased from baseline to endline. It also helps answer the research question, *How effective is exposure to digital GGSS content delivered through a smartphone app in improving early grade reading skills in Grade 1 and 2 students compared to their peers who do not receive exposure*? The following section contains findings across EGRA subtasks for the intervention and comparison groups. EGRA results are also explored by gender and grade.

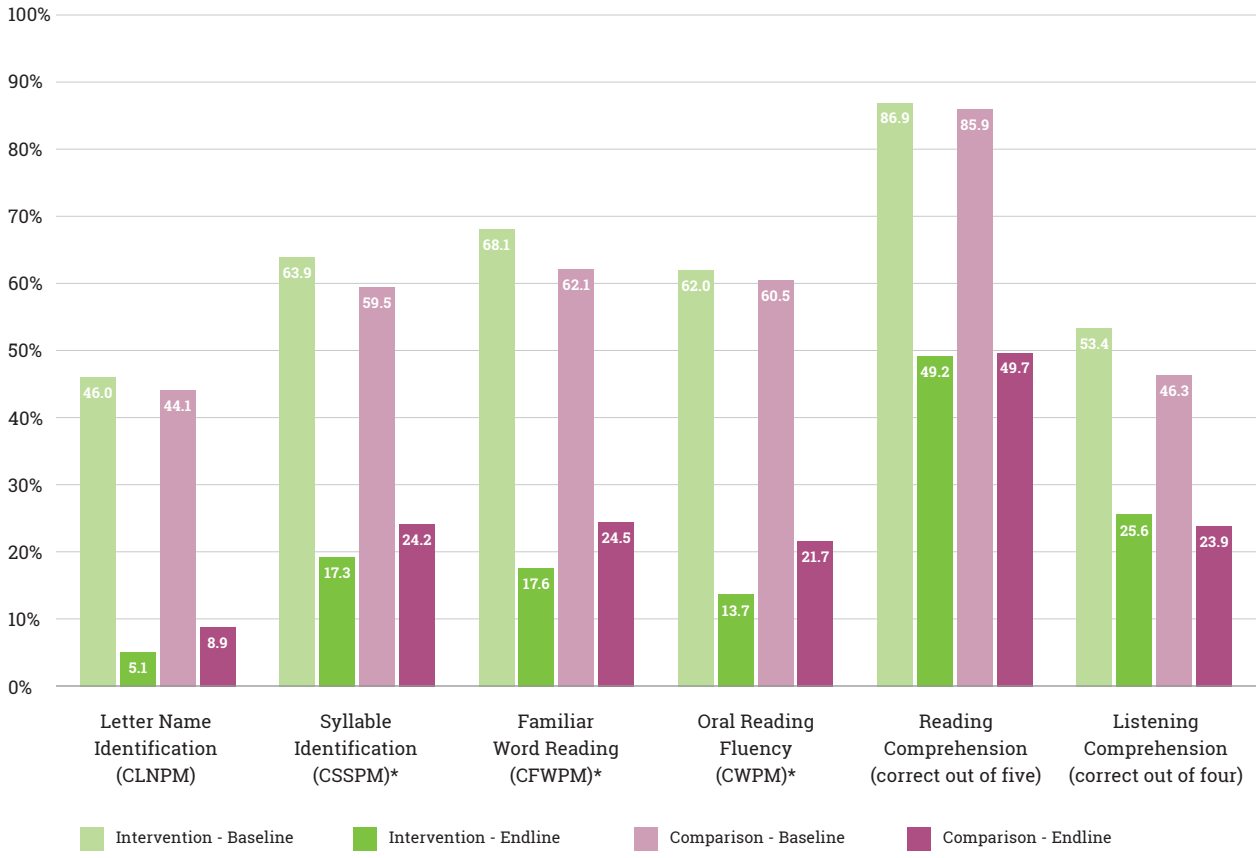
Figure 2 presents results for students across grades. Overall, students participating in the PCL project showed greater gains from baseline to endline than did students in the comparison group on four of the six subtasks: letter name identification, syllable identification, familiar word reading, and ORF. **Additionally, at endline, students participating in the PCL project had a statistically significantly lower proportion of zero scores than did their peers in the comparison group on three subtasks: syllable identification, familiar word reading, and ORF.** The proportions of students receiving zero scores between the intervention and comparison group at endline were comparable on other subtasks (Figure 2).

Figure 2: **Mean Results by EGRA Subtask and Group at Baseline and Endline**[18]



18 An asterisk (*) indicates the average gain score for students in the intervention group was significantly higher than the average gain score for students in the comparison group at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=314$.

Figure 3: **Percentage of Students Receiving Zero Scores by EGRA Subtask and Group at Baseline and Endline (%)**[19]



EGRA Results by Subtask

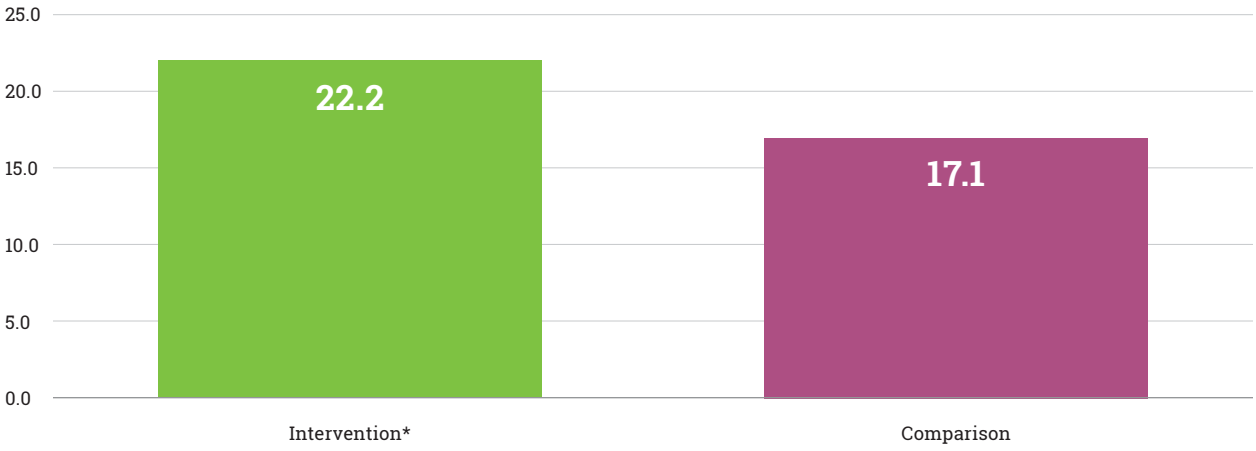
Letter Name Identification

The letter name identification subtask measures children's knowledge of the alphabet and is predictive of later reading success. For this subtask, children were presented with a stimulus of 100 letters and asked to name as many as they could in one minute. The subtask was discontinued if a child was unable to correctly name any of the first ten letters of the stimulus. Results for this subtask are reported as CLNPM, and average gains scores for the letter name identification subtask are presented in Figure 4.

Average gains from baseline to endline on the letter name fluency subtask were statistically significantly greater for students in the intervention group than for students in the comparison group. Intervention group students named an additional 22.2 CLNPM at endline over baseline, while comparison group students named an additional 17.1 CLNPM.

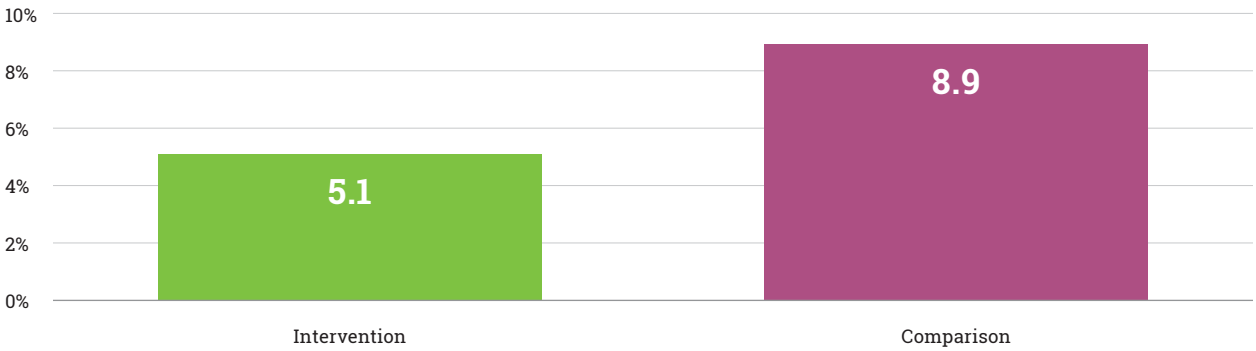
19 An asterisk (*) indicates the proportion of students receiving zero scores in the intervention group was significantly lower than the proportion of students receiving zero scores in the comparison group at endline at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=314$.

Figure 4: **Average Gain Scores from Baseline to Endline by Group—Letter Name Identification (CLNPM)**[20]



The percentage of students receiving zero scores on the letter name identification subtask at endline is presented in Figure 5. The proportion of zero scores at endline was not statistically significantly different between the two groups, meaning that **the proportions of students in the intervention and comparison groups receiving zero scores at endline were comparable.**

Figure 5: **Percentage of Students Receiving Zero Scores by Group at Endline—Letter Name Identification (%)**[21]



Syllable Identification

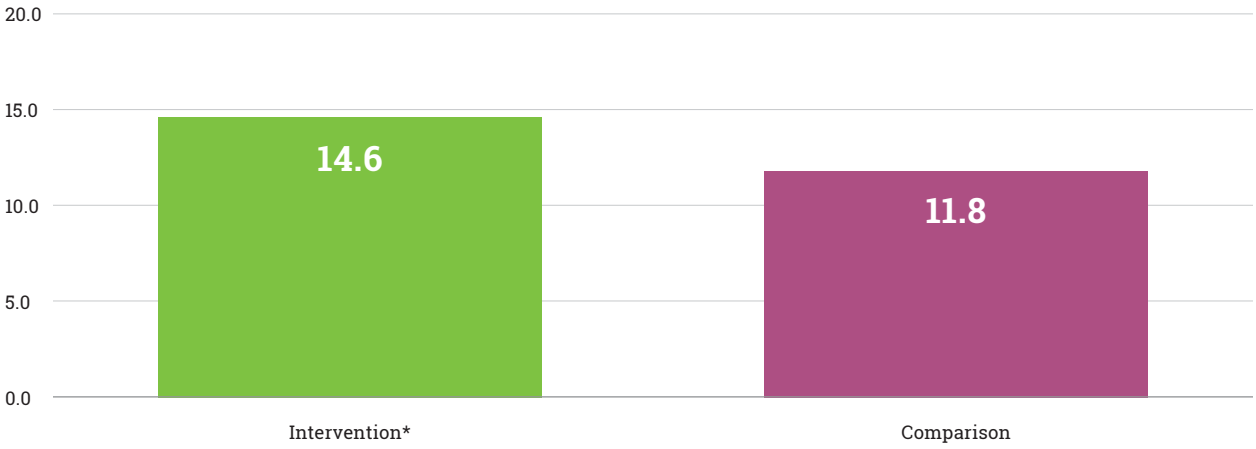
The syllable identification subtask measures students' understanding of how letter combinations correspond to specific sounds. To demonstrate syllable identification, students must vocalize the appropriate sounds for each syllable. The ability to match syllables with correct sounds is critical to reading fluency and comprehension. For this subtask, each student was presented with a stimulus of 100 syllables and asked to read as many of the sounds as they could in one minute. The subtask was discontinued if a student was unable to correctly identify any of the first ten syllables on the stimulus. Results for this subtask are reported as CSSPM, and average gains scores are presented in Figure 6.

20 An asterisk (*) indicates the gain score for the intervention group was significantly higher than the gain score for the comparison group at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=310$.

21 *N* sizes: Intervention Group $n=313$; Comparison Group $n=314$.

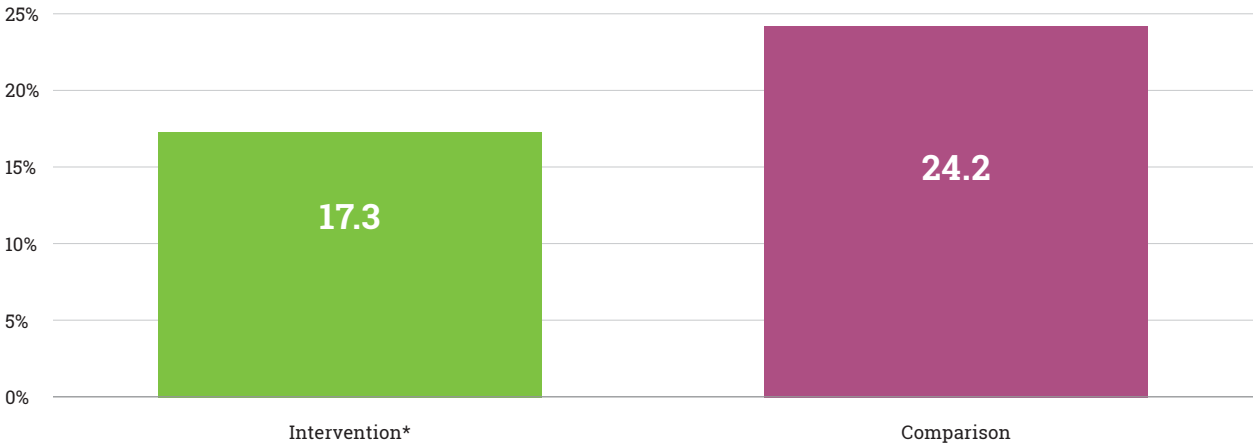
On average, scores on the syllable reading subtask increased from baseline to endline for students in both groups, though **the gains of students in the intervention group were statistically significantly greater than the gains of students in the comparison group.** Specifically, students in the intervention group read, on average, an additional 14.6 CSSPM at endline than at baseline, in contrast with an additional 11.8 CSSPM among students in the comparison group.

Figure 6: **Average Gain Scores from Baseline to Endline by Group—Syllable Identification (CSSPM)**[22]



The percentage of students receiving zero scores on the syllable identification subtask at endline is presented in Figure 7. **The proportions of zero scores at endline were statistically significantly lower for students in the intervention group than for students in the comparison group.** At endline, 17.3 percent of intervention group students were unable to correctly identify a single syllable sound, in contrast with 24.2 percent of comparison group students.

Figure 7: **Percentage of Students Receiving Zero Scores by Group at Endline—Syllable Identification (%)**[23]



22 An asterisk (*) indicates the gain score for the intervention group was significantly higher than the gain score for the comparison group at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=311$.

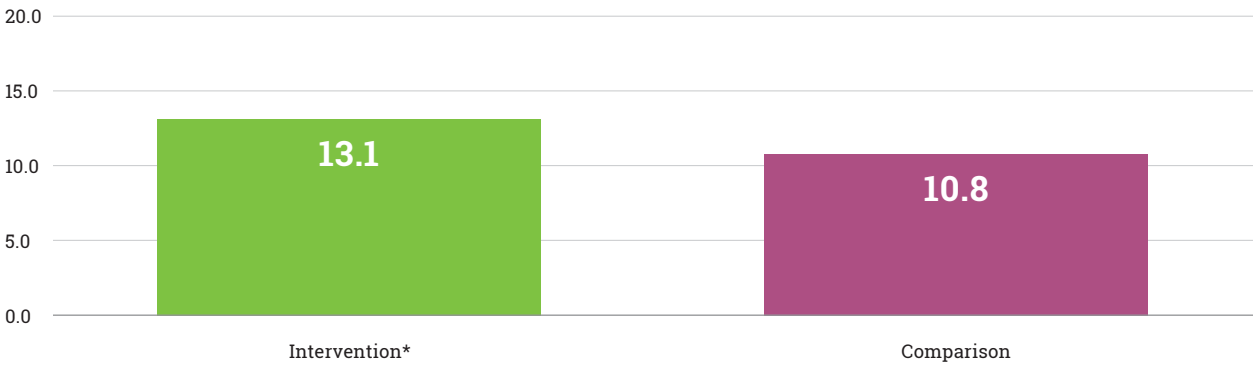
23 An asterisk (*) indicates the proportion of students receiving zero scores in the intervention group was significantly lower than the proportion of students receiving zero scores in the comparison group at endline at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=314$.

Familiar Word Reading

Knowledge of familiar words and the ability to read them quickly enables a child to read with automaticity—a skill critical to learning to read with fluency and comprehension. In the familiar word reading subtask, students were presented with 50 familiar words[24] and asked to read as many as they could in one minute. The subtask was discontinued if a child was unable to name correctly any of the first five familiar words. Results for the familiar word reading subtask are reported as CFWPM, and average gain scores are reported in Figure 8.

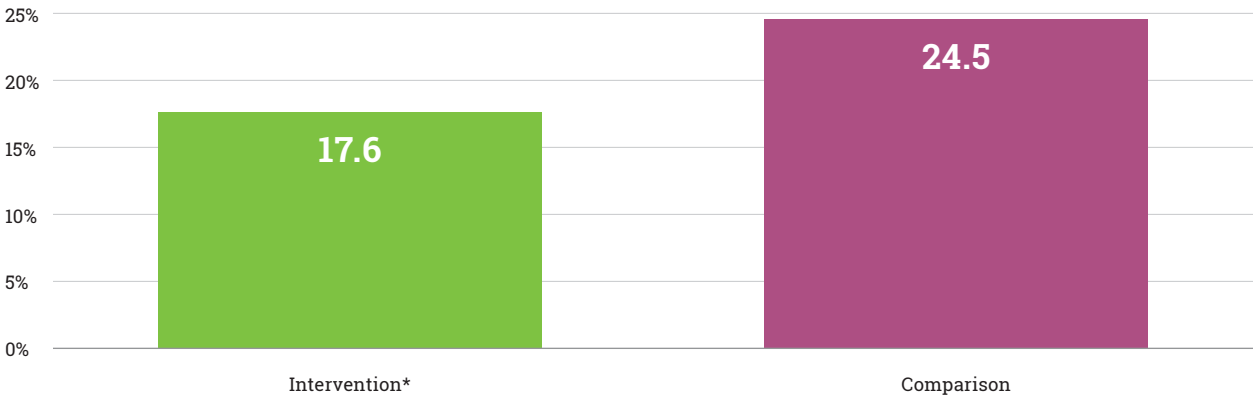
On average, familiar word reading fluency increased from baseline to endline for students in both groups, but **students in the intervention group made significantly greater gains than did those in the comparison group.** Specifically, intervention group students read 13.1 additional familiar words per minute at endline over baseline, compared with 10.8 in the comparison group.

Figure 8: **Average Gain Scores from Baseline to Endline by Group—Familiar Word Reading (CFWPM)[25]**



The percentage of students receiving zero scores on the familiar word reading subtask at endline is presented in Figure 9. **The proportion of intervention group students who received zero scores at endline was statistically significantly lower than the proportion of comparison group students who received zero scores:** 17.6 percent and 24.5 percent, respectively.

Figure 9: **Percentage of Students Receiving Zero Scores by Group at Endline—Familiar Word Reading (%)[26]**



24 The words in this subtask were derived from frequently used words for the age group.

25 An asterisk (*) indicates the gain score for the intervention group was significantly higher than the gain score for the comparison group at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=310$.

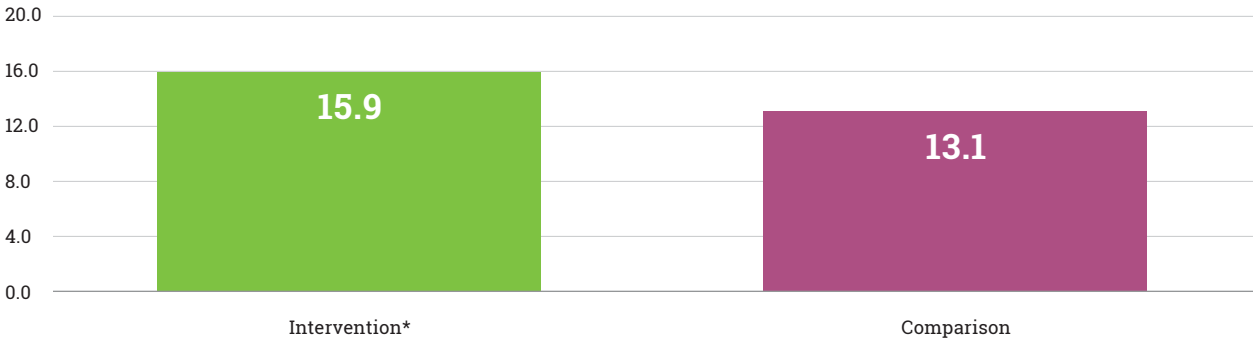
26 An asterisk (*) indicates the proportion of students receiving zero scores in the intervention group was significantly lower than the proportion of students receiving zero scores in the comparison group at endline at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=314$.

Oral Reading Fluency

The ORF subtask measures students' overall reading competence. It is the culmination of translating letters into sounds, merging sounds to become words, linking words to become sentences, relating the text to meaning, and making inferences to fill in missing information. A student's ORF score is dependent on the skills assessed in previous subtasks, since students need to have some mastery of letter sounds and decoding to read fluently. Students had the opportunity to read up to 59 words in one minute on the ORF passage; the subtask was discontinued if a student was unable to read any of the first five words correctly. Results for this subtask are measured as a fluency rate of CWPM, and average gains from baseline to endline are presented in Figure 10.

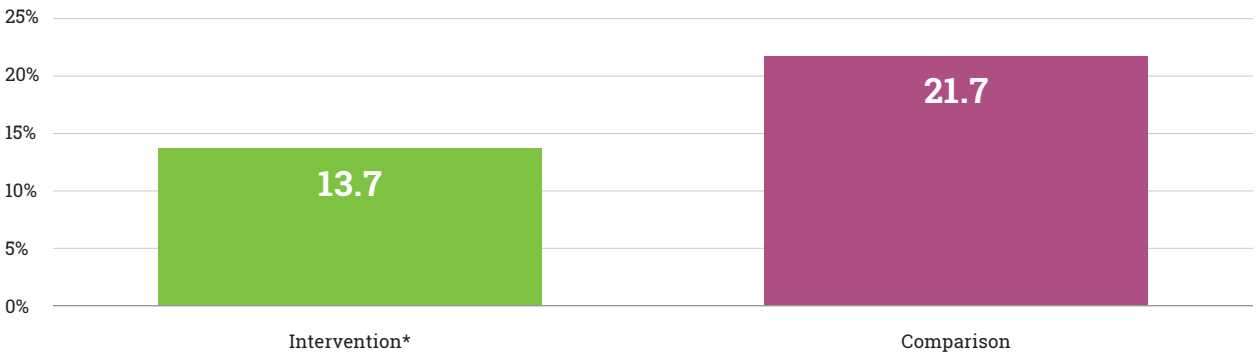
On average, scores on the ORF subtask increased from baseline to endline for students in both groups, though **the gains of students in the intervention group were statistically significantly greater than the gains of students in the comparison group.** Specifically, students in the intervention group read, on average, an additional 15.9 CWPM at endline than at baseline, in contrast with an additional 13.1 CWPM among students in the comparison group.

Figure 10: **Average Gain Scores from Baseline to Endline by Group—ORF (CWPM)**[27]



The percentage of students receiving zero scores on the ORF subtask at endline is presented in Figure 11. **Overall, the percentage of students in the intervention group receiving zero scores at endline was statistically significantly lower than the percentage of students in the comparison group.** Specifically, 13.7 percent of students in the intervention group received zero scores at endline, while 21.7 percent of students in the comparison group received zero scores.

Figure 11: **Percentage of Students Receiving Zero Scores by Group at Endline—ORF (%)**[28]



27 An asterisk (*) indicates the gain score for the intervention group was significantly higher than the gain score for the comparison group at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=311$.

28 An asterisk (*) indicates the proportion of students receiving zero scores in the intervention group was significantly lower than the proportion of students receiving zero scores in the comparison group at endline at $p<0.05$. *N* sizes: Intervention Group $n=313$; Comparison Group $n=314$.

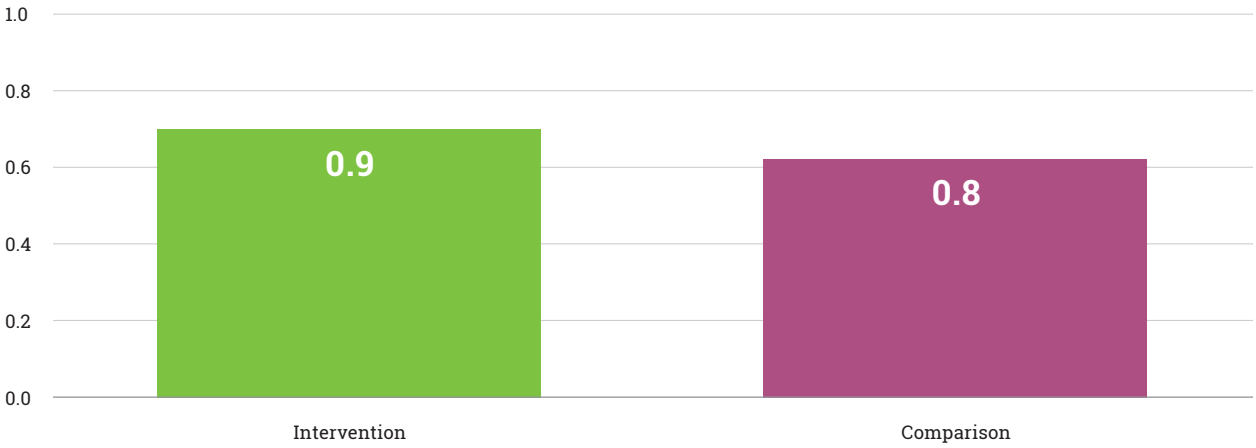
Reading Comprehension

Comprehension is the purpose of reading. Once students learn the sound-letter relationship, can decode, and read with automaticity, they become increasingly able to understand the meaning of a text. This subtask assesses that ability.

For the reading comprehension subtask, the assessor removed the story used in the ORF subtask and asked each student up to five comprehension questions based on what he or she read. The number of questions asked depended on how many words each student read on the ORF subtask. For instance, if a student read just the first five to ten words, he or she would be asked only the first comprehension question. Similarly, if a student read all 59 words, he or she would be asked all five questions. Students who received zero scores on the ORF subtask also received zero scores on the reading comprehension subtask because no questions were presented to them. Additionally, any student who could not correctly answer a single reading comprehension question received a zero score on this subtask. Results for this subtask are presented as the number of questions correctly answered out of five. Average gain scores are presented in Figure 12.

On average, reading comprehension scores increased from baseline to endline for students in both groups. **There was no statistically significant difference between gain scores for intervention and comparison group students,** meaning that the gains of students in intervention and comparison groups were comparable.

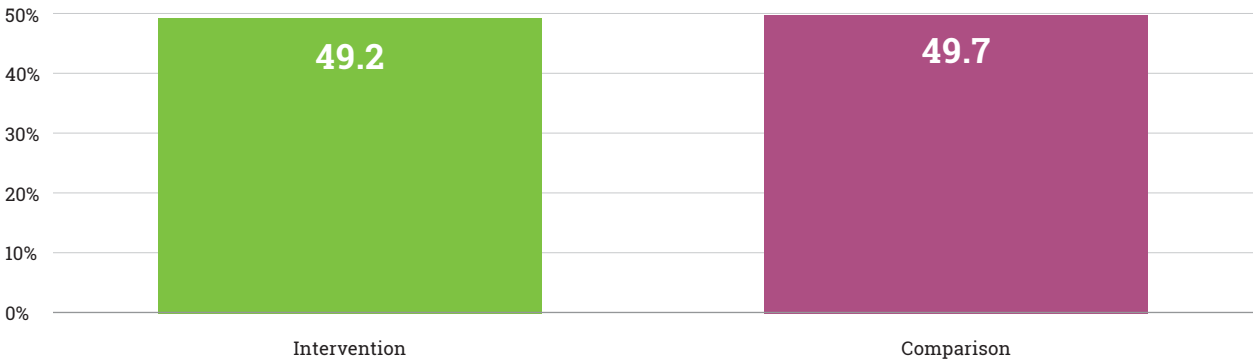
Figure 12: **Average Gain Scores from Baseline to Endline by Group—Reading Comprehension (Correct out of Five)**[29]



The percentage of students receiving zero scores on the reading comprehension subtask at endline is presented in Figure 13. **Overall, the percentage of students in the intervention group receiving zero scores at endline was comparable to the percentage of students in the comparison group receiving zero scores.**

29 *N* sizes: Intervention Group *n*=313; Comparison Group *n*=311.

Figure 13: **Percentage of Students Receiving Zero Scores by Group at Endline—Reading Comprehension (%)**[30]

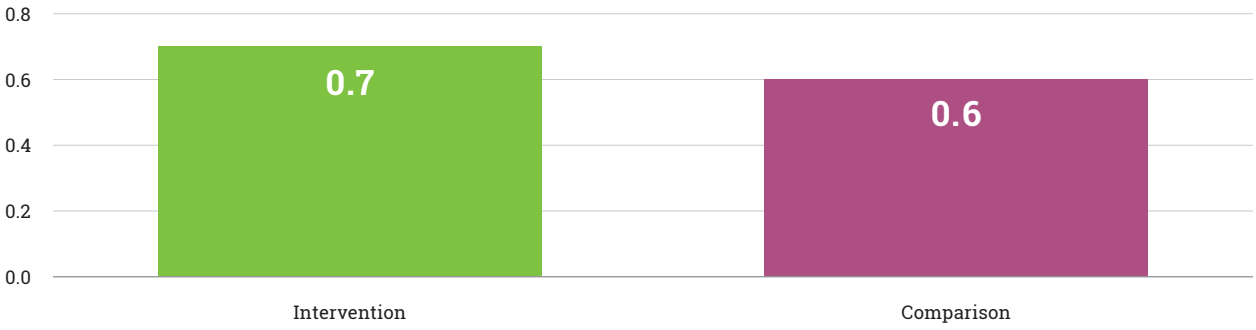


Listening Comprehension

The untimed listening comprehension subtask measures students' ability to comprehend the meaning of a story read to them orally. Students do not need to know how to read to answer listening comprehension questions. As a result, this subtask is an important measure of students' pre-reading abilities because it helps detect obstacles to learning to read, such as limited language proficiency, auditory problems, attention deficit, and other difficulties. In this subtask, the assessor reads a short passage to the student and asks them to answer comprehension questions based on what they heard. Results for this subtask are presented as the number of questions correctly answered out of four.

Average gain scores for the listening comprehension subtask are presented in Figure 14. On average, listening comprehension scores increased from baseline to endline for students in both groups at a comparable level. **There was no significant difference between the gain scores of intervention group students and those of comparison group students on this subtask.**

Figure 14: **Average Gain Scores from Baseline to Endline by Group—Listening Comprehension (Correct out of Four)**[31]

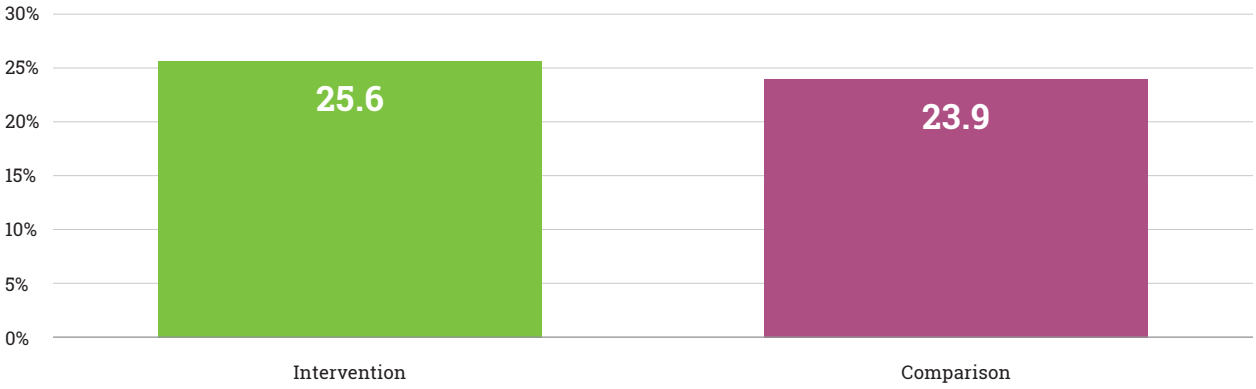


The percentage of students receiving zero scores on the listening comprehension subtask at endline is presented in Figure 14. **The percentages of zero scores at endline were not statistically significantly different between the two groups,** meaning that the proportions of intervention and comparison group students receiving zero scores at endline were comparable.

30 *N* sizes: Intervention Group *n*=313; Comparison Group *n*=314.

31 *N* sizes: Intervention Group *n*=313; Comparison Group *n*=311.

Figure 15: **Percentage of Students Receiving Zero Scores by Group at Endline—Listening Comprehension (%)**[32]



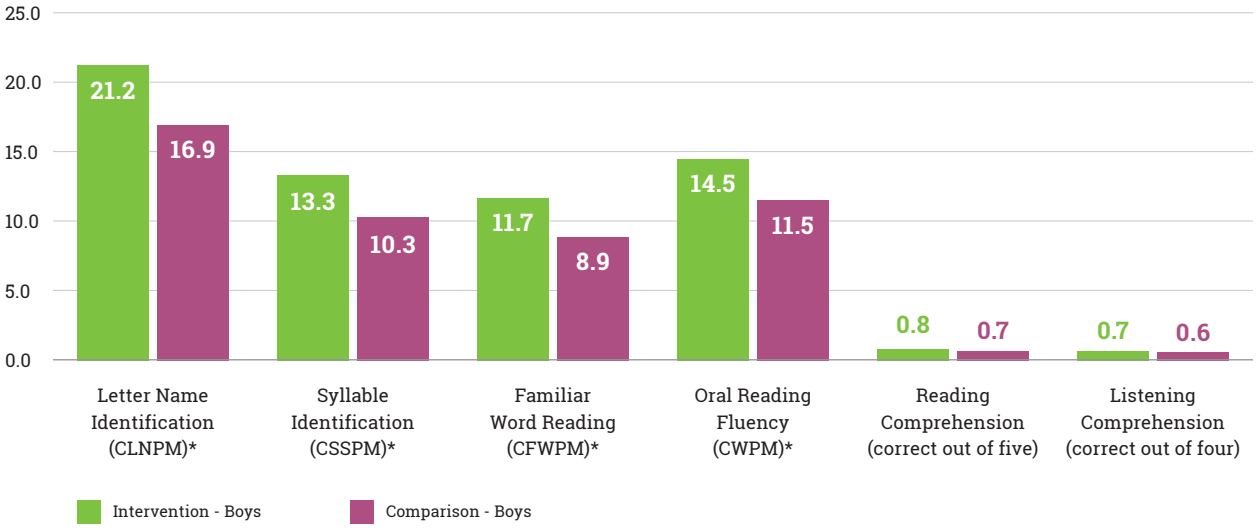
EGRA Results by Gender

EGRA results were analyzed by gender across groups to understand if the PCL project impacted girls and boys differently. Specifically, this section responds to the supplemental question, *How did the project influence certain subsets of the student population more than others based on identifiable contextual factors?*

In total, 318 boys and 309 girls were assessed at both baseline and endline. Gain scores for boys and girls are presented first, followed by zero scores for boys and girls.

Average gain scores for boys by group are presented in Figure 16. All boys, regardless of group, had gains across subtasks from baseline to endline. Boys in the intervention and comparison groups had comparable gains on two subtasks—reading comprehension and listening comprehension. **Boys in the intervention group made statistically significantly greater gains than did boys in the comparison group on four subtasks: letter name identification, syllable identification, familiar word reading, and ORF.**

Figure 16: **Average Gain Scores from Baseline to Endline by Group and Subtask—Boys**[33]

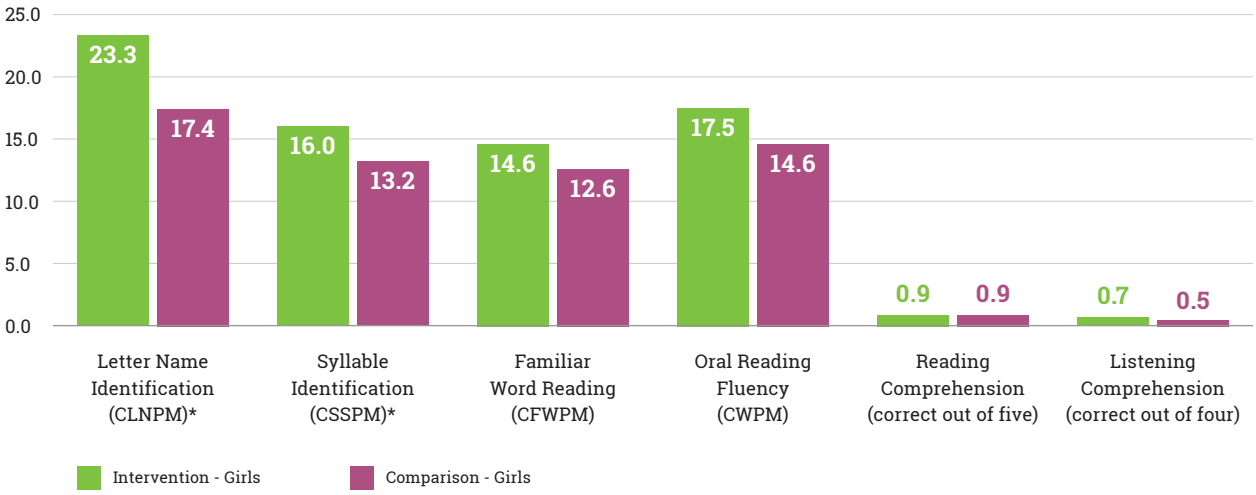


32 *N* sizes: Intervention Group *n*=313; Comparison Group *n*=314.

33 An asterisk (*) indicates the gain scores for boys in the intervention group were significantly higher than the gain scores for boys in the comparison group at p<0.05. *N* sizes: Intervention group—Boys *n*=162; Comparison group—Boys *n*=154.

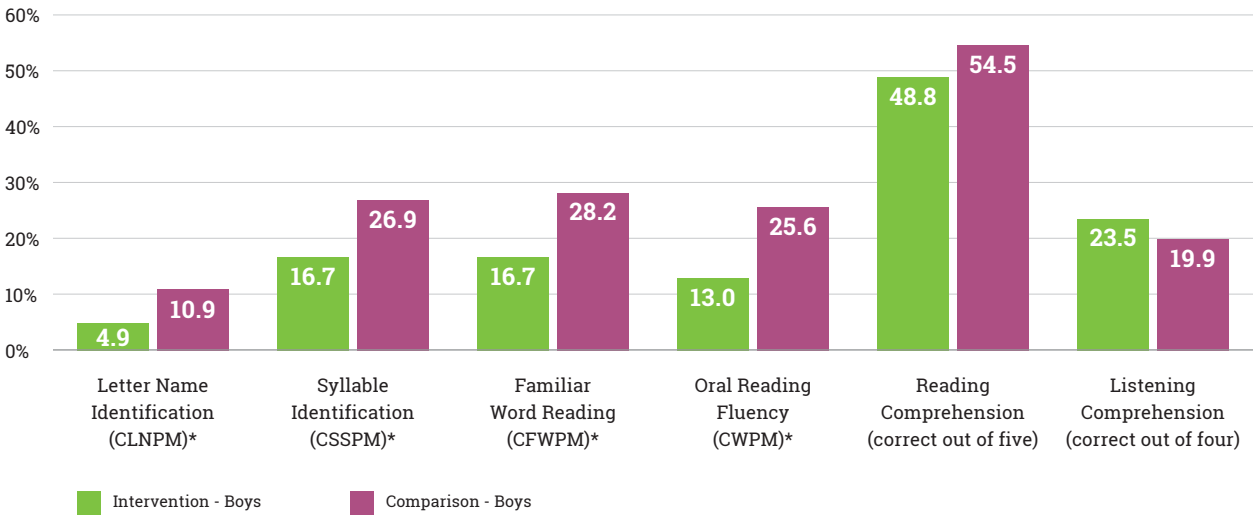
Average gain scores for girls by group are presented in Figure 17. As with boys, all girls had gains across subtasks from baseline to endline. There were no statistically significant differences in gains by intervention and comparison group girls on four of the six subtasks; however, **intervention group girls had statistically significantly greater gains than did girls in the comparison group on the letter name identification and syllable identification subtasks.**

Figure 17: **Average Gain Scores from Baseline to Endline by Group and Subtask—Girls**[34]



The proportions of boys who received zero scores at endline are presented in Figure 18, and the proportions of girls who received zero scores at endline are presented in Figure 19. At endline, the proportion of boys who received zero scores was comparable across groups on two of the six subtasks: reading comprehension and listening comprehension. However, **boys in the intervention group had a statistically significantly lower proportion of zero scores at endline than did boys in the comparison group on the letter name identification, syllable identification, familiar word reading, and ORF subtasks.**

Figure 18: **Percentage of Students Receiving Zero Scores by Group and Subtask at Endline—Boys (%)**[35]

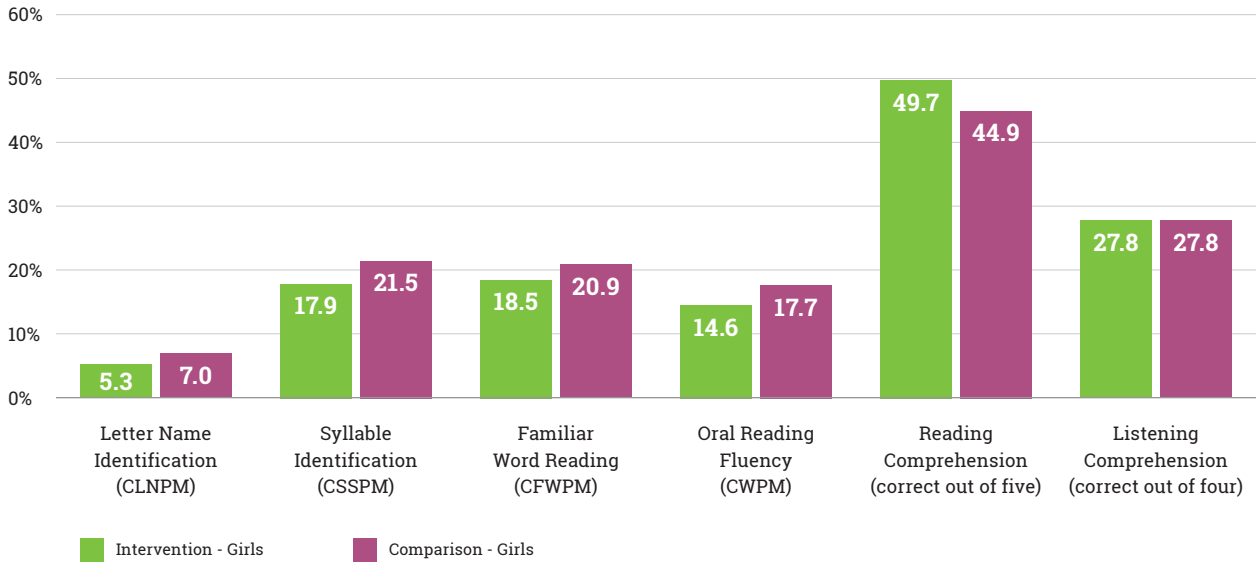


34 An asterisk (*) indicates the gain scores for girls in the intervention group were significantly higher than the gain scores for girls in the comparison group at $p<0.05$. *N* sizes: Intervention group—Girls $n=151$; Comparison group—Girls $n=157$.

35 An asterisk (*) indicates the proportion of boys receiving zero scores in the intervention group was significantly lower than the proportion of boys receiving zero scores in the comparison group at endline at $p<0.05$. *N* sizes: Intervention group—Boys $n=162$; Comparison group—Boys $n=156$.

Among girls at endline, **the proportion of intervention girls receiving zero scores at endline was comparable to the proportion of comparison girls receiving zero scores at endline on all subtasks.** This means that a statistically comparable percentage of girls in the intervention group and girls in the comparison group were unable to answer a single question correctly at endline on all subtasks.

Figure 19: **Percentage of Students Receiving Zero Scores by Group and Subtask at Endline—Girls (%)**[36]



EGRA Results by Grade

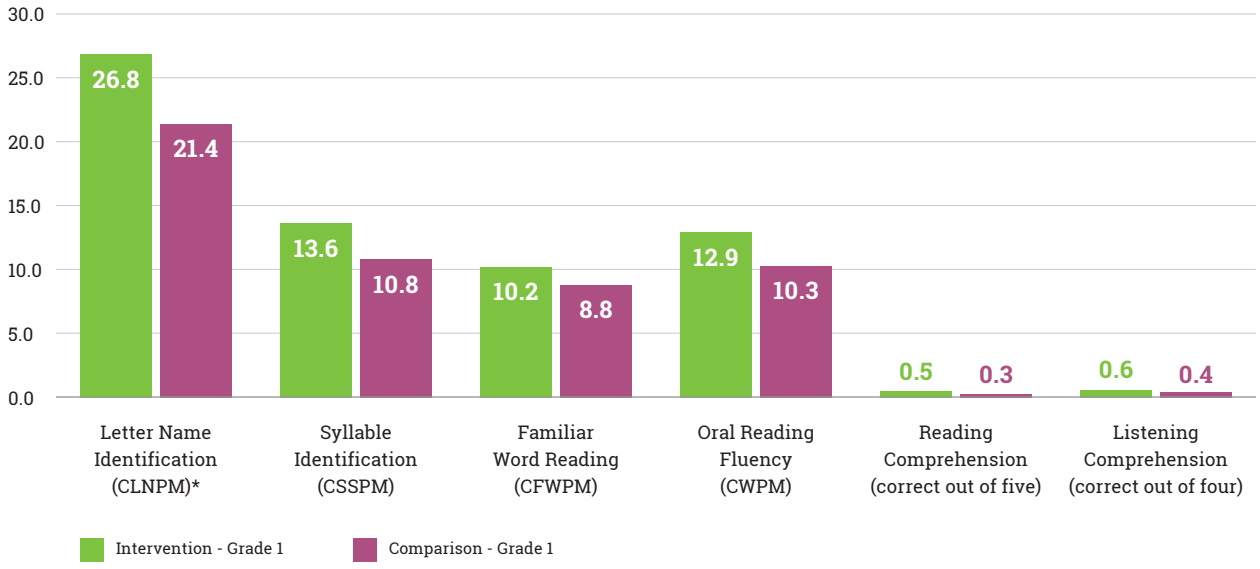
In addition to gender, EGRA results were analyzed by grade across groups to understand if the PCL project impacted Grade 1 and Grade 2 students differently. Specifically, this section responds to the supplemental question, *How did the project influence certain subsets of the student population more than others based on identifiable contextual factors?*

There were 297 Grade 1 students and 330 Grade 2 students who completed the baseline and endline EGRAs. Gain scores for Grade 1 and Grade 2 students are presented first, followed by the proportion of students receiving zero scores for Grade 1 and Grade 2.

Although students in both Grade 1 (Figure 20) and Grade 2 (Figure 21) made gains from baseline to endline, gains were statistically significantly greater for students in the intervention group on several subtasks. **Specifically, intervention group students in Grade 1 made statistically significantly greater gains than did their peers in the comparison group on the letter name identification subtask.**

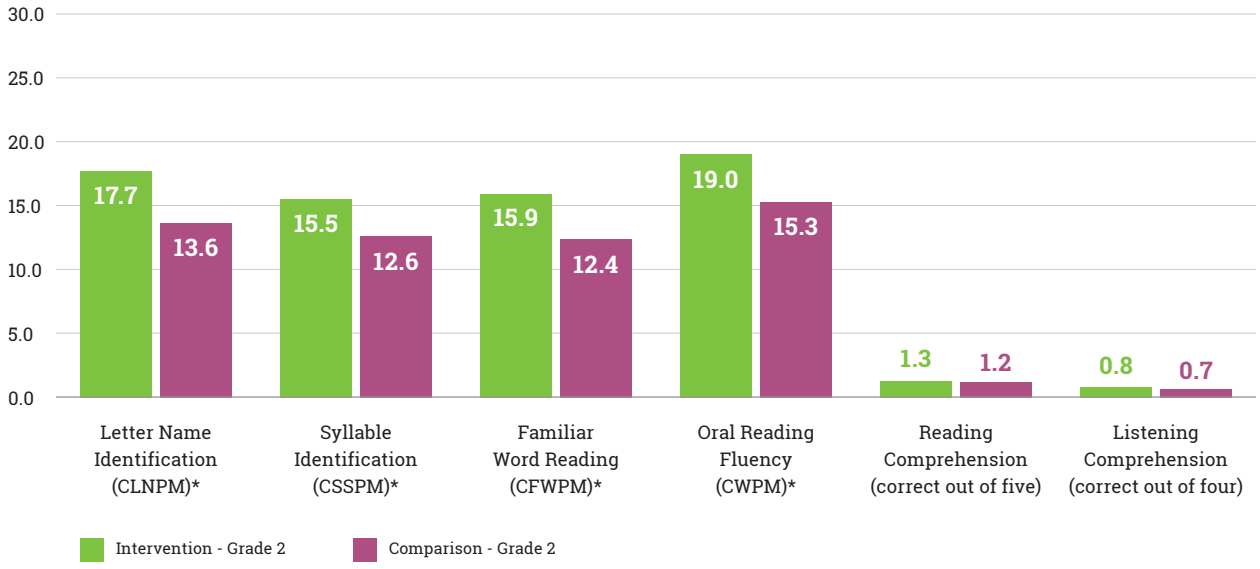
36 *N* sizes: Intervention group—Girls *n*=151; Comparison group—Girls *n*=158.

Figure 20: **Average Gain Scores from Baseline to Endline by Group and Subtask—Grade 1**[37]



While Grade 2 students had comparable gain scores on the reading comprehension and listening comprehension subtasks, **Grade 2 students in the intervention group made statistically significantly greater gains than did their peers in the comparison group on four subtasks: letter name identification, syllable identification, familiar word reading, and ORF.**

Figure 21: **Average Gain Scores from Baseline to Endline by Group and Subtask—Grade 2**[38]

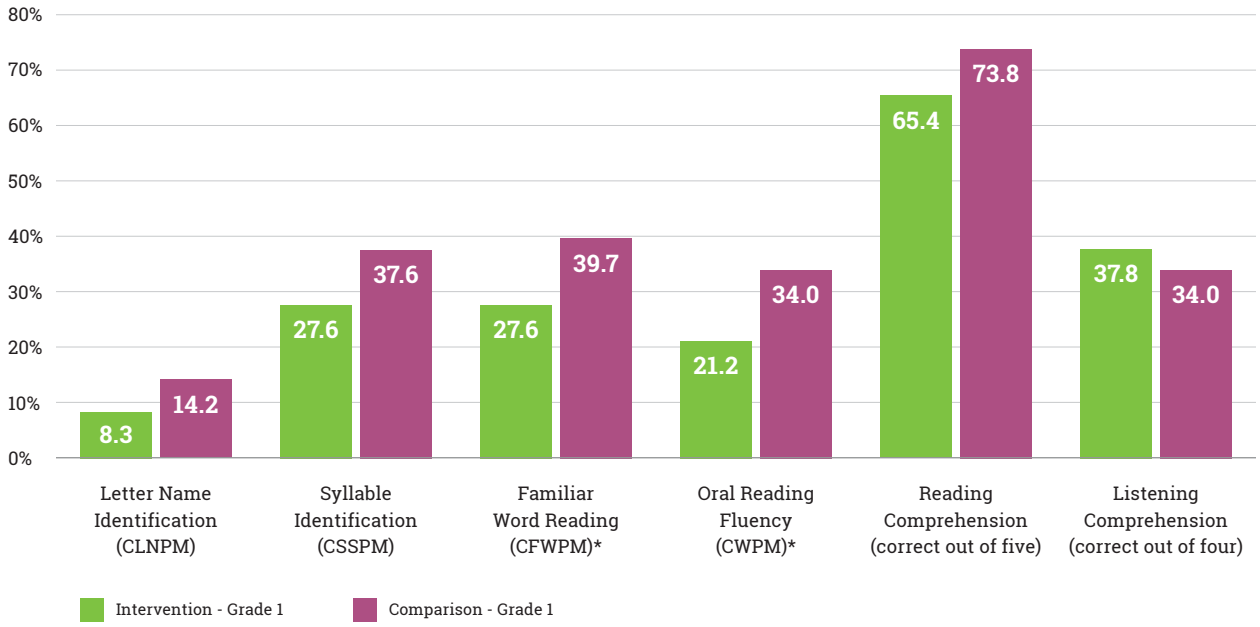


37 An asterisk (*) indicates the gain scores for Grade 1 students in the intervention group were significantly higher than the gain scores for Grade 1 students in the comparison group at $p<0.05$. *N* sizes: Intervention group—Grade 1 $n=156$; Comparison group—Grade 1 $n=138$.

38 An asterisk (*) indicates the gain scores for Grade 2 students in the intervention group were significantly higher than the gain scores for Grade 2 students in the comparison group at $p<0.05$. *N* sizes: Intervention group—Grade 2 $n=157$; Comparison group—Grade 2 $n=173$.

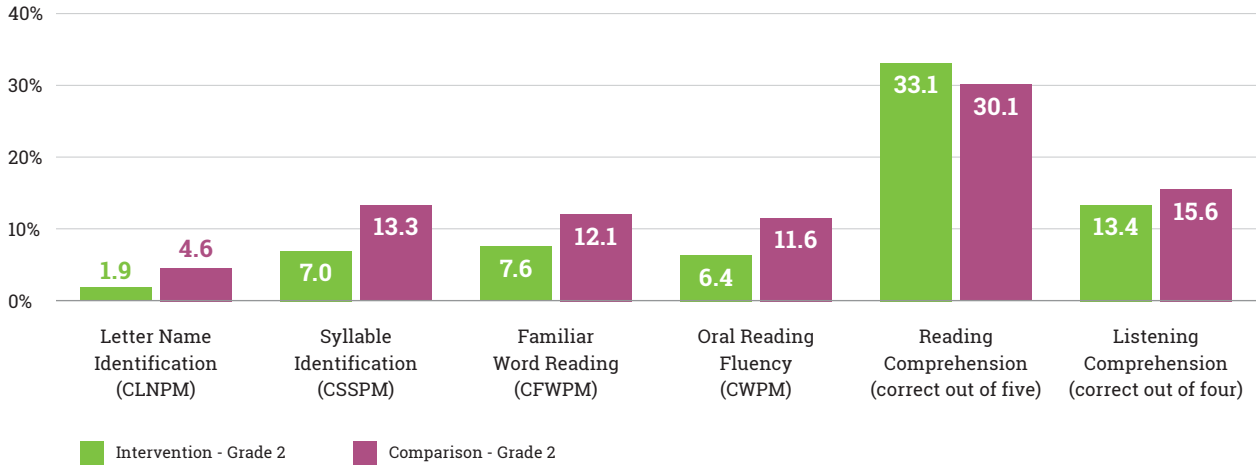
The proportion of Grade 1 students receiving zero scores at endline is presented in Figure 22, and the proportion of Grade 2 students receiving zero scores at endline is presented in Figure 23. The proportions of Grade 1 students receiving zero scores were comparable across groups on four of the six subtasks, while **Grade 1 students in the intervention group had a statistically significant lower proportion of zero scores at endline than did their peers in the comparison group on the familiar word reading and ORF subtasks.**

Figure 22: **Percentage of Students Receiving Zero Scores by Group and Subtask at Endline—Grade 1 (%)**[39]



The proportion of Grade 2 students in the intervention group who received zero scores at endline was comparable to the proportion of Grade 2 students in the comparison group who received zero scores on all subtasks at endline.

Figure 23: **Percentage of Students Receiving Zero Scores by Group and Subtask at Endline—Grade 2 (%)**[40]



39 An asterisk (*) indicates the proportion of Grade 1 students receiving zero score in the intervention group was significantly lower than the proportion of Grade 1 students receiving zero score in the comparison group at endline at $p<0.05$. *N* sizes: Intervention group—Grade 1 *n*=156; Comparison group—Grade 1 n=141.

40 *N* sizes: Intervention group—Grade 2 *n*=157; Comparison group—Grade 2 *n*=173.

VIII. Key Factors for Success

To better understand the factors that may have influenced changes in students' EGRA scores from baseline to endline, questions from the student questionnaire administered at endline were compiled into seven composites, or groups of questions related to each other. Each composite consists of a series of items related to a specific theme that may have affected students' early grade reading skill acquisition; composites were then assigned a maximum score equal to the total number of items in the composite.[41]

The composites for the PCL project include

1. Language exposure
2. Socioeconomic status
3. Parental literacy
4. Family reading support
5. Teacher reading support
6. Disposition to reading
7. Engagement in program

Descriptive statistics for the student questionnaire composites are presented in Table 7 (see Annex C for full composite questions, response options, and frequencies). Students in intervention and comparison groups had similar scores on all composites: language exposure, SES, parental literacy, family support, disposition to reading, and teacher support for learning. Intervention group students were also asked about their engagement in the program.

Table 7: **Descriptive Statistics for Student Questionnaire Composites by Group**

Composite Category	Intervention			Comparison			All Students		
	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Language exposure	312	5.8	0.7	303	5.9	0.5	615	5.8	0.6
Socioeconomic status	302	4.8	1.1	303	4.7	1.2	605	4.8	1.1
Parental literacy	313	1.8	0.5	306	1.8	0.5	619	1.8	0.5
Family reading support	309	3.1	1.2	299	3.0	1.2	608	3.1	1.2
Teacher reading support	307	3.6	0.5	300	3.6	0.6	607	3.6	0.6
Disposition to reading	310	1.9	0.3	305	1.9	0.3	615	1.9	0.3
Engagement in program	291	6.9	1.3						

Students across groups received comparable composite scores. When asked if they like using the smartphone to learn, all intervention students responded yes, and 95.0 percent of intervention students said that reading books on the app was easy. Nearly 90.0 percent (88.9) of students said the phone with the app was always kept at home, and almost 70 percent of students said another family member used the app—the most frequently cited additional user was a sibling.

41 Non-responses were given a "0."

The composite scores and EGRA gains were examined to determine if there was a relationship between these factors and student reading outcomes. The correlation analysis revealed several weak but statistically significant relationships between the composites and gains on reading subtasks (see Annex Table E.1). Specifically, students with higher scores on the language exposure composite tended to have greater gains on all subtasks except listening comprehension. Students with lower scores on the SES composite tended to have lower gains on all subtasks except letter name identification. Students with higher scores on the parental literacy composite had greater gains on all subtasks. Students with higher scores on the disposition to reading composite had greater gains on all subtasks except listening comprehension. Finally, students with higher scores on the teacher reading support composite tended to have greater gains on all subtasks.

IX. Scalability

Stakeholders are increasingly interested in assessing the scalability of interventions, in addition to their results or impacts. To scale up a project means to expand, replicate, adapt, and sustain a successful project in a new geographic area and to reach more beneficiaries over time.[42] ACR GCD grantees have implemented small-scale pilot projects, and an important consideration after each project is the feasibility of replicating or expanding the technology-based innovation and project models to a different or larger population or area.

To inform this decision, STS conducted a scalability assessment guided by the following research question, *Are this project and technology suitable for scaling?* STS used an indirect approach that relied on qualitative descriptions of project performance around seven parameters of sustainability:

- Credibility
- Observability
- Relevance
- Relative advantage
- Ease of transfer and adoption
- Testability
- Sustainability of funding

The seven parameters were adapted from the USAID-funded Scalability Assessment Tool developed by Management Systems International.[43] The tool includes seven sections and 28 questions. STS used data from EOP interviews, EGRA results, literature reviews, and project M&E to assess scalability parameters. These results are meant to inform local program staff, stakeholders, and donors about key considerations before scaling the YCRY project's model and technologies to a larger or different beneficiary population.

42 Cooley, L., & Linn, J. F. (2014). *Taking Innovations to Scale: Methods, Applications and Lessons.* Results for Development Institute. Washington, D.C. Retrieved from https://www.usaid.gov/sites/default/files/documents/1865/v5web_R4D_MSI-BrookingsSynthPaper0914-3.pdf

43 Ibid.

Credibility

An intervention or innovation must be credible to be supported and taken to scale through either replication or expansion. This aspect of scalability assesses whether various stakeholders—including potential adopters, funders, implementers, and beneficiaries—believe that the model has a strong evidence base that may include existing empirical research or anecdotal information.

Key Considerations

1. What evidence was used to develop the intervention?
2. What evaluations have been conducted on the intervention?
3. In what social contexts does the intervention work?
4. What individuals and institutions support the intervention?

The PCL project built on SWI's model of providing content to children and expanded on existing literacy resources from other SWI interventions to create the Marathi-language books and games featured in the app. SWI developed the PCL project based on research that demonstrated the positive impact of family member engagement and the effectiveness of curriculum-based television programming and educational media in improving learning outcomes.[44] SWI incorporated specific lessons learned from the Learn to Read, Read to Learn project funded through ACR GCD Round 1 in Bihar—specifically, that content should be leveled to capture children's interest, children should be allowed to advance at their own pace, and it is vital to engage families and communities in literacy acquisition.[45]

Although SWI has a history of implementing projects that use educational media with promising results, the PCL project is a new intervention model that has not yet been evaluated. Specifically, past SWI interventions provided literacy content in a different language, through a different medium (television instead of smartphones), or with a different type of student population. Although some of the specific content on the PCL project app—including the books and games—had been used in Delhi and surrounding areas, the technology, software, and delivery approach of the PCL project, as well as some of the literacy content, were new and untested. This is SWI's first evaluation of the delivery of content through a smartphone app that provided individualized learning experiences for each child and their families at home.

The PCL project was implemented in areas of Maharashtra with low mobile phone penetration. Because the PCL project requires a smartphone with certain technological capacities—and the most basic smartphones could not run the app—SWI distributed smartphones to intervention families who did not already have the suitable technology. This may be a cost-prohibitive model in the case of scale-up, so the project would be best suited for contexts with high levels of smartphone penetration. Furthermore, delivering content in-person, as NGO staff members did in the PCL project, would also be a difficult strategy to replicate to a larger beneficiary population; therefore, the intervention would be best replicated in areas with an internet connection. Although SWI designed the app for Marathi-speakers, Sesame Workshop designs content for and operates in more than 100 countries.[46] The app could potentially be updated for different languages using different Sesame Street characters to fit different social contexts.

44 Sesame Workshop India Trust. (2014.) Full Application for Play.Connect.Learn (Unpublished proposal for funding).

45 Ibid.

46 Sesame Workshop. (2017). *Where We Work: All Locations.* Retrieved from http://www.sesameworkshop.org/where-we-work/all-locations/

The strongest support for the PCL project came from the project beneficiaries and NGO implementing partners. Parents, students, and NGO staff members provided positive feedback regarding the app's content, fun learning approach, and ability to advance at each users' own pace. Anecdotally, some SWI and NGO staff members noted that schools had expressed interest in having access to the app in their classrooms, though it is unclear if this interest was widespread. SWI did not formally engage any ministry, government officials, or schools in the PCL project.

Credibility Conclusion

Credibility for the PCL project is moderate. The project, which was previously untested, built on empirical evidence related to educational media for reading skills development and lessons learned from previously piloted SWI projects. Credibility for the project's approach would benefit from additional piloting of the app and literacy content to build a stronger evidence base for the project components and delivery mechanisms. Engagement of governmental stakeholders to establish buy-in and support would also strengthen the credibility of the project.

Observability

For an intervention or innovation to be scaled, it should have observable results that show efficacy or impact. Observability of results is key to providing non-technical audiences with proof that an intervention or innovation achieved its intended outcomes and therefore will have positive impacts on beneficiaries.

Key Considerations

1. Are the results visual and observable?
2. What is the relationship (if any) between results and the intervention?
3. Is there any emotional appeal associated with the evidence?

Results of the first evaluation of the PCL project are promising. EGRA gain scores show that, on subtasks that measure pre-reading and foundational skills, students who received the PCL project app outperformed their peers in the comparison group who did not participate. Intervention group students had statistically significantly greater gain scores on four of the six subtasks. Intervention group students gained 22.2 CLNPM at endline over baseline, 14.6 CSSPM, and 13.1 CFWPM, compared with 17.1 CLNPM, 11.8 CSSPM, and 10.8 CFWPM among students in the comparison group. Furthermore, intervention group students read an additional 15.9 CWPM on the ORF passage at endline over baseline, while their peers in the comparison group gained 13.1CWPM. These results appear consistent for boys in the intervention group, who had statistically significantly greater gains than did their peers in the comparison group on the same four subtasks: letter name identification, syllable identification, familiar word reading, and ORF. However, results are less conclusive for girls; intervention group girls had statistically significantly greater gains than did comparison group girls only on the letter name identification and syllable identification subtask. Grade 2 students also appeared to have benefitted more from the PCL project than did Grade 1 students. Grade 2 intervention group students had statistically significantly greater gains than did their peers in the comparison group on the letter name identification, syllable identification, familiar word reading, and ORF subtasks. In comparison, Grade 1 students in the intervention group had statistically significantly greater gains than did Grade 1 students in the comparison group only on the letter name identification subtask.

Although the PCL project explicitly targeted comprehension, this skill did not appear to have been impacted through the project. EGRA results indicated that students who had access to the PCL project app had comparable gains on the reading comprehension subtask as students in the comparison group. This finding, in addition to the comparable performance of Grade 1 students on five out of six subtasks, may indicate that the project is better suited to developing pre-reading and foundational skills for students who have slightly higher than average baseline reading skills. The project should further explore these findings to determine if there are better ways for the app content to build comprehension skills. Furthermore, without student usage or FOI data, it is difficult to understand the link between EGRA results and the intervention conclusively. The project should invest in strengthening the ability to capture user experience data through the app to understand if different groups of children used the app differently or if the children were exposed sufficiently to the comprehension games and quizzes on the app.

There is emotional appeal associated with the evidence, particularly in regard to parents' and caregivers' perspectives on their children's reading and their ability to contribute to their children's learning. Most students and families reported that they did not have significant amounts of reading material in their homes and that the app provided a way for parents and caregivers to engage in reading experiences with their children. In interviews, many parents described the process of reading and learning vocabulary words as a new experience and recognized it as important in their child's learning

Observability Conclusion

The observable results of the PCL project support potential scale-up. Students who received the intervention had statistically significantly greater reading gains than did comparison group students on pre-reading and foundational skills. SWI should further investigate how to better support comprehension skills development and girls' reading skills development as well as how to gauge the best age at which to target the project to strengthen the connection between the intervention and the results. The project should also focus on the capture of dosage and FOI data to support the link between the intervention and the results.

Relevance

An intervention must be relevant to the context in which it is being implemented to be scalable. It should effectively address a problem that is recognizable and considered important by stakeholders.

Key Considerations

1. What is the level of significance of the problem that the intervention is trying to address?
2. Does the intervention address a priority on the policy agenda for potential adopters?
3. Does the intervention address a need felt by the potential beneficiaries?

The ASER Centre, which regularly conducts education assessments and compiles its results in the *Annual Status of Education Report*, found in 2016 in Maharashtra that only 5.9 percent of Grade 1 students could read a Grade 1-level text; in fact, less than one-quarter of Grade 2 or 3 students could read a Grade 1-level text.[47] This indicates

47 ASER Centre. (2016). *Annual Status of Education Report 2016: Maharashtra.* Retrieved from: http://img.asercentre.org/docs/Publications/ASER%20Reports/ASER%202016/State%20pages%20English/maharashtra_state_english.pdf

the severity of the literacy challenges faced in the implementation areas of the PCL project. SWI also observed—during the Learn to Read, Read to Learn project—low teacher motivation and negligible parental engagement in their children's education.[48]

There is evidence that early grade reading is a key priority on the policy agenda for the Government of India (GoI) and other potential adopters. In the Ministry of Human Resource Development's Education for All agenda, GoI articulates a focus on ensuring that all children are in school, bridging gender and social category gaps, and improving elementary education instruction. Furthermore, the agenda also highlights the importance of adult literacy, though there is not a specific high-level objective of improving early grade reading.[49] Currently, USAID/India is supporting ten initiatives in collaboration with the GoI to identify, support, and scale early grade reading innovations. USAID/India supports teacher and school administration capacity building with the goal of improving pedagogy and teaching.[50] Numerous other national and international organizations are also implementing early grade reading projects, indicating that early grade reading is highly relevant to the stakeholder community in India. It is unclear if or how community-based interventions are prioritized on the agenda of potential adopters.

In EOP interviews, families who participated in the project noted the importance of the project for their children. Many parents and caregivers interviewed reported a lack of reading materials for their children. They did not know of any supplementary reading programs that could complement the reading instruction children received through government schools. Parents and caregivers stated that, prior to the project, they only helped their children with homework, as they had no other way to support their learning. Within the PCL project's intervention areas, very few of the communities have libraries; parents, caregivers, and students all said they have few to no reading materials at home, except for religious texts or an occasional newspaper. Many did not know where they could buy or borrow books for their children. This project filled a relevant gap in their ability to support their children outside of school, as a way to supplement regular teaching and learning activities.

Relevance Conclusion

The PCL project is highly relevant given the significance of the problem, the policy agendas of potential adopters, and the needs expressed by beneficiaries. To further increase the relevance of the project, SWI should explore synergies with schools and stakeholders to align the project's community-based approach with ongoing policy initiatives.

Relative Advantage

Relative advantage relates to whether the intervention offers an improvement over current or alternative solutions to the problem.

Key Considerations

1. How adequate are the current solutions to the problem?
2. Is this intervention more effective than the current solution?
3. Is this intervention more effective than other established innovative models?

48 Sesame Workshop India Trust. (2014.) Full Application for Play.Connect.Learn (Unpublished proposal for funding).

49 Ministry of Human Resource Development. (2014). *Education For All: Towards Quality with Equity.* Retrieved from http://dise.in/Downloads/education-foe-all-in-india-2014-review.pdf

50 United States Agency for International Devleopment. (2017). *Our Work: Education.* Retrieved from https://www.usaid.gov/india/education

Existing solutions appear to be focused on improving instruction in schools and classrooms; there is little evidence of current projects that supplement school-level solutions with community-based solutions. In EOP interviews, parents and caregivers said they do not believe that the current approaches to teaching reading in government schools or their children's access to reading materials are sufficient for children to learn to read in Marathi. The SWI team was unaware of any other community-based models being implemented in Maharashtra to address the Marathi literacy needs of early grade students.

Despite the potential that exists for the PCL project model, its effective implementation is highly dependent on the level of smartphone penetration. As the PCL project, in its current state, can only be implemented on smartphones, and because so few families in the intervention area had smartphones at the beginning of the project, SWI had to invest significantly in the procurement and distribution of this hardware to families. If the project were to be replicated only with families who already have smartphones, it is possible that it would not adequately address the lack of early grade reading skills in intervention areas, given the SES of these families and their tendency to be able to access greater levels of resources to support their children's education. Although the model is innovative, given its current technology limitations, it is not clear if it is an effective solution to the problem.

Relative Advantage Conclusion

The relative advantage of the PCL project is unclear. Although the majority of literacy interventions in Maharashtra are currently targeted in the school and classroom, indicating a clear opportunity gap for a community-based intervention that engages families, the project currently requires technology that is not widely owned by potential beneficiaries. The project should investigate alternative implementation models that mitigate the technology limitation of the current model to better address the needs of low-resource children in the intervention area.

Ease of Transfer and Adoption

Ease of transfer and adoption relates to whether the characteristics and components of the intervention lend themselves to being adopted by organizations other than the original implementer. This parameter of scalability looks at how complex or resource-heavy an intervention is, as well as whether specific elements of the intervention may be deemed inappropriate or unattractive to other implementers.

Key Considerations[51]

1. What is the level of technical sophistication of the components and activities of the intervention?
2. What is the level of complexity of the intervention?
3. What level of supervision and monitoring is needed?

The components and activities of the PCL project require a moderate level of technical sophistication. The development and testing of the PCL app required the expertise of a developer. The app went through several iterations of updates prior to and during implementation. Once developed, the use of the PCL app required minimum levels of technological literacy from NGO staff members and users, who received training from SWI. SWI did not require NGO staff members, who transferred app content to families and conducted monitoring visits, to have a strong background in literacy; instead, they relied on the app content to provide reading skills development. Therefore, the project model in its current form does not necessitate highly technically skilled implementers or users.

51 In the original tool, this section includes 11 questions. This analysis includes the questions deemed most relevant for the intervention model and context.

The project model as implemented during the pilot is not complex—it only requires a smartphone and that parents and caregivers oversee their children as they play with the app. Limited or no training and follow-up support were required from NGO staff members or parents and caregivers. It should be noted that the project faced technology-related challenges during its pilot implementation period, which may be relevant if the model were to be adopted by other organizations in similar contexts. The PCL project app requires a smartphone with ample memory to operate and host all content; in an ideal context, it would also require internet connectivity to upload new content as children finish reading books on the app. During the pilot implementation period of the PCL project, SWI had to procure and distribute smartphones to families who were invited to participate in the project. As the app was large and not all content could be installed at one time, and because there was not sufficient internet connectivity to transfer new content remotely, NGO staff members had to visit all project families to upload new content to their smartphones. The NGO staff members tried different delivery mechanisms that were more efficient—including group meetings and creating transfer hotspots. After trying these methods, most NGO staff members opted to deliver content face-to-face. This was a time- and resource-consuming task, and it limited the availability of NGO staff members to conduct monitoring and support visits to families. Additionally, because each content package required significant amounts of memory, NGO staff members often had to delete the previous packages from the smartphones when installing a new package, limiting children's exposure to the full PCL project content.

The PCL project team conducted significant supervision and monitoring in its pilot implementation year. Due to server issues and low rates of internet connectivity, the PCL project team was unable to monitor children's progress remotely. As a result, they had to download usage data during their visits to upload new content packages. Furthermore, the NGO staff members also needed to provide feedback to families on their use of the app and troubleshot any technical issues during these visits. Despite these frequent face-to-face visits, NGO staff members also reported that due to the number of families, large distances between implementation areas, and the extent of necessary troubleshooting, they were unable to monitor usage as frequently or conduct as many monitoring sessions as planned. This confluence of challenges meant that, although the project invested significantly in monitoring, it was unable to sufficiently collect or assess the FOI or dosage.

Ease of Transfer and Adoption Conclusion

The PCL project consists of components and activities that would be relatively easy for new users to adopt and for new organizations to implement. However, the technological requirements of the project—smartphones for all families and internet connectivity—may be limiting for future adopters, especially in similar contexts. The project model would benefit from exploring different ways to provide the app to families and children, such as making the app accessible on communal equipment in a central community location, or decreasing the size of the app so that it could be transferred remotely rather than in-person.

Testability

The testability parameter examines how easy it is for organizations to pilot the intervention on a small scale before full adoption. Testability assesses whether potential adopters would need to commit significant resources or time to test the model if they chose to pilot it in a new context.

Key Consideration

1. Can the model be tested on a limited scale?

The PCL project could be tested in a new context within Marathi-speaking areas of India, though this may require the procurement of additional technology if the project were to target the entire population, instead of the

segment of the population who already has access to smartphones. A significant proportion of project resources was invested in the purchase and distribution of smartphones for families; the project also spent heavily on the distribution of the app content via NGO staff members. If an adopter desired a low-cost replication, the PCL project would be best suited for areas with internet connectivity and a high penetration of smartphones; however, if the adopter desired to serve populations with lower SES and baseline reading skills, they would most likely need to invest significantly to replicate and test the project.

Because the PCL project app was designed to serve populations who speak Marathi, if the model were to be introduced into new languages, an adopter would have to invest heavily in the development of new content and updates to the app before testing the model in the new context.

Testability Conclusion

The PCL project would be easy for a potential adopter to replicate and test in areas of Marathi-speaking India where families already have smartphones and have internet connectivity. However, if the project were to be replicated in a new language or in areas with low smartphone penetration and low to no internet connectivity, an adopter would have to commit significant resources to test the model.

Sustainability of Funding

Sustainability of funding refers to how cost effective the intervention is and whether there are funds available to scale the intervention, either through government or other organizations.

Key Considerations

1. Is the model more cost effective than other solutions?
2. What kind of funding commitment is required to scale the model?
3. Is there any potential for internal revenue from the model (e.g., service fees)?

No comprehensive cost-effectiveness analysis was conducted on the PCL project; instead, a cost analysis was performed to answer the supplemental research question, *How much did the development, implementation, and management aspects of the project cost?* A cost analysis is often a component of scalability assessments, as it helps decision makers and stakeholders understand the feasibility of replication with given budgetary constraints. Because ACR GCD grantees implement new approaches, they often allot significant financial resources to developing new materials that could be used on a recurring basis. To better understand the funding requirements of the PCL project, a cost analysis was conducted to present the total cost of the intervention and to clarify the investments that would be needed for project replication or scale-up.

USAID guidance on conducting cost analyses on early grade reading projects suggests that the "ingredients method"[52] be used to calculate costs in the following categories:

- Management and associated technical costs
- Development costs
- Implementation costs

52 RTI International (2015). *Measurement and Research Support to Education Strategy Goal 1: Early Grade Reading Costing Template and Guidance.* United States Agency for International Development. Washington, D.C. Retrieved from http://www.youblisher.com/p/1362487-Early-Grade-Reading-Costing-Template-and-Guidance/

Project staff completed a costing template with guidance from World Vision and STS. Costs were outlined based on the activities from the project work plan, and each expenditure was classified based on the three categories listed above. The analysis used invoiced costs from the beginning of the project in fiscal year 2015 through June 30, 2017.[53, 54]

Table 8 provides a detailed breakdown of costs by category based on PCL project's key activities.

Table 8: **Cost Analysis**[55]

Objective	Management	Development	Implementation
Activity 1.1 - Needs assessment study	$ -	$ 5,155	$ 416
Activity 1.2 - Development of content modules and roll-out mechanism	$ -	$ 21,481	$ -
Activity 1.3 - Finalization of content and assessment plan	$ -	$ 12,242	$ -
Activity 1.4 - Finalization of app specifications	$ -	$ 16,921	$ -
Activity 1.5 - App development, prototype, and testing	$ -	$ 48,986	$ 3,077
Activity 1.6 - Training on app use, and distribution of app	$ -	$ -	$ 16,311
Activity 2.1 - Identification of project intervention areas and implementing partners	$ -	$ -	$ 3,887
Activity 2.3 - Planning of training modules and development of supporting materials	$ -	$ 856	$ 3,603
Activity 2.4 - Training of NGO partners and key functionaries	$ -	$ -	$ 2,995
Activity 2.5 - Enrollment of participants into the project	$ -	$ -	$ 17,563
Activity 2.6 - Distribution of app to intervention households	$ -	$ -	$ 25,903
Activity 2.7 - Data updates and syncing to understand progress	$ -	$ -	$ 835
Activity 2.8 - Field-level monitoring, monthly meetings, and ongoing support	$ -	$ -	$ 8,918
Activity 3.1 - Finalization of research methodology and sample	$ -	$ 3,135	$ -
Activity 3.2 - EGRA adaptation and testing	$ -	$ 6,665	$ 1,696
Activity 3.3 - Recruitment of research firm to conduct EGRA data collection and RFP development	$ -	$ 1,013	$ -
Activity 3.4 - Baseline EGRA	$ -	$ 2,582	$ 17,002
Activity 3.7 - Endline EGRA	$ 82,732	$ -	$ 13,565
Total	**$ 82,732**	**$ 119,036**	**$ 115,771**
Percentage of Total (%)	**26.1**	**37.5**	**36.5**

53 The total grant amount for the PCL project was $318,955. As of June 30, 2017, the project had invoiced $317,539 and had $1,416 remaining in its budget.

54 SWI contributed $183,487 in matching funds for the translation, dubbing, and broadcast of Sesame content as well as indirect costs. These funds were not included in the cost analysis.

55 Not all activities in the PCL project had associated costs; activities without costs were removed from the Cost Analysis table.

The management category includes costs that are not directly related to implementation and are likely to vary widely based on who is overseeing the implementation of the intervention. **Management costs for the PCL project represented 26.1 percent of the costs expended** and included the cost of maintaining the project office in Maharashtra; personnel salaries and expat costs associated with non-technical work; travel, lodging, and per diem costs for technical consultants; and other indirect rates and fees.[56]

Development includes the costs related to the development of materials, survey instruments, programs, and other content that would not need to be redeveloped in the scale-up of a project. **The development costs for the PCL project represented 37.5 percent of the costs expended.** The major expense within this category was the development of the PCL project app, a one-off expenditure that would not need to be incurred again if a project were implemented in Marathi-speaking areas in India.

The implementation cost category is arguably the most relevant for stakeholders who are considering scaling up a project or intervention. This category includes all of the recurrent activities and costs that would need to be expensed should the project be replicated, including: materials printing and distribution, training, M&E, events and presentations, workshops, and human resources activities. **For the PCL project, implementation costs represented 36.5 percent of the total project cost.** Major costs within this category were the distribution of app content to families, the participant enrollment process, and EGRA data collection. The project also spent significantly on the procurement of technologies for distribution to families.

Projects sometimes benefit from in-kind services, institutional support, or preexisting relationships with stakeholders or governments that may provide the project with tangible benefits, although it may be difficult or impossible to monetize the costs. Examples of this include local volunteers, strong capacity or support from a large nongovernmental organization, or relationships with local governments that could ease logistics and procedures. The PCL project did not benefit from any notable in-kind services, though SWI utilized preexisting reading content that had been developed for other projects; furthermore, SWI may have benefitted from the institutional strength of the organization within India and Sesame Workshop's institutional knowledge from other countries.

Sustainability of Funding Conclusion

Development costs for the PCL project represented a larger proportion of the overall cost of the project than did management or implementation costs. More rigorous cost and impact data should be collected to understand better the cost effectiveness of the model.

56 Management costs may be inclusive of a 17% flat fee charged for Negotiated Indirect Cost Recovery Agreement.

X. Conclusions

SWI implemented the PCL project to improve children's early grade reading skills—specifically, foundational literacy skills and reading comprehension—in their mother tongue, Marathi, by creating and distributing a smartphone app to families for use by children outside of school. The project had significant and positive impacts on children's reading gains, particularly on pre-reading and foundational skills, though it does not appear to have impacted children's reading comprehension skills.

Given the promising results, there is potential for the PCL project model to be scaled, though the implementation model should be examined further to determine the feasibility of replicating the project in areas with low smartphone penetration or low internet connectivity.

The following are lessons that should be considered for any future interventions incorporating components of the PCL project.

Lessons Learned

Interactive literacy content delivered through smartphone technology can improve children's early grade reading skills.

Students who received the PCL project app had significantly higher reading gains than did students in the comparison group on pre-reading and foundational skills—namely, the letter name identification, syllable identification, familiar word reading, and ORF subtasks. The project intended to improve reading comprehension skills, as well, and results from this analysis indicate that intervention and comparison group students had comparable gains on the reading comprehension subtask. SWI should evaluate the content provided to students through the PCL project app to determine how to strengthen users' higher-order literacy skills.

Projects that intervene at the household level and engage parents and caregivers through technology have the potential to strengthen families' role in their children's reading.

The PCL project, which was part of ACR GCD Round 2's family and community engagement focus area, involved parents and caregivers in the project by requiring them to give their children access to smartphones and the PCL project app and content. Linking parents and caregivers with the technology may incentivize them to take a more active role and engage with their children as they use the app. Conversely, it may also limit the children's access to the content if the parent or caregiver is busy, out of the household, or unavailable and does not allow the child to use the technology unaccompanied. Although anecdotal data indicated that families were more interested and active in their children's reading at home because of the PCL project, future research should be conducted to understand better if the project model has changed families' beliefs about their role in helping their children learn to read.

A project's choice of technology may limit its ability to be scaled to wider or more diverse populations.

SWI chose to develop a household-level intervention delivered through smartphones. In Maharashtra, levels of smartphone penetration are still quite low, and internet connectivity significantly limits the ability of app content to be delivered wirelessly. To implement the project, the PCL project team had to purchase and distribute smartphones to families and transfer app content in person, which required significant investments. Unless levels of smartphone ownership increase sharply in the near future, replication of the project would necessitate either distributing technologies to families or targeting households that already own smartphones, which are traditionally households from higher SES backgrounds with better access to learning materials. Initiatives like the PCL project should consider the cost-benefit of developing a household-level intervention that is accessed through a technology that is not widely available in intervention areas.

For projects to achieve student reading gains, limited reading content may be balanced out by an interactive technology experience—though projects should still strive to give children more, rather than less, content.

The PCL project gave intervention group students access to 12 interactive audio storybooks. Due to concerns over the limited amount of content on the PCL project app, SWI also provided 28 supplemental storybooks delivered as PDFs. Although the PDF storybooks were meant to be used by families and children to support the limited amount of content on the PCL project app, feedback from the PCL project team and families indicates that the PDF versions were not widely used and that the majority of children were only exposed to the 12 audio storybooks. Nevertheless, the results showed statistically significant reading gains across the reading spectrum. It is possible that the audio experience, games, quizzes, and GGSS characters provided children with enough incentive to use the PCL project app repeatedly. In fact, in EOP interviews, parents noted that their children practiced the same stories multiple times, though they often learned the new stories within one or two hours. The PCL project created an app with the potential to engage children and their families in reading outside of school, and even though limited content proved impactful, project management should explore the added value in literacy skills by creating even more interactive reading materials for the PCL project app.

Projects should explore the impacts of reading materials delivered through technologies on different subgroups of students.

The results of the PCL project were positive across the intervention group, though boys may have benefitted differently than did girls, and Grade 2 students may have benefitted differently than did Grade 1 students. These results point to interesting areas of future research, including how the creation of gender-sensitive reading content may differently engage girls and improve their reading skills. Furthermore, the project could also explore different levels of reading content or the targeting of pre-reading skills through games and quizzes to improve the reading skills development of younger students.

Annexes

XI. Annexes

Annex A: **EGRA Instrument 1**

Enumerator Name	
Date and Time	
Date	
Time	
Location Information / Student ID	
District	
Block	
Village	
Child Name	
ID	
School Name	
Student Name	

1. If the student's name was not listed, enter the student's name.

2. If the student's name was not listed, enter the student's six-letter ID from baseline.

Consent / अनुमती

गुडमॉर्नगि, माझं नाव . . . . मी . . . . येथे राहतो/राहते. मी तुम्हाला माझ्यावषियी थोडी माहतिी सांगतो/सांगते.

तुझं नाव काय ? तुझ्या कुटुंबाबद्दल थोडी माहतिी सांग.

शाळेच्या नंतर तुला काय काय करायला आवडतं ?

मुलाचे/मुलीचे शाब्दकि अनुमती घेण्यासाठी खालील वाक्ये मोठ्याने वाचावीत.

मी इथे आज का आले ते मी तुला सांगते/सांगतो. मुले वाचावयास कशी शकितात हे समजून घेण्याचा आम्ही प्रयत्न करीत आहोत. आम्हाला या कामात तुझी मदत हवी आहे. पण तुझी इच्छा नसेल तर तू यात सहभागी झाला नाहीस तरी चालेल. आपण वाचन खेळ खेळणार आहोत. मी तुला अक्षरे, शब्द आणि गोष्टी मोठ्याने वाचायला सांगणार आहे. ठरावकि वेळेत (टाईमर लावून) तुला वाचायला कती वेळ लागतो , ते मी पाहणार आहे. ही काही परक्षिा नाही आणि याचा परीणाम तुझ्या शाळेच्या श्रेणीवर होणार नाही. तुझी यात सहभागी व्हावयाची इच्छा नसेल तर तू तसे ठरवू शकतोस. सुरूवात केल्यानंतरही जर तुला उत्तर द्यायचे नसेल तरी हरकत नाही. तुला याबाबत काही शंका आहेत का? सुरू करूया का ?

वद्यिार्थ्रयाने अनुमती दलिे का ? ☐

Student Information / वद्यिार्थी माहिती

1. तुझे पूर्ण नाव काय ?

2. लिंग

☐ Male ☐ Female

3. तुझे वय काय आहे ?

☐ 6 वर्ष ☐ 7 वर्षे ☐ 8 वर्ष

4. तू कोणत्या इयत्तेत शिकतोस/ शिकतेस ?

☐ १ ली ☐ २ री

5. तूझ्या आईचे नाव काय आहे?

6. तूझ्या वडिलांचे नाव काय आहे ?

7. तू कोणत्या इयत्तेत शिकतोस/ शिकतेस ?

☐ मराठी ☐ अमराठी

8. जिल्हा-तालुका (To be filled by surveyor without asking child)

☐ अमरावती-भातकुली ☐ बुलढाणा-संग्रामपूर ☐ बुलढाणा-शेगाव ☐ बुलढाणा-मेहेकर

☐ सांगली-सांगली-मिरज ☐ सांगली-केडगाव ☐ सांगली-कवठे महाकाळ ☐ कोल्हापूर-हातकनंगले

☐ कोल्हापूर-शिरोळ ☐ अमरावती-दर्यापूर ☐ बुलढाणा-नांदुरा ☐ बुलढाणा-जलगावजामोड

☐ यवतमाळ वणी ☐ यवतमाळ यवतमाळ ☐ यवतमाळ घाटंणजी ☐ चंद्रपूर-वरोरा

9. गट (Treatment/Control) (To be filled by surveyor without asking the child)

☐ उपचार गट / Treatment ☐ नियंत्रण गट / Control

Letter Name Identification Endline

मुलांना अक्षरांचे छोटे पुस्तक (स्टमि्युलाय बुक) दाखवा आणि म्हणा.

इथे मराठी अक्षरांनी लिहिलेले पूर्ण पान आहे. जतिक्या अक्षरांचे वाचन तुला करता येईल, ततिकी अक्षरे मला (स्पर्शाने) वाचून दाखवशील का ? अक्षरांची नावे सांग, उच्चार नको.

उदा. अक्षराचे नाव (अ दाखवावे) हा अननसातील अ आहे की आगगाडीतील आ आहे.

चला सराव करू या, मला हे अक्षर कोणते आहे सांग (क - दाखवा)

जर मुलाने / मुलीने बरोबर वाचले तर म्हणा, **उत्तम, अक्षराचे नाव आहे** - क

जर मुलाने/मुलीने बरोबर वाचन केले नाही तर म्हणावे अक्षराचे नाव आहे - क

आता दुसरे अक्षर पाहू. मला या अक्षराचे नाव सांग (ब दाखवा)

जर मुलाने/मुलीने बरोबर वाचले तर म्हणा : **बरोबर, अक्षराचे नाव आहे** - ब

जर मुलाने बरोबर वाचले नाही तर म्हणा : **अक्षराचे नाव** - ब **आहे.**

आता दुसरे अक्षर पाहू. मला या अक्षराचे नाव सांग (स दाखवा)

जर मुलाने/मुलीने बरोबर वाचले तर म्हणा : **बरोबर, अक्षराचे नाव आहे** - स

जर मुलाने बरोबर वाचले नाही तर म्हणा : **अक्षराचे नाव** - स **आहे.**

तुला समजले का, की हा स्वाध्याय कसा सोडवायचा आहे ?

जेव्हा मी म्हणेन, सुरू कर, तेव्हा जतिक्या अचूकपणे तुला अक्षरांचे उच्चार करता येतील, ततिक्या अक्षरांचे उच्चार कर. (उदाहरण दलि्यानंतर पहलि्या ओळीतील पहलि अक्षर दाखवा आणि पहलि्या ओळी खालून आपली बोटे फरिवून दाखवा) **मी गप्प बसून तुझे वाचन ऐकणार आहे, मदत लागल्यास मी मदत करेन. तयार आहेस का ? चल सुरूवात करू.**

ण	स	ग	क्ष	प	र	घ	य	औ	ळ
अः	ष	ई	र	ख	ड	फ	ऐ	झ	ध
ऋ	ठ	झ	त	ट	ब	न	म	ल	अः
क्ष	भ	अं	इ	आ	ज	प	ए	ऊ	द
ज्ञ	म	ल	अ	ऊ	द	क	ॠ	छ	ए
ऋ	ह	क	ग	च	फ	ठ	ष	थ	ल
थ	ष	ड	ज्ञ	थ	इ	छ	श	घ	ह
उ	न	ओ	अं	क्ष	ज	अं	ढ	औ	च
द	ब	ध	व	अ	य	आ	त	भ	ट
ख	घ	ढ	औ	ऊ	ण	त	अः	थ	ई

Time Remaining

Autostop? ☐

Syllable Identification Endline

मुलांना अक्षराचे छोटे पुस्तक (स्टमिुलाय बुक) दाखवावे म्हणाः

येथे मराठीतील अक्षरे दलिेली आहेत. त्यापैकी तुला जतिकी अक्षरे वाचता येतील ततिक्या अक्षरांचे उच्चार सांगा. अक्षरांची नावे सांगू नका, फक्त उच्चार सांगा.

उदा. अक्षराचे नाव (अ दाखवावा) **हा अननसातील अ आहे की आगगाडीतील आ आहे.**

चला सराव करू या, मला अक्षर कोणते आहे सांग (ना - दाखवा)

मुलाचे उत्तर बरोबर आले तर त्याला म्हणा : **छान, ह्या शब्दाचा उच्चार आहे** - ना

जर मुलाने/मुलीने बरोबर उच्चार केला नाही तर म्हणा : **अक्षराचा उच्चार आहे** - ना

आता दुसया अक्षराचा सराव करू. मला या अक्षराचा उच्चार सांग (रू - दाखवा)

जर मुलांनी बरोबर उत्तर दलिे तर म्हणा : **छान, या अक्षराचा उच्चार आहे** - रू.

जर योग्य उत्तर दलिे नाही तर म्हणा : **या अक्षराचा उच्चार आहे** - रू.

आता दुसया अक्षराचा सराव करू. मला या अक्षराचा उच्चार सांग (पि- दाखवा)

जर मुलांनी बरोबर उत्तर दलिे तर म्हणाः **छान, या अक्षराचा उच्चार आहे** - पि.

जर योग्य उत्तर दलिे नाही तर म्हणा : **या अक्षराचा उच्चार आहे** - पि.

तुम्हांला समजले का की स्वाध्याय कसा सोडवायचा आहे ?

जेव्हा मी सुरू करा म्हणेन, तेव्हा अक्षरांचे उच्चार जास्तीत जास्त चांगल्या प्रकारे करा. मला त्या अक्षरांचे उच्चार सांगा, सुरूवात इथून करा आणि अशा प्रकारे पुढे वाचन करीत रहा (उदाहरण दलि्यावर ओळीतील पहलि्या अक्षरावर खूण करा. त्या ओळीतील अक्षरे तुमच्या बोटाने दाखवा) **जोपर्यंत तुम्हांला मदतीची गरज लागणार नाही तोपर्यंत मी शांत राहनि आणि लक्षपूर्वक तुमचे वाचन ऐकेन. ठीक आहे, सुरू करा.**

ता	रं	गे	वे	रु	तौ	फो	झ्या	ठि	णी
टु	ज्ञा	वि	दी	प्र	जो	लु	ठै	न्म	लू
क्रि	षं	ते	या	ट्र	नु	लो	स्वी	ठो	स्तु
धै	सं	–या	स्क	गा	द्या	स्त्री	णे	वृ	है
ळु	थै	म्ह	मि	खि	पा	सु	पॉ	पू	खु
च्य	पं	ज्ञि	जा	त्मा	रि	टु	री	हे	घे
ऋ	भो	लै	डौ	ल्य	णि	शा	श्रा	चु	फु
श्मा	डो	ढु	त्य	मा	गि	शे	दू	कै	वै
डि	टि	ळ्या	ष्ट्र	स्ता	त्री	डा	घो	लौ	णि
मे	चु	अं	डो	ढु	त्य	रा	सू	हु	धै

Time Remaining

Autostop? ☐

Familiar Word Reading Endline

मुलांसाठी तयार केलेल्या पुस्तकितील (स्टमिुलाय बुक) तयार केलेल्या शब्दांची यादी मुलाला दाखवा आणि म्हणा :

ही तयार केलेल्या काही शब्दांची यादी आहे.यातील तुला जतिके शब्द वाचता येतील ततिके शब्द तू वाच. एक एक अक्षर वाचू नकोस पण पूर्ण शब्द वाच. उदा. तयार केलेला एक शब्द आहे

आता तु प्रयत्न कर, कृपया हे वाच (पुढील शब्द दाखवा - आई)

जर त्याने दलिला शब्द बरोबर वाचला तर म्हणा : **शाबास !** आई

जर मुलाने दलिला शब्द बरोबर वाचला नाही तर म्हणा : **हा शब्द आहे - .** आई

आता दुसरा शब्द वाचण्याचा प्रयत्न कर. हा शब्द वाच (पुढील शब्द दाखवा) राजा

(जर मुलाने वाचले रसक , तर म्हणा) : **शाबास**, राजा

जर त्याला दलिला शब्द बरोबर वाचता आला नाही तर म्हणा : **हा शब्द आहे** राजा

आता दुसरा शब्द वाचण्याचा प्रयत्न कर. हा शब्द वाच (पुढील शब्द दाखवा) काका

(जर मुलाने वाचले रसक , तर म्हणा) : **शाबास**, काका

जर त्याला दलिला शब्द बरोबर वाचता आला नाही तर म्हणा : **हा शब्द आहे** काका

तुला समजले का, की हा स्वाध्याय कसा सोडवायचा आहे ?

जेव्हा मी म्हणेन, सुरू कर, तेव्हा जतिक्या चांगल्याप्रकारे तुला शब्दांचे वाचन करता येईल, ततिक्या शब्दांचे वाचन कर. (उदाहरण दल्यिानंतर पहल्या ओळीतील शब्दांनी सुरूवात करून आडवे वाचन कर.) मी शांत बसून तुझे वाचन ऐकणार आहे, मदत लागल्यास मी मदत करेन. तयार आहेस का? चल सुरूवात करू.

चमिणी	मला	हौद	तुझा	दुष्काळ
बैल	ताई	हरिवी	सर्वांनी	पक्षी
मैदान	माल	मोठा	म्हणाले	तेव्हा
गाय	बसा	चला	गेला	काम
आजी	पतंग	भरा-या	झाली	स्वतः
पैज	वमिान	मोर	जॉन	आणि
न्यारी	हळू	हात	उंट	भूक
झोका	नाव	कावळा	माया	फुल
मागे	यांनी	गोल	प्रज्ञा	गौरी
सुट्टी	नाही	चालू	नदी	नव्हती

Time Remaining

Autostop? ☐

Oral Reading Fluency Endline

वद्यिाथ्र्यांसाठी तयार केलेल्या पुस्तकातील गोष्ट (स्टमिुलाय बुक) दाखवा. म्हणा :

येथे छोटी गोष्ट दलिी आहे. ती तू मोठ्याने वाच, जेव्हा तुझे वाचन संपेल तेव्हा त्यावर आधारति काही प्रश्न मी तुला वचिारणार आहे. तुला काय करावयाचे आहे ते समजले का? जेव्हा मी सुरू कर म्हणेन तेव्हा तु शक्य ततिक्या चांगल्या प्रकारे गोष्ट वाच. जोपर्यंत तुला मदत लागत नाही, तोपर्यंत मी शांतपणे ऐकणार आहे. ठीक आहे, सुरू करू या.

एक	जय	नावाचा	मुलगा	होता.
जयच्या	भावाचे	नाव	राम	होते.
राम	आजारी	होता.	रामला	फुगा
खूप	आवडतो.	जयला	बागेत	फुगेवाला
दसिला.	त्याच्याकडे	खूप	फुगे	होते.
जयने	मोठा	फुगा	वकित	घेतला.
तो	फुगा	घेऊन	घरी	आला.
त्याने	रामला	फुगा	दलिा.	जय
आणि	राम	फुग्याशी	खेळले.	मुलांना
खेळताना	पाहून	आईला	आनंद	झाला.
आईने	मुलांसाठी	खीर	केली.	मुले
खीर	खाऊन	झोपी	गेली.	

Time Remaining

Autostop? ☐

Reading Comprehension Endline

आता मी, तु नुकत्याच वाचलेल्या गोष्टीवर तुला काही प्रश्न वचिारणार आहे. तू प्रश्नांची उत्तरे चांगल्या प्रकारे देण्याचा प्रयत्न कर.

1. जयच्या भावाचे नाव काय ? (Correct answer: (राम))

☐ Correct ☐ Incorrect ☐ No response

2. जयने बागेत काय पाहिले ? (Correct answer: (फुगेवाला))

☐ Correct ☐ Incorrect ☐ No response

3. जयने रामला काय दिले ? (Correct answer: (फुगा))

☐ Correct ☐ Incorrect ☐ No response

4. आईला का आनंद झाला ? (Correct answer: (मुलांना एकत्र खेळताना पाहून आईला आनंद झाला.))

☐ Correct ☐ Incorrect ☐ No response

5. जयने रामला फुगा का दिला ? (Correct answer: ((राम आजारी होता म्हणून, रामला फुगा आवडतो म्हणून.))

☐ Correct ☐ Incorrect ☐ No response

Listening Comprehension Endline

मुलांच्या समोरील सर्व वाचन साहित्य उचलून घ्या.मुलांना सूचना द्या. त्यानंतर सावकाश व स्पष्टपणे प्रत्येक प्रश्न वचिारा. प्रत्येक प्रश्न वचिारल्यानंतर उत्तर देण्यासाठी मुलाला/मुलीला 15 सेकंद वेळ द्या. मुलांनी दर्लिले उत्तर बरोबर कवि चूक म्हणून नोंदवून घ्या. त्यानंतर पुढील प्रश्न वचिारा.

म्हणाः आता मी तुला एक गोष्ट वाचून दाखवणार आहे. ती गोष्ट मी तुला एकदाच वाचून दाखवणिार आहे. तू नीट ऐक. त्यानंतर मी तुला त्या गोष्टीवर आधारीत काही प्रश्न वचिारणार आहे. ते प्रश्न तू नीट ऐक आणचिांगल्याप्रकारे उत्तर दे. मी सांगतिलेले तुला नीट समजले का?

राजूच्या स्वप्नात शाहरूख खान आला. हळूच त्याच्या कानात बोलला. माझ्याबरोबर येशील का ? गाण्याच्या तालावर नाचशील का ?

राजू नाचू लागला. सगळे बघू लागले. तेवढ्यात राजू खाटेवरून पडला. स्वप्नातून जागा झाला.

1. राजूच्या स्वप्नात कोण आला ? ((राजूच्या स्वप्नात शाहरूख आला))

☐ Correct ☐ Incorrect ☐ No response

2. शाहरूख राजूला काय म्हणाला ? (((माझ्याबरोबर येशील का ? /गाण्याच्या तालावर नाचशील का ?))

☐ Correct ☐ Incorrect ☐ No response

3. राजू कशावरून पडला ? ((राजू खाटेवरून पडला))

☐ Correct ☐ Incorrect ☐ No response

4. जागे झाल्यावर राजूला काय वाटले ? ((राजूला आनंद झाला/राजू दुःखी झाला/राजू खाटेवरून पडल्यामुळे त्याला इजा झाली))

☐ Correct ☐ Incorrect ☐ No response

Annex B: **Student Questionnaire**

1. शाळेत तुझ्या बाई/सर तुझ्याशी मराठी भाषेत बोलतात का?
   At school does your teacher talk to you Marathi?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

2. शाळेत तुझे मत्रि/मैत्रणिी तुझ्याशी मराठी भाषेत बोलतात का?
   At school do your friends speak to you in Marathi?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

3. तुझ्या मत्रि/मैत्रणिींशी शाळेत तू मराठी भाषेत बोलतोस/बोलतेस का?
   At school do you speak to your friends in Marathi?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

4. तुझ्या भावंडांशी घरी तू मराठी भाषेत बोलतोस/बोलतेस का?
   At home do you speak to your siblings in Marathi?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

5. घरातील इतर मोठ्या व्यक्तीशी तू मराठी भाषेत बोलतोस/बोलतेस का?
   At home do you speak to the adults in your home in Marathi?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

6. शाळेत मराठी भाषेतील वाचन साहत्यि आहे का? (मासकि, वृत्तपत्र इ.)
   At school are there reading materials in Marathi? (magazines or newspapers, at school in Marathi?)

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

7. तुझ्या घरी रेडओि आहे का?
   At your house, do you have a radio?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

8. तुझ्या घरी ट.व्ह.ि आहे का?
   At your house, do you have a TV?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

9. तुझ्या घरी टेलफिोन/मोबाईल फोन आहे का?
   At your house, do you have a telephone/mobile phone?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

10. तुझ्या घरी इलेक्ट्रीसीटी आहे का?
At your house, do you have electricity?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

11. तुझ्या घरात शौचालय आहे का?
Do you have a toilet inside your house?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

12. तुझ्या घरी सायकल कवि मोटर सायकल (दुचाकी) आहे का?
At your house, do you have a bicycle or motorcycle/two wheeler?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

13. तुझ्या घरी मोटार, ट्रक, ट्र्क्टर, इंजनि बोट (चार चाकी) आहे का ?
At your house, do you have a four wheeler? (a car, truck, 4x4, tractor)

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

14. काल रात्री घरातील कामांमध्ये/घरगुती कामांमध्ये तू कती वेळ घालवलास?
Last night, how much time did you spend on household chores (at home or school)?

☐ वेळ द्लिा नाही ☐ थोडा वेळ द्लिा ☐ खूप वेळ द्लिा ☐ कोणताही प्रतसिाद नाही

15. तुझी आई मराठी भाषा वाचू शकते का?
Can your mother read in Marathi?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

16. तुझे वडील मराठी भाषा वाचू शकतात का?
Can your father read in Marathi?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

17. तुझे आई-वडील, भावंड, आजी-आजोबा कवि घरातील इत्तर कोणीही तुला गोष्टी वाचून द्ाखवतिात का?
Does someone from home (parent, sibling, grandparent) read stories to you?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

18. तुझे आई-वडील, भावंड, आजी-आजोबा कवि घरातील इत्तर कोणीही तूला शालेय अभ्यसात मद्त करतात का?
Does someone from home (parent, sibling, grandparent) help you with your school work?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

19. तू कुटुंबतील सद्स्यांसोबत बसून कती वेळा वाचन करतोस/करतेस? (पालक, भावंड, आजी-आजोबा इ.) वाचन केलेस?
How often do you read with a family member at home?

☐ रोज ☐ कधी कधी ☐ कधीच नाही ☐ कोणताही प्रतसिाद नाही

20. तुझ्या घरी तुला वाचनात व गृहपाठ करण्यात जास्त करून कोण मदत करतात?
At home, who most often helps you with your reading or your homework?

☐ आई, वडील कविा दोघेही ☐ भाऊ-बहणि ☐ इतर कुटंबातील व्यक्ती ☐ मला वाचन कविा गृहपाठासाठी सहसा घरी मदत मळि्त नाही.

☐ कोणताही प्रतसिाद नाही

21. तुला घरी वाचन करणे आवडते का?
Do you like reading at home?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

22. तुला शाळेत वाचन करायला आवडते का?
Do you like reading at school?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

23. शांतपणे, स्वतःचे पुस्तके वाचायला तुला शाळेत कधी वेळ मळिते?
At school, how often do you read books quietly by yourself?

☐ रोज ☐ कधी कधी ☐ कधीच नाही ☐ कोणताही प्रतसिाद नाही

24. शाळेत, शक्षिक तुला तू करीत असलेल्या वाचनाबाबत प्रश्न वचिारतात का? जसे कोणते पुस्तक वाचले? काय गोष्ट होती?
At school, does your teacher ask you questions about what you are reading?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

25. तुझे शक्षिक तुला वाचनात अडचण आल्यास मदत करतात का?
Does your teacher help you when you are unable to read something?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

26. शाळेत तुझे शक्षिक तुला कती वेळा लेखन करायला सांगतात?
How often does your teacher ask you to write in school?

☐ रोज ☐ कधी कधी ☐ कधीच नाही ☐ कोणताही प्रतसिाद नाही

27. तुला शकिण्यासाठी स्मार्टफोन वापरणे आवडते का?
Do you like using the smartphone to learn?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

28. गली गली सीम सीम कार्यक्रमापूर्वी तू स्मार्टफोनवर कधी गोष्टी वाचल्या आहेस का?
Have you read story books on a phone before the Galli Galli Sim Sim app?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

29. गली गली सीम सीम अप्लकिेशन वापरून वाचन करणे सोपे आहे का?
Is reading books on the Galli Galli Sim Sim app easy?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

30. गली गली सीम सीम अप्लकिेशन वापरून तू कोणाच्याही मदती शविाय वाचन करु शकतेस का?
Did you read the books on the Galli Galli Sim Sim app on your own?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

31. गली गली सीम सीम अप्लकिेशन वापरून वाचलेल्या गोष्टी तुला आवडल्या का?
Did you like the stories you read on the Galli Galli Sim Sim app?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

32. आठवड्यात तू गली गली सीम सीम अप्लकिेशन वापरून कतिी वेळा वाचन केलेस?
How often do you play the Galli Galli Sim Sim app in a week?

☐ रोज ☐ बरेच दविस ☐ मी ऍप्लकिेशन वापरले नाही ☐ कोणताही प्रतसिाद नाही

33. शैक्षणकि वर्ष संपले असले तरीही तुला गली गली सीम सीम अप्लकिेशन यापुढेही वापरायचे आहे का?
Do you want to continue using the Galli Galli Sim Sim app even though the school year is over?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

34. (गली गली सीम सीम अप्लकिेशन व्यतरिक्त) तू स्मर्टफोने वापरून इतरही पुस्तके वाचतेस/वाचतोस का?
Do you read other books on the smartphone (other than through the Galli Galli Sim Sim app)?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

35. तुझ्या कुटुंबातील इतर लोकही गली गली सीम सीम अप्लकिेशन वापरतात का?
Do other family members use the Galli Galli Sim Sim app?

☐ हो, माझे पालक ☐ हो, भाऊ, बहणि ☐ कुटुंबातील इतर लोक ☐ हो, अनेक वेगवेगळे कुटुंब सदस्य

☐ कोणीही नाही ☐ कोणताही प्रतसिाद नाही

36. गली गली सीम सीम अप्लकिेशन असलेला स्मर्टफोन कायम घरीच असतो का?
Is the phone with the Galli Galli Sim Sim app always kept at home?

☐ हो ☐ नाही ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

37. गली गली सीम सीम अप्लकिेशन असलेला स्मर्टफोन कोणाकडेअसतो?
Who keeps the phone with the Galli Galli Sim Sim app?

☐ मझ्याकडे फोन असतो ☐ कुटंबातील इतरांकडे फोन असतो (पालक, भावंड इ.) ☐ माहति नाही/सांगता येत नाही ☐ कोणताही प्रतसिाद नाही

Annex C: **Student Questionnaire Results and Composites**

Table C.1: **Language Exposure Composite**

Questions and Response Options		Intervention		Comparison	
		Frequency	Percentage (%)	Frequency	Percentage (%)
At school, does your teacher talk to you in Marathi?	No	2	0.6%	0	0.0%
	Yes	311	99.4%	306	99.4%
	Not sure	0	0.0%	2	0.6%
	No response	0	0.0%	0	0.0%
At school, do your friends speak to you in Marathi?	No	3	1.0%	1	0.3%
	Yes	310	99.0%	305	99.3%
	Not sure	0	0.0%	1	0.3%
	No response	0	0.0%	0	0.0%
At school, do you speak to your friends in Marathi?	No	4	1.3%	2	0.6%
	Yes	308	98.4%	306	99.0%
	Not sure	1	0.3%	1	0.3%
	No response	0	0.0%	0	0.0%
At home, do you speak to your siblings in Marathi?	No	14	4.5%	3	1.0%
	Yes	297	95.2%	306	98.7%
	Not sure	1	0.3%	1	0.3%
	No response	0	0.0%	0	0.0%
At home, do you speak to the adults in Marathi?	No	14	4.5%	3	1.0%
	Yes	298	95.2%	306	99.0%
	Not sure	1	0.3%	0	0.0%
	No response	0	0.0%	0	0.0%
At school, are there reading materials (magazines or newspapers) in Marathi?	No	18	5.8%	17	5.5%
	Yes	286	91.7%	279	90.0%
	Not sure	8	2.6%	14	4.5%
	No response	0	0.0%	0	0.0%

Table C.2: **Socioeconomic Status Composite**

Questions and Response Options		Intervention		Comparison	
		Frequency	Percentage (%)	Frequency	Percentage (%)
At your house, do you have a radio?	No	294	94.2%	284	91.6%
	Yes	17	5.4%	26	8.4%
	Don't know	1	0.3%	0	0.0%
	No response	0	0.0%	0	0.0%
At your house, do you have a TV?	No	39	12.5%	36	11.6%
	Yes	272	86.9%	274	88.4%
	Don't know	2	0.6%	0	0.0%
	No response	0	0.0%	0	0.0%
At your house, do you have a telephone/mobile phone?	No	11	3.5%	22	7.1%
	Yes	299	96.1%	286	92.6%
	Don't know	1	0.3%	1	0.3%
	No response	0	0.0%	0	0.0%
At your house, do you have electricity?	No	12	3.8%	11	3.6%
	Yes	299	95.5%	298	96.4%
	Don't know	2	0.6%	0	0.0%
	No response	0	0.0%	0	0.0%
Do you have a toilet inside your house?	No	92	29.6%	99	31.9%
	Yes	218	70.1%	210	67.7%
	Don't know	1	0.3%	1	0.3%
	No response	0	0.0%	0	0.0%
At your house, do you have a bicycle, motorcycle, or two-wheeler?	No	72	23.0%	87	28.2%
	Yes	241	77.0%	220	71.4%
	Don't know	0	0.0%	1	0.3%
	No response	0	0.0%	0	0.0%
At your house, do you have a four-wheeler, car, truck,4x4, or tractor?	No	295	95.2%	287	92.6%
	Yes	15	4.8%	23	7.4%
	Don't know	0	0.0%	0	0.0%
	No response	0	0.0%	0	0.0%
Last night, how much time did you spend on household chores?	None	40	12.9%	75	24.5%
	Some	249	80.3%	219	71.6%
	A lot	21	6.8%	12	3.9%
	No response	0	0.0%	0	0.0%

Table C.3: **Parental Literacy Composite**

Questions and Response Options		Intervention		Comparison	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Can your mother read in Marathi?	No	26	8.3%	31	10.0%
	Yes	283	90.4%	279	90.0%
	Don't know	4	1.3%	0	0.0%
	No response	0	0.0%	0	0.0%
Can your father read in Marathi?	No	25	8.0%	27	8.8%
	Yes	285	91.1%	275	89.9%
	Don't know	3	1.0%	4	1.3%
	No response	0	0.0%	0	0.0%

Table C.4: **Family Reading Support Composite**

Questions and Response Options		Intervention		Comparison	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Does someone from home (parent, sibling, or grandparent) read stories to you?	No	106	34.0%	121	39.4%
	Yes	205	65.7%	184	59.9%
	Don't know	1	0.3%	2	0.7%
	No response	0	0.0%	0	0.0%
Does someone from home (parent, sibling, or grandparent) help you with your schoolwork?	No	41	13.2%	49	16.0%
	Yes	267	85.9%	255	83.1%
	Don't know	3	1.0%	3	1.0%
	No response	0	0.0%	0	0.0%
How often do you read with a family member at home?	Never	28	9.0%	27	8.8%
	Sometimes	116	37.3%	128	41.8%
	Every day	167	53.7%	151	49.3%
	No response	0	0.0%	0	0.0%
At home, who most often helps you with your reading or homework?	I usually do not get help with reading or homework at home	39	12.6%	40	13.3%
	One or both parents	195	62.9%	193	64.1%
	Brother or sister	64	20.6%	50	16.6%
	Other family member (grandparents, aunts, or uncles)	12	3.9%	18	6.0%
	No response	0	0.0%	0	0.0%

Table C.5: **Teacher Reading Support Composite**

Questions and Response Options		Intervention		Comparison	
		Frequency	Percentage (%)	Frequency	Percentage (%)
At school, does your teacher ask you questions about what you are reading?	No	11	3.5%	14	4.6%
	Yes	300	96.2%	286	94.1%
	Don't know	1	0.3%	4	1.3%
	No response	0	0.0%	0	0.0%
Does your teacher help you when you are unable to read something?	No	7	2.2%	4	1.3%
	Yes	304	97.4%	302	98.7%
	Not sure	1	0.3%	0	0.0%
	No response	0	0.0%	0	0.0%
How often does your teacher ask you to write in school?	Never	0	0.0%	3	1.0%
	Sometimes	63	20.2%	59	19.3%
	Every day	249	79.8%	244	79.7%
	No response	0	0.0%	0	0.0%

Table C.6: **Disposition to Reading Composite**

Questions and Response Options		Intervention		Comparison	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Do you like reading at home?	No	8	2.6%	11	3.6%
	Yes	303	97.4%	295	96.1%
	Don't know	0	0.0%	1	0.3%
	No response	0	0.0%	0	0.0%
Do you like reading at school?	No	8	2.6%	5	1.6%
	Yes	302	97.1%	298	97.7%
	Don't know	1	0.3%	2	0.7%
	No response	0	0.0%	0	0.0%
At school, how often do you read books quietly by yourself?	Never	12	3.9%	18	5.9%
	Sometimes	110	35.8%	103	34.0%
	Every day	185	60.3%	182	60.1%
	No response	0	0.0%	0	0.0%

Table C.7: **Engagement with Project Composite**

Questions and Response Options		Intervention	
		Frequency	Percentage (%)
Do you like using the smartphone to learn?	No	0	0.0%
	Yes	301	100.0%
	Don't know	0	0.0%
	No response	0	0.0%
Have you read storybooks on a phone before the PCL app?	No	175	57.9%
	Yes	123	40.7%
	Don't know	4	1.3%
	No response	0	0.0%
Is reading books on the PCL app easy?	No	3	1.0%
	Yes	283	95.0%
	Don't know	12	4.0%
	No response	0	0.0%
Did you read the books on the PCL app on your own?	No	11	3.7%
	Yes	275	92.0%
	Don't know	13	4.3%
	No response	0	0.0%
Did you like the stories you read on the PCL app?	No	0	0.0%
	Yes	287	95.7%
	Don't know	13	4.3%
	No response	0	0.0%
How often do you play the PCL app in a week?	I didn't use the app	14	4.7%
	Several days	43	14.4%
	Every day	242	80.9%
	No response	0	0.0%
Do you want to continue using the PCL app?	No	1	0.3%
	Yes	288	96.0%
	Don't know	11	3.7%
	No response	0	0.0%
Do you read other books on the smartphone (other than through the PCL app)?	No	67	22.8%
	Yes	217	73.8%
	Don't know	10	3.4%
	No response	0	0.0%

Table C.7: **Engagement with Project Composite** (continued)

Questions and Response Options		Intervention	
		Frequency	Percentage (%)
Do other family members use the PCL app?	No	89	30.2%
	Yes, a parent	72	24.4%
	Yes, a brother or sister	125	42.4%
	Yes, other family	5	1.7%
	Yes, many different family members	4	1.4%
	No response	0	0.0%
Is the phone with the PCL app always kept at home?	No	20	6.8%
	Yes	263	88.9%
	Don't know	13	4.4%
	No response	0	0.0%
Who keeps the phone with the PCL app?	Other family members keep the phone (parents, elders, or siblings)	68	23.2%
	I keep the phone	213	72.7%
	Don't know	12	4.1%
	No response	0	0.0%

Annex D: **EGRA Descriptive Statistics and Additional Tables**

Table D.1: **Letter Name Identification (CLNPM)**

Group	*n/N*	Baseline			Endline			Gain from Baseline to Endline
		Mean	SD	Zero Score (%)	Mean	SD	Zero Score (%)	
Comparison	310	16.6	21.2	44.1%	33.6	21.2	8.9%	17.1
Intervention	313	14.7	19.2	46.0%	37.0	20.5	5.1%	22.2
Total: All Students	**623**	**15.7**	**20.2**	**45.0%**	**35.3**	**20.9**	**7.0%**	**19.7**

Table D.2: **Syllable Identification (CSSPM)**

Group	*n/N*	Baseline			Endline			Gain from Baseline to Endline
		Mean	SD	Zero Score (%)	Mean	SD	Zero Score (%)	
Comparison	311	7.9	13.9	59.5%	19.4	17.9	24.2%	11.8
Intervention	313	6.9	13.1	63.9%	21.5	18.2	17.3%	14.6
Total: All Students	**624**	**7.4**	**13.5**	**61.7%**	**20.4**	**18.1**	**20.7%**	**13.2**

Table D.3: **Familiar Word Reading (CNWPM)**

Group	*n/N*	Baseline			Endline			Gain from Baseline to Endline
		Mean	SD	Zero Score (%)	Mean	SD	Zero Score (%)	
Comparison	310	5.6	10.8	62.1%	16.3	17.6	24.5%	10.8
Intervention	313	4.7	9.3	68.1%	17.7	16.9	17.6%	13.1
Total: All Students	**623**	**5.1**	**10.1**	**65.1%**	**17.0**	**17.3**	**21.1%**	**11.9**

Table D.4: **Oral Reading Fluency (CWPM)**

Group	n/N	Baseline			Endline			Gain from Baseline to Endline
		Mean	SD	Zero Score (%)	Mean	SD	Zero Score (%)	
Comparison	311	7.2	14.0	60.5%	20.1	20.1	21.7%	13.1
Intervention	313	6.1	12.0	62.0%	22.0	20.3	13.7%	15.9
Total: All Students	**624**	**6.7**	**13.0**	**61.2%**	**21.1**	**20.2**	**17.7%**	**14.5**

Table D.5: **Reading Comprehension (Correct out of Five)**

Group	n/N	Baseline			Endline			Gain from Baseline to Endline
		Mean	SD	Zero Score (%)	Mean	SD	Zero Score (%)	
Comparison	311	0.2	0.6	85.9%	1.0	1.3	49.7%	0.8
Intervention	313	0.2	0.6	86.9%	1.1	1.4	49.2%	0.9
Total: All Students	**624**	**0.2**	**0.6**	**86.4%**	**1.0**	**1.3**	**49.4%**	**0.8**

Table D.6: **Listening Comprehension (Correct out of Four)**

Group	n/N	Baseline			Endline			Gain from Baseline to Endline
		Mean	SD	Zero Score (%)	Mean	SD	Zero Score (%)	
Comparison	311	1.0	1.2	46.3%	1.6	1.2	23.9%	0.6
Intervention	313	0.9	1.1	53.4%	1.6	1.3	25.6%	0.7
Total: All Students	**624**	**1.0**	**1.2**	**49.8%**	**1.6**	**1.3**	**24.7%**	**0.6**

Table D.7: **Average Gain Scores by Gender and Group**

Subtask	Boys						Girls					
	Comparison			Intervention			Comparison			Intervention		
	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Letter name identification (CLNPM)	152	16.9	19.1	161	21.2	17.5	157	17.4	15.8	151	23.3	20.0
Syllable identification (CSSPM)	154	10.3	12.8	162	13.3	14.0	156	13.2	12.3	151	16.0	15.4
Familiar word reading (CFWPM)	154	8.9	10.5	162	11.7	10.5	156	12.6	11.5	151	14.6	13.7
Oral reading fluency (CWPM)	154	11.5	12.2	162	14.5	12.5	157	14.6	13.0	151	17.5	16.4
Reading comprehension (correct out of five)	154	0.7	0.9	162	0.8	1.1	157	0.9	1.1	151	0.9	1.1
Listening comprehension (correct out of four)	154	0.6	1.4	162	0.7	1.2	157	0.5	1.2	151	0.7	1.3

Table D.8: **Percentage of Students Receiving Zero Scores by Gender and Group at Endline**

Subtask	Boys				Girls			
	Comparison		Intervention		Comparison		Intervention	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Letter name identification (CLNPM)	156	10.9%	162	4.9%	158	7.0%	151	5.3%
Syllable identification (CSSPM)	156	26.9%	162	16.7%	158	21.5%	151	17.9%
Familiar word reading (CFWPM)	156	28.2%	162	16.7%	158	20.9%	151	18.5%
Oral reading fluency (CWPM)	156	25.6%	162	13.0%	158	17.7%	151	14.6%
Reading comprehension (correct out of five)	156	54.5%	162	48.8%	158	44.9%	151	49.7%
Listening comprehension (correct out of four)	156	19.9%	162	23.5%	158	27.8%	151	27.8%

Table D.9: **Average Gain Scores by Grade and Group**

Subtask	Grade 1						Grade 2					
	Comparison			Intervention			Comparison			Intervention		
	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Letter name identification (CLNPM)	138	21.4	19.74	155	26.8	18.68	171	13.6	14.59	157	17.7	17.66
Syllable identification (CSSPM)	138	10.8	14.14	156	13.6	13.97	172	12.6	11.30	157	15.5	15.44
Familiar word reading (CFWPM)	137	8.8	11.75	156	10.2	11.70	173	12.4	10.41	157	15.9	12.11
Oral reading fluency (CWPM)	138	10.3	12.61	156	12.9	14.03	173	15.3	12.35	157	19.0	14.51
Reading comprehension (correct out of five)	138	0.3	0.74	156	0.5	0.77	173	1.2	1.10	157	1.3	1.23
Listening comprehension (correct out of four)	138	0.4	1.22	156	0.6	1.08	173	0.7	1.30	157	0.8	1.43

Table D.10: **Percentage of Students Receiving Zero Scores by Grade and Group at Endline**

Subtask	Grade 1				Grade 2			
	Comparison		Intervention		Comparison		Intervention	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Letter name identification (CLNPM)	141	14.2%	156	8.3%	173	4.6%	157	1.9%
Syllable identification (CSSPM)	141	37.6%	156	27.6%	173	13.3%	157	7.0%
Familiar word reading (CFWPM)	141	39.7%	156	27.6%	173	12.1%	157	7.6%
Oral reading fluency (CWPM)	141	34.0%	156	21.2%	173	11.6%	157	6.4%
Reading comprehension (correct out of five)	141	73.8%	156	65.4%	173	30.1%	157	33.1%
Listening comprehension (correct out of four)	141	34.0%	156	37.8%	173	15.6%	157	13.4%

Annex E: **Correlation Analysis Results**

Table E.1: **Project Exposure and EGRA Subtask Gains Correlation Analysis Results**

Subtask	Mean	1	2	3	4	5	6	7	8	9	10	11
1. Letter name identification (CLNPM) gain	19.7	—										
2. Syllable identification (CSSPM) gain	13.2	—	—									
3. Familiar word reading (CFWPM) gain	11.9	—	—	—								
4. Oral reading fluency (CWPM) gain	14.5	—	—	—	—							
5. Reading comprehension (correct out of five) gain	0.8	—	—	—	—	—						
6. Listening comprehension (correct out of four) gain	0.6	—	—	—	—	—	—					
7. Language exposure composite	5.8	.092*	.098*	.104**	.119**	.099*	0.044	—	—	—	—	—
8. Socioeconomic status composite	4.8	0.017	.097*	.152**	.164**	.249**	.126**	—	—	—	—	—
9. Parental literacy composite	1.8	.118**	.181**	.190**	.177**	.149**	.094*	—	—	—	—	—
10. Teacher support for learning composite	3.6	.088*	.106**	.150**	.137**	.121**	.103*	—	—	—	—	—
11. Disposition to reading composite	1.9	.101*	.095*	.135**	.133**	.120**	-0.004	—	—	—	—	—

N=613; * sig. at p<0.05; ** sig. at p<0.001

Annex F: **EGRA Reliability Results**

Table F.1: **Reliability Results for Baseline EGRA**

Subtask	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Letter name identification (CLNPM)	0.844	0.827
Syllable identification (CSSPM)	0.877	0.839
Familiar word reading (CFWPM)	0.906	0.854
Oral reading fluency (CWPM)	0.876	0.820
Reading comprehension (correct out of five)	0.773	0.857
Listening comprehension (correct out of four)	0.446	0.943
	EGRA Coefficient Alpha	**0.878**

Table F.2: **Reliability Results for Endline EGRA**

Subtask	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Letter name identification (CLNPM)	0.810	0.892
Syllable identification (CSSPM)	0.879	0.889
Familiar word reading (CFWPM)	0.922	0.893
Oral reading fluency (CWPM)	0.915	0.873
Reading comprehension (correct out of five)	0.854	0.882
Listening comprehension (correct out of four)	0.494	0.947
	EGRA Coefficient Alpha	**0.913**