ALL CHILDREN READING:
GRAND CHALLENGE FOR DEVELOPMENT

EVALUATION REPORT

Lesotho Literacy for Young Visually Impaired Persons

Catholic Relief Services, Lesotho

OCTOBER 2016

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

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I. Executive Summary

All Children Reading: A Grand Challenge for Development (ACR GCD), a joint partnership between the United States Agency for International Development (USAID), World Vision, and the Australian Government's Department of Foreign Affairs and Trade (DFAT), is an ongoing series of grant and prize competitions that leverage scalable solutions to improve the 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 are focused on three key areas:

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

ACR GCD is increasing its focus on the assessment of early grade reading skills in order to understand the ability of the technology-based innovations to improve the literacy skills of early grade learners. Because of this, ACR GCD is using the Early Grade Reading Assessment (EGRA) to systematically assess reading skills across all Round 2 grantees. The EGRA is an oral student assessment designed to measure the most basic foundational skills for literacy acquisition 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. The EGRA instruments used by ACR GCD grantees were adapted according to each grantee's project context.

Catholic Relief Services (CRS), an ACR GCD Round 2 grantee, implemented the Lesotho Literacy for Young Visually Impaired Persons project that began in February 2015 and will end in February 2017. The project's goal is to improve the reading skills of students who have low vision or are blind. To understand how these students' reading outcomes may have changed as a result of the project, School-to-School International (STS) and CRS collected baseline EGRA data on September 2–3, 2015, and endline EGRA data on August 10–11, 2016. STS also conducted end-of-project (EOP) interviews with CRS project management, teachers, students, and stakeholders on August 10–15, 2016, to learn how the project influenced different subsets of both students and the greater community, and to determine lessons learned from project implementation.

The following report presents a summary of project implementation lessons learned, comparative EGRA results from baseline to endline, and a sustainability assessment. Below is a summary of the key findings:

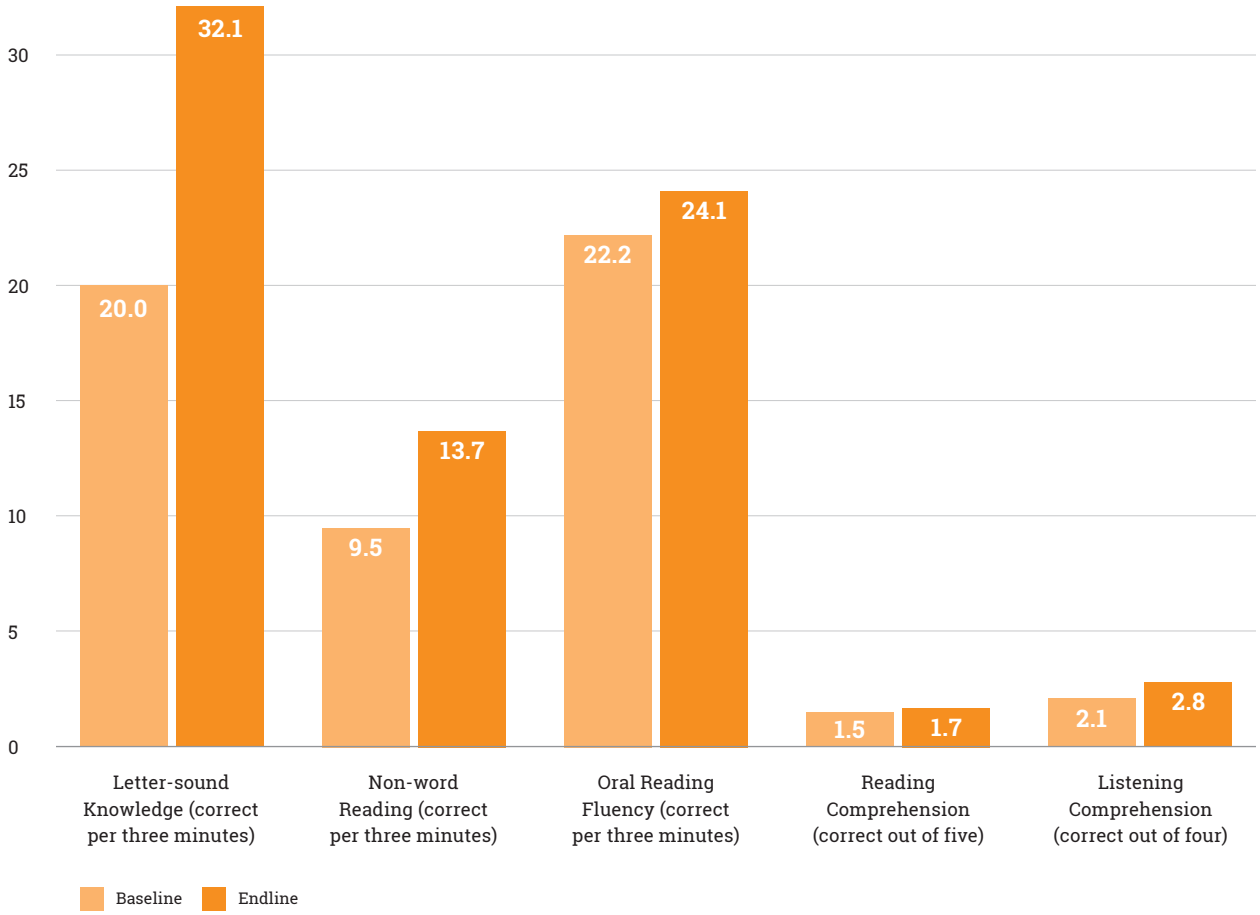
Key Findings

- **Overall, EGRA results showed an increase in all early grade reading skills of students in the project.** The increases were modest, but because there was no control group and because statistical significance tests were not conducted (see *Data Analysis* subsection), it is not possible to determine if the increases were a result of the project or an additional year of schooling.
- **Zero scores for students decreased on all subtasks except for listening comprehension.** Because zero scores are measures of the number of students who are unable to identify any items correctly, this decrease further indicates improvements in the early grade reading skills of students in the project.

1 Retrieved from: http://allchildrenreading.org/about-us/

- Boy students had higher baseline and endline EGRA results than girl students, and boys also had larger increases from baseline to endline on all subtasks.
- Students were highly engaged in the project and showed very favorable attitudes toward the new technologies. Nearly all students (over 90%) agreed or strongly agreed that the Jot-a-Dot technology improved their reading, and the same proportion said they wanted to continue using the technology to learn to read. Further, students who reported using the Jot-a-Dots more frequently had larger increases in EGRA scores at endline than their classmates who reported using the technology less frequently.
- The project provided some innovative solutions to challenges faced by primary school students who have low vision or are blind in Lesotho in a specific context, but the project needs further definition of scope, refinement, and pilot testing before scale-up.

Figure 1: **Overall Results by EGRA Subtask**



II. Project Description

CRS implemented the Lesotho Literacy for Young Visually Impaired Persons project in collaboration with the Lesotho Ministry of Education and Training (MOET). The project began in February 2015, and implementation in classrooms began in September 2015. CRS worked with teachers in two intervention schools—a national school that specifically serves students who have low vision or are blind in Grades 1 and 2, and the neighboring mainstream primary school that serves students in Grades 3–7—with the goal of improving students' early grade reading skills. The project provided innovative technologies for braille production/translation, as well as teacher training on how to use the technologies. Teachers were also supposed to receive a Teacher Resource Guide and curriculum materials, including individualized lesson plans and braille reading materials to improve their teaching strategies; however, the materials were not developed in time to be distributed to the schools during the implementation period.

CRS introduced two technologies through the project to improve the early grade reading skills of students who have low vision or are blind: the Mountbatten Pro Brailler (MB Pro) and the Jot-a-Dot portable brailler (JAD). The MB Pro, used by the teachers, features an ergonomic braille keyboard, memory, speech feedback, and the ability to translate from braille to print and print to braille. The braille to print/print to braille feature aids in teaching students who have low vision or are blind, especially for teachers who may not be literate in braille. The JAD, used by the students, facilitates braille learning through a six-key braille entry system.[2]

The project reached 30 Grades 1-3 primary school students who have low vision or are blind in a Lesotho urban area.

III. Research Purpose and Design

The goal of the Lesotho Literacy for Young Visually Impaired Persons project was to improve the early grade reading skills of primary school students who have low vision or are blind in Grades 1–3 through teacher training and innovative braille technology. The research conducted by STS and CRS sought to answer the following key research questions specific to the Lesotho Literacy for Young Visually Impaired Persons project:

1. Does the use of the MB Pros and the JADs improve reading skills for students who have low vision or are blind?
2. Does teacher training in pedagogy and reading, as implemented, improve reading skills for students who have low vision or are blind?

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

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

2 Retrieved from: http://allchildrenreading.org/innovators/catholic-relief-services/

To answer the two key research questions identified above, CRS conducted EGRA assessments of students in the project with assistance from STS. Because of the absence of a control group, the project used a reflexive comparison design in which the treatment group was compared at baseline and endline as a way of understanding the extent to which the intervention may have led to its intended result. Qualitative and cost data were also collected throughout the project in order to answer the ACR GCD supplemental questions.

Sample

At the start of the intervention, 30 students who have low vision or are blind were enrolled in the intervention schools. Six students participated in the piloting process of the Sesotho EGRA, and the remaining 24 students served as the treatment group.[3] Over the course of the year, three students stopped attending school for various personal reasons and were not included in the endline assessment.[4] Consequently, results from 21 students were used for comparison from baseline to endline.

Table 1: **EGRA Sample Characteristics**

Sample Characteristics	Sample Size (*N*=21)
Grade 1	10
Grade 2	3
Grade 3	8
Boy	13
Girl	8
Partially Blind	12
Mostly Blind	2
Completely Blind	7

Table 2: **Student Age (in Years) by Grade at Baseline**

Grade	Mean Age	Age Range
Grade 1	10.6	7–15
Grade 2	14.0	11–17
Grade 3	12.3	10–15

Table 2 provides average ages and the age range of the students who participated in the project by grade. Although students were in Grades 1–3, the majority were older than the typical age range for their grade.

In addition to the EGRA assessment, STS conducted in-person EOP interviews on August 9–15, 2016. EOP interviews were conducted to learn how the project influenced different subsets of both students and the greater community, as well as to determine lessons learned from project implementation.

The individuals interviewed were selected based on a variety of factors, including role in the project, participant background, and exposure to the intervention. All in-country staff who worked directly on the Lesotho Literacy

3 Students who were assessed using the pilot version of the EGRA participated in the project, but their results were not included as part of the census data collection because of their participation in the pilot test.

4 The students who stopped attending school had the following observable characteristics: one boy and two girls; one partially blind and two completely blind; aged 7, 10, and 12. One student per grade from the baseline stopped attending school.

for Young Visually Impaired Persons project were interviewed. All teachers who received training and MB Pros through the project were interviewed. Ten students were interviewed; three were randomly selected per grade, and one student who had not progressed from Grade 1 to Grade 2 was selected to provide insight on challenges facing students who are held back. Stakeholders who participated in the EGRA adaptation workshop were invited to join for a results dissemination event, during which STS conducted a focus group with the attending stakeholders. Organizations that participated included MOET, Lesotho College of Education (LCE), Lesotho National Federation of Organisations of the Disabled (LNFOD), Lesotho National League of the Visually Impaired Persons (LNLVIP), and World Vision.

Table 3: **EOP Interview Sample**

Type of Interview	*N*	Description
Project Management	3	Head of Programs, Education Program Manager, Education Project Officer
Teacher	8	4 teachers and the principal from Grade 1 and 2 school, and 3 teachers from the primary school
Student	10	4 students from Grade 1, 3 from Grade 2, and 3 from Grade 3
Stakeholder	4	Stakeholders from MOET, LCE, LNFOD, LNLVIP , World Vision
Total	**25**	

IV. Fieldwork Preparation and Data Collection

EGRA Instrument

The EGRA instrument used for the Lesotho Literacy for Young Visually Impaired Persons project was developed prior to administration of the EGRA at baseline. No Sesotho EGRA had previously been developed in Lesotho, so STS conducted an EGRA adaptation workshop in August 2015 to review and pilot test each EGRA subtask into Sesotho. After the finalization of the EGRA, it was adapted to Sesotho braille. CRS attended the adaptation workshop, as did a number of additional stakeholders.[5]

Table 4: **Fieldwork Preparation and Data Collection Timeline**

Task	Dates
EGRA Adaptation Workshop	August 17–21, 2015
Baseline Assessor Training incl. IRR and Pilot Testing	August 25–27, 2015
Baseline EGRA Assessment	September 2–3, 2015
Endline Assessor Training	August 9, 2016
Endline EGRA Assessment	August 10–11, 2016
EOP Interviews	August 10–15, 2016

5 For additional information on EGRA validation, see project Baseline Report.

The final EGRA assessment tool, administered in Sesotho braille, included five subtasks: Letter-sound Knowledge, Non-word Reading, Oral Reading Fluency (ORF), Reading Comprehension, and Listening Comprehension. The same EGRA tool was applied at baseline and at endline (see Annex 1). Based on guidance from special needs experts and lessons learned from the Sesotho braille EGRA pilot test, students in the sample were given three minutes to complete timed subtasks instead of the standard one-minute time limit ordinarily used for sighted students.

Institutional Review Board (IRB)

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.

Because there was no IRB in Lesotho appropriate for this project, CRS submitted all EGRA instruments and protocols to Solutions IRB, an internationally recognized IRB that was used for all the ACR GCD grantees who did not have a local option. The CRS Education Program Manager completed the required research ethics training. Solutions IRB granted approval to CRS for the planned research before the baseline data collection, and the approval was valid through August 27, 2016.

Baseline EGRA Assessment

After the EGRA adaptation workshop, STS and CRS conducted an assessor training during which they were accompanied by special needs experts from MOET who provided guidance on best practices for assessing students who have low vision or are blind. All assessors participated in the EGRA adaptation workshop and were therefore familiar with the EGRA administration procedures.

As part of the assessor training, inter-rater reliability (IRR) tests were conducted to ensure consistency between assessors. IRR measures the degree to which different assessors agree in their assessment decisions, and at least 90% consistency is considered the minimum requirement, meaning that at least 90% of assessors' ratings are consistent with the list of acceptable responses. All assessors at baseline met the threshold of 90%.

Assessors conducted operational data collection on September 2–3, 2015. A total of three assessors—one per grade—administered the EGRA to the sample students in the intervention schools. A total of 24 students were assessed at baseline, and each assessment took an average of 40 minutes.

Endline EGRA Assessment

At the conclusion of the project, team members from STS and World Vision travelled to Lesotho to guide the operational data collection for the EGRA endline.

Assessor refresher training was held August 9, 2016, for two of the assessors who conducted the baseline. The training included a review of EGRA protocols, practice marking on the tablets, and mock interviews. Assessors underwent IRR tests, and both assessors met the 90% threshold.

Endline data were collected on August 10–11, 2016. In addition to the EGRA subtasks, assessors administered a student questionnaire. The questionnaire, which was administered to all students on the tablet after the EGRA subtasks, consisted of 60 questions. Questions were mostly multiple choice and collected information on the following topics: Sesotho and Sesotho braille language use, socioeconomic status, parental literacy, parental support for reading, access to reading materials, teacher support for reading, disposition to reading, technology use, engagement and attitude, and dosage of the intervention.

EOP Interviews

STS and World Vision team members, with translators when necessary, conducted EOP interviews with four populations: project management, teachers, students, and stakeholders. These interviews took place on August 10–15, 2016.

Project management interviews consisted of 19 open-ended questions on topics including general project information and intervention timeline, implementing organization characteristics, other supporting organizations, perceptions of project design and implementation quality, and scalability.

Teacher interviews contained approximately 35 questions. Teachers were asked questions about the technology they received (MB Pro and JAD) and the related technology training, the purpose and frequency of the use of technology for themselves and their students, and behavioral and teaching changes that may have occurred as a result of the project. Additionally, teachers responded to questions related to the scalability of the project.

Students were asked 20 open-ended questions related to their use of and satisfaction with the technology (JAD), their reading habits before and during the project, and the presence of other reading materials in Sesotho and braille in their schools.

EOP interview data for stakeholders were collected through a focus group discussion guided by six questions related to the scalability of the project.

Data Analysis

EGRA assessment data were analyzed using SPSS, resulting in graphs and frequency tables. Mean subtask fluencies, standard deviations (SD),[6] and zero scores were calculated.[7] Baseline and endline EGRA subtask results were compared in order to calculate change over the life of the project.[8]

For each subtask, decision rules were applied to assess whether outliers would need to be removed. 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 time remaining were based on multiple factors, including the rate at which letters or words in the language tested are typically read and the mean fluency rate with and without the outlier data point(s). After consideration of the reasonable ranges in the data, no outliers were removed.

6 SD describes how much observed values vary from the mean. A smaller SD indicates that the majority of values are close to the mean; a larger SD indicates that values are further from the mean.

7 Zero scores are the number of students who are unable to correctly identify any item on a subtask. In this report, zero scores are presented as the number of students who were unable to correctly identify any item on a subtask as well as the proportion of zero scores to the total number of students assessed.

8 Detailed results from the EGRA baseline can be found in the project's Baseline Report.

Table 5: **EGRA Subtask and Data Analysis Method**

Subtask	Type[9]	Analysis
Letter-sound Knowledge	Timed	Letter-sound Knowledge is measured as the number of correct letter-sounds read in three minutes. Letter-sound Knowledge is a measure of alphabet knowledge. Each student had the opportunity to read up to 100 uppercase and lowercase letters.
Non-word Reading	Timed	Non-word Reading is measured as the number of correct "non-words" read in three minutes. Non-word Reading measures decoding. Each student had the opportunity to read up to 50 one- and two-syllable "non-words."
Oral Reading Fluency (ORF)	Timed	ORF is measured as the number of correct words read in three minutes. ORF is a decoding and reading fluency measure. Each student had the opportunity to read 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 to them by the assessor.

Considerations

Control Group

The research design for this project did not include a control group. The purpose of control groups is to provide a counterfactual measure, or a measure of the changes that occurred in the absence of a project or intervention. Because the student population of the Lesotho Literacy for Young Visually Impaired Persons project attended the only national school in Lesotho specifically serving students who have low vision or are blind and the neighboring mainstream primary school, no comparable group existed in the country. As a result, the findings of this report should be understood as the changes that occurred from a combination of the project and an additional year of schooling. It is not possible to fully isolate how much of the measured change from baseline to endline is due to the project and how much is due to an additional year of schooling.

Sample Size

There were a total of 21 students who were tested at both baseline and endline. Given this small sample size, no significance tests—neither ANOVA nor chi-squared—were conducted on the differences in means between baseline and endline or on the proportion of zero scores. With a sample size of only 21, there was only sufficient statistical power to detect large differences in means. Accordingly, results presented in this report should not be interpreted beyond this sample of students.

9 Timed subtasks are calculated as fluency per three minutes. See Considerations for more details.

Extended Time for Students Who Have Low Vision or Are Blind

Timed EGRA subtasks are generally administered within a one-minute period, and results are reported as the number of correct items identified per minute. After consultation with special needs experts, it was decided that students in the Lesotho Literacy for Young Visually Impaired Persons project should receive three minutes to complete timed subtasks. This gave the students, who conducted the subtasks in braille, enough time to complete the assessment. All timed subtask results presented in this report are fluency rates per three minutes—a consideration that should be taken into account when comparing results to subtask fluencies with sighted students timed at the one-minute mark.

V. Project Implementation

The Lesotho Literacy for Young Visually Impaired Persons project began on February 1, 2015, and is scheduled to end on January 30, 2017.[10] 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 project did not require significant investment in technology development other than procurement of the MB Pros and JADs. The key elements of the development phase were the creation of the Teacher Resource Guide and curriculum materials, including individualized lesson plans and braille reading materials.

CRS collaborated with Perkins School for the Blind to develop these materials. However, due to significant delays, the materials were not completed in time to be used during project implementation. Several factors contributed to this delay, and CRS estimates that materials will be completed between October and December 2016.

Implementation

The implementation of the Lesotho Literacy for Young Visually Impaired Persons project was delayed by a number of months. The project began on February 1, 2015, and the teachers at the intervention schools were provided initial trainings on the use of the MB Pro and the JAD on April 20–23, 2015. Because of concerns about teachers' ability to effectively use the MB Pro with PC computers, a basic computer literacy (ICT) training program consisting of six sessions with on-site support was provided to teachers. Immediately after the first training session, MB Pros and JADs were distributed to teachers for their use in the classroom.

Although the academic year for the intervention schools runs from January to December, the project anticipated that teachers would begin using the technologies in the classroom immediately after training. Because the baseline assessment needed to be conducted before the teachers began to implement the project in their classrooms—a consideration that was not originally in the project work plan—there was a delay of several months between the teacher MB Pro/JAD and ICT trainings and the beginning of classroom implementation. To mitigate this challenge, the project conducted refresher trainings with teachers after the original training and before the baseline assessment. Refresher trainings were also conducted periodically throughout the remainder of the project.

In addition to the timing challenges due to the baseline assessment, it became evident during routine monitoring that many teachers were not effectively using the MB Pro and JAD in their classrooms—and in some classrooms, children were still using the old slate and stylus devices several months into project implementation. In the EOP interviews, more than half of the teachers interviewed expressed that they faced

10 The project was initially programmed to end in October 2016.

problems or technical challenges with the devices. Several said that the devices were not able to accommodate standard pieces of paper (A4 size), and some noted that the students struggled to use the devices for longer compositions. Teachers also mentioned that the MB Pros experienced paper jams. At least two teachers expressed a desire to have more training on the use of the MB Pros, and CRS project management also noted that additional training could have mitigated inconsistent use of the technologies and facilitated better integration of the technologies into classroom teaching. Project management also mentioned that the low capacity of the teachers may have hindered implementation more than expected, as the teachers were relied upon to provide training to their students on how to use the JADs rather than the project providing training directly to the students.

CRS project management noted generally that the implementation timeline was ambitious and that more time would have allowed for better quality training and more integration of technology use in the classroom. Nevertheless, both teachers and project management agreed that, despite the challenges with the MB Pros and JADs, they offered an improvement over preexisting writing options for the students. All students who were interviewed at EOP said they liked using the JADs, and although most said they still used slate and stylus devices, they used the improved technologies frequently.

Management

Prior to the Lesotho Literacy for Young Visually Impaired Persons project, CRS had not implemented a project for students who have low vision or are blind in Lesotho, although CRS as an organization has experience in this sector in other countries. One of the major challenges expressed by project management was the lack of sector-specific technical knowledge of its staff on the ground. Because of this lack in technical skills, as well as the need to identify other stakeholders or partners working with students who have low vision or are blind, some elements of the project were delayed. In certain cases, these stakeholders or partners did not have the exact skills required to support the project, and as a result, it was difficult at times to introduce the technologies to stakeholders and teachers and explain how they solved existing challenges for students who have low vision or are blind.

Fidelity of Implementation (FOI)

FOI, by definition, is the accurate and consistent application of an agreed upon procedure, and 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 gains in the treatment group are significantly greater than gains in the control group, it is possible to attribute impact to the intervention, which, in turn, makes it possible to recommend scaling the intervention. FOI also makes it possible to identify which components of an intervention are most strongly associated with outcomes. When FOI is low, implementers and researchers are unable to attribute any impacts observed to the project or to assess the quality of the design of the project. Beyond attribution, FOI can also be coupled with monitoring and evaluation to provide feedback to implementers during the project cycle to improve upon adherence to project design in the case of low FOI.[11]

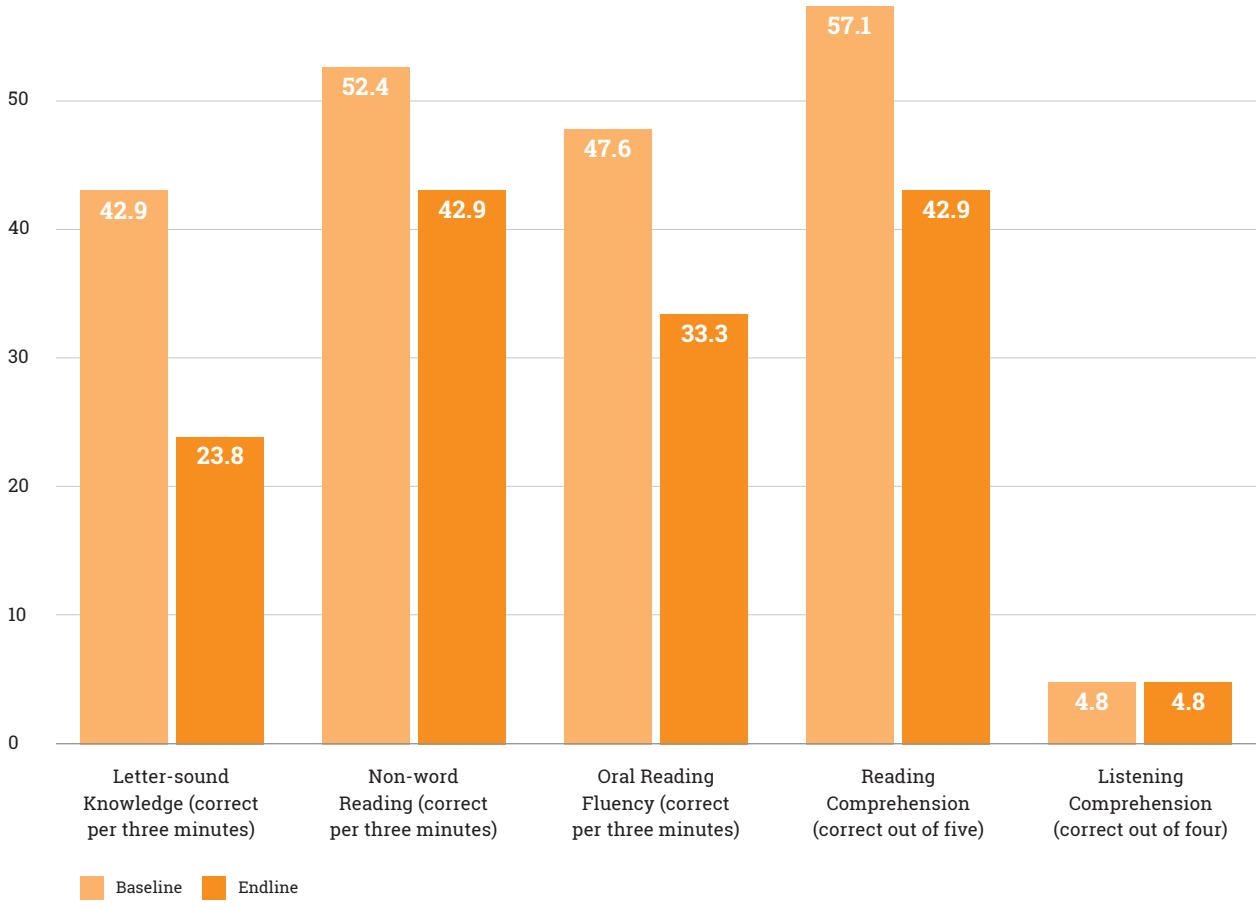
As part of their projects, ACR GCD Round 2 grantees, with support from STS, conducted FOI research during the project implementation period between baseline and endline EGRA assessments. Due to project delays, CRS conducted an abbreviated FOI data collection process. The FOI data collected mid-project showed that students used JADs on a regular basis, but that the students did not have access to braille reading materials and other key inputs of the project. Because of the limited amount of data, CRS used the FOI results to highlight where improvements in implementation were needed rather than to attribute impact by combining FOI data with EGRA assessment data.

11 Creative Associates International, Inc. (2015). *Fidelity of Implementation (FOI) How-to Guide* (unpublished). United States Agency for International Development (USAID). Washington, D.C.

VI. Results

Overall, the students participating in the Lesotho Literacy for Young Visually Impaired Persons project showed improved reading skills at endline. Mean scores were higher at endline for all subtasks, and the number of zero scores at endline was lower on all subtasks except for Listening Comprehension, on which zero scores remained the same.

Figure 2: **Percent of Zero Scores**[12]



Changes in subtask fluencies and scores between baseline and endline are reported throughout this section as the mean, or average, change. Change was determined by matching student results at baseline and endline, calculating the change for each student from baseline to endline, and taking the average change across the 21 students assessed.

12 Zero scores are shown as the percent of the total students unable to correctly identify a single item.

Table 6: **Mean Change from Baseline by Subtask**

Subtask	Mean Change
Letter-sound Knowledge (correct per three minutes)	12.1
Non-word Reading (correct per three minutes)	4.2
ORF (correct per three minutes)	1.9
Reading Comprehension (correct out of five)	0.2
Listening Comprehension (correct out of four)	0.7

EGRA Results by Subtask

Letter-sound Knowledge

In this subtask, students were presented with 100 letters and asked to indicate the sound created by each letter within three minutes. If a child is able to understand that letters represent sounds and to identify which sounds they represent, then he or she can use this knowledge to "sound out" groups of letters or words. Over time, the student should be able to associate the sounds with meaning, thus learning to decode words he or she has never seen before. This was a timed subtask, and students were given three minutes to complete the subtask.

Table 7: **Letter-sound Knowledge Fluency by Grade**[13]

Grade at Baseline	*N*	Baseline			Endline			Mean Change
		Mean Fluency	SD	Zero Scores (*n*)	Mean Fluency	SD	Zero Scores (*n*)	
Grade 1	10	0.9	2.0	8 (80.0%)	6.0	11.2	4 (40.0%)	5.1
Grade 2	3	15.0	13.2	1 (33.3%)	41.3	43.1	1 (33.3%)	26.3
Grade 3	8	45.9	27.7	0 (0.0%)	61.3	48.0	0 (0.0%)	15.4
Total: All Students	**21**	**20.0**	**27.2**	**9 (42.9%)**	**32.1**	**41.8**	**5 (23.8%)**	**12.1**

On average, students were able to identify about 12 additional letter-sounds correctly at endline within three minutes. The greatest increases were observed in Grade 2 students, who showed an average increase in fluency of about 26 correct letter-sounds. The smallest increases were seen in Grade 1 students, whose fluency increased by slightly more than five letter-sounds. The number of students who were not able to identify any letter-sounds correctly decreased from nine at baseline to five at endline.

13 Zero scores are shown as the number and percent of students unable to correctly identify a single letter-sound.

Non-word Reading

In this subtask, students were presented with 50 non-words, or words that obey the linguistic and orthographic rules of the Sesotho language but do not have any meaning. Children's non-word reading skills were assessed to determine the extent of development of their decoding ability, a foundational skill in learning how to read. This was a timed subtask, and students were given three minutes to complete the subtask.

Table 8: **Non-word Reading Fluency by Grade**[14]

Grade at Baseline	*N*	Baseline			Endline			Mean Change
		Mean Fluency	SD	Zero Scores (*n*)	Mean Fluency	SD	Zero Scores (*n*)	
Grade 1	10	0.2	0.4	8 (80.0%)	0.9	1.9	8 (80.0%)	0.7
Grade 2	3	6.0	10.4	2 (66.7%)	16.3	17.0	1 (33.3%)	10.3
Grade 3	8	22.6	17.0	1 (12.5%)	28.7	26.5	0 (0.0%)	6.1
Total: All Students	**21**	**9.5**	**15.0**	**11 (52.4%)**	**13.7**	**21.2**	**9 (42.9%)**	**4.2**

On average, students were able to read an additional four non-words at endline within three minutes. As with the Letter-sound Knowledge subtask, the greatest increases were observed in Grade 2 students—about 10 non-words—and the smallest increases were observed in Grade 1 students—almost one non-word. The number of students who were unable to correctly identify any non-words decreased from 11 at baseline to nine at endline.

ORF

For this subtask, assessors provided each student with a story of 59 words to read in three minutes. Along with skills like decoding and vocabulary, ORF is a strong predictor of comprehension because to understand groups of words, a certain amount of automaticity is required so that the reader can store what is read in working memory. If someone reads too slowly, they become unable to remember all words in a sentence and to understand its meaning. This was a timed subtask, and students were given three minutes to complete the subtask.

On average, ORF at endline increased by nearly two words in three minutes. Students in Grades 1 and 2 increased their ORF by nearly three words and nearly nine words, respectively, and students in Grade 3 had a small decline from about 50 words at baseline to about 48 words at endline. The number of zero scores on this subtask decreased from 10 at baseline to seven at endline, and all of these students were in Grade 1.

14 Zero scores are shown as the percent of the total students unable to correctly identify a single non-word.

Table 9: **ORF by Grade**[15]

Grade at Baseline	N	Baseline			Endline			Mean Change
		Mean Fluency	SD	Zero Scores (*n*)	Mean Fluency	SD	Zero Scores (*n*)	
Grade 1	10	0.9	2.0	8 (80.0%)	6.0	11.2	4 (40.0%)	5.1
Grade 2	3	15.0	13.2	1 (33.3%)	41.3	43.1	1 (33.3%)	26.3
Grade 3	8	45.9	27.7	0 (0.0%)	61.3	48.0	0 (0.0%)	15.4
Total: All Students	**21**	**20.0**	**27.2**	**9 (42.9%)**	**32.1**	**41.8**	**5 (23.8%)**	**12.1**

Reading Comprehension

For this subtask, the assessor removed the story from the ORF subtask and then asked each student five comprehension questions based on what they had read. Four of these questions were direct, requiring the student to respond based on information explicitly provided in the story; one question was inferential, requiring the student to infer (i.e. reason or deduce) the answer, which was not provided explicitly in the story. Comprehension is the purpose of reading. Once a child learns the letter-sound relationship (alphabetic principle) and is able to decode and read with automaticity, he or she becomes increasingly able to understand the meaning of a text. This untimed subtask assessed that ability.

Table 10: **Reading Comprehension Score by Grade**[16]

Grade at Baseline	N	Baseline			Endline			Mean Change
		Mean Fluency	SD	Zero Scores (*n*)	Mean Fluency	SD	Zero Scores (*n*)	
Grade 1	10	0.0	N/A	10 (100.0%)	0.3	0.7	8 (80.0%)	0.3
Grade 2	3	1.7	1.5	1 (33.3%)	2.3	2.1	1 (33.3%)	0.6
Grade 3	8	3.4	1.8	1 (12.5%)	3.3	1.7	0 (0.0%)	(0.1)
Total: All Students	**21**	**1.5**	**2.0**	**12 (57.1%)**	**1.7**	**1.9**	**9 (42.9%)**	**0.2**

On average, students increased their Reading Comprehension score by 0.2 at endline. At baseline, students were able to correctly answer 1.5 questions on average out of five, and at endline, they were able to answer 1.7 questions out of five. The greatest increases occurred in Grade 2 students, who scored 0.6 higher at endline.

15 Zero scores are shown as the number and percent of students unable to correctly identify a single word.

16 Zero scores are shown as the number and percent of students unable to correctly answer a single question.

Of the three Grade 2 students, two made gains, and one remained a zero score. Students in Grade 3 showed a slight decrease in the average number of questions answered correctly: three students received lower reading comprehension scores at endline, three had higher reading comprehension scores at endline, and two had no change in score. The number of zero scores at endline dropped by three, two of which were observed in Grade 1 students and one in a Grade 3 student.

Across grades, three students declined in the number of questions they answered correctly at baseline and at endline, and 11 students had no change. Five students answered one more question correctly, and two students answered two or three more questions correctly.

Listening Comprehension

The Listening Comprehension subtask is an untimed assessment of students' abilities 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, and attention deficit. In this subtask, the assessor read a short passage of about 30 words to the student and asked four comprehension questions—three direct and one inferential—about what the student heard.

Table 11: **Listening Comprehension Score by Grade**[17]

Grade at Baseline	*N*	Baseline			Endline			Mean Change
		Mean Fluency	SD	Zero Scores (*n*)	Mean Fluency	SD	Zero Scores (*n*)	
Grade 1	10	1.6	1.2	1 (10.0%)	2.0	1.3	1 (10.0%)	0.4
Grade 2	3	2.0	1.0	0 (0.0%)	3.7	0.6	0 (0.0%)	1.7
Grade 3	8	2.9	0.8	0 (0.0%)	3.5	0.8	0 (0.0%)	0.6
Total: All Students	**21**	**2.1**	**1.2**	**1 (4.8%)**	**2.8**	**1.3**	**1 (4.8%)**	**0.7**

On average, students increased their Listening Comprehension score by 0.7 at endline. At baseline, students were able to answer an average of about two questions out of four correctly, and at endline, they were able to answer nearly three questions out of four correctly. Students in Grade 2 improved most from baseline to endline, and students in Grade 1 had the smallest relative gain. Zero scores remained the same from baseline to endline, with only one student unable to answer a single question correctly.

Across the grades, only one student declined in the number of listening questions answered correctly from baseline to endline, seven students had no change, 11 students answered one additional question correctly at endline, and two students answered two or three additional questions correctly at endline.

17 Zero scores are shown as the number and percent of students unable to correctly answer a single question.

EGRA Results by Subgroup

In addition to being calculated by grade, results were calculated and analyzed by gender and by vision status.

In total, 13 boys and eight girls were assessed, and their results are presented in Table 12.[18]

Table 12: **Results by EGRA Subtask and Gender**[19]

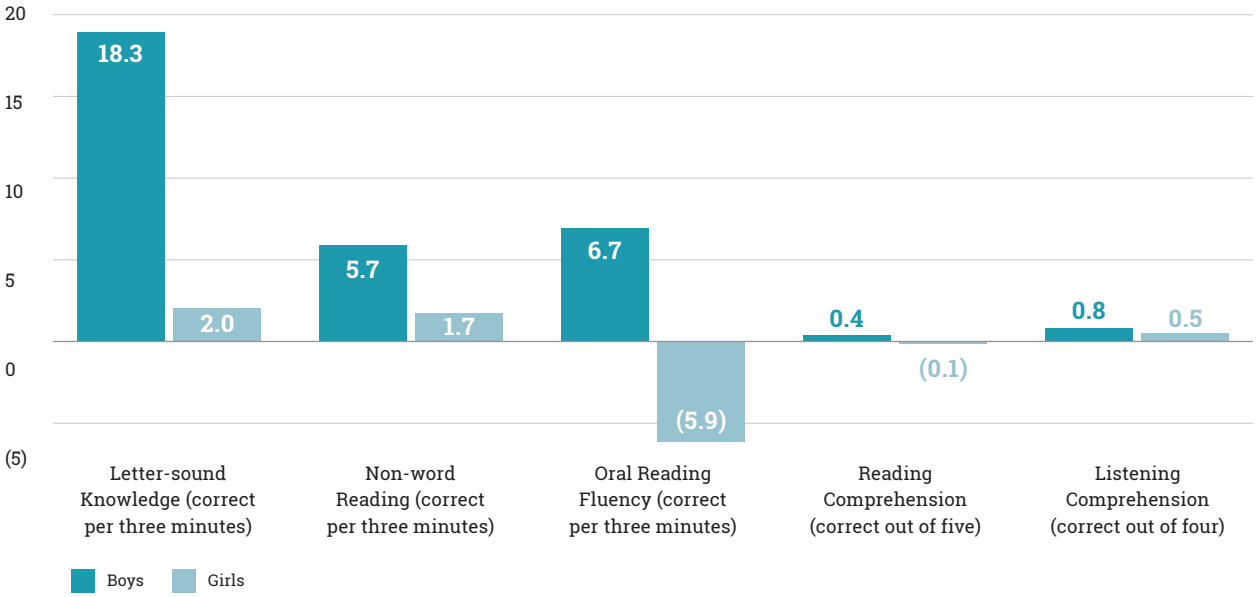
Subtask	Baseline				Endline			
	Boys (*N* = 13)		Girls (*N* = 8)		Boys (*N* = 13)		Girls (*N* = 8)	
	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)
Letter-sound Knowledge (correct per three minutes)	25.2	6 (46.2%)	11.6	3 (37.5%)	43.5	4 (30.8%)	13.6	1 (12.5%)
Non-word Reading (correct per three minutes)	13.5	6 (46.2%)	3.1	5 (62.5%)	19.2	5 (38.5%)	4.8	4 (50.0%)
ORF (correct per three minutes)	26.6	6 (46.2%)	15.0	4 (50.0%)	33.3	4 (30.8%)	9.1	3 (37.5%)
Reading Comprehension (correct out of five)	1.8	7 (53.8%)	1.1	5 (62.5%)	2.2	6 (46.2%)	1.0	3 (37.5%)
Listening Comprehension (correct out of four)	2.2	1 (7.7%)	2.0	0 (0.0%)	3.0	0 (0.0%)	2.5	1 (12.5%)

At baseline and endline, boys had consistently higher mean scores and fluencies than girls. In comparisons of mean increases from baseline to endline, boys performed better than girls on all subtasks, with the greatest differences in mean increases observed on the Letter-sound Knowledge and ORF subtasks. On ORF and Reading Comprehension subtasks, the average changes for girls were negative. Average changes in scores for boys were positive on all subtasks.

18 The distribution of boys by grade was: six in Grade 1, two in Grade 2, and five in Grade 3. The distribution of girls by grade was: four in Grade 1, one in Grade 2, and three in Grade 3.

19 Zero scores are shown as the number and percent of students unable to correctly answer a single item.

Figure 3: **Mean Change by Subtask and Gender**



Prior to the baseline EGRA assessment, CRS and the intervention schools conducted a diagnostic exam to determine the vision status of the students participating in the project. Based on their results, students were categorized as partially blind (12), nearly blind (2), and completely blind (7). EGRA results based on student vision status are presented in Table 13.

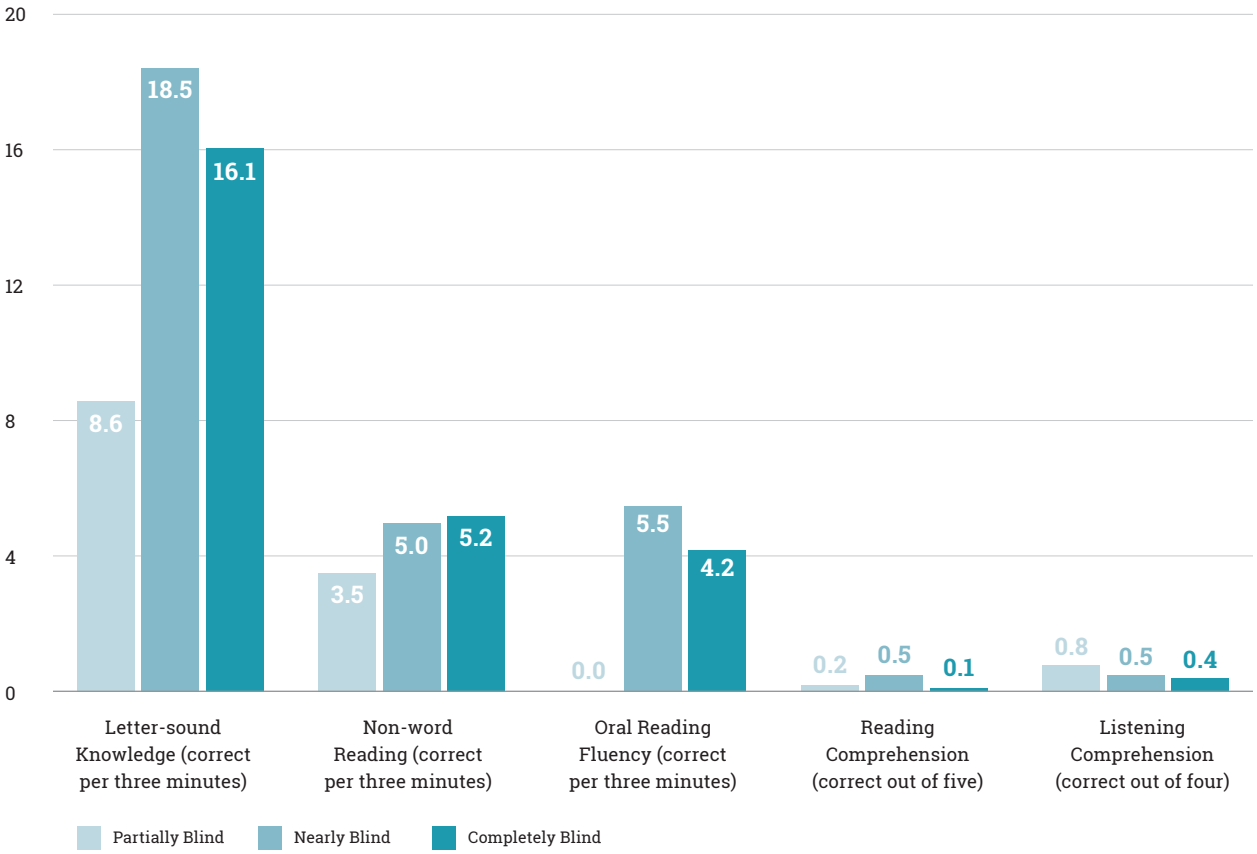
Table 13: **Results by EGRA Subtask and Vision Status**[20]

Subtask	Baseline						Endline					
	Partially Blind (*N* = 12)		Nearly Blind (*N* = 2)		Completely Blind (*N* = 7)		Partially Blind (*N* = 12)		Nearly Blind (*N* = 2)		Completely Blind (*N* = 7)	
	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)
Letter-sound Knowledge (correct per three minutes)	28.2	4 (33.3%)	7.0	3 (37.5%)	9.9	0 (0.0%)	36.8	5 (71.4%)	25.5	0 (0.0%)	26.0	2 (28.6%)
Non-word Reading (correct per three minutes)	13.0	5 (41.7%)	0.5	5 (62.5%)	6.1	1 (50.0%)	16.5	5 (71.4%)	5.5	0 (0.0%)	11.3	4 (57.1%)
ORF (correct per three minutes)	30.9	5 (41.7%)	5.0	4 (50.0%)	12.1	0 (0.0%)	30.9	5 (71.4%)	10.5	0 (0.0%)	16.3	4 (57.1%)
Reading Comprehension (correct out of five)	1.9	6 (50.0%0	1.0	5 (62.5%)	1.0	1 (50.0%)	2.1	5 (71.4%)	1.5	0 (0.0%)	1.1	5 (71.4%)
Listening Comprehension (correct out of four)	2.2	1 (8.3%)	2.5	0 (0.0%)	2.0	0 (0.0%)	3.0	0 (0.0%)	3.0	0 (0.0%)	2.4	1 (14.4%)

20 Zero scores are shown as the number and percent of students unable to correctly answer a single item.

Students categorized as partially blind had the highest mean baseline scores and fluencies for all subtasks except Listening Comprehension. Students across all three vision categories experienced increases in mean scores and fluencies on all subtasks except ORF; on ORF, partially blind students read the same number of words at endline and at baseline. The average change in scores and fluencies appears to have increased at higher magnitudes for nearly blind and blind students than for their classmates categorized as partially blind.

Figure 4: **Mean Change by Subtask and Vision Status**



Key Factors for Success

To better understand factors that may have influenced changes in EGRA scores from baseline to endline, questions from the student questionnaire were combined into nine composites, or groups of questions related to each other. Each composite consisted of a series of questions related to a specific theme that may have affected students' early grade reading skill acquisition, and each composite was assigned a maximum score equal to the total number of questions in the composite.[21] Students were then categorized as high or low based on a determined composite score cut-off. When enough students were in high and low categories for a specific composite, average EGRA scores were calculated by category to compare baseline and endline results, as well as the average change for high and low categories.[22]

21 Non-responses were given a '0'.

22 This analysis method was chosen due to the sample size and to the type and number of items in each composite. Regression analysis or ANOVA testing on the composite scores is not recommended for sample sizes of less than 250.

The composites for the project were:

1. Language Consistency
2. Socioeconomic Status
3. Parental Literacy
4. Parental Reading Support
5. Reading Materials Access
6. Teacher Reading Support
7. Disposition to Reading
8. Technology Use
9. Engagement in Program

Details on each composite are described below. Full composite questions and responses can be found in Annex 2.

Language Consistency

The Language Consistency composite includes questions related to student use of Sesotho and Sesotho braille in various situations. Because the Lesotho Literacy for Young Visually Impaired Persons project sought to improve student reading skills in Sesotho, the consistency and exposure of students to Sesotho at school and at home are important to understanding how a student performed on the EGRA assessment.

The Language Consistency composite was comprised of seven questions for a maximum composite score of 7.0, and higher scores indicate more language consistency.[23] Questions on the composite included:

- At school, does your teacher talk to you in Sesotho?
- At school, do your friends speak to you in Sesotho?
- At school, are there reading materials in Sesotho braille?
- At school, do you speak to your friends in Sesotho?
- At home, do you speak to your siblings in Sesotho?
- At home, do you speak to the adults in your home in Sesotho?
- At home, are there reading materials in Sesotho braille?

The average composite score for Language Consistency was 5.8, indicating that students were frequently exposed to Sesotho and Sesotho braille.[24] Students were classified as having either high (scores greater than or equal to 4) or low (scores less than 4) language consistency. All 21 students were categorized as having high language consistency, and because of this, it was not possible to calculate EGRA results by high or low Language Consistency composite scores.

23 To compute the composite score, items with three options were recoded as follows: 1 = yes; 0.5 = sometimes, or 0 = no. The sum across items yielded the composite score, with higher scores (closer to 7) indicating greater language consistency between the test language and home and school language.

24 Item 3 had two students who provided no response, and item 5 had one.

Socioeconomic Status (SES)

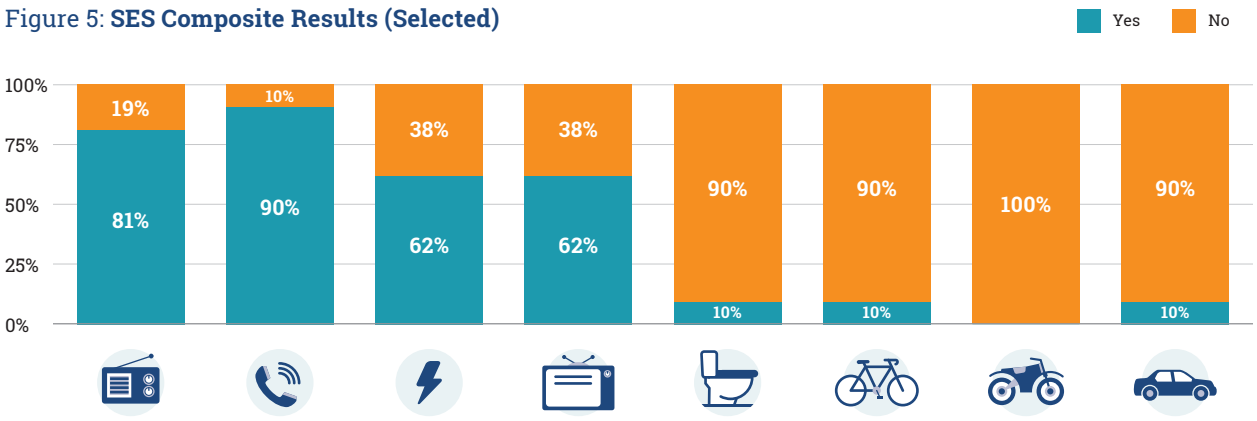
SES is a commonly reported composite used to describe an individual's or household's education, financial situation, and occupation, among other variables. Students were asked a series of questions that were used to estimate SES based on assets and characteristics of their home.

The SES composite was calculated using 10 questions, for a maximum composite score of 10.0.[25] Scores closer to 10 indicate higher SES, and scores closer to one indicate lower SES. Questions on the composite included:

- At your house, do you have a radio?
- At your house, do you have a telephone/mobile phone?
- At your house, do you have electricity?
- At your house, do you have a television?
- At your house, do you have a toilet inside the house?
- At your house, do you have a bicycle?
- At your house, do you have a motorcycle?
- At your house, do you have a car, truck, 4x4, or tractor?
- How long does it take you to travel to town?
- Last night, how much time did you spend on your duties?

Overall, students had relatively low SES composite scores, and the average score for all students was 3.8.[26] Figure 5 presents results on a selection of questions from the SES composite.

Figure 5: **SES Composite Results (Selected)**



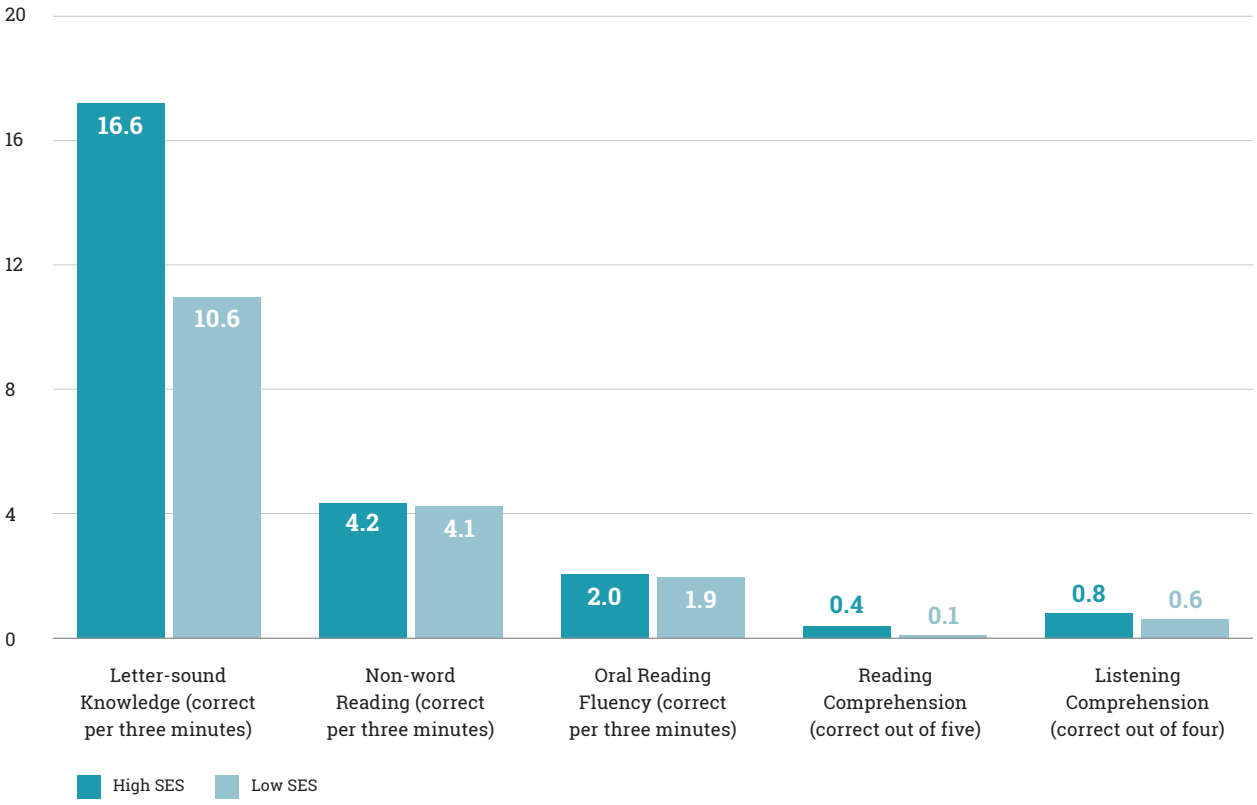
25 Students who responded "yes" to each question received a score of 1, and the sum of the items yielded the composite score.

26 Item 9 had four students who provided no response.

Although nearly all students reported having a telephone/mobile phone in their house (90%), only 62% have electricity in their house, and only 10% have a toilet inside their house.

SES composite scores were classified as high (greater than or equal to 5.5) or low (less than 5.5). Five students were categorized as high and 16 as low. Average changes in EGRA subtask results by SES are presented in Figure 6. Students in the high SES category experienced larger average increases at endline, although they also had higher baseline scores and fluencies (see Annex 3).

Figure 6: **Mean Change by Subtask and SES**



Parental Literacy

The Parental Literacy composite included questions related to literacy rates and the educational level of the students' parents or guardians. The Parental Literacy composite was based on three questions for a maximum composite score of 3.0. Questions included in the composite are:

- Can **[adult #1]** at home read?[27]
- Can **[adult #2]** at home read?
- What is the highest level of education your parent/guardian has achieved?

27 The assessors asked the questions using the appropriate reference to adults in the child's home.

The average Parental Literacy composite score was 2.1 out of 3.0, indicating that the adults in the students' homes have high levels of literacy.[28] Parental Literacy composite scores were classified as high (greater than or equal to 1.5) or low (less than 1.5). Twenty out of 21 students were categorized as having parents with high literacy, and because of this, it was not feasible to examine EGRA results by high or low Parental Literacy composite scores.

Parental Reading Support

The Parental Reading Support composite was comprised of questions related to whether parents, guardians, or other adults in the home read with the students or provide them with support for reading. The Parental Reading Support composite consisted of three questions for a maximum composite score of 3.0. Questions included in the composite were:

- Does someone at home read stories to you?
- Does someone from home review, ask, or care about your school work?
- Last week, how many days did you read with someone outside of school?

The average score for the Parental Reading Support composite was 1.0. This score indicates that students receive a relatively low level of reading support outside the classroom. Students were classified as having either high parental reading support (scores greater than or equal to 1.5) or low (scores less than 1.5). Almost all students (19) were categorized as having low parental reading support, and because of this, it was not possible to examine EGRA results by high or low Parental Reading Support composite scores.

Reading Materials Access

The Reading Materials Access composite included questions on students' access to textbooks or reading materials in Sesotho braille or English braille. The composite consisted of five questions for a maximum composite score of 5.0. Questions included in the composite were:

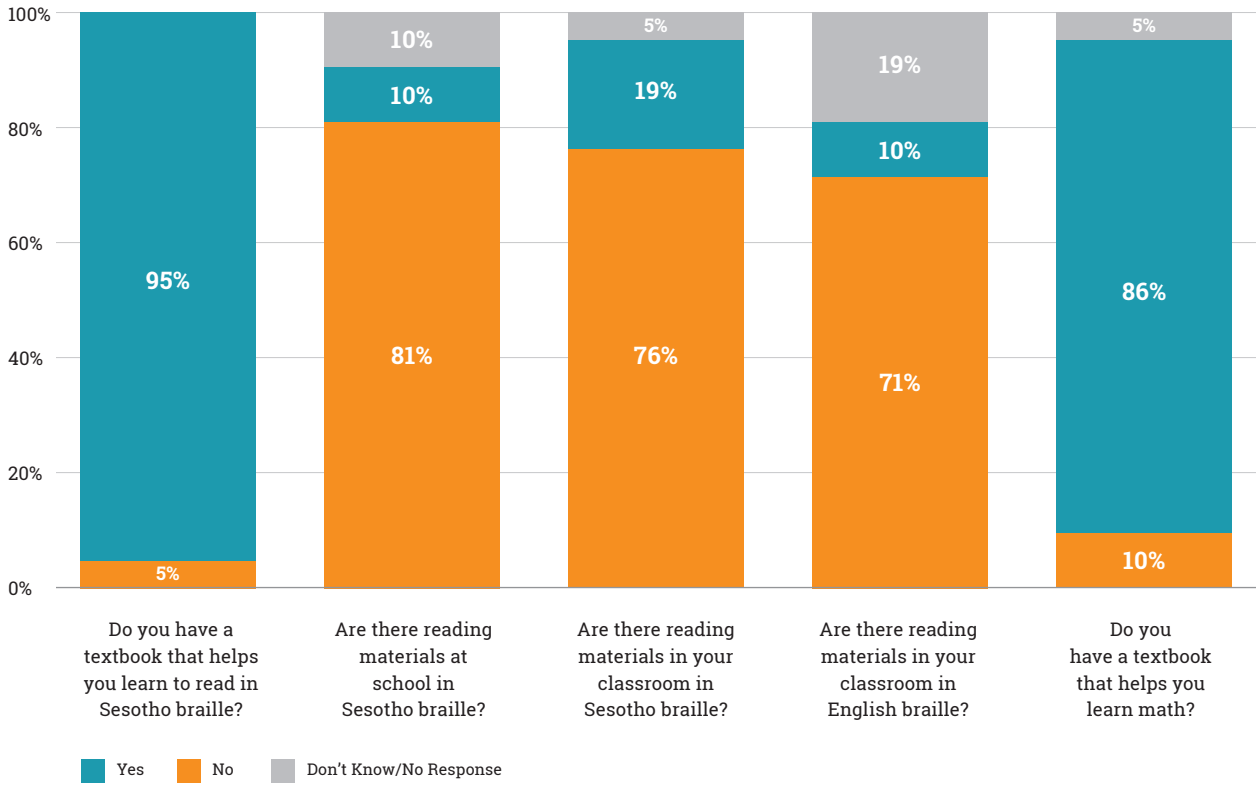
- Do you have a textbook that helps you learn to read in Sesotho braille?
- Are there reading materials at school in Sesotho braille?
- Are there reading materials in your classroom in Sesotho braille?
- Are there reading materials in your classroom in English braille?
- Do you have a textbook that helps you learn math?

The average composite score was 2.8 out of 5.0.[29] Results from the Reading Materials Access composite are shown in Figure 7.

28 Item 3 had six students who provided no response.

29 Item 2 had two students who provided no response, item 3 had one, item 4 had four, and item 5 had one student with no response.

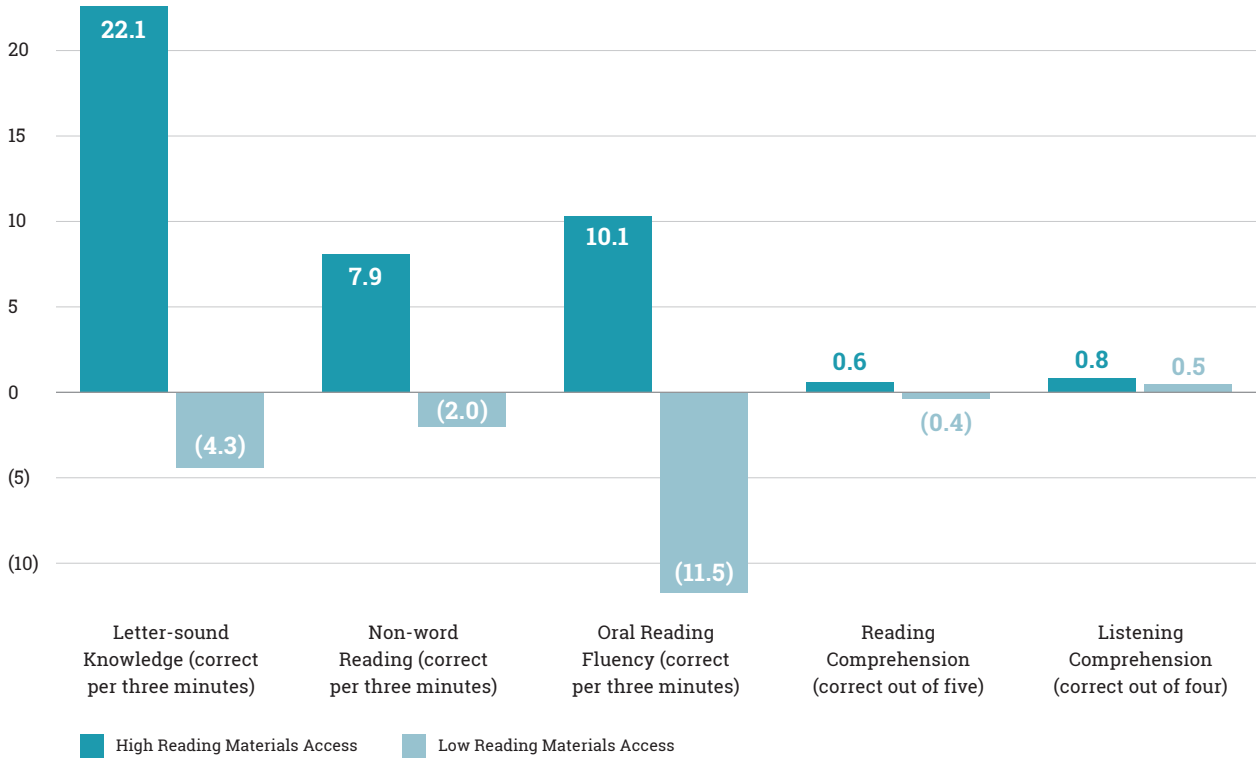
Figure 7: **Reading Materials Access Composite Results**



The majority of students reported having access to reading materials at school and in their classroom in Sesotho braille and English braille, but nearly all students (95%) said they did not have access to a textbook to help them learn to read in Sesotho braille. Further, only 10% of students reported having a textbook to help them learn math.

Students were categorized as having either high reading materials access (scores greater than or equal to 2.5) or low reading materials access (scores less than 2.5). Thirteen students were in the high category, and eight were in the low category. Average changes in EGRA subtask results by Reading Materials Access are presented in Figure 8. Students with high Reading Materials Access composite scores had higher baseline EGRA results and larger gains across all subtasks at endline. Students with low Reading Materials Access composite scores showed an average decrease in all subtask means except listening comprehension.

Figure 8: **Mean Change by Subtask and Reading Materials Access**



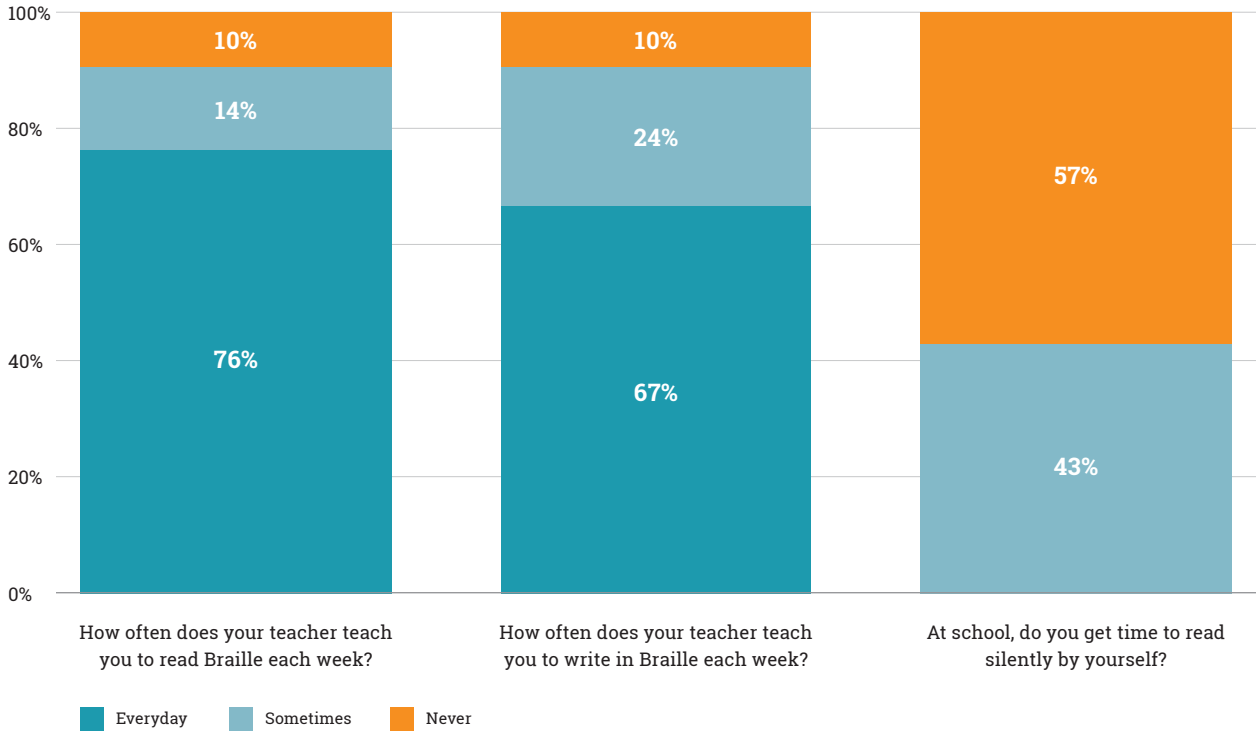
Teacher Reading Support

The Teacher Reading Support composite included questions on teachers' instruction of braille and support provided for reading. The composite consisted of six questions for a maximum composite score of 6.0. Questions included in the composite were:

- How often does your teacher teach you to read braille each week?
- How often does your teacher teach you to write in braille each week?
- At school, do you get time to read silently by yourself?
- At school, does your teacher ask you questions about what you are reading?
- How often does your teacher help you when you are struggling with reading?
- Does your teacher work with you to help you become a better reader?

The average score for the Teacher Reading Support composite was 4.3 out of 6.0. Based on students' responses (see Figure 9), it appears that teachers provided regular reading support in braille in the classroom, although no students reported having daily time to read silently to themselves.

Figure 9: **Teacher Reading Support Composite Results (Selected)**



Students were classified as having either high (scores greater than or equal to 3.5) or low (scores less than 3.5) teacher reading support. Almost all students (18) were categorized as having high teacher reading support, and because of this, it was not possible to present EGRA results for this composite.

Disposition to Reading

The Disposition to Reading composite included questions and statements on children's attitudes toward reading in general. The composite consisted of three questions or statements for a maximum composite score of 3.0. Questions and statements included in the composite were:

- Do you love, like, dislike, or hate reading?
- How do you feel when you are learning to read at school?
- Reading is important to your future.

The average composite score was 2.5 out of 3.0, indicating that students had highly favorable attitudes toward reading.[30] Disposition to Reading composite scores were classified as high (greater than or equal to 1.5) or low (less than 1.5). Twenty of 21 students were categorized as having a high disposition to reading. Because of this, it was not possible to examine EGRA results between the two categories of students.

30 Item 1 had one student who provided no response.

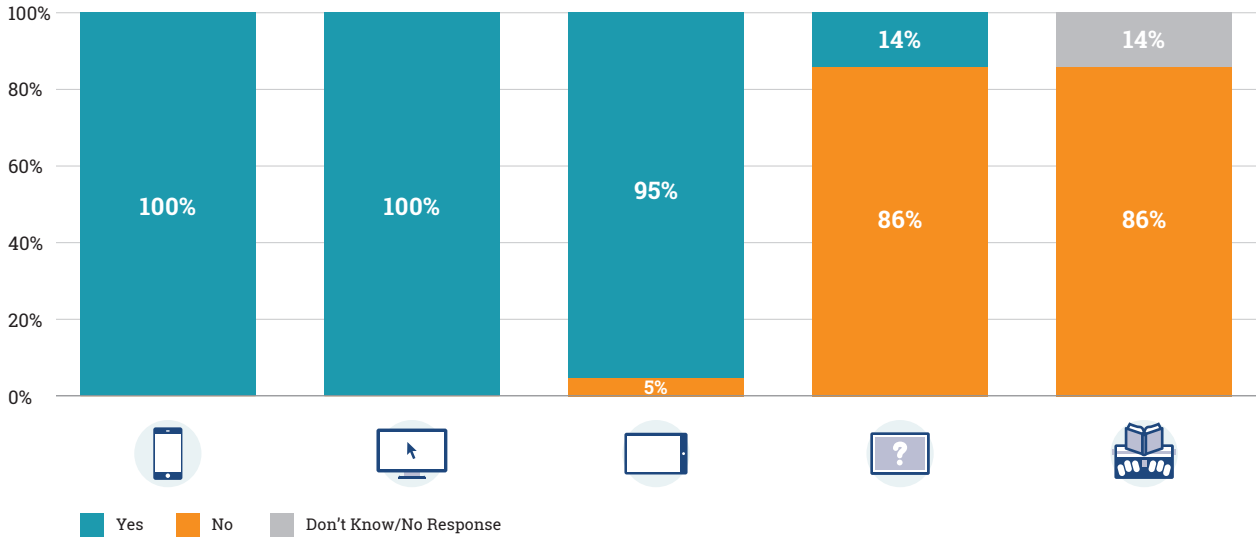
Technology Use

The Technology Use composite included questions on students' use of technology before the project and their use of the JAD during the project. The composite consisted of seven questions for a maximum composite score of 7.0. Questions included in the composite were:

- Have you used a mobile phone to help you learn to read before you used the Jot-a-Dot?
- Have you used a computer to help you learn to read before you used the Jot-a-Dot?
- Have you used a tablet to help you learn to read before you used the Jot-a-Dot?
- Have you used another device to help you learn to read before you used the Jot-a-Dot?
- How comfortable do you feel using the Jot-a-Dot?
- How capable are you using the Jot-a-Dot?
- Did participation in this program increase your comfort with learning to read by using the Jot-a-Dot?

The average Technology Use composite score was 3.7 out of 7.0, and selected question results are presented in Figure 10.[31] No students reported having used mobile phones or computers in the past to learn to read, and only 5% had used tablets in the past to learn to read. Despite students' limited technology use, about 86% said that the project had helped them learn to read with the Jot-a-Dot.

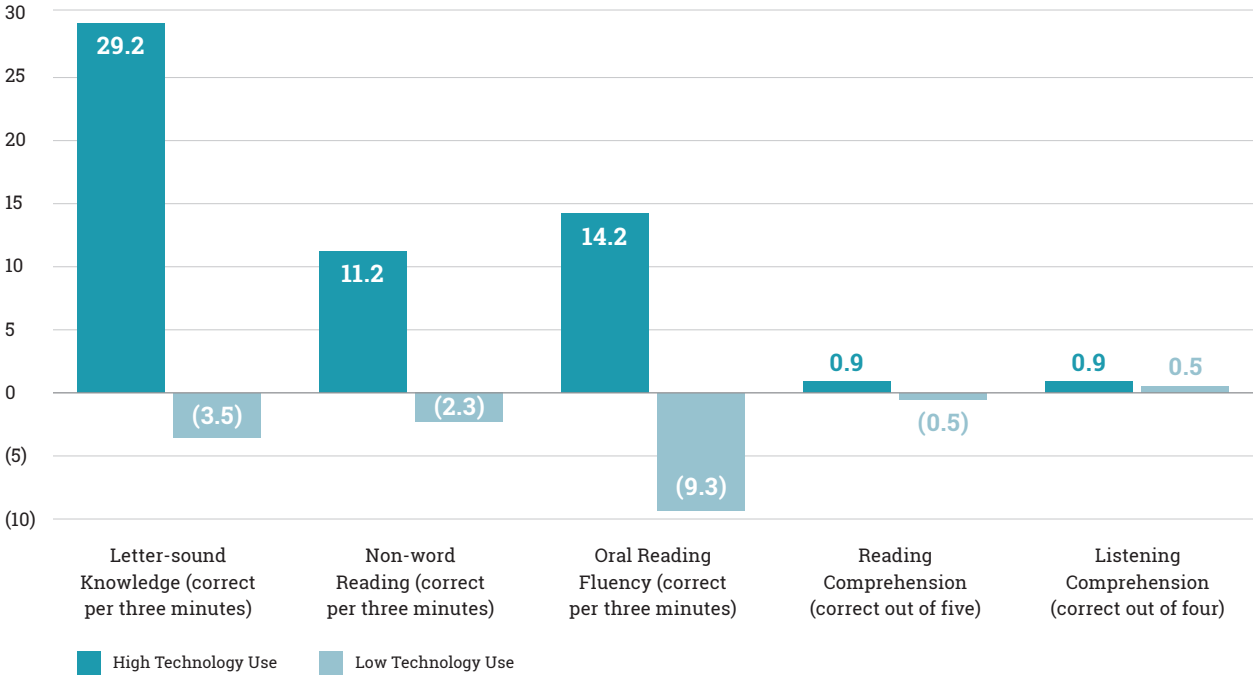
Figure 10: **Technology Use Composite Results (Selected)**



31 Item 5 had two students who provided no response, item 6 had two, and item 7 had three students with no response.

Students were categorized as having either high technology use (scores greater than or equal to 4) or low technology use (scores less than 4). EGRA subtask results for the two categories of students are presented in Figure 11. Students with high Technology Use composite scores showed positive change on all EGRA subtasks, whereas students with low Technology Use composite scores had decreases in scores and fluencies on all subtasks except Listening Comprehension. Students with high technology use had higher baseline scores and also showed greater drops in zero scores.

Figure 11: **Mean Change by Subtask and Technology Use**



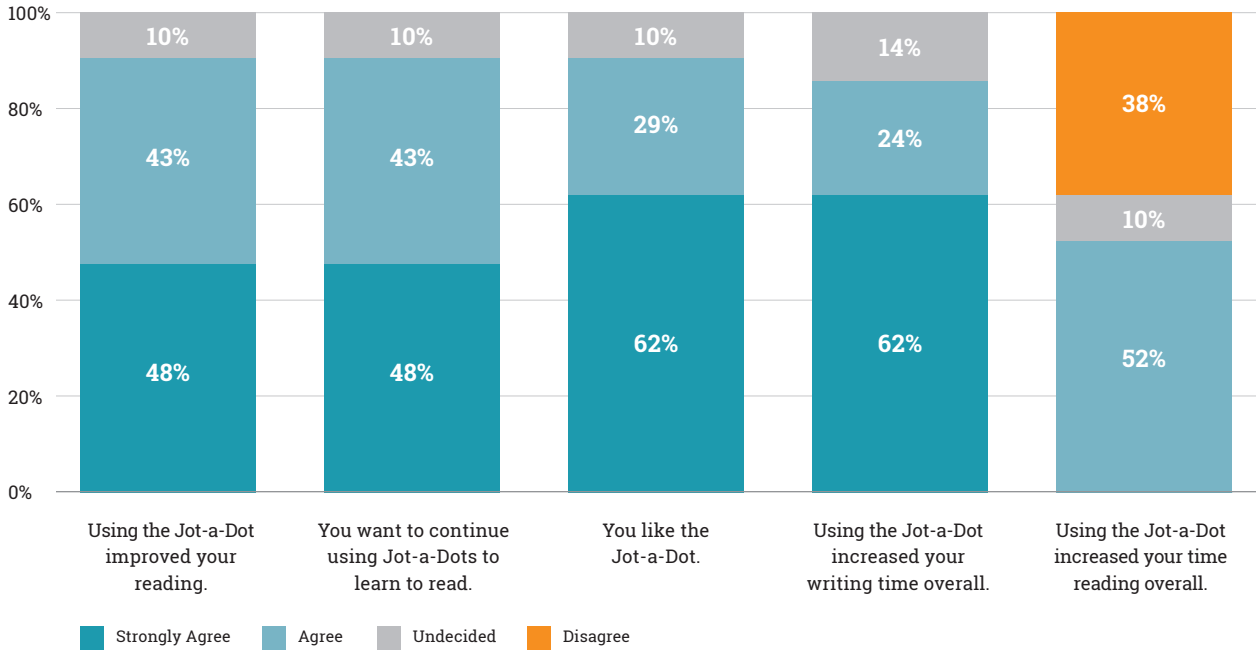
Project Engagement

The Project Engagement composite included a series of statements, and students were asked how strongly they agreed with the statements. The composite consisted of six statements for a maximum composite score of 6.0. Statements included in the composite were:

- Using the Jot-a-Dot improved your reading.
- You want to continue using Jot-a-Dots to learn to read.
- You like the Jot-a-Dot.
- Using the Jot-a-Dot changed your attitude toward reading.
- Using the Jot-a-Dot increased your writing time overall.
- Using the Jot-a-Dot increased your time reading overall.

The average composite score was 4.5 out of 6.0, indicating that, on average, students were highly engaged with the project.

Figure 12: **Project Engagement Composite Results (Selected)**



Most students strongly agreed or agreed that the JADs improved their reading, and they expressed favorability toward the technology. Although 86% of students strongly agreed or agreed that the JADs increased their time spent writing, only 52% said the same about reading time—and 38% disagreed that the JAD increased their time spent reading.

Students were categorized has having high project engagement (scores greater than or equal to 3.5) or low project engagement (scores less than 3.5). Almost all students (19) were categorized as having project engagement, and because of this, it was not possible to examine EGRA results by high or low Project Engagement composite scores.

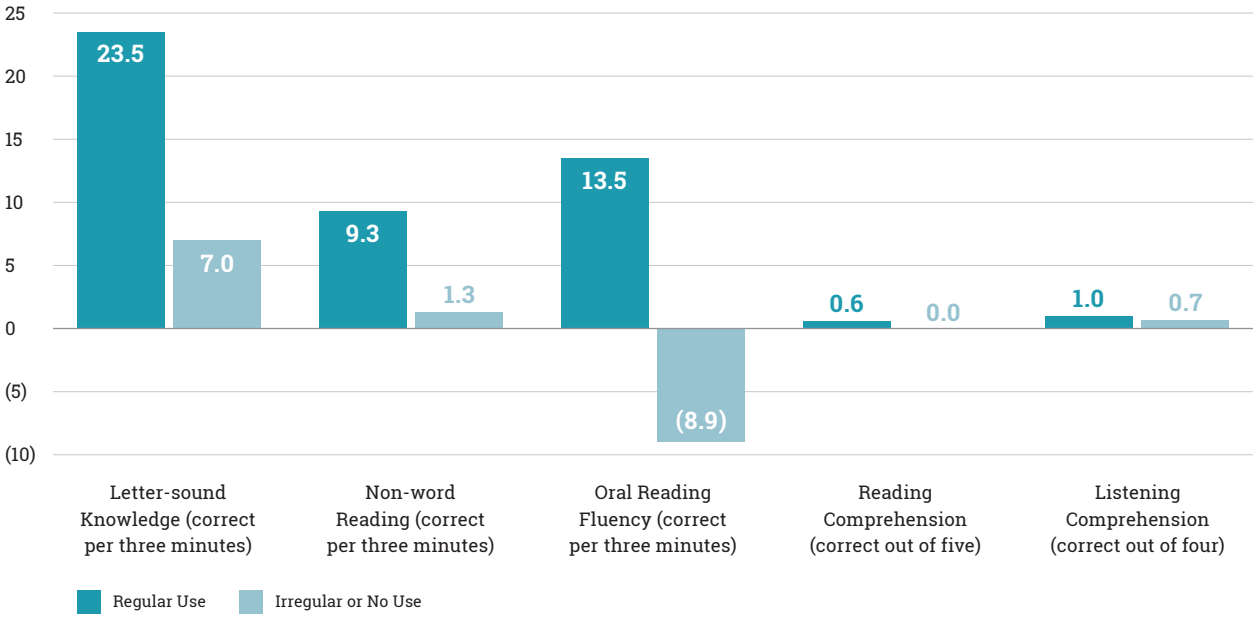
Additional Student Questionnaire Results

An essential component of the project implementation was students' regular use, or dosage, of JADs. Because there was no control group for this assessment, it is difficult to determine if the changes in student reading skills were related to the intervention or were increases that would naturally have accrued over a year of classroom instruction. Examining the relationship between dosage and student learning outcomes on the EGRA may make it possible to understand how student results could have changed from baseline to endline without the project intervention.

Results in Figure 13 show mean increases for students (10) who reported using JADs regularly (three or more days per week) and those (6) who reported using JADs irregularly or not at all (two or fewer days per week).[32] For all subtasks, students who regularly used JADs had higher increases than their classmates who used the JADs less frequently. It should be noted, however, that students who used JADs regularly had higher starting scores and fluencies at baseline than their classmates, which may indicate differences in unobservable characteristics, such as attitude, natural aptitude for learning, or access.

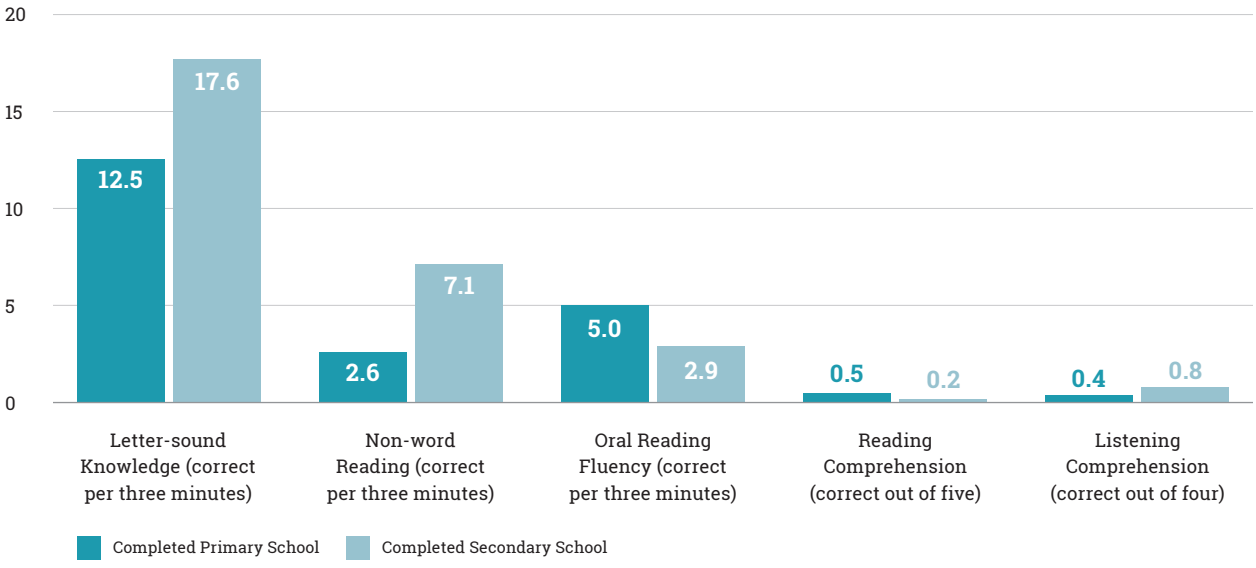
32 Five students responded that they did not know or had no response to the question.

Figure 13: **Mean Change by Subtask and JAD Usage**



Results in Figure 14 show mean changes in results for students based on the education level of their parents or guardians. Students were categorized in two groups: those whose parent or guardian completed primary school (9) and those whose parent or guardian completed secondary school (6).[33] Students whose parent or guardian completed secondary school had higher baseline scores on all subtasks, and these students had higher average increases at endline than their classmates on Letter-sound Knowledge, Non-word Reading, and Reading Comprehension subtasks. Students whose parents completed primary school read about five more correct words at endline than at baseline on the ORF subtask.

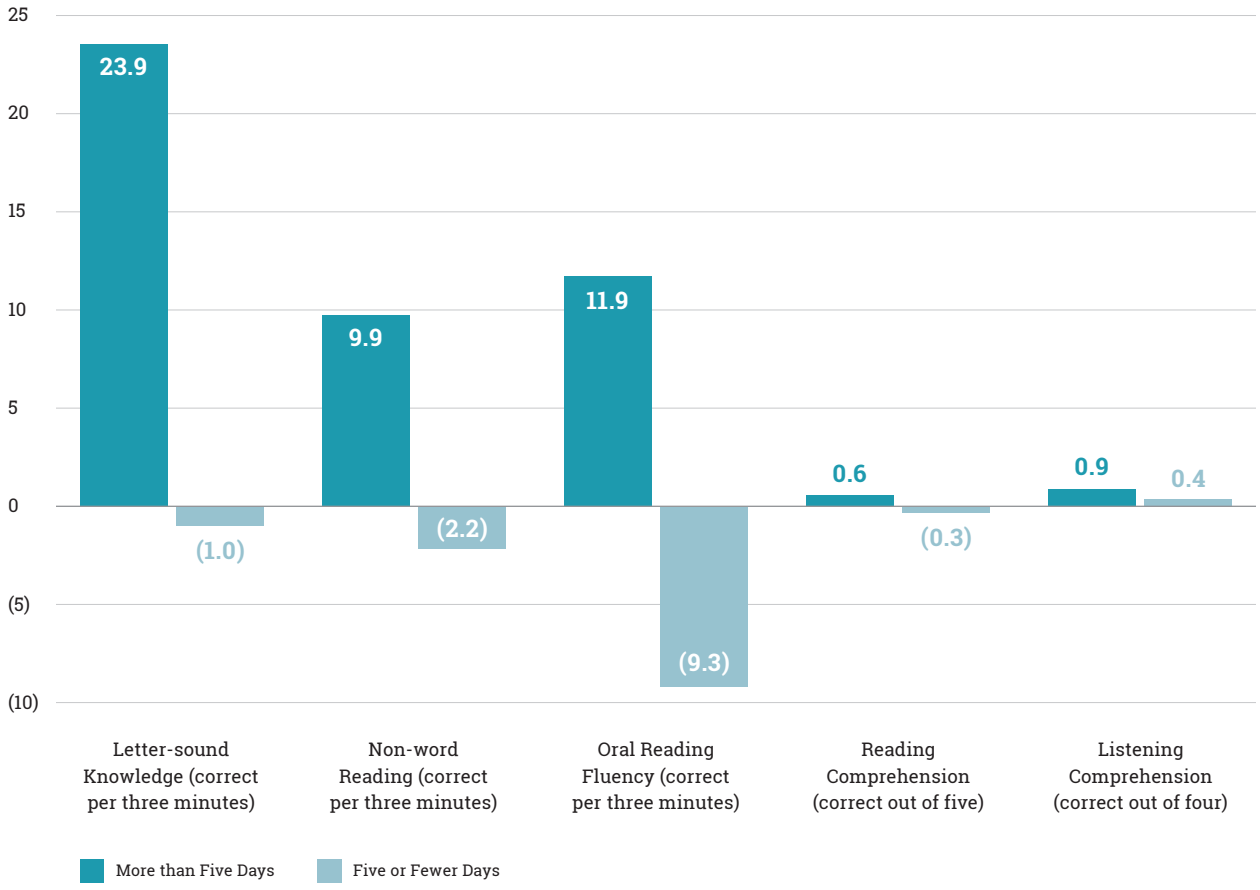
Figure 14: **Mean Change by Subtask and Parent/Guardian Education Level**



33 Six students did not know the highest level of education of their parent or guardian or did not respond to the question.

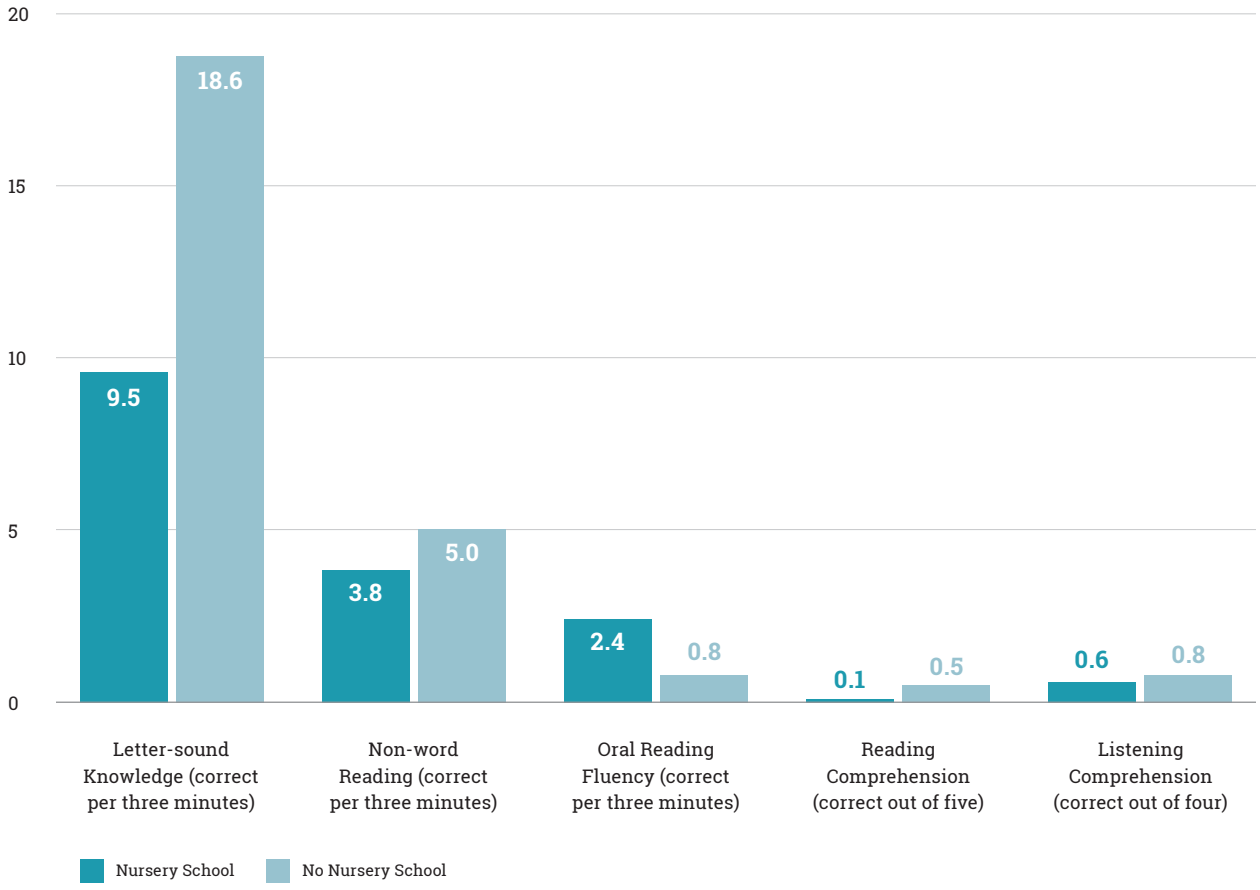
Students were also asked about their attendance in school in the past month. They were categorized into two groups based on their response: those who were absent more than five days in the past month (11) and those who were absent five or fewer days in the past month (10). Students who were absent five or fewer days in the past month had lower baseline scores, endline scores, and fluencies on all subtasks than their classmates who were absent more than five days in the past month. Further, students who were absent five or fewer days had average decreases in fluency at endline on Letter-sound Knowledge, Non-word Reading, and ORF subtasks, as well as on Reading Comprehension scores. Students who were absent more than five days in the past month had, on average, increases on all subtasks, including a gain of nearly 24 letter-sounds at endline.

Figure 15: **Mean Change by Subtask and Number of Absences in Last Month**



Results in Figure 16 show the average change in subtask scores and frequencies based on whether students attended nursery school. Students who did not attend nursery school (6) had higher baseline scores and fluencies than those students who did attend nursery school (15) on Letter-sound Knowledge, Non-word Reading, ORF, and Reading Comprehension. Students who did not attend nursery school had larger average increases at endline than their classmates who did not attend nursery school on all subtasks except ORF. On the ORF subtask, students who did attend nursery score were able to read, on average, an additional two words in three minutes at endline, and students who did not attend nursery score were able to read, on average, nearly one additional word at endline.

Figure 16: **Mean Change by Subtask and Nursery School Attendance**



VII. 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.[34] ACR GCD grantees have implemented small-scale pilot projects designed to "spur and foster technology-based innovations,"[35] and an important consideration at the conclusion of each project is the feasibility of replicating or expanding the technology-based innovations 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: *Is this intervention and/or innovation suitable to be considered for scaling?* STS used an indirect approach that relies 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 (MSI).[36] The tool includes seven sections and 28 questions. Each question is assessed using a 3-point scale to illuminate the viability of potential scaling and how difficult the scaling process may be for a specific intervention or innovation. The assessment can also identify areas of improvement that should be addressed prior to assessing scaling.

STS used data from EOP interviews, EGRA assessment results, literature reviews, and project monitoring and evaluation to assess scalability. These results are meant to inform local program staff, stakeholders, and donors of key considerations to be taken into account before scaling the Lesotho Literacy for Young Visually Impaired Persons project model and technologies to a larger beneficiary population.

At the time of assessment, the project had not distributed the Teacher Resource Guide or the curriculum materials. Accordingly, this assessment assumes the intervention to be the provision of the technologies (MB Pros and JADs), initial and refresher teacher trainings on use of the technologies, and a basic computer literacy (ICT) training program for teachers consisting of six sessions and on-site support.

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 if 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.

34 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

35 World Vision. *All Children Reading: A Grand Challenge for Development Information Sheet*. Retrieved from: http://allchildrenreading.org/wordpress/wp-content/uploads/2016/04/ACR-Info-Sheet.pdf

36 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

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?

CRS developed its intervention to specifically meet the needs of students in the intervention schools. They selected the MB Pros based on limited evidence from a single project evaluation conducted in Texas that used the technology to improve braille literacy in students aged 5–7.[37] CRS's research found no published studies or evaluations of the impact of MB Pros in developing country contexts, although anecdotal data from schools in Zambia and South Africa indicated that teachers had used MB Pros with favorable results.[38] CRS also cited general research from the American Foundation for the Blind regarding the positive relationship between students' exposure to technology and motivation to learn braille.[39] The JADs were selected based on desk research on useful technologies for early grade students who have low vision or are blind, but supporting evidence and supporting project evaluations were not provided.

The project, which combined the use of MB Pros and JADs in schools, represents a new intervention model that had never previously been piloted. The unique nature of the intervention schools, which serve a high proportion of students who have low vision or are blind, represents a single social context that differs from the situation of students who have low vision or are blind outside of these intervention schools. For the JADs to be useful for students, teachers must be able to read the braille produced by students on the JADs and provide feedback to students as they learn to type on the devices. Teachers in the Grade 1 and 2 intervention school already knew how to read and type braille. In contrast, the teachers at the intervention primary school neither knew how to read braille nor had specialized training to work with students who have low vision or are blind. However, they do have an awareness and commitment to supporting these students because they regularly enter their classrooms from the neighboring specialized school. Teachers in other schools might not have the same capacity or the same awareness and motivation to support students who have low vision or are blind. Accordingly, the context in which the intervention could work is fairly limited. Despite this, there may be other countries with higher numbers of specialized schools for students who have low vision or are blind. These countries may also have the potential to benefit from the intervention model.

Finally, stakeholders from MOET, the schools, and disability interest groups interviewed at EOP expressed both support for the current intervention and concerns about its ability to address all the challenges facing students who have low vision or are blind and their teachers. They noted that the intervention is not an appropriate solution for students in mainstream environments because of the level of braille needed by teachers to use the MB Pros and to support students using JADs in schools throughout the country.

Creditability Conclusion

The current evidence is not sufficient to support replication or expansion. The model would benefit from further piloting of the components and exploration of how the intervention could meet the needs of students who have low vision or are blind in other social contexts.

37 Catholic Relief Services (CRS) USCCB (2014). *Full Application for Literacy for Young Visually Impaired Persons (Literacy for Young VIPs).* (Unpublished proposal for funding)

38 Ibid.

39 Ibid.

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 proof that an intervention or innovation achieves 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 between (any) results and the intervention?
3. Is there any emotional appeal associated with the evidence?

EGRA assessment results provided the primary source of observable results. Students showed positive gains in early grade reading skills, and students who reported using JADs more frequently had higher average increases at endline than their classmates who used the JADs less, which indicates that this technology may have had a positive impact on students' early grade reading skills. Without a counterfactual or sufficient FOI measures, however, it is not possible to conclusively determine the extent to which gains can be attributed to the project. Additional piloting of the intervention, with the inclusion of the Teacher Resource Guide and curriculum material, should be explored to improve upon implementation challenges and fine-tune the intervention model. Research that includes a control group should also be considered to better isolate the relationship between the observable results and intervention.

Although the quantitative results do not provide conclusive observability evidence, EOP interviews indicated that teachers and students believed that the JADs made a positive impact on student reading skills. Two teachers reported that they used the MB Pros to create additional reading materials for their students, but they did not think that these materials led to any measurable gains in reading outcomes for their students.

Observability Conclusion:

Additional research should be conducted to more clearly establish a relationship between the intervention and the observable results.

Relevance

To be scalable, an intervention must be relevant to the context in which it is being implemented, and 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. Is the intervention addressing a priority on the policy agenda for potential adopters?
3. Does the intervention address a need felt by the potential beneficiaries?

The project was implemented in two intervention schools: a national school that specifically serves students who have low vision or are blind in Grades 1 and 2, and the neighboring mainstream primary school that serves students in Grades 3–7. These two schools are unique in that they serve a significantly higher proportion of

students who have low vision or are blind than other schools throughout the country. According to a 2010 Education Statics Report, MOET reported that 4,171 students (5.3%) enrolled in Grades 1–7 have some visual impairment.[40] However, the entire population of school-aged students who have low vision or are blind is likely much higher because these students are more likely to not be enrolled in school and because the Government of Lesotho does not have a formal system of identifying students who have low vision or are blind. This means that students enrolled at the intervention schools represent a small fraction of the potential beneficiary population of primary school-aged students who have low vision or are blind throughout Lesotho.

Despite the number of students who have low vision or are blind, there is a significant absence of braille reading materials and quality learning environments for these students throughout Lesotho. The problem is evident even in the intervention schools: at the Grade 1 and 2 intervention school, which specifically serves students who have low vision or are blind and uses braille for all teaching and learning, there are little to no reading materials for students. Teachers in this school spend most of their working time transcribing braille for students in Grade 3 who were mainstreamed into the neighboring primary school. Because these teachers focus the majority of their time on this task for students in the neighboring mainstream primary school, students in Grades 1 and 2 are provided minimal teaching instruction on a regular basis. In EOP interviews, both teachers and students reported frustration at the lack of teaching time in the current situation.

The intervention has the potential to improve students' early grade reading skills by providing efficiency to teachers' daily tasks and allowing them to allocate more time to classroom instruction. MB Pros have the ability to enhance instructional time by enabling teachers at the intervention primary school to create braille learning materials on their own. This would free up time for teachers of Grades 1 and 2 to provide teaching instruction to their students, and teachers could also save time by saving braille teaching materials on their computers and reprinting them when needed. If MB Pros were provided to all teachers at the neighboring primary school, then the teachers of Grades 1 and 2 would not need to spend instructional time developing materials for older students. However, given the small number of students who have low vision or are blind in the primary school classes in Grades 3–7, it seems unlikely that resources would be allocated to provide MB Pros and training to all primary school teachers. Moreover, although the intervention did free up instructional time for Grade 1 and 2 teachers by lessening their need to create braille materials for students in the neighboring primary school, it did not effectively address all teacher capacity and instructional time challenges. The beneficiaries of the project have additional needs that remain unmet by the intervention.

Stakeholders (including MOET), teachers, and disability groups view the problem that the intervention addresses as relevant. MOET is committed to supporting students with disabilities, but there was a general consensus among stakeholders that the problem is not currently a top priority issue. Teachers expressed a need for additional support on this issue and are in favor of technologies or interventions that reduce their workload and increase the quantity of braille reading materials for their students.

Relevance Conclusion

The intervention currently does not fully meet the needs of teachers and students in the intervention schools and throughout Lesotho. Although stakeholders are committed to addressing the problem, the intervention needs to be modified and/or expanded before scale-up to ensure that it provides more comprehensive solutions to the challenges facing teachers and students who have low vision or are blind in Lesotho.

40 Ibid.

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 innovative models established?

The current approach for teachers in the implementation schools does not sufficiently address the learning needs of the students in the early grades. Currently, students learn to type braille using a slate and stylus to punch out the braille characters, which does not allow them to read the braille they create. Slate and stylus devices are challenging to learn and use; the JADs offer a simpler and more effective way for students to create and read braille. Students interviewed at EOP said they were very satisfied with the JADs, and teachers said that students seemed to learn braille more rapidly than in previous years. Although slate and stylus devices are not ideal, teachers still use them to teach students to write braille because of the JAD's limitations—namely, it cannot be used to write full sentences or complex texts, just letters and simple words on small papers. As students progress to Grade 3 and higher, they will most likely still need to use slate and stylus—or an alternative technology with more functionality—to complete their classwork. Given the current functionality of the JAD, the technology provides a solution for early grade students with low vision/blindness but does not do so for older students who need a device that can accommodate more complex text.

Before the intervention, teachers used simple Perkins Braillers that do not require electricity to create or transcribe learning materials for the students. The MB Pro has certain advantages over the Perkins Brailler, including the ability to store files for reprinting later and to create multiple copies without needing to re-type. Additionally, users do not need to know braille to operate the printer. However, there are related challenges with the MB Pro: they require a certain level of computer proficiency, need electricity to print, are too noisy to use during class time, and have technical glitches such paper jams and freezing during printing.

The project has not fully replaced the current approach to teaching reading in either intervention school. At the intervention schools, only two teachers out of seven have reported using the MB Pro exclusively or frequently to create materials and support teaching instruction for their students. Other teachers said they still use their Perkins Brailler on a daily basis, and teachers at the neighboring primary school still rely on Grade 1 and 2 teachers to create braille materials for their classrooms.

Finally, as noted in other sections, this intervention is not appropriate for other mainstream environments in Lesotho because of the lack of teachers able to read braille and because of insufficient technical and ICT capacity to support the technologies.

Relative Advantage Conclusion

The intervention poses potential advantages over current practices but does not provide a comprehensive solution for students who have low vision or are blind throughout Lesotho, especially for those in higher grades. If combined with additional technologies or components, the intervention may have the potential to provide relative advantages over the current solutions.

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 if specific elements of the intervention may be deemed inappropriate or unattractive to other implementers.

Key Considerations:[41]

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?

One of the key challenges uncovered through this intervention was the low technological capacity of teachers in Lesotho. It is evident from quantitative and qualitative data that the students more readily adopted the technologies and enjoyed using them. Over 90% of students agreed or strongly agreed that the JAD technology improved their reading, and the same proportion wanted to continue using the technology to learn to read. However, because teachers were required to have or develop a high level of technical sophistication to implement the project with fidelity, low teacher capacity was a major obstacle. It is possible that, in populations with prior exposure to technologies, the intervention would have more potential to be implemented with fidelity.

The project components—the provision of the technologies (MB Pros and JADs), initial and refresher teacher trainings on use of the technologies, and a six-session ICT training program for teachers with on-site support—were not particularly complex in of themselves. The intervention, however, sought to address a set of unique challenges faced by students who have low vision or are blind in low-resource settings, and it necessitated a high level of technical assistance on the part of the implementing organization. CRS project management expressed concerns over the lack of technical knowledge of its staff on the ground, which, in turn, created delays in implementation, and it is possible that these challenges would make adoption of the model similarly complex for other implementing organizations.

Further, because of the low technological capacity of the teachers, significant project resources were dedicated to supervision and monitoring of project implementation. Through routine monitoring and FOI data collection, the project uncovered low levels of technology adoption by the teachers—for example, only two of seven teachers fully incorporated use of the MB Pros in their classrooms. If a similar project were to be implemented in a similar context, it is reasonable to assume that resources would need to be devoted both to monitoring of technology adoption and to supplemental training for teachers with low capacity.

Ease of Transfer and Adoption Conclusion

The intervention requires high levels of technical expertise in education for students who have low vision or are blind, and it requires beneficiaries to have or develop comfort with new technologies. As implemented, the model presents significant challenges for scale-up because of its complexity, and organizations that are interested in adopting and scaling the model should be well-versed in the needs of students who have low vision or are blind or be willing to invest significant resources in developing those skills.

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

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 intervention as implemented is both labor intensive and expensive to pilot test. The model requires high levels of technical expertise, a strong knowledge of the challenges faced by students who have low vision or are blind in the local context, and significant investment in training and monitoring to ensure that the project is implemented effectively. Additionally, because one of the key components of the project is the distribution of technologies to teachers and students, the intervention requires significant financial investment to be implemented.

Testability Conclusion

The current model is not easily tested in new contexts because it requires significant support and investment by potential adopters.

Sustainability of Funding

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

Key Considerations:

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

Cost analysis is often a component of scalability assessments, as it helps decision makers and stakeholders understand the feasibility of replication given budgetary constraints and comparative costs per child. Because ACR GCD grantees implemented new approaches, they often allotted significant financial resources to the development of new materials that could be used on a recurring basis. To better understand the funding requirements of the project, a cost analysis was conducted to present the total cost of the intervention and to categorize costs that would need to be considered for scaling.

USAID guidance on conducting cost analyses on early grade reading projects suggests that the "ingredients method"[42] be used to calculate costs in the following categories:

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

42 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 (USAID). Washington, D.C. Accessed via: 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 cost expenditure was classified based on the three categories above. Invoiced costs were used for analysis from the beginning of the project through June 2016, and projected costs were used for June to October 2016.[43] This analysis does not include costs for activities that will be conducted after October 2016, as in-school intervention had been completed by that time.[44] Though costs specific to the close-out of the project are not included in this analysis, these would be categorized as implementation costs.[45] The absence of these costs should be considered when comparing the proportion of project budget spent on the three categories.

Despite attempts to fully account for all invoiced costs by CRS, approximately $27,786.45 (i.e. about 18% of invoiced costs) were not accounted for in the costing template. This may be in part due to the exclusion of costs related to staff benefits and allowances, which were charged at an average rate of 23.2% of salary expenditures.[46] For the purposes of this analysis, it is assumed that these unallocated costs were divided equally between the three cost categories. This assumption should be further researched prior to making any recommendations for scaling.

Table 14: **Cost Analysis**

Activity	Management	Development	Implementation
Activity 1.1 Hire Staff		$ -	$ 561.39
Activity 1.2 Project Start-up Meeting		$ -	$ 983.68
Activity 1.3 ACR Grantee Workshop		$ -	$ 3,724.38
Activity 1.4 Allocate ICT/Braille Tech to intervention schools		$ -	$ 37,686.45
Activity 1.5 Training		$ -	$ 14,387.24
Activity 1.6 Develop Teacher Resource Guide		$ 13,034.59	$ -
Activity 1.7 Curriculum Materials		$ 7,349.50	$ -
Activity 2.1 EGRA		$ 3,172.26	$ 783.72
Activity 2.2 Project Monitoring		$ -	$ 11,990.39
Activity 2.3 EOP Preparation[47]		$ -	$ -
Activity 3.1 Dissemination and Advocacy Events		$ -	$ 12,190.48
Activity 3.2 Exchange Visit		$ -	$ 9,269.18
Total	**$ 31,959.76**	**$ 23,556.35**	**$ 91,576.91**
Proportion	**0.22**	**0.16**	**0.62**

43 An additional $20,601 had been projected for FY2016 Q4 expenses. To categorize costs for FY2016 Q4, the projected expenses were categorized according to FY2016 Q3 expenses, and the cost values were calculated proportional to the costs from FY2016 Q3.

44 The overall project budget was $221,530.17, and at the time of this analysis, only $143,965 had been invoiced by CRS through FY2016 Q3.

45 Because close-out costs are not included in this analysis, the cost proportions in Table 14 are not inclusive of all implementation costs.

46 Staff benefits and allowances were excluded from the cost analysis based on expert guidance.

47 EOP Preparation costs were not expended or budgeted at the time of analysis. The implementation costs of conducting the endline EGRA and end of project data collection are incorporated into Project Monitoring and are categorized as implementation.

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 project represent about 22% of the costs expended** and include the cost of maintaining the project office in Lesotho 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.[48]

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 Lesotho Literacy for Young Visually Impaired Persons project represent the smallest proportion of expenditures at about 16%.** The major expenses within this category were the cost of consultants and curriculum specialists to develop the Teacher Resource Guide and curriculum materials, as well as the cost of developing the EGRA assessment tool for the local Lesotho context. These costs are one-off expenditures that would not need to be incurred again in the case of scale-up.

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, monitoring and evaluation, events and presentations, workshops, and human resources activities. **For the Lesotho Literacy for Young Visually Impaired Persons project, implementation costs represented about 62% of the total project cost, by far the largest proportion of the three categories.** Within this cost category, the largest expenses were the purchase of the MB Pro and JAD technologies, which accounted for nearly half of the total costs within the implementation category. This is an important observation, as scale-up of the project model would necessitate the procurement of a large quantity of MB Pro and JAD units. Training of teachers and workshops, exchange visits, and stakeholder meetings also represented a significant portion of the implementation costs.

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 not possible to monetize the costs. Examples of this include local volunteers, strong capacity or support from a large non-governmental organization, or relationships with local governments that could ease logistics and procedures. After conversations with project management and World Vision, no non-monetized inputs were identified.

In total, the project benefitted 30 students. **The cost per student, using the total project budget, was $7,384.34.** The cost per student, using the total invoiced at the time of this analysis,[49] was $5,485.52.

Often, project costs are used to conduct cost-effectiveness or cost-benefit analyses. Because of the length of implementation, the limited size of the beneficiary population, and the lack of measurable project results, STS did not conduct a cost-effectiveness or cost-benefit analysis of the Lesotho Literacy for Young Visually Impaired Persons project.

Scalability of Funding Conclusion

Once the project has stabilized and observable results have been obtained, additional analysis should be conducted to assess the cost-effectiveness of the model.

48 Management costs are inclusive of a 17% flat fee charged for Negotiated Indirect Cost Recovery Agreement (NICRA), which captures indirect costs including regional management and technical support, the local CRS country representative, Overseas Operations management (CRS HQ), Program Quality and Support (CRS HQ), and shipping and procurement costs. This also captures miscellaneous HQ-based services that were provided to the project including Finance, Internal Auditing, HR, Executive Management, Board, and Global Knowledge and Information Management. This analysis assumes that no NICRA expenses were also billed as independent line items, although it should be recognized that some double-counting may have occurred.

49 Including projected invoice amount for FY2016 Q4.

VIII. Conclusions

The Lesotho Literacy for Young Visually Impaired Persons project, implemented by CRS, provided an innovative solution for primary school students who have low vision or are blind and their teachers. However, the project faced a number of design and implementation challenges that may have limited its ability to effectively increase the early grade reading skills of its beneficiaries. The key lessons learned from implementation and from the EGRA assessments are detailed below and respond to the research questions identified earlier in this report.

Lessons Learned

(S) Students in the project showed increases in all EGRA subtasks from baseline to endline, and it is possible that the MB Pros and the JADs were partially responsible for these gains in reading skills. However, without sufficient FOI measures nor a counterfactual measure, it is not possible to conclusively determine the extent to which gains can be attributed to the project.

(T) Teachers were trained only in computer literacy and the use of the MB Pros and JADs. They did not receive supplemental materials or training specifically on pedagogical techniques for students who have low vision or are blind. Although the training on how to use the technologies may have helped teachers integrate the technologies more effectively in their classrooms, it is unlikely that this type of teacher training alone can help improve reading skills for students who have low vision or are blind. Further, because the project used a Training of Trainers–type model in which teachers received direct training the project and were responsible for helping students incorporate the new technologies into the classroom, high FOI and technology adoption would be necessary for the project benefits to fully accrue for students. Because only two out of seven teachers in the intervention reported fully incorporating the new technologies in their classroom, it is unlikely that this component of the project was responsible for additional reading gains.

(G) The project faced significant challenges, including delays in implementation and the production of the Teacher Resource Guide and curriculum materials. Many teachers showed slow uptake of the new technologies, and there were considerable technical challenges with the MB Pros. If the project were given a longer implementation timeline, it is possible that some of the challenges with technology adoption could have been mitigated and some of the time constraints that resulted in lack of adaption by the teachers at the primary school could have been addressed.

(S) Certain subsets of the student population appear to have benefitted more from the project than others. Boys had higher average increases in EGRA results at endline than girls, students who used JADs more frequently had higher average increases in EGRA results at endline than their classmates who used the JADs less, and students with higher SES outperformed their classmates with lower SES. However, sample sizes for each of these student population subsets were small, and results should not be generalized beyond the students who were included in the sample.

(S) Students (T) Teachers (G) General

S Based on the student questionnaire and on EOP interviews, it is evident that the beneficiaries of the project believed that the technologies had the capacity to increase early grade reading skills. These changes in attitudes are encouraging, but the positive changes in attitudes and beliefs must be coupled with changes in behavior, which as technology adoption, in order for the intervention to reach its goals of improving early grade reading outcomes.

G Implementation represented the largest cost category of the project, followed by Management and Development. A significant portion of the costs of the project were spent on the procurement of the technologies for teachers and students, and these costs would be incurred again if the project were replicated. The average cost per child of the intervention was $7,384.34. Without data from comparable projects implemented in Lesotho, it is difficult to make conclusive statements about whether the project was cost-efficient.

G Although the project has the potential to provide innovative solutions for students who have low vision or are blind and their teachers, the implementation model in its current form does not appear to be stable enough for scaling. The project was not able to solve many of the challenges in the intervention schools, including low levels of braille literacy and ICT capacity, and it does not provide a model for teachers in the mainstream school system who hope to better serve students who have low vision or are blind. Further, the project requires large financial and human resources investments, making it a model that may not be easily adopted by local governments. Overall, the project needs further definition of scope, refinement, and pilot testing before it is scaled up.

Annexes

I. Annexes

Annex 1: **EGRA Instrument and Student Questionnaire**

Enumerator Name	
Date and Time	
Date	
Time	
School Location	
School	
ID	
ID	

Consent/Tumello

Lumela. Lebitso la ka ke _____'me ke lula_____. Ke rata ho u phetela hanyane ka "na. (Lenane la litho tsa lelapa, u ratang; lenane la metsoalle, joalojoalo)

1. Mpolelle lebitso la hau. [Morutoana u fana ka lebitso]. [lebitso la morutoana] mphetele/nqoqele hanyane ka uena le lelapa leno. [emela karabo, haeba morutoana a bonts'a hose arabe, bots a potsa ea bobeli, empa ha a bonts'a a lokolohileho tsoelapele ka tumello ea molomo]

U rata ho etsang ka nako eo u seng sekolong?

Read the following statement aloud to the student to obtain the student's verbal consent.

Bala polelo e hlahlamang haholo ho morutoana ho fumana tumello ea morutoana ka molomo.

Ere ke u phetele hobaneng ke le mona letsatsing lena. Re leka ho utloisisa hore na bana ba ithuta ho bala joang. Re kopa thuso ea hau mona. Feela u lokolohile hose nke karolo ha feela u sa batle. Re tlo bapala papali e balang. Ke tlo u kopa ho bala litlhaku, mantsoe le moqoqo o mokhuts'oane haholo. Ke u behetse nako, ke tlo bona na ho u nka nako e kae ho bala. Sena hase hlahlobo ebile haho moo se tlang ho ama mosebetsi oa hau oa sekolo. Ke pheta hape, hase setlamo hore u nke karolo ea hlahlobo ena ha u sena thahasello e joalo. Hang ha re qala, ha u sa batle ho araba potso, ho nepahetse. U na le lipotsa tseo u ka li botsang? Re ka qala

Na morutoana o ile a fana ka tumello? ☐

Student Information

1. What is the student's gender?

☐ Male ☐ Female

2. What is your full name?

3. What is your age?

4. What is your teacher's name?

5. What grade are you in?

Letter Sound Identification

Bonts'a ngoana leqhephe la litlhaku ka bokeng ea ngoana. Ebe ore:

Leqhephe lena le tletse litlhaku tsa alefabete ea sesotho. Ke kopa u ntjoetse melumlo eo u e tsebang; eseng MABITSO a litlhaku, empa MELUMO.

For example, the sound of this letter:

Mohlal, molumo oa Litlhaku tsena ; [Supa 'ng'] ebe o re ke "ngoana, ngola, ngaka"

Hare ikoetlise, ntjoetse molumo oa ltlhaku [Supa S]

Haeba karabo ea ngoana e nepahetse, ere: U nepile, molumo oa tlhaku ena ke "Ss", as in "Sejana", "Sello".

Haeba karabo ea ngoana e fosahetse, ere: molumo oa tlhaku ena ke "Ss", as in "Sejana", "Sello"

Hare leke ho hong: Ntjoetse molumo oa tlaku ena [supa Q]

Haeba karabo ea ngoana e nepahetse ere: u nepile, molumo oa tlhaku ke "Q" as in Quthing, Qopitsa.

Haeba karabo ea ngoana esa nepahala, ere: molumo oa tlhaku ke "Q" as in Qhuthing, Qopitsa.

U utloisisa seo u lokelang hose etsa?

i	o	Hl	e	L	Ny	e	Sh	i	n
l	ts	m	Qh	l	Ph	L	K	p	ts
hl	E	O	H	i	R	t	Ch	k	A
Ts	kh	F	P	H	I	h	Ts	Tl	E
K	Ng	Th	ng	u	l	Ng	ch	a	B
E	N	s	f	tlh	Tl	A	B	tl	q
A	U	t	M	o	r	L	T	i	m
l	tl	ng	E	s	O	a	ts	a	k
b	a	Q	ph	th	ny	k	b	u	e
S	e	sh	Tlh	l	H	Kh	qh	S	h

Time Remaining

Autostop? ☐

Non-Word Reading

Bonts'a ngoana pampiri ea matsoe a iketselitsoeng ka bukaneng ea morutoana. U re:

Hona ke mantsoe a iketselitsoeng. Ke batla u bale mantsoe a mangata ka moo u ka khonang. U seke ua peleta mantsoe, empa ua bale. Mohlala, lentsoe lena ke "laba'.

Joale leka: Bala lentsoe lena [supa lentsoe] laba

[Haeba morutoana are "laba", ere]: "u nepile haholo: "laba"

[Haeba morutoana asa nepa hore "nge"]: lentsoe lena le iketselitsoeng ke "nge."

Joale leka le leng: ke kopa u bale lentsoe lena [supa lentsoe le hlahlamang]: "nge"

[Haeba morutoana are "shoru"]: U nepile haholo: "shoru"

[Haeba morutoana as bitse "shoru" kaho nepahala ere]: Lentsoe lena ke "shoru."

U utloisisa seo u tlamehang hose etsa? Ha kere "qala," bala mantsoe ka mokhoa oo ka khonang. Bala mantsoe a pampering, u qala moleng oa pele. Ke tla thola ke u mamela, ntle leha u hloka thusa. U mala-alaotsoe? Qala.

Ha nako e beiloeng e feela, ere "emisa." Ebe u ts'oaea lentsoeng leo ngoana a qetelletseng ho lona.

AUTOSTOP RULE: Haeba u ts'oaile likarabo tsohle li fosahetse moleng oa pele, tlhotlhobo etla emisa. Ebe u re "Kea leboha," emisa tlhahlobo ,ebe u fetela ho e hlahlamang.

ku	uo	eje	foko	pate
taru	qhibi	jou	ie	uka
tobi	shiha	olo	tletla	rekhu
ibo	teme	tseni	hio	labu
opo	shutla	oapa	lopu	khaje
moale	jekhu	nge	tjeme	pui
qhe	koeu	uhloe	tlema	bira
boru	qui	hua	qheha	napi
lou	tsimi	ero	shiri	hlara
betu	hoele	pang	hluju	qaqi

Time Remaining

Autostop? ☐

Oral Reading Fluency Story: Lost Transport Fare

Bonts'a ngoana pale e hlahang bokaneng ea barutoana. E re:

Hona ke pale e khuts'oane. Ke batla u e bale haholo. Ha u qetile, ke tla u botsa lipotso ka seo u se balileng. U utloisisa seo u lokelang hose etsa? Ha kere "qala," bala pale ka katleho eo u ka khonang. Ke tla thola ke u mamele, ntle leha u ka hloka thuso. U Malalaalaotsoe? Qala.

Palesa	o	kena	sekolo	Maseru.	O
palama	likoloi	tsa	baeti	ho	ea
sekolong.	Sekolong	o	bapala	liketo.	Palesa
o	ile	a	lahla	chelete	ea
ho	palama.	Tichere	ea	utloa	Palesa
ha	a	lla.	A	mo	bitsa
ho	utloa	na	o	llelang.	Palesa
a	re	o	lahlile	chelete.	Tichere
a	fa	Palesa	chelete	ea	ho
palama.	Palesa	a	thaba	haholo.	

Time Remaining

Autostop? ☐

Reading Comprehension Story: Lost Transport Fare

Joale ke tlo u botsa lipotso tse fokolang ka pale eo u qetang ho ebala. Leka ho araba lipotso ka katleho eo u ka e khonang.

1. Palesa o kena sekolo kae? (Correct answer: [Maseru])

☐ Correct ☐ Incorrect ☐ No response

2. Palesa o palama eng ha a ea sekolong? (Correct answer: [Likoloi tsa baeti])

☐ Correct ☐ Incorrect ☐ No response

3. Palesa o bapala eng sekolong? (Correct answer: [Liketo])

☐ Correct ☐ Incorrect ☐ No response

4. Palesa o ne a llelang? (Correct answer: [o ne a llela chelete])

☐ Correct ☐ Incorrect ☐ No response

5. Palesa o ne a thabetse eng? (Correct answer: [Tichere o mo file chelete])

☐ Correct ☐ Incorrect ☐ No response

Listening Comprehension Story: Bees

Litaelo: joale, ke tlo bala pale e khts'oanyane. Ke tla u balla ha 'ngoe. Hake qetile, ke tla u botsa lipotso ka seo ke u balletseng sona. Mamela pale ka hloko hake bala. Hake qeta ho bala pale, leka ho araba lipotso ka katleho eo u ka e khonang. U Malalaalaotsoe? Hare qale.

Pale:

Ke Phato joale, limela li hlahisa lipalesa ka mefuta ea tsona. Tumelo a botsa nkhono, "lerata lee ke lang?" Nkhono a re, "ke linotsi nchanyana li thabetse lipalesa ho tla etsa makhea a monate."

1. Limela li hlahisa lipalesa neng? (Correct answer: [ka Phato])

☐ Correct ☐ Incorrect ☐ No response

2. Ke mang ea botsang nkhono ka lerata? (Correct answer: [Tumelo])

☐ Correct ☐ Incorrect ☐ No response

3. Linot'si li thabetse eng? (Correct answer: [Lipalesa])

☐ Correct ☐ Incorrect ☐ No response

4. Palesa o ne a llelang? (Correct answer: [o ne a llela chelete])

☐ Correct ☐ Incorrect ☐ No response

5. Linotsi li tl'o etsa eng ka lipalesa? (Correct answer: [Makhea])

☐ Correct ☐ Incorrect ☐ No response

Student Questionnaire

1. Na sekolong tichere ea hao e bua le uena ka sesotho

☐ Ho joalo, haholo Sesotho ☐ Eo, o sebelisa Sesotho le Sekhooa ☐ Ka nako e ngoe ☐ Ha ho joalo

☐ Ha ke tsebe, ha ho karabo

2. Sekolong na metsoalle ea hao e bua le uena ka Sesotho

☐ Ho joalo ☐ Ka nako e ngoe ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

3. Na sekolong ho na le tse baloang ka Braille ba Sesotho?

☐ Ho joalo ☐ Tse 'maloa ☐ Ha li eo ☐ Ha ke tsebe, ha ho karabo

4. Hao le sekolong o bua le metsoalle ea hao ka Sesotho

☐ Ho joalo ☐ Ka nako e ngoe ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

5. Ha o le lapeng na o bua le bana beno ka Sesotho?

☐ Ho joalo ☐ Ka nako e ngoe ☐ Ha li eo ☐ Ha ke tsebe, ha ho karabo

6. Ha o le lapeng na o bua le batho ba baholo ka Sesotho?

☐ Ho joalo ☐ Ka nako e ngoe ☐ Ha li eo ☐ Ha ke tsebe, ha ho karabo

7. Lapeng, na ho na libaloa tsa Sesotho tse ngotsoeng ka Braille

☐ Ho joalo ☐ Tse 'maloa ☐ Ha li eo ☐ Ha ke tsebe, ha ho karabo

8a. Lapeng, na o na le tse latelang: Se-ea-moea

☐ Ho joalo ☐ Ha ho joalo

8b. Mohala oa fat'se/mohala oa thekeng

☐ Ho joalo ☐ Ha ho joalo

8c. Motlakase

☐ Ho joalo ☐ Ha ho joalo

8d. Thelefishini

☐ Ho joalo ☐ Ha ho joalo

8e. Ntloana ea ka tlung

☐ Ho joalo ☐ Ha ho joalo

8f. Baesekele

☐ Ho joalo ☐ Ha ho joalo

8g. Sethuthuthu

☐ Ho joalo ☐ Ha ho joalo

8h. Motokara, teraka, 4x4, terekere

☐ Ho joalo ☐ Ha ho joalo

9a. U lula kae?

9b. O nka nako e kae - ho tsamaea ka maoto - o ea mabenkeleng o tloha lapeng?

☐ Ka tlase ho metsotso e mashome a mabeli (ka koloi)

☐ Ho feta metsotso e mashome a mabeli empa ka tlase ho hora (ka koloi)

☐ Ho feta hora (ka koloi)

☐ Ka tlase ho metsotso e mashome a mabeli (ka maoto)

☐ Ho feta metsotso e mashome a mabeli empa ka tlase ho hora (ka maoto)

☐ Ho feta hora (ka maoto)

☐ Ha ke tsebe

10. Bosiu bo fetileng, o nkile nako e kae o etsa mesebetsi ea hao ntle le oa sekolo?

☐ Ha ho letho ☐ Nakoana ☐ O mongata

☐ Haka etse letho ☐ Ha ke tsebe, ha ho karabo

11a. U lula le mang hae:

☐ M'e ☐ Ntate ☐ Mohlokomeli ☐ Ha ke tsebe, ha ho karabo

12a. Na motsoali/mohlokomelo o tseba ho bala?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

12b. Na motsoali/mohlokomeli oa hao o tseba ho bala?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha hona motsoali/ mohlokomeli ☐ Ha ke tsebe, ha ho karabo

13. Boemo ba thuto ba batsoali/mohlokomeli ba hao ke bo feng?

☐ University ☐ Lengolo la sekolo se phahameng ☐ Lengolo la mathomo ☐ Ha ke tsebe, ha ho karabo

14. Ho na le motho ea o ballang lipale lapeng?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

15. Ho na le motho ea u botsang ka mosebetsi oa hao oa sekolo lapeng?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

16. Bekeng e fetileng, O ile oa bala le motho e mong eo e seng oa sekolo matsatsi a ma kae?

☐ Matsatsi a supileng ☐ A mane ho isa ho a t'seletseng ☐ Letsatsi ho isa ho a mararo ☐ Ha kea etsa joalo hohang

17a. Na u na le buka e ngotsoeng ka braille ele ea Sesotho?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

17b. Na libuka tsa ho baloa sekolong tsa sesotho li ngotsoe ka braille?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

17c. Naho na le libuka tsa Sesetho tsa braille sekolong sa hao?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

17d. Ho na le libuka tse kae tsa Sesotho tsa Braille ka sehlopheng sa hao?

18a. Naho na le libuka tsa English tsa Braille sekolong sa hao?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

18b. Ho na le libuka tse kae tsa English tsa Braille ka sehlopeng sa hao?

19. Na u na le buka e o thusang ho ithuta lipalo?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

20. Tichere ea hao eo ruta ho bala Braille hangata ha kae bekeng?

☐ Letsatsi le letsatsi ☐ Ka nako e ngoe ☐ Ho hang

21. Tichere ea hao eo ruta ho ngola hangata ha kae bekeng?

☐ Letsatsi le letsatsi ☐ Ka nako e ngoe ☐ Ho hang

22. Hao le sekolong, o ee o fumana nako ea ho bala moo o leng mong?

☐ Letsatsi le letsatsi ☐ Ka nako e ngoe ☐ Ho hang

23. Ha o le sekolong, na tichere e u botse lipotso ka seo o ntseng o se bala?

☐ Letsatsi le letsatsi ☐ Ka nako e'ngoe ☐ Hohang ☐ Ha ke nahane ke hloka thusa ka ho bala

24. Tichere ea hao eo thusa hangata hakae ha o qakehile ke ho bala?

☐ Letsatsi le letsatsi ☐ Ka nako e'ngoe ☐ Hohang ☐ Ha ke nahane ke hloka thusa ka ho bala

25. Na tichere ea hao e sebetsa le uena hoo thusa ho tseba ho bala?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

26. Na o rata, hao rate, kapa o hloile ho bala?

☐ Ke rata ho bala haholo ☐ Ke rata ho bala ho bala ☐ Ha ke rate ho bala ☐ Ke hloile ho bala

☐ Ha ke tsebe, ha ho karabo

27. U ikutloa joang ha o ithuta ho bala sekolong?

☐ Ke ba le boitsepo ☐ Kea ts'oha ☐ Tse ling ☐ Ha ke sa rate ho bala

☐ Ha ke tsebe, ha ho karabo

28. Ho bala ho bohlokoa bakeng sa bokamoso ba hau

☐ Ke lumela haholo ☐ Kea lumela ☐ Ha ke lumele ☐ Ha ke na maikutlo

29. O kene sekolo sa likonyana pele o bala sehlopha sa pele?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

30. O ne o le ka sehlopheng se feng selemong se fetileng?

☐ Likonyana ☐ Sehlopha sa pele ☐ Sehlopha sa bobeli ☐ Sehlopha sa boraro

☐ Ne ke sa kene sekolo ☐ Ha ke tsebe, ha ho karabo

31. O lofile sekolo matsatsi a makae khoeling e fetileng?

☐ Ho feta matsatsi a mahlano ☐ Matsatsi a mararo ho isa ho a mahlano ☐ Letsatsi ho isa ho a mahlano ☐ Ha ke so lofe

32. O kene sehlopheng sa ho bala matsatsi a makae bekeng ea ho feta?

☐ Matsatsi a mahlano ☐ Matsatsi a mararo ho isa ho a mahlano ☐ Ka tlase ho matsatsi a mabeli ☐ Ha ke tsebe, ha ho karabo

33. Ke lisebelisoa lifeng tseling tseo le kileng la sebelisa pele ho li Jot-a-Dots?

☐ Mohala oa thekeng ☐ Komporo ☐ Tablet ☐ Tse ling?

☐ Ha ho tse ling

34. U nolofalloa ha kae ho sebelisa Jot-a-Dot ho bala.

☐ Ha bonolo haholo ☐ Ha bonolonyana ☐ Ha thata ☐ Ha ho karabo

35. Boiphihlelo ba hao t'sebelisong ea Jot-a-Dot bo bokae?

☐ Ka boit'sepo bo holimo ☐ Ka boit'sepo-nyana ☐ Ke hloka bot'sepo ☐ Ha ho karabo

36. Karolo eo oe nkileng morerong oo eo thusitse ho phutholoha ho feta pele ka ho ithuta ho bala o sebelisa Jot-a-Dot?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

37. O rata ho ithuta ho bala o sebelisa Jota Dot kapa o sebelisa letlapa?

☐ Ho joalo ☐ Ha ho joalo ☐ Ha ke tsebe, ha ho karabo

38. Ho sebelisa Jot-a-Dot ho ekelitse tsebo ea hao ea ho bala.

☐ Ke lumela haholo ☐ Kea lumela ☐ Ha ke lumele ☐ Ha kena maikutlo

39. Ke lakatsa ho toselapele ho sebelisa Jot-a-Dot ho ithuta ho bala.

☐ Ke lumela haholo ☐ Kea lumela ☐ Ha ke lumele ☐ Ha kena maikutlo

40. Lingoloa (libuka) tseo ke ithutileng tsona li ne li le...

☐ Bonolo ☐ Ka nako engoe li ba thata ☐ Li that aka nako tsohle ☐ Ha kena maikutlo

41. U rata Jot-a-Dots

☐ Ke lumela haholo ☐ Kea lumela ☐ Ha ke lumele ☐ Ha kena maikutlo

42. U rata lipale tseo ke li balileng selemong sena.

☐ Ke lumela haholo ☐ Kea lumela ☐ Ha ke lumele ☐ Ha kena maikutlo

43. Ho sebelisa Jotadot ho fetotse maikutlo a hau ka ho bala.

☐ Litlamorao tse hantle ☐ Ha ea etsa joalov ☐ Litlamorao tse bosula

44a. Ho sebelisa Jot-a-Dot ho ekelitse nako eo o e nkang o ngola ka kakaretso

☐ Ke lumela haholo ☐ Kea lumela ☐ Ha ke lumele ☐ Ha kena maikutlo

44b. Ho sebelisa Jot-a-Dots ho ekelitse nako ea hao ea ho bala

☐ Ke lumela haholo ☐ Kea lumela ☐ Ha ke lumele ☐ Ha kena maikutlo

45. Bekeng e fetileng, o kile oa leka ho sebelisa jotadot empa oa seke oa e fumana?

☐ Hang ka beke ☐ Habeli ka beke ☐ Hararo kappa ho feta ka beke ☐ Ha hang

☐ Ha ke tsebe, ha ho karabo

46. Bekeng e fetileng, o sebelisitse Jotadot matsatsi a makae?

☐ Hang ka beke ☐ Habeli ka beke ☐ Hararo kapa ho feta ka beke ☐ Letsatsi le leng le le leng

☐ Ha hang ☐ Ha ke tsebe, ha ho karabo

Annex 2: **Student Questionnaire Results and Composites**

Table A2.1: **Composite Descriptive Statistics**

Composite	N Items	N Student	Mean	Mode	Min.	Max.
Language Consistency	7	18	5.8	6.0	4.5	7.0
Socioeconomic Status (SES)	10	17	3.8	3.0	1.0	6.5
Parental Literacy	3	15	2.1	2.0	0.0	2.5
Parental Reading Support	3	21	1.0	1.0	0.0	2.0
Reading Materials Access	5	16	2.8	3.0	0.0	4.0
Teacher Reading Support	6	21	4.3	5.0	1.5	5.5
Disposition to Reading	3	20	2.5	3.0	1.5	3.0
Technology Use	7	18	3.7	4.0	3.0	4.0
Engagement in Program	6	21	4.5	6.0	0.5	6.0

Table A2.2: **Language Consistency Composite Results**

Item	Response Options	Freq.	Percent
At school, does your teacher talk to you in Sesotho?	Yes – Mainly Sesotho	14	66.7
	Yes – Uses Sesotho and English	7	33.3
	Sometimes – Uses Sesotho	0	0.0
	No – Doesn't use Sesotho	0	0.0
	Don't know, no response	0	0.0
At school, do your friends speak to you in Sesotho?	Yes	21	100.0
	Sometimes	0	0.0
	No	0	0.0
	Don't know, no response	0	0.0
At school, are there reading materials in Sesotho braille?	Yes	17	81.0
	Some	0	0.0
	None	2	9.5
	Don't know, no response	2	9.5
At school, do you speak to your friends in Sesotho?	Yes	21	100.0
	Sometimes	0	0.0
	No	0	0.0
	Don't know, no response	0	0.0
At home, do you speak to your siblings in Sesotho?	Yes	19	90.5
	Sometimes	0	0.0
	No	1	4.8
	Don't know, no response	1	4.8
At home, do you speak to the adults in your home in Sesotho?	Yes	21	100.0
	Sometimes	0	0.0
	No	0	0.0
	Don't know, no response	0	0.0
At home, are there reading materials in Sesotho braille?	Yes	2	9.5
	Sometimes	0	0.0
	No	19	90.5
	Don't know, no response	0	0.0

Table A2.3: **Socioeconomic Status (SES) Composite Results**

Item	Response Options	Freq.	Percent
At your house, do you have a radio?	Yes	17	81.0
	No	4	19.0
At your house, do you have a telephone/mobile phone?	Yes	19	90.5
	No	2	9.5
At your house, do you have electricity?	Yes	13	61.9
	No	8	38.1
At your house, do you have a television?	Yes	13	61.9
	No	8	38.1
At your house, do you have a toilet inside the house?	Yes	2	9.5
	No	19	90.5
At your house, do you have a bicycle?	Yes	2	9.5
	No	19	90.5
At your house, do you have a motorcycle?	Yes	0	0.0
	No	21	100.0
At your house, do you have a car, truck, 4 x 4, or tractor?	Yes	2	9.5
	No	19	90.5
How long does it take you to travel to town?	Less than 20 minutes (car)	2	9.5
	More than 20 minutes but less than an hour (car)	2	9.5
	More than an hour (car)	8	38.1
	Less than 20 minutes (walk)	0	0.0
	More than 20 minutes but less than an hour (walk)	1	4.8
	More than an hour (walk)	4	19.0
	I don't know	4	19.0
Last night, how much time did you spend on your duties?	Don't do chores	5	23.8
	A lot	7	33.3
	Some	7	33.3
	None	2	9.5

Table A2.4: **Parental Literacy Composite Results**

Item	Response Options	Freq.	Percent
Can adult #1 at home read?	Yes	20	95.2
	No	1	4.8
	Don't know, no response	0	0.0
Can adult #2 at home read?	Yes	20	95.2
	No	1	4.8
	Don't have second parent/guardian	0	0.0
	Don't know, no response	0	0.0
What is the highest level of education your parent/guardian has achieved?	University	0	0.0
	High School	6	28.6
	Primary	9	42.9
	Don't know, no response	6	28.6

Table A2.5: **Parental Reading Support Composite Results**

Item	Response Options	Freq.	Percent
Does someone at home read stories to you?	Yes	1	4.8
	No	20	95.2
	Don't know, no response	0	0.0
Does someone from home review, ask or care about your school work?	Yes	19	90.5
	No	2	9.5
	Don't know, no response	0	0.0
Last week, how many days did you read with someone outside of school?	All 7 days	1	4.8
	4-6 days	0	0.0
	1-3 days	4	19.0
	I did not read at all with someone from home last week	16	76.2

Table A2.6: **Reading Materials Access Composite Results**

Item	Response Options	Freq.	Percent
Do you have a textbook that helps you learn to read in Sesotho braille?	Yes	1	4.8
	No	20	95.2
	Don't know, no response	0	0.0
Are there reading materials at school in Sesotho braille?	Yes	17	81.0
	No	2	9.5
	Don't know, no response	2	9.5
Are there reading materials in your classroom in Sesotho braille?	Yes	16	76.2
	No	4	19.0
	Don't know, no response	1	4.8
Are there reading materials in your classroom in English braille?	Yes	15	71.4
	No	2	9.5
	Don't know, no response	4	19.0
Do you have a textbook that helps you learn math?	Yes	2	9.5
	No	18	85.7
	Don't know, no response	1	4.8

Table A2.7: **Teacher Reading Support Composite Results**

Item	Response Options	Freq.	Percent
How often does your teacher teach you to read braille each week?	Everyday	16	76.2
	Sometimes	3	14.3
	Never	2	9.5
How often does your teacher teach you to write in braille each week?	Everyday	14	66.7
	Sometimes	5	23.8
	Never	2	9.5
At school, do you get time to read silently by yourself?	Everyday	0	0.0
	Sometimes	9	42.9
	Never	12	57.1
At school, does your teacher ask you questions about what you are reading?	Yes	11	52.4
	Sometimes	5	23.8
	No	5	23.8
	Don't know, no response	0	0.0
How often does your teacher help you when you are struggling with reading?	Every time	13	61.9
	Sometimes	7	33.3
	Never	1	4.8
	I don't think I need help with reading	0	0.0
Does your teacher work with you to help you become a better reader?	Yes	21	100.0
	No	0	0.0
	Don't know, no response	0	0.0

Table A2.8: **Disposition to Reading Composite Results**

Item	Response Options	Freq.	Percent
Do you love, like, dislike or hate reading?	Love reading	7	33.3
	Like reading	13	61.9
	Dislike reading	0	0.0
	Hate reading	0	0.0
	Don't know, no response	1	4.8
How do you feel when you are learning to read at school?	I feel confident	15	71.4
	I feel anxious	5	23.8
	I did not like to learn to read	1	4.8
	Other response	0	0.0
	Don't know, no response	0	0.0
Reading is important to your future.	Strongly agree	13	61.9
	Agree	8	38.1
	Undecided	0	0.0
	Disagree	0	0.0

Table A2.9: **Technology Use Composite Results**

Item	Response Options	Freq.	Percent
Have you used a mobile phone to help you learn to read before you used the Jot-a-Dot?	Yes	0	0.0
	No	21	100.0
Have you used a computer to help you learn to read before you used the Jot-a-Dot?	Yes	0	0.0
	No	21	100.0
Have you used a tablet to help you learn to read before you used the Jot-a-Dot?	Yes	1	4.8
	No	20	95.2
Have you used another device to help you learn to read before you used the Jot-a-Dot?	Yes	18	85.7
	No	3	14.3
How comfortable do you feel using the Jot-a-Dot?	Very comfortable	14	66.7
	Somewhat comfortable	2	9.5
	Not comfortable	3	14.3
	Don't know, no response	2	9.5
How capable are you using the Jot-a-Dot?	Very confident	13	61.9
	Somewhat confident	6	28.6
	Not confident	0	0.0
	Don't know, no response	2	9.5
Did participation in this program increase your comfort with learning to read by using the Jot-a-Dot?	Yes	18	85.7
	No	0	0.0
	Don't know, no response	3	14.3

Table A2.10: **Disposition to Reading Composite Results**

Item	Response Options	Freq.	Percent
Using the Jot-a-Dot improved your reading.	Strongly agree	10	47.6
	Agree	9	42.9
	Undecided	2	9.5
	Disagree	0	0.0
You want to continue using Jot-a-Dots to learn to read.	Strongly agree	10	47.6
	Agree	9	42.9
	Undecided	2	9.5
	Disagree	0	0.0
You like the Jot-a-Dot.	Strongly agree	13	61.9
	Agree	6	28.6
	Undecided	2	9.5
	Disagree	0	0.0
Using the Jot-a-Dot changed your attitude toward reading.	Positive Impact	19	90.5
	No Impact	2	9.5
	Negative Impact	0	0.0
Using the Jot-a-Dot increased your writing time overall.	Strongly agree	13	61.9
	Agree	5	23.8
	Undecided	3	14.3
	Disagree	0	0.0
Using the Jot-a-Dot increased your time reading overall.	Strongly agree	0	0.0
	Agree	11	52.4
	Undecided	2	9.5
	Disagree	8	38.1

Table A2.11: **Additional Questionnaire Results**

Item	Response Options	Freq.	Percent
This past week how many days did you use the Jot-a-Dot?	Once a week		
	Twice a week		
	Three or more times a week		
	Everyday		
	None		
	Don't know, no response		
What is the highest level of education your parent/guardian has achieved?	University		
	High School		
	Primary		
	Don't know, no response		
How many times were you absent from school in the last month?	More than 5 days		
	3-5 days		
	1-3 days		
	Not absent		
Did you go to nursery or pre-school before Class 1?	Yes		
	No		
	Don't know, no response		

Annex 3: **Descriptive Statistics**

Table A3.1: **Results by EGRA Subtask and Jot-a-Dot Usage**

Subtask	Jot-a-Dot Used Three or More Days in Past Week (*n* = 10)					Jot-a-Dot Used Two or Less Days in Past Week (*n* = 6)				
	Baseline		Endline			Baseline		Endline		
	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean Change	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean Change
Letter-sound Knowledge	24.2	3 (30.0%)	47.7	2 (20.0%)	23.5	20.7	2 (33.9%)	27.7	1 (16.7%)	7.0
Nonword Reading	12.4	3 (30.0%)	21.7	4 (40.0%)	9.3	9.2	2 (33.3%)	10.5	2 (33.3%)	1.3
Oral Reading Fluency (ORF)	22.7	4 (40.0%)	36.2	3 (30.0%)	13.5	27.6	4 (66.7%)	18.7	1 (16.7%)	(8.9)
Reading Comprehension	1.6	1 (10.0%)	2.2	1 (10.0%)	0.6	1.8	2 (33.3%)	2.5	2 (33.3%)	0.0
Listening Comprehension	2.3	6 (60.0%)	3.3	3 (30.0%)	1.0	1.8	0 (0.0%)	1.8	0 (0.0%)	0.7

Table A3.2: **Results by EGRA Subtask and Parent/Guardian Education Level**

Subtask	Parent/Guardian Completed Primary School (*n* = 9)					Parent/Guardian Completed Secondary School (*n* = 6)				
	Baseline		Endline			Baseline		Endline		
	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean Change	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean Change
Letter-sound Knowledge	3.2	6 (66.7%)	15.7	4 (44.4%)	12.5	38.5	1 (16.7%)	56.1	0 (0.0%)	17.6
Nonword Reading	2.2	6 (66.7%)	4.8	6 (66.7%)	2.6	17.1	2 (33.3%)	24.2	1 (16.7%)	7.1
Oral Reading Fluency (ORF)	4.6	7 (77.8%)	9.6	4 (44.4%)	5.0	39.0	1 (16.7%)	41.9	1 (16.7%)	2.9
Reading Comprehension	0.3	8 (88.9%)	0.8	6 (66.7%)	0.5	2.8	1 (16.7%)	3.0	1 (16.7%)	0.2
Listening Comprehension	1.9	0 (0.0%)	2.3	1 (11.1%)	0.4	2.5	0 (0.0%)	3.3	0 (0.0%)	0.8

Table A3.3: **Results by EGRA Subtask and School Attendance in Last Month**

Subtask	Absent More than Five Days (n = 11)					Absent Five or Fewer Days (n = 10)				
	Baseline		Endline		Mean Change	Baseline		Endline		Mean Change
	Mean	Zero Scores (n)	Mean	Zero Scores (n)		Mean	Zero Scores (n)	Mean	Zero Scores (n)	
Letter-sound Knowledge	28.1	2 (18.2%)	52.0	1 (9.1%)	23.9	11.2	7 (70.0%)	10.2	4 (40.0%)	(1.0)
Nonword Reading	14.1	4 (36.4%)	24.0	3 (27.3%)	9.9	4.5	7 (70.0%)	2.3	6 (60.0%)	(2.2)
Oral Reading Fluency (ORF)	28.3	3 (27.3%)	40.2	2 (18.2%)	11.9	15.6	7 (70.0%)	6.3	5 (50.0%)	(9.3)
Reading Comprehension	2.0	4 (36.4%)	2.6	2 (18.2%)	0.6	1.0	8 (80.0%)	0.7	7 (70.0%)	(0.3)
Listening Comprehension	2.3	1 (9.1%)	3.2	0 (0.0%)	0.9	2.0	0 (0.0%)	2.4	1 (10.0%)	0.4

Table A3.4: **Results by EGRA Subtask and Nursery School Attendance**

Subtask	Attended Nursery School (n = 15)					Did Not Attend Nursery School (n = 6)				
	Baseline		Endline		Mean Change	Baseline		Endline		Mean Change
	Mean	Zero Scores (n)	Mean	Zero Scores (n)		Mean	Zero Scores (n)	Mean	Zero Scores (n)	
Letter-sound Knowledge	16.3	7 (46.7%)	25.8	4 (26.7%)	9.5	29.3	2 (33.3%)	47.9	1 (16.7%)	18.6
Nonword Reading	7.9	9 (60.0%)	11.7	7 (46.7%)	3.8	13.5	2 (33.3%)	18.5	2 (33.3%)	5.0
Oral Reading Fluency (ORF)	18.4	8 (53.3%)	20.8	6 (40.0%)	2.4	31.6	2 (33.3%)	32.4	1 (16.7%)	0.8
Reading Comprehension	1.4	9 (60.0%)	1.5	7 (46.7%)	0.1	1.8	3 (50.0%)	2.3	2 (33.3%)	0.5
Listening Comprehension	2.2	1 (6.7%)	2.8	1 (6.7%)	0.6	2.0	0 (0.0%)	2.8	1 (10.0%)	0.8

Table A3.5: **Results by EGRA Subtask and Socioeconomic Status**

Subtask	High SES (*n* = 5)					Low SES (*n* = 16)				
	Baseline		Endline		Mean Change	Baseline		Endline		Mean Change
	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)		Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	
Letter-sound Knowledge	19.4	2 (40.0%)	36.0	1 (20.0%)	16.6	20.3	7 (43.8%)	30.9	4 (25.0%)	10.6
Nonword Reading	11.4	3 (60.0%)	15.6	2 (40.0%)	4.2	9.0	8 (50.0%)	13.1	7 (43.8%)	4.1
Oral Reading Fluency (ORF)	21.8	2 (40.0%)	23.8	2 (40.0%)	2.0	22.3	8 (50.0%)	24.2	5 (31.3%)	1.9
Reading Comprehension	1.6	2 (40.0%)	2.0	2 (40.0%)	0.4	1.5	10 (62.5%)	1.6	7 (43.8%)	0.1
Listening Comprehension	1.8	1 (20.0%)	2.6	1 (20.0%)	0.8	2.3	0 (0.0%)	2.9	1 (6.3%)	0.6

Table A3.6: **Results by EGRA Subtask and Reading Materials Access**

Subtask	High Reading Materials Access (*n* = 13)					Low Reading Materials Access (*n* = 8)				
	Baseline		Endline		Mean Change	Baseline		Endline		Mean Change
	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)		Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	
Letter-sound Knowledge	22.1	5 (38.5%)	44.2	2 (15.4%)	22.1	16.8	4 (50.0%)	12.5	3 (37.5%)	(4.3)
Nonword Reading	12.0	6 (46.2%)	19.9	4 (30.8%)	7.9	5.6	5 (62.5%)	3.6	5 (62.5%)	(2.0)
Oral Reading Fluency (ORF)	22.2	5 (38.5%)	32.3	3 (23.1%)	10.1	22.1	5 (62.5%)	10.6	4 (50.0%)	(11.5)
Reading Comprehension	1.5	7 (53.8%)	2.1	5 (38.5%)	0.6	1.5	5 (62.5%)	1.1	4 (50.0%)	(0.4)
Listening Comprehension	2.4	0 (0.0%)	3.2	0 (0.0%)	0.8	1.8	1 (12.5%)	2.3	1 (12.5%)	0.5

Table A3.7: **Results by EGRA Subtask and Technology Use**

Subtask	High Technology Use (*n* = 10)					Low Technology Use (*n* = 11)				
	Baseline		Endline			Baseline		Endline		
	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean Change	Mean	Zero Scores (*n*)	Mean	Zero Scores (*n*)	Mean Change
Letter-sound Knowledge	30.4	2 (20.0%)	59.6	0 (0.0%)	29.2	10.6	7 (63.6%)	7.1	5 (45.5%)	(3.5)
Nonword Reading	15.5	3 (30.0%)	26.7	1 (10.0%)	11.2	4.1	8 (72.7%)	1.8	8 (72.7%)	(2.3)
Oral Reading Fluency (ORF)	30.6	2 (20.0%)	44.8	1 (10.0%)	14.2	14.6	8 (72.7%)	5.3	6 (54.5%)	(9.3)
Reading Comprehension	2.0	4 (40.0%)	2.9	2 (20.0%)	0.9	1.1	8 (72.7%)	0.6	7 (63.6%)	(0.5)
Listening Comprehension	2.8	0 (0.0%)	3.7	0 (0.0%)	0.9	1.5	1 (9.1%)	2.0	1 (9.1%)	0.5