Baseline Report

E-books 4 Khmer (E4K)

Kampuchean Action for Primary Education, Cambodia

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School-to-School International and Kampuchean Action for Primary Education
For All Children Reading: A Grand Challenge for Development

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I. Executive Summary

Recognizing that literacy is fundamental to learning, skills acquisition, and success in primary school and beyond, education stakeholders are increasing their focus on the assessment of early grade reading skills. The Early Grade Reading Assessment (EGRA) is an oral assessment of students designed to measure foundational skills for literacy acquisition: recognizing letters of the alphabet, reading simple words, understanding sentences and paragraphs, and listening with comprehension.[1] The EGRA methodology was developed under EdData II and has been applied in more than 30 countries and 60 languages.[2]

All Children Reading: A Grand Challenge for Development (ACR GCD)—a partnership between the United States Agency for International Development (USAID), World Vision, and the Australian Government—recommends EGRAs to assess reading skills across all Round 2 grantees systematically. The instrument is adapted according to each grantee's project context.

Kampuchean Action for Primary Education (KAPE), an ACR GCD Round 2 grantee based in Cambodia, conducted a baseline EGRA in 15 schools in collaboration with School-to-School International (STS). The EGRA was administered to students in Grades 2 and 3 to establish a baseline for early grade reading skills among students who will be participating in the E-books 4 Khmer (E4K) program, as well as for students who are part of a comparison group.

This report presents the results of the EGRA baseline data collection from November 2016 as well as conclusions and recommendations. Below is a summary of the key findings.

Key Findings

1. The proportion of students unable to answer a single item correctly was highest on the reading comprehension subtask and lowest on the letter name identification subtask. This finding is consistent with the expected pattern of early grade reading skills acquisition by students. Letter sound identification is generally seen as a precursor for reading, while reading comprehension requires letter and word recognition as well as comprehension.

[1] RTI International and International Rescue Committee. (2011). Guidance Notes for Planning and Implementing Early Grade Reading Assessments.
[2] USAID EdData II. Available at: https://www.eddataglobal.org/reading/

2. EGRA results for the intervention groups—both group A and group A+B[3]—are significantly higher than the results for students in the comparison group.

3. Students had lower scores on the nonword reading subtask than on the familiar word reading subtask. Across all groups and grades, students could read 5.6 nonwords per minute compared to 11.0 familiar words in the same amount of time. Less than half of all students could not read a single nonword, but only 40.5 percent of students could not read a familiar word. Both the letter name identification and the nonword reading subtask show students' foundational decoding skills.

4. The best single measure of a student's reading proficiency in the lower primary grades appears to be oral reading fluency (ORF). ORF is known to be a powerful predictor of overall reading competence and comprehension. Accordingly, Cambodia's Ministry of Education, Youth and Sport (MoEYS) has set minimum reading proficiency standards at 45 words per minute for the lower primary school grades and 100 words per minute for the upper primary grades. However, more than one-third of students were unable to read a single word in either the ORF-sentences subtask or the ORF-story subtask. Intervention group A students correctly read, on average, 26 and 25 words per minute on the ORF-sentences and -story subtasks, respectively. Comparatively, students in intervention group A+B, correctly read 20.2 words and 19.2 words per minute, and students in the comparison group read 14.6 words and 14.1 words per minute correctly on average.

5. On average, 46 percent, 54 percent, and 67 percent of students in intervention groups A, A+B, and the comparison group, respectively, were unable to answer any questions correctly in the reading comprehension subtask. Overall, students only responded correctly to 0.8 out of five reading comprehension questions on average.

6. Lastly, students' scores on the subtask measuring listening comprehension of spoken Khmer was higher than their performance on the reading comprehension subtasks. On average, students correctly responded to 1.3 out of three listening comprehension questions based on a short story. Only about 19 percent of students in intervention group A, 17 percent of students in intervention group A+B, and 20 percent of students in the comparison group were unable to answer a single listening comprehension question correctly.

[3] The research sample includes two intervention groups: 1) intervention A: students receive tablets with the *SmartBooks* app (component one); and 2) intervention A+B: students receive tablets with the *SmartBooks* app (component one) and teachers receive instructional materials and a manual on differentiated instruction (component two).

Table 1: Mean Results for EGRA Subtasks by Group

Subtask	Intervention A (N=247)		Intervention A+B (N=250)		Comparison (N=253)		All Students (N=750)	
	Mean	Zero Scores (n)	Mean	Zero Scores (n)	Mean	Zero Scores (n)	Mean	Zero Scores (n)
Letter name identification (CLNPM)	29.8	19	27.5	11	22.3	23	26.5	53
Familiar word reading	14.1	86	11.2	90	7.5	128	11.0	304
Nonword reading (CNWPM)	7.1	110	6.0	117	3.7	154	5.6	381
Oral reading fluency (ORF)-sentences (CWPM)	26.0	88	20.2	102	14.6	134	20.2	324
Oral reading fluency (ORF)-story (CWPM)	25.0	80	19.2	97	14.1	125	19.4	302
Reading comprehension (correct out of five)	1.0	114	0.8	134	0.6	169	0.8	417
Listening comprehension (correct out of three)	1.3	46	1.3	43	1.3	50	1.3	139

II. Project Description

KAPE, a local Cambodian NGO, is implementing the E4K project funded by ACR GCD as part of its mother-tongue instruction and reading materials focus area. E4K seeks to improve reading proficiency in Grades 2 and 3 through two intervention components:

1. Introducing standard reading textbooks that have been converted into basal electronic readers (known as *SmartBooks*) with leveled text and interactive features that build on students' oral language skills. This intervention will be mediated through a tablet application and mobile devices will be made available in libraries for students to use after school.
2. Introducing differentiated instruction (DI) methodologies into target classrooms based on a new training manual developed for this project and contextualized to the Cambodian school environment. DI is important as it provides teachers with an approach for discerning content and teaching methods according to each student's needs. Teachers in the project are expected to use the provided methodologies and materials to tailor their support to students' individual needs.

The E4K project is being implemented in a mix of ten urban and rural primary schools in the Kampong Cham Province located in eastern Cambodia along the Vietnamese

border. This is a large and densely populated province with a mix of demographic groupings.

The tablet application (app) *SmartBooks* was developed by KAPE specifically for the E4K project. *SmartBooks* allows students to access content from standard reading textbooks in basal electronic format; it also contains digitized quizzes and tests that evaluate students' reading levels. As children move through the content, texts are accessible to them based on their quiz and test results; this allows for students to advance from low- to high-complexity content as they learn to read. To guide the leveling of the text in *SmartBooks*, KAPE conducted a content analysis and created a readability formula.

The content in *SmartBooks* is closely linked to the national curriculum. In this respect, KAPE collaborated closely with the MoEYS, recruiting Ministry writers to help re-write texts into different levels of complexity based on newly developed readability criteria. In addition, the project worked with an oversight committee tasked with monitoring project implementation and chaired by the director of the Primary Education Department (PED). In total, the project transferred 72 stories into *SmartBooks* formats with leveled text. Ultimately, KAPE intends to make the *SmartBooks* app available on Google Play.

The second component of the E4K project relates to the creation and dissemination of DI manuals and training for teachers. For it, KAPE intends to:

- Enable teachers to understand the basic principles of DI.
- Help teachers implement flexible task assignments leading to fluid student groupings that avoids labeling and stigma.
- Provide actionable methods and techniques that introduce DI into Cambodian classrooms by focusing on the role of assessment and the use of the reading benchmarks in assessments.
- Help teachers understand distinct skills in classroom management that facilitate DI, including time management, lesson planning, and the physical organization of the classroom.
- Provide guidance to teachers on the use of curricular materials that complement the core textbooks—such as basal readers and materials—as well as interactive electronic materials that can facilitate DI.
- Help teachers develop student profiles and tracking records so students can be tracked as they progress in their learning.
- Provide teachers and school directors with a task list for integrating DI into the classroom after they return to their schools following the workshop.

The manual for the E4K project includes such topics as: 1) personalized instruction; 2) classroom management to achieve DI; 3) classroom assessment to achieve DI; and 4) curricular materials to promote DI. The E4K project will conduct workshops and

trainings with teachers that introduce them to the methodology, help them understand the content in the manual, and build capacity to utilize the test and quiz results from the *SmartBooks* to guide their DI approach for students. Ultimately, teachers are expected to create leveled reading groups in their classroom to focus better on students' individual learning needs.

Although implementation of the E4K project was initially planned for the 2015/16 academic year in Cambodia (November 2015–June 2016), delays in the development of the *SmartBooks* content—including the completion of the content analysis, development of the readability formula, and leveling of the texts—made it necessary to postpone the project's implementation until the 2016/17 academic year.

III. Purpose

The E4K project seeks to improve Grade 2 and 3 students' reading proficiency in their mother tongue of Khmer. To understand if the program reaches this goal, a research study will be conducted to answer two key research questions specific to the E4K project:

1. Does access to electronic leveled readers via an app improve reading acquisition for Grade 2 and Grade 3 students in Cambodia public school classrooms?
2. Is there any increased effect on reading gains for students who also study with teachers using differentiated classroom literacy structures (i.e., differentiated instruction) while also having access to the electronic leveled-reader app?

IV. Evaluation Design and Methodology

To answer the questions determined under the E4K research framework, an EGRA will be conducted in two phases: a baseline assessment and an endline assessment. The research sample includes two intervention groups: intervention group A, in which students receive tablets with the *SmartBooks* app (component one), and intervention group A+B, in which students receive tablets with the *SmartBooks* app (component one) and their teachers receive instructional materials and a manual on DI (component two). By creating two intervention groups, the project can determine how much additional impact the DI teacher training component may have compared with only providing the technology-based component to students. The research design also includes a comparison group of students who will not receive any benefits from the project. Baseline and endline results will be analyzed across the two intervention groups and the comparison groups to determine any early reading skills attributable to the project or to its individual components.

Instrument Development

KAPE organized an EGRA adaptation workshop from November 2–6, 2015 with the goal of reviewing, revising, and adding components to an existing EGRA in Khmer,

which was developed in 2010 by MoEYS in collaboration with the World Bank. STS provided technical support during the workshop; MoEYS curriculum and literacy experts also participated as did technical experts from World Vision Cambodia and KAPE (see Annex B for the full adaptation workshop schedule).

As a result of the adaptation workshop and a pre-test of two non-intervention schools in Kampong Cham, significant changes were made to the earlier EGRA, including:

- Removing subtasks on syllable knowledge, phonemic awareness and diction;
- Aligning the oral reading with harder text subtask and comprehension with harder text subtask in to the overall oral reading and comprehension subtasks;
- Developing the nonword reading subtask and the ORF-sentences subtask;
- Revising items in the familiar word reading subtask; and
- Randomizing letters and subscripts.

The 2010 EGRA included ten subtasks. As a result of the adaptation workshop, the EGRA used in this project includes seven subtasks:

1. Letter name identification
2. Familiar word reading
3. Nonword reading
4. ORF-sentences
5. ORF-story
6. Reading comprehension
7. Listening comprehension

In addition to revising EGRA subtasks, the instrument was translated into English and was programmed into Tangerine[4] for administration on tablets during the workshop. This was the first time an electronic version of a Khmer-language EGRA instrument had been developed. The full EGRA instrument can be found in Annex A. The same instrument will be used at endline.

[4] Tangerine is an electronic data collection software designed for use on mobile computers, including netbooks, tablet computers and smartphones. Its primary use is to enable recording of students' responses in oral early grade reading and mathematics skills assessments, specifically EGRA and Early Grade Mathematics Assessment (EGMA), and interview responses from children, teachers and principals on home and school context information (http://tangerinecentral.org/).

Sample Construction

Figure 1: School Nomination Criteria

- Full Section School (i.e., includes Grades 1 to 6)
- No Multi-grade Classes
- No Contract Teachers in Grades 2 & 3
- Student to Teacher Ratio less than 50 to 1
- Library Facilities
- Strong Director with History of Innovation (specified and well documented)

The E4K research study population consists of 750 Grade 2 and 3 students from 15 schools in Kampong Cham Province. Schools were selected prior to the initial baseline data collection in November 2015. Originally, a research design with a simple random sampling of schools within the total provincial school population was proposed. However, given the small number of schools to be included in the project sample and the low quality of management in many Cambodian public schools, KAPE and STS agreed to randomly select 15 schools from a pre-selected list of well-managed schools from a total population of 798 primary schools in the province. Project managers believed that a minimum level of school management would help mitigate any confounding influences that might later undermine the fidelity of implementation. Thus, a purposive sampling strategy was used to identify all the well-managed schools in the province based on the standardized criteria laid out Figure 1.

As the first step in this purposive sampling strategy, the 15 district offices of education comprising the provincial school system were invited to nominate seven to eight well-managed schools using the criteria mentioned above. This led to the compilation of a list of 122 schools. District lists were then screened and validated by E4K staff members by cross-checking the data and reputations of schools with statistical yearbooks and other key informant sources (e.g., contacts in the Provincial Office of Education, KAPE project staff, etc.). In some cases, schools were visited when questions arose about their reputations. Following this screening process, a population of 90 well-managed schools was finalized and adopted. Next, 15 schools were chosen from this population using simple random sampling techniques. Similar simple randomization techniques were used to assign schools to intervention and comparison conditions (ten schools and five schools, respectively). A summary of the purposive sampling protocols is provided in Annex D.

Following the construction of the sample and the assignment of schools to intervention and comparison conditions, the project team turned to student selection. Among the randomly selected intervention and comparison schools, there was a student population of 2,337 children within the target grades. To reach the target number of students desired for the student sample—750 across intervention groups and grades[5]—students were randomly selected using random sample generator

[5] The target research sample size was suggested by STS based on their experience in other projects and represents about 32 percent of the student population, which ensures a 95 percent confidence level and a 2.95 percent confidence interval.

software. This was undertaken through a pure randomization process, though quotas were set by grade but not by gender or age. This resulted in the selection of 50 students from each school (i.e., 25 students per grade per school). A breakdown of the research sample by grade, gender, and intervention group is provided in Table 2. The sample was comprised of 48 percent boys and 52 percent girls. In addition, 50 percent of the sample was from Grade 2 and 50 percent from Grade 3.

Table 2: Total Number of Students Assessed by Intervention Group, Grade, and Gender

Intervention Group	Grade 2			Grade 3			Total: All Grades
	Boys	Girls	Total	Boys	Girls	Total	
A	58	64	122	53	72	125	247
A+B	68	57	125	62	63	125	250
Comparison	60	68	128	61	64	125	253
All Students	186	189	375	176	199	375	750

V. Fieldwork Preparation and Data Collection

Assessor Training

The first assessor training took place during November 10–14, 2015 in advance of the first baseline data collection. The training consisted of the following activities:

- Review the EGRA principles and gain a comprehensive understanding of the EGRA instrument components;
- Practice EGRA administration and scoring procedures;
- Practice conducting the EGRA on tablets;
- Become familiar with the roles and responsibilities of both supervisors and assessors in the field; and
- Undergo interrater reliability (IRR) administration and scoring evaluation.

Following the training, assessors piloted the Khmer EGRA instrument. The two best performing stories on both the reading and listening comprehension subtasks were selected to develop two forms of the EGRA.

An assessor refresher training took place from October 31 to November 1, 2016 prior to the second baseline data collection. Most of the assessors had been trained the previous year, and the activities conducted were similar to those from the first assessor training using the same agenda that KAPE conducted with input from STS. However, because many classrooms were occupied with activities associated with the beginning of the school year, organizers opted not to include in-school practice in this refresher training.

Interrater Reliability Test

Interrater reliability (IRR) is a measure of reliability used to assess the degree to which different assessors agree in assessment decisions. IRR tests ensure that the different assessors interpret answers in the same way. At least 90 percent consistency is considered the minimum requirement—meaning that at least 90 percent of assessors' ratings are consistent with the list of acceptable responses.

During the pre-test, initial, and refresher assessor trainings, IRR testing was conducted to ensure the reliability of scoring between assessors. Assessors achieved an average of 95 percent agreement with acceptable responses and scored higher during a second round of field testing (see Annex E).

Institutional Review Board for Human Participants[6]

Institutional review boards (IRBs) are responsible for ascertaining the acceptability of proposed research in terms of institutional commitments and regulations, applicable laws, standards of professional conduct and practice, and ethical and societal norms. The IRB examines subject recruitment procedures, proposed remuneration, and the informed consent process. An IRB also evaluates the potential risks and benefits to participants outlined in each protocol. Unfortunately, there are no institutional bodies either within or outside of the government that can perform the functions of an IRB in Cambodia.

This problem notwithstanding, KAPE, with Cambodia's national Primary Education Department, determined that the study would take place in accordance with Child Protection Policy rules adopted by KAPE and that the study should be approved and authorized by the Government of Cambodia. The Primary Education Department agreed with this proposal and provided a letter of authorization (see Annex F).

Data Collection

The operational data collection that will serve as the baseline for this project was conducted November 5–28, 2016.

VI. Data Analysis

Data Intervention and Analysis

Baseline EGRA data were analyzed using Stata and IBM SPSS Statistics software. Differences between the results of the intervention and comparison groups were tested for significance; where found, these differences were noted. Mean scores of multiple groups were compared using ANOVA, or analysis of variance, a statistical

[6] Following The Protection of Human Subjects in Research Supported by USAID, all ACR GCD projects sought human subjects approval through a local IRB to ensure there was minimal risk to the students participating in the interventions and associated assessments.

strategy that is used to analyze the differences between group means. Differences in the proportion of students who unable to answer a single item or question, known as zero scores, were compared using the chi-square test for significance.

Details on each subtask and analysis method are provided in Table 3.

Table 3: Subtask and Data Analysis Methods

Subtask	Type	Description
Letter name identification	Timed	Letter name identification is measured as correct letters named per minute (CLNPM). Letter name identification is a measure of alphabet knowledge and is highly predictive of later reading achievement. Each student had one minute to name up to 100 letters.
Familiar word reading	Timed	Familiar word reading is measured as correct familiar words read in one minute (CFWPM). Each student had the opportunity to read up to 50 words.
Nonword reading	Timed	Nonword reading is measured as correct "nonwords" read in one minute (CNWPM). Nonword Reading measures decoding. Each student had the opportunity to read up to 50 one and two syllable nonwords.
Oral reading fluency-sentences	Timed	ORF-sentences is measured as correct words read in one minute (CWPM). ORF is a decoding and reading fluency measure. Each student had the opportunity to read up to 55 words from eight unrelated sentences.
Oral reading fluency-story	Timed	ORF-story is measured as correct words read in one minute (CWPM). ORF is a decoding and reading fluency measure. Each student had the opportunity to read up to 82 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-story subtask. Each student had the opportunity to answer five factual questions.
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 questions based on a passage read to them by the assessor.

Considerations

Analysis of baseline data for all 15 schools indicated that the subtask results of students in the intervention groups (both A and A+B) were significantly higher than the results of students in the comparison group; this was true when data were analyzed across grades and by grade. This means that, based on baseline findings, students in the intervention groups had, on average, higher early grade reading skills than their peers in the comparison group at the start of the E4K project.

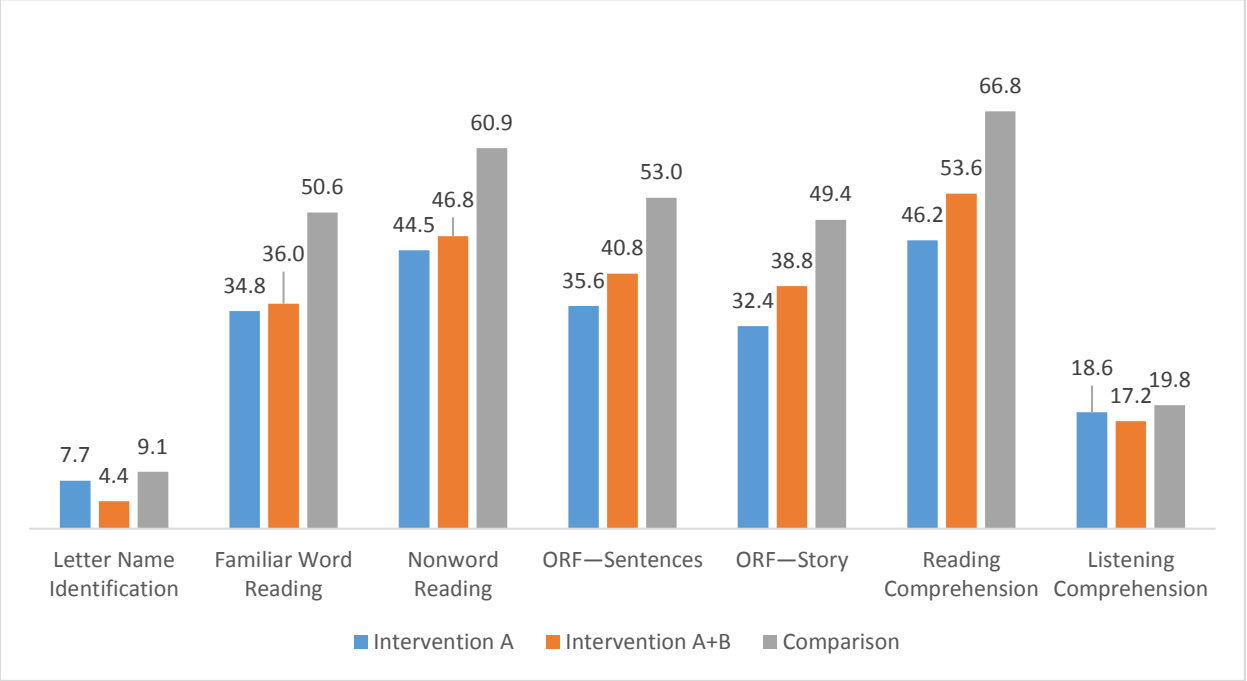
To best mitigate and account for this challenge when comparing baseline and endline results, the E4K team and STS will consider contextual factors that might have contributed to the baseline findings. Specifically, the team will review school-level

factors that were captured in the school selection criteria, including school size, teacher-pupil ratio, community engagement, and external support. Additional factors will be explored, such as school urbanicity, school academic standing, and family socio-economic status. Additional data will be collected from students through monitoring, fidelity of implementation surveys and the ACR GCD student questionnaire used to develop composite scores on key factors for student reading success.[7]

VII. Summary of Findings

Overall, the students participating in the E4K project have relatively high foundational pre-reading and reading comprehension skills, as can be seen in Figure 1. Students had the highest proportion of zero scores on the reading comprehension subtask and the lowest on the letter sound identification subtask. Across all subtasks, a higher proportion of students received zero scores in the comparison group than in either of the intervention groups.

Figure 1: Proportion of Students Receiving Zero Scores by Group (%)



VIII. Results by Intervention Group and Grade

This section presents detailed baseline results for each EGRA subtask by intervention group and grade. Results by gender can be found in Annex C. Each subsection contains a description of the subtask followed by the mean score on untimed subtasks

[7] Items from the student questionnaire are used in developing nine composite scores: language exposure, socio-economic status, parental literacy, family reading support, learning materials access, teacher reading support, disposition to reading, technology use, and engagement in program.

or mean fluency rate on timed subtasks, standard deviation (SD),[8] and number of zero scores.

Letter Name Identification

The letter name identification subtask measures students' knowledge of the alphabet and is predictive of later reading success. For this subtask, each student was presented with a stimulus of 100 letters and asked to read as many of the sounds as they could in one minute.[9] Results for this subtask are presented as a fluency rate per minute.

The mean fluency rates, reported as correct letters named per minute (CLNPM), are presented in Table 4. **On average, students correctly identified 26.5 letter names in one minute.** Students in intervention group A identified 29.8 CLNPM, students in intervention group A+B identified 27.5 CLNPM, and students in the comparison group identified 22.3 CLNPM. Within intervention groups, Grade 3 students correctly identified more letter sounds than Grade 2 students. However, Grade 2 students in intervention group A correctly identified more letter sounds than Grade 3 students in the comparison group, on average. Overall, students in the comparison group had significantly lower fluencies than students in their same grade in the intervention groups.

The proportion of students who received zero scores was highest in the comparison group, in which about nine percent of students were unable to identify a single letter sound correctly. When considering the students' grade, comparison group students also had the highest proportion of zero scores (about 13 percent in Grade 2 and nearly five percent in Grade 3). The proportion of students who received zero scores was lowest in intervention group A—about four percent overall, and about six percent and two percent for Grades 2 and 3, respectively.

Table 4: Letter Name Identification Fluency by Group and Grade

Group	Grade	N	Mean Fluency (CLSPM)	SD	Zero Scores (n)
Intervention A	Grade 2	122	24.4	17.1	14
	Grade 3	125	35.2	21.2	5
	Subtotal	247	29.8	19.1	19
Intervention A+B	Grade 2	125	22.8	15.9	8
	Grade 3	125	32.1	18.0	3
	Subtotal	250	27.5	17.0	11
Comparison	Grade 2	128	18.9	14.7	17
	Grade 3	125	25.6	16.2	6
	Subtotal	253	22.3	15.5	23
Total: All Students		750	26.5	17.2	53

[8] The standard deviation (SD) of the measure of interest—here, mean fluency rates—describes the spread between scores. Smaller SD values indicate that the majority of values lie close to the mean; larger SD values indicate that mean fluency rates varied and were more spread out.

[9] There is an auto stop rule in the timed EGRA subtasks. In this case, the test was discontinued if a student was unable to correctly name any of the first 10 letters on the stimulus.

Familiar Word Reading

Knowledge of familiar words and the ability to read them quickly enables a child to read with automaticity—a skill critical to learning to read with fluency and comprehension. In the familiar word reading subtask, students were presented with 50 familiar words[10] with diacritics and were asked to read as many as they could within one minute. The subtask was discontinued if a child was unable to name any of the first five familiar words correctly.

Results for the familiar word reading subtask are presented in Table 5. **On average, students correctly read 11 familiar words in one minute**, with the lowest fluency observed in the comparison group (7.5 CFWPM) and the highest in intervention group A (14.1 CFWPM). As with the letter sound identification subtask, the lowest fluencies by grade were observed in the comparison group (4.0 CFWPM in Grade 2 and 11.0 CFWPM in Grade 3). Regardless of group, students in Grade 3 had higher average fluencies on this subtask than students in Grade 2.

Overall, about 41 percent of students received zero scores on the familiar word reading subtask, with the highest proportion of students receiving zero scores in the comparison group—nearly 51 percent. The lowest proportion of Grade 2 students who received zero scores were in intervention group A+B (about 43 percent), and the lowest proportion of Grade 3 students receiving zero scores were in intervention group A (nearly 21 percent).

Table 5: Familiar Word Reading Fluency by Group and Grade

Group	Grade	N	Mean Fluency (CFWPM)	SD	Zero Scores (n)
Intervention A	Grade 2	122	7.7	10.6	60
	Grade 3	125	20.6	21.3	26
	Subtotal	247	14.1	15.9	86
Intervention A+B	Grade 2	125	6.4	9.4	54
	Grade 3	125	16.0	17.9	36
	Subtotal	250	11.2	13.7	90
Comparison	Grade 2	128	4.0	7.9	88
	Grade 3	125	11.0	12.4	40
	Subtotal	253	7.5	10.2	128
Total: All students		750	11.0	12.2	304

Nonword Reading

The nonword reading subtask is a measure of decoding ability that is designed to present children with words that they would not be able to recognize on sight through past encounters. Many children in the early grades learn to memorize or recognize a range of familiar words by sight alone. Thus, to assess students' decoding skills, they are presented with invented (nonsense) words which require them to sound out each letter and syllable to decode a word's pronunciation. In many respects, this is one of

[10] The words in this subtask were derived from frequently used words for the age group.

the most difficult subtasks in the test because it assesses students' decoding strategies and knowledge of language rules. Knowledge of letter classes in the Khmer language (i.e., voiced and unvoiced letters) and how vowel sounds change when used with different classes of letters are needed to give correct answers on this subtask. During this subtask, children were presented with 50 nonwords and asked to read as many as possible in one minute.

Results from the nonword reading subtask are presented in Table 6. Overall, fluency rates on this subtask were low. **Across groups, students could correctly decode an average of 5.6 nonwords per minute.** As with the previous subtasks, students in Grade 3 had higher average fluencies than students in Grade 2. The average fluency rates for students in the comparison group (3.7 CNWPM) were lowest across groups and across grades (2.3 CNWPM for Grade 2 and 5.0 CNWPM for Grade 3). The highest fluency rates were observed in intervention group A; Grade 2 students had an average fluency rate of 5.0 CNWPM and Grade 3 students had an average fluency rate of 9.1 CNWPM.

The average proportion of students receiving zero scores on the nonword reading subtask was just over 50 percent, with the highest proportion in the comparison group (about 61 percent) and the lowest in intervention group A (about 45 percent). Across grades, the comparison group also had higher proportions of students receiving zero scores than their peers in intervention groups A and A+B.

Table 6: Nonword Reading Fluency by Group and Grade

Group	Grade	N	Mean Fluency (CNWPM)	SD	Zero Scores
Intervention A	Grade 2	122	5.0	7.1	61
	Grade 3	125	9.1	11.9	49
	Subtotal	247	7.1	9.5	110
Intervention A+B	Grade 2	125	4.5	6.8	63
	Grade 3	125	7.5	10.3	54
	Subtotal	250	6.0	8.5	117
Comparison	Grade 2	128	2.3	5.0	93
	Grade 3	125	5.0	6.8	61
	Subtotal	253	3.7	5.9	154
Total: All students		750	5.6	8.0	381

Oral Reading Fluency-Sentences

The ORF-sentences subtask is a measure of overall reading competence.[11] Like the ORF-story subtask, the ORF-sentences subtask measures a student's ability to translate letters into sounds, unify sounds into words, process connections, relate text

[11] ORF-story is the generally accepted measure of correct words per minute according to EGRA toolkit guidance. ORF-sentences is not a standard subtask but was included in the E4K EGRA instrument to capture an additional measure of reading fluency prior to comprehension.

to meaning, and make inferences to fill in missing information.[12] A student's ORF score is dependent on the foundational skills in the previous subtasks since individuals need to have some mastery of letter sounds, phonics, and decoding strategies to read fluently. The research indicates that learning to read at a sufficient rate is essential for comprehension and to transition from "learning to read" to "reading to learn." In terms of the acquisition of literacy proficiency in the Khmer language, students are greatly challenged by the preponderance of vowels, consonants, subscripts, and special signs that they need to learn. Thus, students' reading performance can falter until the time that they fully master Khmer orthography rules. Only then can they read with both speed and accuracy. For this EGRA subtask, students were asked to read aloud 55 words in eight non-related sentences.

The results of this subtask are presented in Table 7. **On average, students correctly read 20.2 words per minute;** students in Grade 3 had higher fluency rates than students in Grade 2. The lowest fluency rates were observed among Grade 2 students in the comparison group; on average, they correctly read nearly seven words per minute compared to Grade 2 students in intervention groups A and A+B, who had fluency rates of 12.4 CWPM and 9.2 CWPM, respectively. Similarly, Grade 3 students in the comparison group correctly read fewer words per minute than their peers in the intervention groups.

Table 7: ORF-Sentences by Group and Grade

Group	Grade	N	Mean Fluency (CWPM)	SD	Zero Scores
Intervention A	Grade 2	122	12.4	19.7	58
	Grade 3	125	39.6	40.3	30
	Subtotal	247	26.0	30.0	88
Intervention A+B	Grade 2	125	9.2	17.6	63
	Grade 3	125	31.2	34.4	39
	Subtotal	250	20.2	26.0	102
Comparison	Grade 2	128	6.9	17.6	85
	Grade 3	125	22.3	27.4	49
	Subtotal	253	14.6	22.5	134
Total: All students		750	20.2	26.2	324

The proportion of students receiving zero scores for the ORF-sentences subtask was slightly higher than those on the familiar word reading subtask—about 43 percent on ORF-sentences compared with nearly 41 percent on familiar word reading**.** Again, more students in the comparison group across grades were unable to read a single word on this subtask correctly.

[12] Hasbrouck, J., & Tindal, G. A. (2006). Oral reading fluency norms: A valuable assessment tool for reading teachers. International Reading Association, 636–644.

Oral Reading Fluency-Story

ORF-story is perhaps the strongest predictor of reading comprehension. Along with skills like decoding and vocabulary, ORF-story is a strong predictor of comprehension because a certain amount of automaticity is required so that the reader can store what is read in working memory. If a student reads too slowly, he or she may be unable to remember all the words in a sentence and thus not understand the story's meaning. For the ORF-story subtask, the assessor provided each student with a story of 82 words to read in one minute.

Results for the ORF-story subtask are presented in Table 8. **On average, students read 19.4 CWPM, and students in Grade 3 had higher fluencies than students in Grade 2.** Students in intervention group A had an average fluency of 25.0 CWPM, while students in intervention group A+B had an average fluency of 19.2 CWPM. Students in the comparison group had the lowest fluency across groups and correctly read, on average, 14.1 words per minute. Across groups, students had slightly lower fluencies on the ORF-story subtask than on the ORF-sentences subtask.

Table 8: ORF-Story by Group and Grade

Group	Grade	N	Mean Fluency (CWPM)	SD	Zero Scores
Intervention A	Grade 2	122	13.6	20.2	57
	Grade 3	125	36.3	34.7	23
	Subtotal	247	25.0	27.5	80
Intervention A+B	Grade 2	125	10.0	16.9	60
	Grade 3	125	28.3	30.2	37
	Subtotal	250	19.2	23.5	97
Comparison	Grade 2	128	7.4	16.2	86
	Grade 3	125	20.8	22.9	39
	Subtotal	253	14.1	19.5	125
Total: All students		750	19.4	23.5	302

The total number of students receiving zero scores on the ORF-story subtask was 302 out of 750, or about 40 percent. The proportion of students receiving zero scores was lower in Grade 3 than in Grade 2 and lowest in intervention group A—onlyabout 32 percent of students were unable to read a single word correctly. The highest proportion of students receiving zero scores occurred in the comparison group where nearly half of students were unable to read a single word correctly. Zero scores on this subtask were slightly lower than on the ORF-sentences subtask.

Reading Comprehension

Comprehension is the purpose of reading. Once a child learns the sound-letter relationship (alphabetic principle) and decodes and reads with automaticity, he or she becomes increasingly able to understand the meaning of a text. This subtask assesses that ability.

For the reading comprehension subtask, the assessor removed the story from the ORF-story subtask, then asked each student up to five comprehension questions based on what they read. The number of questions students were asked dependens on how many words they read on the ORF-story subtask. For instance, if a student read the first ten words of the ORF-story passage, he or she would be asked the first comprehension question. Similarly, if a student read all 82 words, he or she would be asked all five questions. Students who received zero scores on the ORF subtask received a zero score on the reading comprehension subtask.

In cases where children could not demonstrate oral reading fluency, no questions were asked. The zero scores in Table 9, therefore, reflect two types of students: students who read too little of the passage to be asked a single comprehension question and students who read enough to be asked as least one comprehension question but answered incorrectly.

Results for the reading comprehension subtask are presented in Table 9. **On average, students correctly answered about 0.8 reading comprehension question**. Students from intervention group A answered the most questions on average (1.0), while students in the comparison group answered the least number of questions on average (0.6). The proportion of students who received zero scores was highest on this subtask; **nearly 57 percent of students were unable to answer correctly a single reading comprehension question.**

Table 9: Reading Comprehension Score by Group and Grade

Group	Grade	N	Mean Score (Number of Questions Correct)	SD	Zero Scores
Intervention A	Grade 2	122	0.5	0.8	76
	Grade 3	125	1.5	1.4	38
	Subtotal	247	1.0	1.3	114
Intervention A+B	Grade 2	125	0.4	0.7	88
	Grade 3	125	1.2	1.2	46
	Subtotal	250	0.8	1.1	134
Comparison	Grade 2	128	0.3	0.7	109
	Grade 3	125	0.9	1.1	60
	Subtotal	253	0.6	0.9	169
Total: All students		750	0.8	1.1	417

Table 10 shows the percentage of students in the sample who correctly answered reading comprehension questions. In intervention group A+B and the comparison group, a majority of students were unable to answer a single reading comprehension question correctly. In intervention group A, about two percent of students correctly answered all five reading comprehension questions.

Table 10: Number of Reading Comprehension Questions Answered Correctly by Group

Questions Answered Correctly	Intervention A		Intervention A+B		Comparison		Total	
	N	%	N	%	N	%	N	%
0	114	46	134	54	169	67	417	56
1	70	28	62	25	41	16	173	23
2	30	12	27	11	28	11	85	11
3	18	7	21	8	13	5	52	7
4	10	4	5	2	2	1	17	2
5	5	2	1	0	0	0	6	1
Total	247	100	250	100	253	100	750	100

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 that prevent them from learning to read, such as limited language proficiency, auditory problems, attention deficit, or other difficulties. In this subtask, the assessors read a short passage to the student and asked him or her to answer three comprehension questions about the passage.

Table 11: Listening Comprehension Score by Group and Grade

Group	Grade	N	Mean Score (Number of Questions Correct)	SD	Zero Scores
Intervention A	Grade 2	122	1.0	0.9	36
	Grade 3	125	1.5	0.8	10
	Subtotal	247	1.3	0.9	46
Intervention A+B	Grade 2	125	1.1	0.9	32
	Grade 3	125	1.6	0.8	11
	Subtotal	250	1.3	0.9	43
Comparison	Grade 2	128	1.2	1.0	38
	Grade 3	125	1.5	0.9	12
	Subtotal	253	1.3	1.0	50
Total: All students		750	1.3	0.9	139

Results of the listening comprehension subtask are presented in Table 11. **Out of a set of three, students could, on average, answer 1.3 listening comprehension questions correctly.** Scores were relatively consistent across intervention groups; students in both intervention groups A and A+B and the comparison group answered an average of 1.3. This is the only subtask that the comparison group scored the same than either intervention group.

Results in Table 11 and 12 indicate that zero scores were less frequent on the listening comprehension subtask than on other subtasks. **Across groups, 19.0 percent of students could not answer any listening comprehension questions correctly**, and

this rate of frequency was relatively consistent across all intervention groups. Between 40 and 45 percent of students across intervention groups could answer at least one question correctly while about another third (26 to 32 percent) could answer at least two questions correctly. Only about 10 percent of the sample could answer all three questions correctly.

Table 12: Number of Listening Comprehension Questions Answered Correctly by Group

Questions Answered Correctly	Intervention A		Intervention A+B		Comparison		Total	
	N	%	N	%	N	%	N	%
0	46	19	43	17	50	20	139	19
1	110	45	104	42	101	40	315	42
2	71	29	80	32	67	26	218	29
3	20	8	23	9	35	14	78	10
Total	247	100	250	100	253	100	750	100

IX. Conclusions and Recommendations

Following the baseline EGRA testing, the E4K project will conduct regular monitoring of project implementation over the remaining life of the project. The two intervention arms of the project will run simultaneously over the course of one school year. The project will then determine if app usage can contribute to greater gains in students' reading proficiency than changes in classroom practice alone (i.e., using differentiated instruction techniques). Because the assessor training and data collection administration of the baseline assessment established acceptable levels of interrater reliability as well as test item reliability, the credibility of findings has increased.

Preparations for the baseline data collection in this study broke new ground by reformulating the EGRA test earlier developed by Ministry and transferring it to an electronic form. To do so, the E4K project used *Tangerine* software to facilitate electronic data collection. These changes enabled a more accurate administration of the EGRA allowing timing and auto-stop procedures as well as standardized data collection of student information. It also assigned randomized student IDs, thereby ensuring anonymity of the participants, per child protection guidelines observed by KAPE. With the close participation of MoEYS officials in the process, there is now a greater understanding of how to create high-quality EGRA subtasks, how to build best practices in electronic data capture, and the importance of and methods to measure IRR among assessors. These lessons could contribute to the greater adoption of electronic EGRA data collection for other MoEYS needs related to reading assessment in the early grades.

In all, the Khmer language EGRA utilized seven reading subtasks including the introduction of nonword decoding, which is a new section on the test. It should also

be noted that stakeholders opted to continue to include the ORF-sentences subtask as an intermittent subtask between decoded and passage reading. This is not a standard subtask but one that met stakeholders' needs.

The analysis of test scores among the various intervention conditions provided reasonable measures of central tendency, variance, and incidence of students receiving zero scores. These measures will allow for better monitoring of future impacts on reading proficiency among students in the sample. An endline EGRA will be administered in June 2017 to determine the extent of change, if any, in reading proficiency within and between all intervention groups, including various demographic groupings such as gender and grade level.

Recommendations

1. Students in the sample showed the ability to decode letter names with much higher fluency than reading passages. They also showed a greater ability to read familiar words rather than to decode the combined sounds in the nonword reading subtask. It will be important for the E4K project to use *SmartBooks* and the differentiated instruction strategies to address these early reading strategies by scaffolding the students' current needs with the curriculum-aligned books. Without proper support, students who couldn't read a single word of the story may be left behind.

2. Because student levels differ, the E4K project should track *SmartBooks* usage per student and assess progress periodically throughout the project, when possible. Students who are just learning to read require different support than those who are readers improving their fluency.

3. EGRA results at baseline indicate that students in the intervention groups are different than those in the comparison group, which may cause challenges in assessing the true impact of the E4K project on reading gains. The KAPE team should rigorously collect fidelity of implementation data, monitoring data, and contextual data from schools and students throughout the project. High quality and consistent supplementary data on project implementation may help mitigate the challenges presented by the sample selection.

X. ANNEXES

ANNEX A: BASELINE EGRA INSTRUMENT

Early Grade Reading Assessment (EGRA) Version A Final

Enumerator Name:
Date:
Time:
ID:
School Location:
School Name:

Consent Form

It is important to **read aloud slowly and clearly ONLY the bold sections in the gray boxes.**
Always record the child's response before moving on to the next instruction or exercise.

It is important to establish a playful and relaxed environment with the children to be assessed using simple initial conversation among topics of interest to the student (see example below). The student should perceive the following assessment almost as a game to be enjoyed rather than an exam or severe situation.

Hello, my name is …… And I live in …… I want to tell you about myself (family member, favorite, number of friends and etc.)
1. Tell me your name. *[Student gives name]. [Student name]* **tell me a little about yourself and your family.** [*Wait for response; if the student is reluctant, ask question no. 2, but if they seem comfortable continue to verbal consent*].
2. What do you like to do when you are not in school?

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

Let me tell you why I am here today. We are trying to understand how children learn to read. We would like your help in this. But you do not have to take part if you do not want to. We are going to play reading games. I am going to ask you to read letters, words and a short story aloud. Using a timer, I will see how long it takes you to read. This game takes about 20 to 30 minutes. This is NOT a test, and it will not affect your grade at school. Once again, you do not have to participate if you do not wish to. Once we begin, if you would rather not answer a question, that is all right. Do you have any questions? Are you ready to get started?
(If verbal consent is not obtained, thank the student and move on to the next child, using this same form.)

Student Information

1. Sex ☐Male ☐Female
2. What is your name? (Full name)
3. How old are you?
4. Can you tell me about your birthdate? (DD/MM/YYYY)
5. What grade are you in? (Example: 2, 3)
6. What class are you in? (Example: A, B)

Letter Name Version A (Knowledge of Alphabet)

Show the child the sheet of letters in the student stimuli booklet. Say:
Show students the list of letters in the Khmer Alphabet. Tell them the list contains consonants, vowels, and independent vowels. Ask the students, "Please read as many items as possible in the time allowed."

For example, the name of this letter *[point to ឋ (vô)]* **is "*ឋ (vô)*" not "(var)" or "letter *ឋ (vô)*."**

Let's practice: Tell me the name of this letter *[point to ◌ (a)]:*

If the child responds correctly say: **Good.**
If the child does not respond correctly, say: **The name of this letter is "◌ (a)"**

Now try another one: Tell me the name of this letter *[point to ◌ (ŭ)]:*

If the child responds correctly say: **Good.**
If the child does not respond correctly, say: **The name of this letter is "◌ (ŭ)"**

Do you understand what you are to do?

When I say "Begin," please name out the letters as best as you can. Tell me the name of the letters, starting here and continuing this way. *[Point to the first letter on the row after the example and draw your finger across the first line].* **I will keep quiet and listen to you. Ready? Begin**.

Consonant	Consonant	Consonant	Consonant	Consonant	Consonant	Consonant	Dependent vowel	Consonant	Consonant
ល	ន	ឈ	ច	អ	ភ	ខ	é	ឈ	ភ
Consonant	Consonant	Consonant	Dependent Vowel	Consonant	Dependent vowel	Consonant	Consonant	Independent vowel	Consonant
ព	ឃ	ល	e A	ឈ	H	ឧ	ក	ឱំ	ព
Dependent vowel	Consonant	Dependent vowel	Indepen-dent Vowel	Dependent vowel	Consonant	Dependent vowel	Consonant	Consonant	Consonant
E a H	ជ	H	ឧ	e O	ឋ	e I	ង	ណ	ប
Consonant	Dependent vowel	Consonant	Dependent Vowel	Consonant	Consonant	Consonant	Dependent vowel	Dependent vowel	Consonant
ឋ	E o	គ	E	ថ	ត	ត	E a H	é	ឧ
Consonant	Consonant	Consonant	Consonant	Consonant	Consonant	Consonant	Consonant	Consonant	Dependent vowel
ដ	ទ	ម	ធ	គ	ស	ញ	ឈ	ទ	e
Consonant	Dependent vowel	Consonant	Consonant	Dependent vowel	Consonant	Consonant	Consonant	Consonant	Consonant
រ	e A	ថ	ញ	e O	ឃ	រ	ស	ឃ	ប
Dependent vowel	Dependent vowel	Indepen-dent vowel	Indepen-dent vowel	Consonant	Consonant	Consonant	Consonant	Consonant	Consonant
e o	E	ឮ	ឪ	ឡ	ក	អ	ហ	ច	ង

Indepen-dent vowel	Consonant	Consonant	Consonant	Consonant	Dependent vowel	Dependent vowel	Consonant	Consonant	Consonant
ឱ	រ	ធ	ជ	ន	a	u H	ឆ	ឆ	ណ
Dependent vowel	Independe nt vowel	Independe nt vowel	Dependent Vowel	Consonant	Dependent vowel	Dependent vowel	Dependent vowel	Consonant	Independe nt vowel
e a	ឱ	ឬ	e H	ផ	e	e H	a	ផ	ឯ
Consonant	Consonant	Consonant	Dependent Vowel	Consonant	Consonant	Consonant	Dependent vowel	Dependent vowel	Consonant
ម	រ	ខ	e a	ដ	ឃ	ឡ	u H	e	ហ

Time Remaining

Autostop? ☐

Familiar Word Reading Version A

Show the child the sheet of words in the student stimuli booklet. Say:
Tells the student: Here is the list of words. Please to read the whole word. You must read the words without spelling them out. Please read as many items as possible in the time allowed.

For example, the word *[point to ឆ្នា (cat)]* **must be read "ឆ្នា (cat)" only, not "ក ួ ា (c… a… t)"**

Let's practice: Tell me this word *[point to ផ្សារ (market)]:*

If the child responds correctly say: **Good.**
If the child does not respond correctly, say: **This word is "ផ្សារ (market)"**

Now try another one: This word *[point to ពួក (they)]:*

If the child responds correctly, say: **Good.**
If the child does not respond correctly, say: **This word is "ពួក (they)"**

Do you understand what you are to do?

When I say "Begin," please tell me the words, starting here and continuing this way. *[Point to the first word on the row after the example and draw your finger across the first line].* **I will keep quiet and listen to you. Ready? Begin**.

Word with Three Syllables	One Syllable	Two Syllables	Two Syllables	Two Syllables
គ្រូបង្រៀន	លី	កុមារ	ជំនួយ	ការងារ
One Syllable	Two Syllables	Two Syllables	Two Syllables	One Syllable
ទុំ	បុគ្គលិក	ទាហាន	វប្បធម៌	ញុំ
One Syllable	Two Syllables	Three Syllables	Two Syllables	Two Syllables
គូរ	ឆេវឆាវ	អាកាសចរណ៍	ទំនេរ	សាលា
Two Syllables	One Syllable	Three Syllables	Two Syllables	One Syllable

កាំបិត	ល្បែង	ប្រពៃណី	អាកាស	គំនូរ
One Syllable	Two Syllables	Three Syllables	One Syllable	Three Syllables
ជុំ	ឫស្សី	សន្តិភាព	ទៅ	មន្ទីរពេទ្យ
One Syllable	One Syllable	Two Syllables	Two Syllables	Two Syllables
កោះ	ម្ទេស	សាងសង់	សុខភាព	ថែទាំ
One Syllable	Two Syllables	Two Syllables	One Syllable	Three Syllables
ម្សៅ	គំនិត	រ៉ាយរ៉ាប់	ជិះ	បណ្ណាល័យ
Two Syllables	Two Syllables	Two Syllables	Three Syllables	One Syllable
អំណាន	សៀវភៅ	ព្យាយាម	មាតុភូមិ	ចេះ
One Syllable	One Syllable	Two Syllables	One Syllable	One Syllable
ពោះ	ស្រែ	គ្រួសារ	ខោ	ផ្ទះ
One Syllable	One Syllable	One Syllable	Three Syllables	One Syllable
ដេរ	ដើរ	គោ	ថែរក្សា	ម៉ែ

Time Remaining

Autostop? ☐

Nonsense Word Reading Version A

Show the child the sheet of nonsense words in the student stimuli booklet. Say:
Tells the student: Here is the list of nonsense words. Please read the whole word. You must read the nonsense words without spelling them out. Please read as many items as possible in the time allowed. For example, the nonsense word *[point to ឆ្មេស (chmes)]* **must be read "ឆ្មេស (chmes)" only, not "ក ឩ ១ ស (c…h…m…e…s)"**

Let's practice: Tell me this word *[point to ង៉ុស (ngosh)]:*

If the child responds correctly say: **Good.**
If the child does not respond correctly, say: **This word is "ង៉ុស (ngosh)"**

Now try another one: This word *[point to ថ្ងូ (thaou)]:*

If the child responds correctly say: **Good.**
If the child does not respond correctly, say: **This word is "ថ្ងូ (thaou)"**

Do you understand what you are to do?

When I say "Begin," please tell me the nonsense words, starting here and continuing this way. *[Point to the first nonsense word on the row after the example and draw your finger across the first line].* **I will keep quiet and listen to you. Ready? Begin**.

Nonsense Word with One Syllable	Two Syllables	One Syllable	One Syllable	Two Syllables
ង៉ុ	តតាយ	ផ្ទ៉ា	ង្ឆែ	កាប៉ាត
Two Syllables	One Syllable	Two Syllables	One Syllable	Two Syllables

ដំឡៅ	ដាញ់	ផឡា	ក្បប	សសៅ
Two Syllables	One Syllable	One Syllable	Two Syllables	One Syllable
កំណិត	ខ្សែ	ខែស	រតិល	ងឿត
One Syllable	One Syllable	One Syllable	One Syllable	One Syllable
ខៀ	គិ	កីស	ជើច	គួង
One Syllable	Two Syllables	One Syllable	Two Syllables	One Syllable
ឈិស	ហូហែត	ញ៉ែប	កាផៅ	ថ្ន
One Syllable	One Syllable	Two Syllables	One Syllable	Two Syllables
ខឿង	ចូស	គីឡាញ	ឃ្ន	រឡែត
One Syllable	Two Syllables	Two Syllables	Two Syllables	One Syllable
ឈុក	ដែដាល	អាហាញ	ចំណែ	ម៉ែន
Two Syllables	One Syllable	Two Syllables	One Syllable	One Syllable
ជ្រៀច	ខ្ទុះ	លំណាំង	ហាំ	ឆែល
One Syllable	One Syllable	One Syllable	Two Syllables	One Syllable
ញឿ	តាញ់	ច្រឿង	ទេម៉ា	ផ្អែ
One Syllable	Two Syllables	Two Syllables	Two Syllables	Two Syllables
លូស	ឈេច្ចូ	មមឹង	ឈន់ធា	អំណែច

Time Remaining

Autostop? ☐

Oral Reading Fluency Sentences A

Show the child the sheet of sentences in the student stimuli booklet. Say:

Here is the list of sentences. Please read the whole sentence as many as possible in the time allow. For example, សិស្សទៅសាលាម្តង។ (Student goes to school.)

Let's practice: Please repeat this sentence again.
If the child responds correctly say: **Good.**
If the child does not respond correctly, say: **This sentence is "សិស្សទៅសាលាម្តង។ (Student goes to school.)"**

Do you understand what you are to do?

When I say "Begin," please read the sentence, starting here and continuing this way. *[Point to the first nonsense word on the row after the example and draw your finger across the first line].* **I will keep quiet and listen to you. Ready? Begin**.

បូណាទទួលរាក់ទាក់មិត្តយ៉ាងរីករាយ។

(Bona show her friend hospitality and happily.) (6 words in Khmer)

ត្រីរ៉ស់ហែលដេញគ្នាក្នុងទឹកបឹង។

(Rors Fish are chasing each other in the lake.) (7 words in Khmer)

វាលស្រែភូមិយើងមានពណ៌ខៀវស្រងាត់។

(Rice field in our village are lush green.) (7 words in Khmer)

សិស្សកំពុងអានសៀវភៅក្នុងបណ្ណាល័យ។

(Students are reading the book in the library.) (6 words in Khmer)

សុខ ផឹកទឹកឆៅទើបវាឈឺពោះ។

(Sok drank unsafe water then he has a stomach ache.) (8 words in Khmer)

សុភីភ្ញាក់ពីដំណេករួចទៅហាត់ប្រាណ។

(Sophy gets up and does the exercise.) (8 words in Khmer)

សាលារៀនខ្ញុំ ជាសាលាកុមារមេត្រី។

(My school is a child-friendly school.) (6 words in Khmer)

ខ្ញុំគោរព ស្រឡាញ់ម្តាយឪពុកខ្ញុំណាស់ ។

(I adore my parents). (7 words in Khmer)

Time Remaining

Autostop? ☐

Oral Reading Fluency Story A

Show the child the story in the student stimuli booklet. Say:
Here is a short story. I want you to read it aloud. When you have finished, I will ask you some questions about what you have read. Do you understand what you are to do? When I say "begin," read the story as best as you can. I will keep quiet and listen to you. Ready? Begin.

ថ្ងៃមួយ សុភីបានទូលស្វាយទុំមួយល្អីទៅលក់ឯផ្សារ។

មកដល់ពាក់កណ្តាលផ្លូវ នាងបានឈប់សម្រាក។ ស្វាក៏លួចស៊ីស្វាយអស់ប្លន់ប្រាំ។

សុភីទៅមុខក៏ជួបគោ គោក៏លួចស៊ីស្វាយទុំវាអស់ខ្លះទៀត។ នាងទៅមុខទៀតជួបសេះ

សេះក៏លួចស៊ីស្វាយទុំរហូតអស់ពីល្អី។សុភីទៅមុខទៀតក៏ឃើញដំរីមួយផ្អើលបុកដើម ក្រូច។

សុភីភ័យណាស់ ហើយបន្តដំណើរដល់ផ្សារ។

សុភីដាក់ល្អីចុះស្រាប់តែលាន់មាត់៖"អូ! ផ្លែក្រូច!ម៉ែចG'ៀចឹង!"។

One upon the time, Sophy carried a basket of mangos on the head to sell at the market.

She took a rest on the halfway then monkey stole four or five mangos to eat. When Sophy moved on the way, she met a cow, and cow also stole some mangos to eat. After she had moved forward, she met a horse, and horse also stole the rest of mangos to eat. When Sophy moved on the way, she saw the elephant crush the orange three. She was really frightened then went straight to the market.
When Sophy put the basket down, she exclaimed "Oh! It is orange!".
(Story in the Khmer language have 8 sentences and 82 words)

Time Remaining

Autostop? ☐

Reading Comprehension Story A

Now I am going to ask you a few questions about the story you just read. Try to answer the questions as well as you can. Ready? Begin.

1. What did Sophy take to sell in the market when she left the house? (Possible Answer: Mango/ Mangos/ Ripe Mango)
   ☐Correct ☐Incorrect ☐No Answer
2. What did happen when Sophy took a rest on the halfway? (Possible Answer: Monkey stole mangos/ Monkey ate Mangos/ Monkey ate four or five mangoes)
   ☐Correct ☐Incorrect ☐No Answer
3. What animals did it steal mangos besides monkey? (Possible Answer: Cow/ Horse/ Cow and Horse)
   ☐Correct ☐Incorrect ☐No Answer
4. Why was Sophy frightened? (Possible Answer: fear elephant/ fear elephant crush/ fear elephant step on)
   ☐Correct ☐Incorrect ☐No Answer
5. Did Sophy know that animal stole her mangos? Why? (Possible Answer: No Because she surprised when she put the basket down in the market)
   ☐Correct ☐Incorrect ☐No Answer

Listening Comprehension Story A

Please tells the student: **I will read a text, and you must listen carefully. After I have finished reading, I will ask questions, and you must answer the question**. **Ready? Begin**.

Sok and Dara are close friends. They are six years old. They always play with each other every day. Once day Sok saw Dara go to school, then he asks his mother to school too. After that, they are happy to go to school together.

1. What is the relation between Sok and Data? (Possible Answer: Friend/ Close Friend/ Classmate)
   ☐Correct ☐Incorrect ☐No Answer
2. Why did Sok go to school? (Possible Answer: Sok ask his mother/ Sok want to study/ want to study)
   ☐Correct ☐Incorrect ☐No Answer
3. Why are Sok and Dara happy? (Possible Answer: go to school/ go to school together)
   ☐Correct ☐Incorrect ☐No Answer

ANNEX B: EGRA ADAPTATION WORKSHOP AGENDA

Date	Activity
Mon., Nov 2	Overview of the existing tool, selection of subtasks, begin revision and development of nonword, ORF passages, listening comprehension.
Tues., Nov 3	Continue revising the subtasks as a group for final inclusion in the EGRA.
Wed., Nov 4	Review and finalization of all subtasks; Administration Procedures, Pilot-Testing Prep; Tangerine training
Thurs., Nov 5	Pilot-testing of EGRA instrument; debriefing session and instrument revision
Fri., Nov 6	Presentation of Pre-Test results to MoEYS and other stakeholders

ANNEX C: BASELINE EGRA RESULTS BY GROUP, GRADE, AND GENDER

Distribution of gender by group

Intervention Type	Male		Female		Total	
	N	%	N	%	N	%
Intervention A	111	44.9%	136	55.1%	247	100.0%
Intervention A+B	130	52.0%	120	48.0%	250	100.0%
Comparison	121	47.8%	132	52.2%	253	100.0%
Total	362	48%	388	52%	750	100.0%

Descriptive statistics of the age of the student by group

Intervention Type	N	Mean	SD	Range
Intervention A	241	8.05	1.30	6-13
Intervention A+B	248	7.91	1.22	6-12
Comparison	245	8.16	1.09	6-13
Total	734	8.04	1.21	6-13
Missing Value N:16				

Distribution of grade by group

Intervention Type	Grade 2		Grade 3		Total	
	N	%	N	%	N	%
Intervention A	122	49.4%	125	50.6%	247	100.0%
Intervention A+B	125	50.0%	125	50.0%	250	100.0%
Comparison	128	50.6%	125	49.4%	253	100.0%
Total	375	50%	375	50%	750	100.0%

Letter Name Identification

Number of letters attempted by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	38.7	17.5	10	94
Intervention A+B	250	37.0	15.2	10	93
Comparison	253	33.1	14.3	10	74
Total	750	36.25	15.65	10	94

Letter name identification fluency by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	29.9	20.0	0	84
Intervention A+B	250	27.5	17.6	0	80
Comparison	253	22.2	15.8	0	69
Total	750	26.5	18.1	0	84

Letter name identification fluency by gender

Sex	N	Mean	SD	Min	Max
Male	362	24.9	17.1	0	84
Female	388	28.0	18.9	0	80
Total	750	26.5	18.1	0	84

Letter name identification fluency by grade

Grade	N	Mean	SD	Min	Max
Grade 2	375	22.0	16.0	0	76
Grade 3	375	31.0	18.9	0	84
Total	750	26.5	18.1	0	84

Letter Name Fluency by Intervention Group and Gender

Intervention Group	Gender	N	Mean (CLNPM*)	SD	Zero scores
Intervention Group A	Boys	111	28.4	19.44	9
	Girls	136	31.1	20.36	10
Subtotal		247	29.77	19.90	19
Intervention Group A+B	Boys	130	23.8	16.09	11
	Girls	120	31.5	18.29	0
Subtotal		250	27.65	17.19	11
Comparison Group	Boys	121	22.8	15.57	8
	Girls	132	21.7	16.09	15
Subtotal		253	22.24	15.83	23
Sample Total		**750**	**26.55**	**17.64**	**53**

*Correct Letters Per Minute

Proportion of non-reader by group

Intervention Type	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Intervention A	228	92.3%	19	7.7%	247	100.0%
Intervention A+B	239	95.6%	11	4.4%	250	100.0%
Comparison	230	90.9%	23	9.1%	253	100.0%
Total	697	93%	53	7%	750	100.0%

Proportion of non-reader by gender

Sex	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Male	334	92.3%	28	7.7%	362	100.0%
Female	363	93.6%	25	6.4%	388	100.0%
Total	697	93%	53	7%	750	100.0%

Proportion of non-reader by Grade

Grade	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Grade 2	336	89.6%	39	10.4%	375	100.0%
Grade 3	361	96.3%	14	3.7%	375	100.0%
Total	697	93%	53	7%	750	100.0%

Familiar Word Reading

Number of words attempted by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	20.5	15.0	5	50
Intervention A+B	250	18.1	13.5	5	50
Comparison	253	15.3	12.8	5	50
Total	750	17.98	13.77	5	50

Familiar words fluency by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	14.2	18.0	0	79
Intervention A+B	250	11.2	15.1	0	85
Comparison	253	7.5	10.9	0	67
Total	750	10.9	15.1	0	85

Familiar words fluency by Gender

Sex	N	Mean	SD	Min	Max
Male	362	8.2	11.9	0	71
Female	388	13.5	17.3	0	85
Total	750	10.9	15.1	0	85

Familiar words fluency by Grade

Grade	N	Mean	SD	Min	Max
Grade 2	375	6.0	9.4	0	64
Grade 3	375	15.9	18.0	0	85
Total	750	10.9	15.1	0	85

Familiar Word Reading Fluency by Intervention Group and Gender

Group	Gender	N	Mean (CLPM)	SD	Zero scores
Intervention Group A	Boys	111	11.4	15.00	46
	Girls	136	16.5	19.91	40
Subtotal		247	13.97	17.45	86
Intervention Group A+B	Boys	130	7.1	10.60	62
	Girls	120	15.7	17.71	28
Subtotal		250	11.39	14.15	90
Comparison Group	Boys	121	6.3	9.16	65
	Girls	132	8.5	12.30	63
Subtotal		253	7.40	10.73	128
Sample Total		**750**	**10.92**	**14.11**	**304**

Proportion of non-reader by group

Intervention Type	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Intervention A	161	65.2%	86	34.8%	247	100.0%
Intervention A+B	160	64.0%	90	36.0%	250	100.0%
Comparison	125	49.4%	128	50.6%	253	100.0%
Total	446	59%	304	41%	750	100.0%

Proportion of non-reader by Gender

Sex	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Male	189	52.2%	173	47.8%	362	100.0%
Female	257	66.2%	131	33.8%	388	100.0%
Total	446	59%	304	41%	750	100.0%

Proportion of non-reader by Grade

Grade	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Grade 2	173	46.1%	202	53.9%	375	100.0%
Grade 3	273	72.8%	102	27.2%	375	100.0%
Total	446	59%	304	41%	750	100.0%

Nonword Reading

Number of nonwords attempted by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	15.0	12.0	5	50
Intervention A+B	250	13.0	9.9	5	50
Comparison	253	11.1	8.8	5	44
Total	750	13.06	10.25	5	50

Nonword fluency by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	7.1	10.0	0	47
Intervention A+B	250	6.0	8.8	0	54
Comparison	253	3.7	6.1	0	29
Total	750	5.6	8.3	0	54

Nonword fluency by gender

Sex	N	Mean	SD	Min	Max
Male	362	4.4	6.4	0	36
Female	388	6.7	10.1	0	54
Total	750	5.6	8.3	0	54

Nonword fluency by Grade

Grade	N	Mean	SD	Min	Max
Grade 2	375	3.9	6.4	0	41
Grade 3	375	7.2	10.0	0	54
Total	750	5.6	8.2	0	54

Nonword Reading Fluency by Intervention Group and Gender

Group	Gender	N	Mean (CWPM)	SD	Zero scores
Intervention Group A	Boys	111	6.1	7.90	47
	Girls	136	7.9	11.47	63
Subtotal		247	7.00	9.68	110
Intervention Group A+B	Boys	130	4.2	5.83	65
	Girls	120	7.9	10.91	52
Subtotal		250	6.07	8.37	117
Comparison Group	Boys	121	3.1	5.16	74
	Girls	132	4.2	6.84	80
Subtotal		253	3.64	6.00	154
Sample Total		**750**	**5.57**	**8.02**	**381**

Proportion of non-reader by group

Intervention Type	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Intervention A	137	55.5%	110	44.5%	247	100.0%
Intervention A+B	133	53.2%	117	46.8%	250	100.0%
Comparison	99	39.1%	154	60.9%	253	100.0%
Total	369	49%	381	51%	750	100.0%

Proportion of non-reader by gender

Sex	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Male	176	48.6%	186	51.4%	362	100.0%
Female	193	49.7%	195	50.3%	388	100.0%
Total	369	49%	381	51%	750	100.0%

Proportion of non-reader by Grade

Grade	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Grade 2	158	42.1%	217	57.9%	375	100.0%
Grade 3	211	56.3%	164	43.7%	375	100.0%
Total	369	49%	381	51%	750	100.0%

ORF-Sentences

Number of words attempted by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	25.4	19.4	6	55
Intervention A+B	250	22.3	18.6	6	55
Comparison	253	19.2	17.4	6	55
Total	750	22.31	18.49	6	55

Oral Sentence Reading fluency by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	26.1	34.6	0	141
Intervention A+B	250	20.2	29.4	0	162
Comparison	253	14.5	24.2	0	108
Total	750	20.2	30.0	0	162

Oral Sentence Reading fluency by gender

Sex	N	Mean	SD	Min	Max
Male	362	15.1	24.4	0	132
Female	388	25.0	33.7	0	162
Total	750	20.2	30.0	0	162

Oral Sentence Reading fluency by grade

Grade	N	Mean	SD	Min	Max
Grade 2	375	9.4	18.4	0	105
Grade 3	375	31.0	35.1	0	162
Total	750	20.2	30.0	0	162

Oral Sentence Reading Fluency by Intervention Group and Gender

Group	Gender	N	Mean (CWPM)	SD	Zero scores
Intervention Group A	Boys	111	21.0	29.54	43
	Girls	136	30.3	37.80	45
Subtotal		247	25.67	33.67	88
Intervention Group A+B	Boys	130	13.0	21.68	64
	Girls	120	27.9	34.37	38
Subtotal		250	20.47	28.03	102
Comparison Group	Boys	121	11.8	20.92	68
	Girls	132	16.9	26.73	66
Subtotal		253	14.37	23.83	134
Sample Total		**750**	**20.17**	**28.51**	**324**

Proportion of non-reader by group

Intervention Type	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Intervention A	159	64.4%	88	35.6%	247	100.0%
Intervention A+B	148	59.2%	102	40.8%	250	100.0%
Comparison	119	47.0%	134	53.0%	253	100.0%
Total	426	57%	324	43%	750	100.0%

Proportion of non-reader by gender

Sex	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Male	187	51.7%	175	48.3%	362	100.0%
Female	239	61.6%	149	38.4%	388	100.0%
Total	426	57%	324	43%	750	100.0%

Proportion of non-reader by grade

Grade	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Grade 2	169	45.1%	206	54.9%	375	100.0%
Grade 3	257	68.5%	118	31.5%	375	100.0%
Total	426	57%	324	43%	750	100.0%

ORF-Story

Number of words attempted by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	31.3	23.7	11	82
Intervention A+B	250	26.8	21.0	11	82
Comparison	253	23.6	18.1	11	82
Total	750	27.22	20.94	11	82

Oral Story Reading fluency by group

Intervention Type	N	Mean	SD	Min	Max
Intervention A	247	25.1	30.6	0	129
Intervention A+B	250	19.2	26.1	0	132
Comparison	253	14.0	20.8	0	85
Total	750	19.4	26.4	0	132

Oral Story Reading fluency by gender

Sex	N	Mean	SD	Min	Max
Male	362	14.8	21.5	0	110
Female	388	23.7	29.8	0	132
Total	750	19.4	26.4	0	132

Oral Story Reading fluency by grade

Grade	N	Mean	SD	Min	Max
Grade 2	375	10.3	18.0	0	96
Grade 3	375	28.5	30.2	0	132
Total	750	19.4	26.4	0	132

Oral Story Reading Fluency by Intervention Group and Gender

Group	Gender	N	Mean (CLPM)	SD	Zero scores
Intervention Group A	Boys	111	20.6	26.22	43
	Girls	136	28.7	33.44	37
Subtotal		247	24.68	29.83	80
	Boys	130	12.6	19.22	61

Intervention Group A+B	Girls	120	26.3	30.39	36
Subtotal		250	19.44	24.80	97
Comparison Group	Boys	121	11.7	17.65	66
	Girls	132	16.2	23.24	59
Subtotal		253	13.94	20.45	125
Sample Total		**750**	**19.36**	**25.03**	**302**

Proportion of non-reader by group

Intervention Type	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Intervention A	167	67.6%	80	32.4%	247	100.0%
Intervention A+B	153	61.2%	97	38.8%	250	100.0%
Comparison	128	50.6%	125	49.4%	253	100.0%
Total	448	60%	302	40%	750	100.0%

Proportion of non-reader by gender

Sex	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Male	192	53.0%	170	47.0%	362	100.0%
Female	256	66.0%	132	34.0%	388	100.0%
Total	448	60%	302	40%	750	100.0%

Proportion of non-reader by grade

Grade	Reader		Non-Reader		Total	
	N	%	N	%	N	%
Grade 2	172	45.9%	203	54.1%	375	100.0%
Grade 3	276	73.6%	99	26.4%	375	100.0%
Total	448	60%	302	40%	750	100.0%

Reading Comprehension

Number of good answers by group

No of correct answers	Intervention Type							
	Intervention A		Intervention AB		Comparison		Total	
	N	%	N	%	N	%	N	%
0	114	46%	134	54%	169	67%	417	56%
1	70	28%	62	25%	41	16%	173	23%
2	30	12%	27	11%	28	11%	85	11%
3	18	7%	21	8%	13	5%	52	7%
4	10	4%	5	2%	2	1%	17	2%
5	5	2%	1	0%	0	0%	6	1%
Total	247	100%	250	100%	253	100%	750	100%

Number of good answers by grade

No of correct answers	Grade 2	Grade 3	Total

	N	%	N	N	Total	Total
0	273	73%	144	38%	417	56%
1	70	19%	103	27%	173	23%
2	19	5%	66	18%	85	11%
3	12	3%	40	11%	52	7%
4	1	0%	16	4%	17	2%
5	0	0%	6	2%	6	1%
Total	375	100%	375	100%	750	100%

Listening Comprehension

Number of good answers by group

	Intervention Type							
	Intervention A		Intervention AB		Comparison		Total	
	N	%	N	%	N	%	N	%
0	46	19%	43	17%	50	20%	139	19%
1	110	45%	104	42%	101	40%	315	42%
2	71	29%	80	32%	67	26%	218	29%
3	20	8%	23	9%	35	14%	78	10%
Total	247	100%	250	100%	253	100%	750	100%

Number of good answers by gender

Score of Answers	Male		Female		Total	
	N	%	N	%	N	%
0	80	22%	59	15%	139	19%
1	152	42%	163	42%	315	42%
2	98	27%	120	31%	218	29%
3	32	9%	46	12%	78	10%
Total	362	100%	388	100%	750	100%

Number of good answers by grade

Score of Answers	Grade 2		Grade 3		Total	
	N	%	N	%	N	%
0	106	28%	33	9%	139	19%
1	152	41%	163	43%	315	42%
2	86	23%	132	35%	218	29%
3	31	8%	47	13%	78	10%
Total	375	100%	375	100%	750	100%

Item Statistics

Letter Name Identification

Reliability Statistics

Cronbach's Alpha	N of Items
.973	100

Item	Mean	Corrected Item-Total Correlation
LNA_1	.772	.579
LNA_2	.699	.616
LNA_3	.431	.570
LNA_4	.885	.454
LNA_5	.824	.530
LNA_6	.699	.625
LNA_7	.871	.397
LNA_8	.477	.534
LNA_9	.649	.604
LNA_10	.689	.622
LNA_11	.823	.531
LNA_12	.779	.579
LNA_13	.776	.545
LNA_14	.509	.579
LNA_15	.647	.627
LNA_16	.432	.576
LNA_17	.388	.540
LNA_18	.879	.424
LNA_19	.381	.584
LNA_20	.789	.567
LNA_21	.531	.514
LNA_22	.677	.638
LNA_23	.393	.561
LNA_24	.396	.604
LNA_25	.479	.572
LNA_26	.408	.569
LNA_27	.453	.662
LNA_28	.624	.652
LNA_29	.563	.700
LNA_30	.605	.686
LNA_31	.392	.677
LNA_32	.372	.667
LNA_33	.505	.705
LNA_34	.379	.728
LNA_35	.409	.770
LNA_36	.443	.731
LNA_37	.428	.728
LNA_38	.309	.727
LNA_39	.289	.714
LNA_40	.241	.702
LNA_41	.316	.731
LNA_42	.305	.734
LNA_43	.292	.740
LNA_44	.260	.751
LNA_45	.272	.709
LNA_46	.255	.722
LNA_47	.229	.728
LNA_48	.180	.686
LNA_49	.215	.712
LNA_50	.176	.687
LNA_51	.176	.692
LNA_52	.145	.669
LNA_53	.140	.654
LNA_54	.141	.663
LNA_55	.107	.616
LNA_56	.107	.600
LNA_57	.095	.582
LNA_58	.084	.565
LNA_59	.075	.553
LNA_60	.073	.556
LNA_61	.060	.515
LNA_62	.059	.513
LNA_63	.045	.483
LNA_64	.032	.402
LNA_65	.040	.468
LNA_66	.036	.460
LNA_67	.035	.454
LNA_68	.033	.449
LNA_69	.031	.434
LNA_70	.031	.434
LNA_71	.021	.345
LNA_72	.020	.334
LNA_73	.020	.334
LNA_74	.017	.334
LNA_75	.015	.326
LNA_76	.013	.313
LNA_77	.007	.218
LNA_78	.009	.268
LNA_79	.008	.248
LNA_80	.005	.211
LNA_81	.004	.193
LNA_82	.004	.193
LNA_83	.003	.161
LNA_84	.003	.161
LNA_85	.003	.161
LNA_86	.003	.161
LNA_87	.003	.161
LNA_88	.001	.114
LNA_89	.001	.114
LNA_90	.001	.114
LNA_91	.001	.114
LNA_92	.001	.114
LNA_93	.003	.053
LNA_94	.001	.114
LNA_95	0.000	0.000
LNA_96	0.000	0.000
LNA_97	0.000	0.000
LNA_98	0.000	0.000
LNA_99	0.000	0.000
LNA_100	0.000	0.000

Familiar Word Reading

Cronbach's Alpha	N of Items
.978	50

	Mean	Corrected Item-Total Correlation
WordA_1	.271	.740
WordA_2	.456	.584
WordA_3	.517	.677
WordA_4	.249	.537
WordA_5	.515	.679
WordA_6	.533	.633
WordA_7	.047	.500
WordA_8	.152	.697
WordA_9	.031	.431
WordA_10	.457	.688
WordA_11	.423	.641
WordA_12	.159	.587
WordA_13	.069	.504
WordA_14	.424	.719
WordA_15	.465	.704
WordA_16	.379	.699
WordA_17	.303	.737
WordA_18	.265	.751
WordA_19	.333	.768
WordA_20	.327	.761
WordA_21	.347	.784
WordA_22	.231	.788
WordA_23	.084	.548
WordA_24	.297	.799
WordA_25	.201	.792
WordA_26	.249	.807
WordA_27	.201	.796
WordA_28	.164	.763
WordA_29	.181	.764
WordA_30	.176	.805
WordA_31	.141	.791
WordA_32	.139	.782
WordA_33	.037	.463
WordA_34	.119	.747
WordA_35	.125	.794
WordA_36	.124	.788
WordA_37	.128	.775
WordA_38	.107	.769
WordA_39	.084	.702
WordA_40	.096	.734
WordA_41	.081	.699
WordA_42	.084	.721
WordA_43	.073	.691
WordA_44	.072	.676
WordA_45	.071	.662
WordA_46	.065	.654
WordA_47	.063	.661
WordA_48	.060	.648
WordA_49	.057	.636
WordA_50	.056	.592

Nonword Reading

Cronbach's Alpha	N of Items
.957	50

	Mean	Corrected Item-Total Correlation
NonWordA_1	.413	.578
NonWordA_2	.221	.684
NonWordA_3	.187	.561
NonWordA_4	.245	.527
NonWordA_5	.157	.574
NonWordA_6	.220	.620
NonWordA_7	.280	.593
NonWordA_8	.280	.632
NonWordA_9	.156	.490
NonWordA_10	.297	.684
NonWordA_11	.247	.633
NonWordA_12	.279	.645
NonWordA_13	.169	.530
NonWordA_14	.152	.572
NonWordA_15	.173	.630
NonWordA_16	.179	.614
NonWordA_17	.173	.591
NonWordA_18	.149	.623
NonWordA_19	.112	.631
NonWordA_20	.143	.656
NonWordA_21	.080	.606
NonWordA_22	.111	.663
NonWordA_23	.109	.687
NonWordA_24	.112	.713
NonWordA_25	.085	.656
NonWordA_26	.091	.721
NonWordA_27	.091	.663
NonWordA_28	.067	.636
NonWordA_29	.057	.627
NonWordA_30	.057	.655
NonWordA_31	.060	.667
NonWordA_32	.055	.627
NonWordA_33	.044	.585
NonWordA_34	.036	.547
NonWordA_35	.040	.623
NonWordA_36	.028	.601
NonWordA_37	.019	.495
NonWordA_38	.024	.527
NonWordA_39	.023	.543
NonWordA_40	.016	.511
NonWordA_41	.016	.495
NonWordA_42	.016	.489
NonWordA_43	.013	.486
NonWordA_44	.015	.455
NonWordA_45	.012	.463
NonWordA_46	.011	.446
NonWordA_47	.007	.337
NonWordA_48	.012	.451
NonWordA_49	.005	.326
NonWordA_50	.007	.320

ORF-Sentences

Reliability Statistics

Cronbach's Alpha	N of Items
.991	55

	Mean	Corrected Item-Total Correlation
ORFSA_1	.549	.674
ORFSA_2	.429	.715
ORFSA_3	.185	.710
ORFSA_4	.356	.800
ORFSA_5	.424	.770
ORFSA_6	.385	.831
ORFSA_7	.159	.463
ORFSA_8	.443	.750
ORFSA_9	.296	.647
ORFSA_10	.400	.774
ORFSA_11	.440	.806
ORFSA_12	.472	.759
ORFSA_13	.451	.792
ORFSA_14	.384	.820
ORFSA_15	.377	.826
ORFSA_16	.424	.813
ORFSA_17	.431	.821
ORFSA_18	.328	.823
ORFSA_19	.355	.835
ORFSA_20	.231	.738
ORFSA_21	.363	.871
ORFSA_22	.355	.871
ORFSA_23	.363	.873
ORFSA_24	.359	.881
ORFSA_25	.352	.893
ORFSA_26	.311	.877
ORFSA_27	.283	.802
ORFSA_28	.311	.890
ORFSA_29	.313	.896
ORFSA_30	.292	.884
ORFSA_31	.231	.856
ORFSA_32	.263	.886
ORFSA_33	.260	.889
ORFSA_34	.245	.887
ORFSA_35	.241	.857
ORFSA_36	.224	.866
ORFSA_37	.244	.895
ORFSA_38	.231	.877
ORFSA_39	.237	.895
ORFSA_40	.228	.862
ORFSA_41	.197	.850
ORFSA_42	.196	.849
ORFSA_43	.199	.845
ORFSA_44	.199	.845
ORFSA_45	.199	.847
ORFSA_46	.199	.847
ORFSA_47	.195	.840
ORFSA_48	.187	.833
ORFSA_49	.180	.827
ORFSA_50	.168	.803
ORFSA_51	.169	.810
ORFSA_52	.161	.794
ORFSA_53	.159	.787
ORFSA_54	.156	.780
ORFSA_55	.156	.783

ORF-Story

Reliability Statistics

Cronbach's Alpha	N of Items
.990	82

	Mean	Corrected Item-Total Correlation
ORFA_1	.560	.637
ORFA_2	.480	.678
ORFA_3	.548	.654
ORFA_4	.285	.514
ORFA_5	.443	.708
ORFA_6	.549	.660
ORFA_7	.293	.690
ORFA_8	.509	.668
ORFA_9	.423	.723
ORFA_10	.436	.745
ORFA_11	.435	.745
ORFA_12	.435	.730
ORFA_13	.225	.773
ORFA_14	.371	.781
ORFA_15	.461	.731
ORFA_16	.485	.717
ORFA_17	.395	.762
ORFA_18	.289	.791
ORFA_19	.265	.668
ORFA_20	.375	.753
ORFA_21	.307	.753
ORFA_22	.363	.816
ORFA_23	.345	.808
ORFA_24	.345	.831
ORFA_25	.316	.806
ORFA_26	.329	.801
ORFA_27	.309	.832
ORFA_28	.309	.828
ORFA_29	.268	.795
ORFA_30	.287	.846
ORFA_31	.265	.820
ORFA_32	.299	.855
ORFA_33	.292	.855
ORFA_34	.259	.834
ORFA_35	.225	.849
ORFA_36	.249	.861
ORFA_37	.241	.857
ORFA_38	.233	.862
ORFA_39	.221	.871
ORFA_40	.203	.840
ORFA_41	.200	.864
ORFA_42	.200	.861
ORFA_43	.183	.849
ORFA_44	.179	.845
ORFA_45	.191	.867
ORFA_46	.187	.867
ORFA_47	.181	.858
ORFA_48	.177	.863
ORFA_49	.177	.863
ORFA_50	.163	.848
ORFA_51	.139	.823
ORFA_52	.141	.821
ORFA_53	.144	.832
ORFA_54	.139	.821
ORFA_55	.139	.829
ORFA_56	.136	.825
ORFA_57	.129	.806
ORFA_58	.124	.791
ORFA_59	.129	.814
ORFA_60	.128	.811
ORFA_61	.112	.767
ORFA_62	.083	.684
ORFA_63	.092	.726
ORFA_64	.089	.707
ORFA_65	.087	.718
ORFA_66	.081	.700
ORFA_67	.083	.706
ORFA_68	.080	.698
ORFA_69	.075	.681
ORFA_70	.075	.683
ORFA_71	.068	.653
ORFA_72	.075	.685
ORFA_73	.069	.665
ORFA_74	.068	.659
ORFA_75	.067	.655
ORFA_76	.065	.650
ORFA_77	.059	.618
ORFA_78	.056	.606
ORFA_79	.053	.593
ORFA_80	.049	.569
ORFA_81	.047	.553
ORFA_82	.043	.530

Reading Comprehension

Reliability Statistics

Cronbach's Alpha	N of Items
.687	5

	Mean	Corrected Item-Total Correlation
CQ1	.4320	.484
CQ2	.1907	.645
CQ3	.1173	.569
CQ4	.0387	.407
CQ5	.0173	.286

Listening Comprehension

Reliability Statistics

Cronbach's Alpha	N of Items
.340	3

	Mean	Corrected Item-Total Correlation
LCA_01	.7227	.161
LCA_02	.3320	.202
LCA_03	.2587	.219

ANNEX D: PROTOCOLS FOR SCHOOL SELECTION

Protocols for School Selection under E-books for Khmer (E4K) Programming

Kampong Cham Province, Cambodia

1. PURPOSE

KAPE has agreed to develop a rigorous quasi-experimental research design that will enable the project to make valid conclusions and generalizations about the impact of various aspects of the E4K program model. There are two key interventions that will be assessed in this regard including: (i) Differentiated Classroom Literacy Structures and (ii) Basal Readers expressed in Electronic Form (i.e., e-Books). The proposed design calls for a sample of schools chosen by simple random sampling. However, KAPE has expressed concerns about such an approach because (i) the sample will be very small (only 15 schools including controls) and (ii) the low quality of management in most Cambodian public schools may arise as a confounding factor that undermines impacts.

In order to address these concerns, KAPE and *All Children Reading* have agreed that the population of schools from which the school sample is to be chosen will include only the best-managed schools in Kampong Cham and Tbong Khmum Provinces.[13] In all, there are 798 state primary schools in both provinces; the project expects to identify a sub-population of approximately 100 to 150 well-managed schools within the total population of public primary schools.

2. CONTEXT DESCRIPTION

There are 17 administrative districts in Kampong Cham and Tbong Khmum Provinces with 798 primary schools as noted above. KAPE will include 15 districts in its efforts to build a population of well-managed schools. Ou Reang Ov and Steung Trong Districts are deemed as too poorly managed to participate, and there have been many problems with nearly all of the schools in those districts. Each district has approximately 25 to 50 schools within their jurisdiction(s). Of these schools, District Offices of Education will be asked to nominate seven to eight schools or about 120 schools based on criteria to be provided to them.

3. CRITERIA FOR THE NOMINATION OF SCHOOLS

In making their determination to nominate a school for participation in the E4K project, DOE Directors will be provided with a list of criteria to consider in addition to the requirement that the school director has credible and reliable management. These criteria

[13] When this award was made to KAPE in 2014 by ACR GCD, the proposed implementation site was Kampong Cham Province only. Since that time, the Cambodian government has recently divided Kampong Cham into two separate provinces known as Kampong Cham (west of the Mekong River) and Tbong Khmum Province (east of the Mekong River).

relate to situational variables that provide maximal conditions for implementation of interventions and include such things as school size, teacher assignments, the availability of library services and other factors. A short explanation of each of these criteria is provided in Box 1. Each school will be provided with a special form to complete that explains these criteria and asks whether the school is compliant or not (see School Nomination Form attached). In particular, DOEs will need to indicate the innovations that school management at various schools has undertaken, which validates the assessment that they are well-managed. When reviewing school nominations, E4K may eliminate schools that it determines do not meet stated criteria. In all, E4K seeks to create a population of at least 100 well-managed schools.

Box 1: School Nomination Criteria

- School of Medium Size (300-500 Students)
- Full Section School (Grades 1 to 6)
- No Multi-grade Classes
- No Double Shift Teachers
- No Contract Teachers
- Student Teacher Ratio less than 40 to 1
- Majority of Teachers (75% or more) Have a 10+2 Background or better
- Library Facilities Available
- Director or Vi Director Not Teaching
- Strong Director with History of Innovation (these should be specified)

The deadline for school nomination should be 31 July 2015.

4. KEY POINTS TO BE EXPLAINED TO DISTRICT OFFICES OF EDUCATION

When meeting with District Offices of Education, the following points should be explained:

- ***Purpose:*** To determine whether electronic readers that are leveled according to students' reading ability are effective in improving reading scores.
- ***How This Purpose Will be Achieved:*** The project will create a research design that will require the designation of 10 treatment schools and 4 control schools. The assignment of schools to a specific condition will be done impartially and in a way that reflects baseline scores of each school.
- ***Investments That Will Be Made in Each Treatment School:*** DOEs should understand that all treatment schools will receive investments in furniture, classroom, design, and teacher training. There will be five schools that will also receive investments in tablets for student use.
- ***Control School Benefits:*** Following the completion of the research design, Control Schools will receive investments in teaching aids that will be provided by TTS.
- ***Target Grades:*** The project will focus on Grades 2 and 3 only as these are the grades where the MoEYS has created new readers upon which the e-Books are

based.

- ***Time Frame:*** The pilot will last for one year starting in November 2015 and ending in August 2016.
- ***Key Activities:*** All schools will undergo baseline testing at the start of the year in Grades 2 and 3. There will also be a midline assessment and a post-test. Interventions will start early in the school year.

These points may be explained either verbally or through a PowerPoint presentation.

5. STEPS IN IMPLEMENTATION

The following steps have been identified for undertaking the school sample construction process. These include the following:

Nomination Process

Step 1: Meet with all DOEs in a general meeting at the Provincial Office of Education. This will require meeting with the POE to get clearance to access the DOEs at their monthly meeting. Otherwise, E4K will need to organize a special meeting for DOEs in a separate venue.

Step 2: Explain to DOEs the purpose and parameters of the E4K project, what the project is trying to demonstrate, and why it needs their assistance. Pass out nomination forms for each of the schools that they would like to nominate for participation in the project.

Step 3: Follow up with any DOEs that may be late in submitting nomination forms.

Step 4: Review nominated schools submitted by DOEs. Eliminate any schools that do not conform to the criteria or justify exceptions as needed if the school has a well-established reputation but does not meet a certain criterion.

School Selection Process

Step 5: Cross-validate the nomination of finalized school lists received from each District Office of Education. This may be done by discussing the school's background with the respective Provincial Offices of Education, KAPE staff from other projects, or the staff from other agencies. For schools where it is not possible to cross-validate in this way, it may be necessary for E4K staff to visit the school and make a direct assessment. Schools that do not meet stated criteria should be eliminated from the final list of nominated schools. A column has been provided in the School Nomination Form for E4K Staff to check whether the school meets the criteria agreed or provide comments. At the bottom of the nomination form, the individual checking the form should indicate his or her name and provide an assessment as to whether the nomination can be validated by indicating "Nomination Validated."

Step 6: Finalize school nominations by compiling all schools into a single final list (see

form attached). The goal is to create a population of at least 100 well-managed schools across the two provinces.

Step 7: Assign each school in the nominated list a three digit number starting with 001, 002, etc.

Step 8: Choose 15 schools using a process of simple random sampling. This may be done either through SPSS or using a Table of Computer-generated Random Numbers.

School Condition Assignment Process

Step 9: Administer baseline EGRA tests to all 15 schools.

Step 10: Match schools together based on a process of Propensity Match Scoring.

School Nomination Form

E-books for Khmer Project

The District Office of Education, Youth, and Sport of _____ would like to nominate _____PS for participation in the E-books for Khmer Project. We have reviewed the criteria requested by the project and find this school to be worthy of consideration based on its strong level of management and other situational variables that comply with project criteria. The particulars of this school are provided in the form below:

Name of School Director: _____ Telephone Number: _____

Commune Name: _____

Criteria	***Provided Information***	***For Project Use Only***
1. *Total Enrolment*	_____	
2. *Total Number of Teachers*	_____	
3. *Pupil Teacher Ratio*	_____	
4. *Has Grades 1 to 6*	☐ Yes ☐ No	
5. *Has Multi-grade Classes*	☐ Yes ☐ No	
6. *Has Double Shift Teachers*	☐ Yes ☐ No If Yes, which grades: Grade 1 2 3 4 5 6 *(Please Circle the appropriate grade)*	
7. *Has Contract Teachers*	☐ Yes ☐ No If Yes, which grades: Grade 1 2 3 4 5 6 *(Please Circle the appropriate grade)*	
8. *How many teachers have 10+2 backgrounds or higher?*	_____	
9. *School has library facilities*	☐ Yes ☐ No	
10. *Does the Director and/or Vice Director have to teach at this school?*	☐ Yes ☐ No	
11. *How would you rate the management capacity of the School Director at this*	☐ Very Strong	

Criteria	*Provided Information*	*For Project Use Only*
school?	☐ Strong ☐ Medium	
12. *How would you rate the management capacity of the School Vice Director at this school?*	☐ Very Strong ☐ Strong ☐ Medium ☐ No Vice Director at this school	
13. *Overall, how would you rate the teachers at this school?*	☐ Better than most schools ☐ About the same as most schools ☐ Worse than most schools	
14. *How would you rate the involvement of communities and parents involved in school?*	☐ Better than most schools ☐ About the same as most schools ☐ Worse than most schools	
15. *Does the school have access to electricity?*	☐ Yes ☐ No	
16. *Does the school receive assistance from NGOs or others donors?*	☐ Yes ☐ No If yes, please specify: ……... …… ……	
17. *Does the school agree to support the implementation from E-Book for Khmer (E4K) Project of KAPE?*	☐ Yes ☐ No	
18. *Please cite some outstanding things that the school director has achieved at this school.* • _____ _____ • _____ _____ • _____ _____		

Prepared by:

Signature: _____

Name: _____

Approved by:

Signature: _____

Name: _____

	___		____
Position:	_____	*Position:*	_____
	___		____
Date:	_____	*Date:*	_____
	__		_

For Project Use Only	
Form Checked by:	
Nomination Assessment:	

Final List of Nominated Schools

Running Number	Nominated School Name	District	Commune
001			
002			
003			
004			
005			
006			
007			
009			
010			
011			
012			
013			
014			
015			
016			
017			
018			
019			
020			
021			
022			
023			
024			
025			
	ADD MORE LINES AS NECESSARY		

ANNEX E: INTERRATER RELIABILITY

No	Enumerator	LNA	FWA	NWA	ORSFA	ORF	RCA	LCA	Average
1	Kamtola	96%	94%	93%	89%	90%	100%	100%	95%
2	Khy	92%	100%	97%	100%	99%	100%	100%	98%
3	Kimheang	59%	94%	90%	98%	98%	100%	100%	91%
4	Krel	94%	92%	87%	98%	96%	100%	100%	95%
5	Leakna	94%	97%	97%	98%	100%	100%	100%	98%
6	Sareth	94%	100%	93%	98%	98%	100%	100%	98%
7	Sopha	88%	100%	90%	98%	98%	100%	100%	96%
	Total	**88%**	**97%**	**92%**	**97%**	**97%**	**100%**	**100%**	**96%**

ANNEX F: LETTER OF AUTHORIZATION

Kingdom of Cambodia

Nation Religion King

Phnom Penh, December 07th, 2015

Mr. Soa Vanna
Executive Director

Kampuchean Action for Primary Education
Provincial Teacher Training College of Kampong Cham,
Kampong Cham Town, Kampong Cham Province

Re: Request for your kindly approval on the using of revised Early Grade Reading Assessment (EGRA) and project implementation in 10 schools in Kampong Cham Province and Tbong Khmum Province.

Reference: Letter of Request Approval from KAPE on December 03rd, 2015
Letter of E4K Project Working Group on October 20th, 2015

Dear Mr.Vanna,

On behalf of Primary Education Department, Ministry of Education, Youth and Sport, we would like to inform you that we have reviewed the E-books for Khmer (E4K) project research designs, instruments, protocols and the revised Early Grade Reading Assessment (EGRA) which implemented by Kampuchean Action for Primary Action and funded by All Children Reading team, including USAID, World Vision, and the Australian government.

According to your request, we think that it has no negative effect on the study involvement from students, teachers, school directors and parents, or community members. We hereby appreciate to authorize the implementation these school's interventions in Kampong Cham and Tbong Khmum provinces in order to improve the reading outcomes for students in grade 2 and grade 3.

We recognize that these activities will provide the value added to the Ministry on national studies and testing and it is the innovative interventions to improve the reading outcomes for student in grade 2 and grade 3.

Sincerely,

CHAN SOPHEA

•**Head Offices:** Provincial Teacher Training College of Kampong Cham, Kampong Cham Town, Kampong Cham Province.
Mailing Address: PO Box1621, P. Penh Post Office, **Tel:** (855)42 941 481; 941 918 ; **E-mail:** kape@kapekh.org ; www.kapekh/new.org.
•**Sub-Office:** House#57, Street 302, Sangkat Boeung Kengkong 1, Khan Chamcarmon, Phnom .Penh, Kingdom of Cambodia.
Mailing address:P.O Box:2643; Tel:(855)23 215 053; 215 058

For KAPE USE/Government