

Ghana iREAD Study²⁰¹²⁻²⁰¹⁴ (iREAD 2)

Final Evaluation November 2014



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Acronyms

AusAID Australian Agency for International Development

BECE Basic Education Certificate Education

CSR Corporate Social Responsibility

CWPM Correct Words per Minute

EGRA Early Grade Reading Assessment

GES Ghana Education Service

ICT4D Information and Communication Technologies for Development

ICT4E Information and Communication Technologies for Education

MDGs Millennium Development Goals

MoE Ministry of Education

NALAP National Literacy Acceleration Program

NEA Ghana's 2013 National Education Assessment

NGO Non-Governmental Organization

iREAD 1 Ghana iREAD Study (2011-2012)

iREAD 2 Ghana iREAD Study (2013 - 2014)

SMC School Management Committee

USAID US Agency for International Development



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1. Executive Summary

Background: Literacy is a foundational skill that sets up children for lifelong success. Unfortunately, few children in sub-Saharan Africa have access to even the most basic tools they need to learn to read, including contextually and linguistically relevant books and reading materials. At the same time, advances in technology have unlocked solutions to battle resource scarcity and inequity in ways that were unimaginable even a decade ago.

To support global efforts to fight illiteracy the United States Agency for International Development (USAID), the Australian Agency for International Development (AusAid) and Worldreader partnered to issue a Grand Challenge to the global development community: find a way to help kids read better using sustainable, affordable and innovative solutions that can be rolled out quickly, to prevent another generation from being stuck in a cycle of illiteracy.

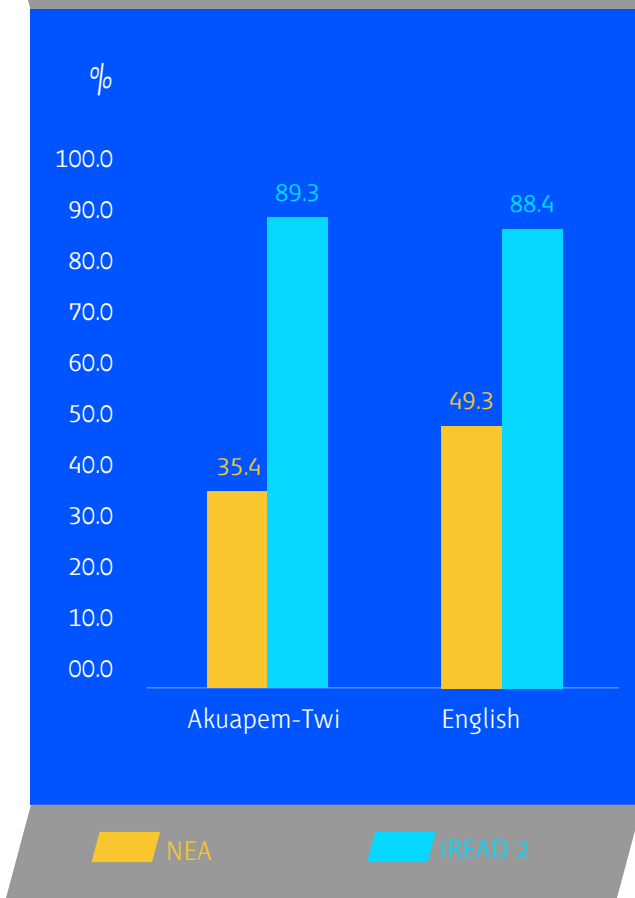
Worldreader accepted this challenge with the iREAD Ghana Study 2012-2014 (iREAD 2), designed to tackle the lack of reading materials and low levels of literacy among Ghana's early primary school students. The intervention addressed these issues with the provision of relevant (culturally and age appropriate) reading materials via e-readers, the implementation of effective teaching practices, and activity-based learning opportunities.

The program, which ran from January 2013 - July 2014, served 574 students from Primary 1, 2, and 3 (P1, P2, and P3) grades in four under-resourced schools in Ayensuano and Suhum Districts in the Eastern Region of Ghana. Components included:

1. Providing relevant content through e-reader technology:
 - Each of the 574 project students, their teachers, and head teachers received an e-reader loaded with 240 titles in Akuapem-Twi and English;
 - Roughly 50% of the content came from African and Ghanaian publishers. From that, 79% were storybooks, 18% were textbooks and 3% were reference books;
2. Strengthening the use of phonics and other literacy instruction techniques in conjunction with the e-reader;
3. Creating and deploying extracurricular reading activities that leveraged the e-reader;
4. Empowering schools and communities to manage the e-reader programs at the local level, working with School Management Committees that included teachers, parents and project coordinators.

Evaluation Method and Results: To assess the results of these project components Worldreader carried out a randomized evaluation that measured progress on early literacy skills for students at the treatment schools against that of four control schools. The final number of students evaluated was 720. The Early Grade Reading Assessment (EGRA) methodology was used to measure progress on basic reading skills, and additional qualitative and quantitative data were collected through student surveys and other tools.

Percent of students sampled who could read²



As the figure shows, at the end of the intervention P2 students in the iREAD 2 program out-performed their peers who took part in Ghana’s National Education Assessment (NEA) (MoE, 2014).¹ Only 35.4% of students who took the NEA in Akuapem-Twi could read at least one word compared to 89.3% of students in the Worldreader intervention. In English, 49.3% of students nationally could read at least one word, compared to 88.4% of iREAD 2 students.

The project’s evaluation showed the following additional outcomes:

- Significant improvements in oral reading fluency:
 - Students in the treatment group, on average, improved nearly twice as much as control students on measures of oral reading fluency in Twi (gains of 19 correct words per minute versus 10). The treatment’s mean number of correct words read per minute on the final assessment was 34.11.
 - On average, students in the treatment group read over 24 words per minute more in

¹ While P1-P3 students were assessed for Worldreader’s project, only P2 students were assessed for the NEA. As such, scores for P2 students from the treatment group are used for comparisons to the NEA, however data for all three grades are used for other analyses.

² “Could read” is defined as “could read at least one word on the assessment.” These data are further broken down into reading levels (such as, “could read and understand”) in Figures 1 & 2 in the body of the report.

English than they could before. The control group improved less, around 15 words per minute. The treatment's mean number of correct words read per minute on the final assessment was 41.6 in English.

- 41% of treatment group students exiting the third grade could read above a minimum proficiency level of 45 correct words per minute in English by the end of the intervention, compared to just 13.4% of the control group.
- Reading comprehension gains:
 - In both Twi and English, students in the treatment group more than doubled their reading comprehension scores. Students went from answering 20.0% of Twi questions correctly at the baseline to 43.0% correct at the final, and from 16.6% to 43.5% on English comprehension questions.
 - While students in the control group also improved, their gains were significantly lower.
- Significant impact among low-performing students:
 - The proportion of treatment students who could not read a single word in Twi decreased dramatically from 64.6% to 8.9%.
- Development of positive reading habits:
 - Students in treatment schools reported completing nearly three (2.89) books per day, versus control students who report completing less than one book (.69) per day.

Student surveys at the treatment schools (n=117) showed that the amount read in the previous 24 hours and having a favorite book on the e-reader were correlated to higher final scores on oral reading fluency. This opens the door for future research that examines the relationship between reading habits and reading performance.

The iREAD 2 study was proposed after Worldreader's iREAD 1 (2011- 2012) demonstrated that access to digital learning materials improved literacy scores among upper primary students in Ghana. With funding from USAID, an independent evaluation of iREAD 1 found that after 7 months, Primary 4 students receiving e-readers and a full package of support interventions saw a 15.7% increase in literacy test scores, as opposed to the 8.1% increase among the control group. The results of iREAD 2 therefore show that these positive outcomes in reading skill development extend to younger children in Primary 1 to 3.

Challenges: iREAD 1 also revealed that e-readers could be fragile, with 40% of the devices reported broken over the course of that 1-year study. iREAD 2 used

a more recent version of the e-reader and saw the number of device failures fall to under 20% over the course of one year. It should be noted that the technology used in iREAD 2 is now more than two years old, and e-readers have been engineered for greater sturdiness since then—in Worldreader’s LEAP Study (Libraries, E-Reading, Activities, Partnership) in Kenya (2013 - 2014), no devices have been reported broken after more than 6 months of use.

Other challenges encountered included student absenteeism and turnover, increased school enrollments due to excitement around the e-readers, teacher engagement, and building a reading culture outside of the school to reinforce students’ gains in literacy. One challenge to scaling the program is the concern around the cost-effectiveness of providing one e-reader to each child. Responding to this concern, Worldreader has proposed a study to test the effectiveness of providing e-readers at a ratio of one to every three to five students. This proposal was submitted for Round 2 of All Children Reading: A Grand Challenge for Development.

Sustainability: To ensure the viability of iREAD 2 schools in meeting these and other challenges after the close of the program, and to ensure long-term sustainability, Worldreader worked closely with the School Management Committee to create transition plans for managing and financing the e-reader programs on their own. To ensure maximum impact and cost effectiveness, all four schools decided to move away from the individual e-reader models towards shared models, in which students have access to classroom or library sets of e-readers.

Conclusions & Next Steps: In addition to outlining areas for future research, the results and lessons learned presented in this report will inform the future scale-up of the e-reader program to other geographies and more deprived districts in Ghana. Considerations for scale-up include further exploration of the shared e-reader models the iREAD 2 schools are adopting moving forward, cost analyses and program modifications to keep costs low, and the incorporation of Worldreader Mobile to engage community members and parents and ensure that students are reading outside of school.

The learnings presented in this report not only point to the efficacy of the e-reader intervention for improving early grade literacy skills and increasing access to books, but also provide insights towards a way forward that will allow Worldreader and partners to reach more students, in more corners of Ghana and sub-Saharan Africa, with cost-effective and impactful digital reading programs.

2. Background and Context

2.1 Early Grade Literacy in the Developing World & Ghana

A Global Commitment to Education

The adoption of the Millennium Development Goals (MDGs) by the international community in the year 2000 reaffirmed a commitment to achieving education for all, recognizing universal access to primary education as a right belonging to every child, and setting out to make this a reality.

But stepping inside a classroom is only a precursor to a process of lifelong learning. The next step is learning to read.

Evidence over the past decade has demonstrated that many children are not taking this critical step. Research shows that without the basic skill of literacy, people are not only unable to finish their education, they have lower health outcomes, fewer employment opportunities, and are less engaged in their communities.

To battle global illiteracy, several international aid agencies have strengthened their commitment to the education sector, including the US Agency for International Development (USAID) by committing to helping 100 million children read better. In this fight, one of the critical limitations is a lack of reading materials – how can a child learn to read if (s)he doesn't see written words?

To help address this specific issue, USAID, The Australian Agency for International Development (AusAID) and World Vision issued a Grand Challenge to the global development community: help kids read better using innovative, scalable, sustainable and practical solutions; get *All Children Reading*.

From “Learning to Read” to “Reading to Learn”

Early primary school is a critical moment when it comes to getting kids to read more and better. The crucial transition from “learning to read” to “reading to learn” generally must happen by the fourth grade for students to continue to advance and succeed in school. The data show that children who cannot read with ease and understanding by the time they enter the fourth grade are less able to take advantage of future learning opportunities (Abadzi, 2011).

In the “learning to read” stage, the student’s brain is absorbed by the mechanics of reading itself—sounding out letters, combining sounds to form words, and stringing those words together to form sentences. The “reading to learn” stage occurs when the act of reading becomes fluid enough where the student can focus on and absorb information from what (s)he is reading. At this stage reading becomes the gateway to more learning for the student.

Data from across the developing world show that primary school pupils in low-income countries are not making this transition. Studies estimate that 80-90 percent of second and third graders in some countries cannot even read a single word, and roughly 67 million children around the world are growing up without learning how to read (RTI, cited in Abadzi, 2013).

Worldreader is on a mission to bring digital books to every child and her family, so that they can improve their lives. Using e-readers, mobile phones and other digital technology, Worldreader reaches readers in 27 countries, providing them with over 6,000 book titles in 41 languages from Yoruba to Swahili. With offices in Ghana, Kenya, San Francisco, USA, and Barcelona, Spain, we currently work with over 140 publishers to acquire and digitize the most compelling and relevant content for our readers; 70% of our library comes from African and Indian publishers. Since 2010, over 200,000 people per month have read more than 1.7 million books through Worldreader's e-reader programs and mobile phone app.

Early literacy trends in Ghana

The situation in Ghana's primary schools, as indicated by the country's 2013 NEA) revealed a similar situation unfolding among the nation's primary schools. The assessment, which sampled 7,923 grade 2 (P2) students in 815 primary schools throughout Ghana showed that, "by the end of P2, the majority of public school pupils could not yet read with comprehension—neither in a Ghanaian language nor in English. In every language, at least half, and often more, of the pupils assessed could not read a single word correctly (MoE, 2014)."

Research points to insufficient amounts of instruction, practice, and feedback as driving forces behind the trends seen throughout the developing world, including Ghana (Abadzi, 2011). Books—both storybooks and instructional books—provide a vital opportunity to gain necessary practice reading, and yet 50% of schools in sub-Saharan Africa have few or no books at all (SACMEQ III, 2011). The NEA reported that less than half of students in Ghana had an English language reader (41.7%), and that even fewer (34.7%) had a reader in a Ghanaian language (MoE, 2014).

2.2 iREAD Ghana Study 2012-2014 (iREAD 2)

Worldreader accepted the All Children Reading (ACR) challenge to address lack of reading materials and underachievement on early literacy benchmarks in Ghana with the iREAD Ghana Study 2012-2014 (iREAD 2). The program's integrated approach combined relevant reading materials with e-reader technology, new teaching methodologies and activity-based learning. The program was created based on the following key assumptions:

- Reading is a foundational skill for lifelong learning.
- If children have access to reading materials, they will read better.
- Intervening early is key because of the “reading to learn” transition.
- E-readers are a cost-effective and context-appropriate solution to increase access to reading materials in sub-Saharan Africa.

Funded by the ACR Grand Challenge and building off the lessons learned of the [iREAD Ghana Study 2010-2011 \(iREAD 1\)](#), the eighteen month program focused on 574 Primary 1, 2, and 3 (P1, P2, and P3) students in four under-resourced schools in Ayensuano and Suhum Districts in the Eastern Region of Ghana. The primary project components included:

1. Providing a wide range of Ghanaian and English language reading materials through e-reader technology;
2. Strengthening the use of phonics and other literacy instruction techniques in conjunction with the e-reader;

Program at a Glance iREAD 2

Country	Ghana
Region	Eastern
Number of Students	574
Grades	1-3
Number of schools	4
Duration	2 years
E-reader: Student Ratio	1:1
Number of books per e-reader	240
Total number of books distributed	137,760

3. Creating and deploying extracurricular reading activities that leverage the e-reader;
4. Empowering schools, communities, and stakeholders to manage e-reader school programs.

The expected outcomes of the project were:

- Increased student and teacher access to relevant reading materials;
- Improved Ghanaian and English language literacy skills among students;
- Increased quality of literacy instruction;
- Increased stakeholder buy-in around using e-readers in classrooms;
- Increased capacity to use technology among students and teachers;
- Improved logistical system for distributing textbooks and supplementary reading materials.

The goal of this report is to present the final evaluation of the iREAD 2 project. It outlines details on program activities carried out, lessons learned and challenges encountered, and its primary focus is the analysis of student performance, habits and success factors. The lessons presented here will serve as inputs towards a strategy for scaling up early grade digital reading programs throughout Ghana.

2.3 Details on Program Activities

The following section outlines the program's four primary components carried out over its eighteen-month duration. The integrative approach seeks to address the "five T's" that are critical for the acquisition of reading skills, particularly in the early grades:

1. **Time:** More time devoted to teaching reading
2. **Teaching:** Better techniques for teaching reading
3. **Text:** More texts in the hands of children
4. **Tongue:** Mother tongue instruction (a language students speak and understand)
5. **Test:** Testing children's reading progress



Name: Abigail
Class: Primary 4

Abigail had never owned a book until she received an e-reader. Now that she has access to hundreds of digital books, she has incorporated reading into her family's daily routine— after school, she helps her family on the farm, and then she reads to her younger siblings in the evening. If her siblings don't understand what she reads to them, Abigail patiently answers any questions they have. She says that explaining the stories to her siblings has helped her gain a better understanding of the stories herself. Abigail has read over 75 books on her e-reader, and says that having the device has improved her ability to study and learn. She is one of the top students in her class.

Providing a wide range of Ghanaian and English language reading materials through e-reader technology

iREAD 2 deployed low-cost, connected e-readers to 574 students and their teachers in four under-resourced public schools in Ghana's Ayensuano and Suhum Districts. The e-reader is an increasingly inexpensive, easy-to-use device with the capacity to download and store hundreds of books and other written materials. It includes a built-in dictionary, educational word games, and the option to increase text-size. The battery lasts approximately 2-4 weeks on a single charge, making it a practical technological tool for students with limited access to electricity. As a device focused solely on reading, it is generally easier to use, cheaper, and less distracting than more complex technology that could also be used for digital reading, such as tablets and laptops.

At the beginning of the program, each student, project teacher and head teacher received an e-reader featuring 140 titles. Worldreader works with African and Ghanaian publishers to digitize the most locally-relevant content for students, including fun storybooks written by Ghanaian authors, primary grade textbooks, and local language curriculum. Worldreader provided additional content based on teacher and student feedback throughout the program, so that by the end of the project each e-reader featured 240 titles. See Table 1 for a summary of the types of books featured on the e-readers.

TABLE 1
iREAD 2 Book Breakdown

Book Origins	Types
Africa 62%	Storybooks 79%
Ghana 34%	Textbooks 17%
Kenya 23%	Reference Books 3%
South Africa 3%	Languages
Other Africa 3%	Twi* 5%
US, Europe & other 38%	English 94%
	Other 1%

*It is important to note that book selection was carried out in partnership with the project schools. Schools wanted Akuapem-Twi books specifically, which are difficult to find (in either paper or digital form). However, in general the e-reader did feature many books produced locally.

Strengthening use of phonics and other literacy instruction techniques in conjunction with the e-reader

Worldreader partnered with the Olinga Foundation for Human Development, a local Ghanaian NGO, to train iREAD teachers to use e-readers as part of effective literacy instruction methods. The specific goals of training were to:

- Provide teachers with new literacy instruction methodologies and plans, with a focus on phonics, syllabic and participatory approaches;
- Support teachers in effectively incorporating e-readers and the digital version of the Olinga Foundation’s curriculum into lessons;
- Reduce teacher absenteeism and increase time on task during designated literacy hours among teachers in the four target schools;
- Create a child-friendly teaching environment through participative methods of language instruction and alternative disciplinary practices.

Over the course of the program the Olinga Foundation held two 3-day workshops and two refresher trainings with roughly 20 teachers from the target schools attending each (for a 100% participation rate from those teachers required to attend). Participants included class teachers and their respective head teachers from the four schools, as well as Circuit Supervisors and the Director of Supervision from the District Offices of the Ghana Education Service (GES). By directly involving head teachers who could then train other teachers at their schools, a training-of-trainers approach was employed to increase the reach of the new methods. Additionally, by involving district-level GES officers, the program engaged local education authorities who could consequently monitor and provide supervision in the schools.

All four schools reported using the Olinga Foundation’s methodology at least twice a week for a total of 120 minutes. To support teachers in applying new instructional methods in their classrooms, the Olinga Foundation and Circuit Supervisors made routine monitoring visits to schools. The Olinga Foundation also sent weekly motivational text messages to teachers throughout the project to remind them of key points from the training.

Implementing extracurricular reading activities that leverage the e-reader

A vital component of iREAD 2 was the implementation of extracurricular reading activities that created fun, engaging spaces that fostered children’s interest in reading. Since teachers focused on textbooks during regular class time, and some students did not have literate

Schools take initiative to engage parents

The School Management Committee identified engaging parents in the iREAD 2 program as a critical priority. Parents are key for encouraging reading practice on the e-readers at home and supervising children to reduce device breakage. In order to learn how to best involve parents, one of the schools –Suhum D/A –designed and conducted a parent survey among members of its PTA. After administering the survey to 24 parents, the school found that half of those surveyed did not know to use the e-reader, and that 10 of 24 parents wanted to receive training on operating the e-reader. In response, the class teachers at Suhum D/A organized a parent e-reader workshop attended by 42 parents, which included both literate and illiterate parents. Following Suhum D/A's lead, Amanase Presbyterian also organized a successful parent workshop attended by 35 parents.

adults at home who could help them with reading, extracurricular reading activities were the only opportunity for many students to explore storybooks with adult support, and to gain the practice and repetition necessary to advance their reading skills. Extracurricular reading activities were led by teachers as well as trained volunteers, including university students.

Extracurricular reading activities generally took place every two weeks in the four treatment schools and followed fun, participatory lesson plans designed by the Olinga Foundation and a Worldreader education specialist (see Appendix 4 for a sample of lesson plans). At the start of the project all students in a particular school took part in extracurricular reading activities as one large group; however, in January 2014 the program divided students into three groups based on reading level, so that activities would be geared towards varying abilities. Dividing students into proficiency groups was an effective way to work in small groups and target students' specific needs. The results of this change are reported in [4. Findings and Analysis](#).

Empowering schools, communities, and stakeholders to manage e-reader school programs

Twenty schools from the Suhum and Ayensuano Districts applied for the iREAD 2 program, and of these 12 were shortlisted. The application process helped ensure a higher sense of ownership and accountability from the schools.

At each school, trained head teachers, project coordinators, and class teachers ensured the effective implementation and management of iREAD 2 interventions. Head teachers were responsible for overseeing the e-reader activities at their schools; ensuring class teachers were effectively employing appropriate literacy instruction methods and



Name: Stanley
Class: Primary 3

It used to be difficult for Stanley to do his homework after school. He had no textbooks at home, and his parents and grandparents can't read and unable to help him with schoolwork. However, now that he has an e-reader, Stanley can refer to his textbooks when studying and doing homework, and use the e-reader's dictionary to look up the meanings of new words. Stanley can also read his favorite stories, such like the Ananse stories, *Kofi has Malaria*, and *My Big Dada*. Stanley says, "The stories take me to another world, let me know what is going on around the world, and open my mind."

incorporating devices in their classrooms; meeting with other iREAD 2 head teachers at School Management Committee meetings, and communicating program activities to teachers, students, and the community. Project coordinators were also designated at each school to oversee the operational aspects of maintaining e-readers, including inventory management, content issues, charging, and providing ICT support. These coordinators were generally teachers at the project schools who taught upper primary grades, and were selected by school management or volunteered for the role. Class teachers incorporated e-readers into their classrooms using the literacy methodologies presented by the Olinga Foundation, and reported any device issues to project coordinators.

Additionally, a School Management Committee (SMC) met at least once a quarter to share best practices and problem solve on issues such as device breakage, parent engagement, scheduling extracurricular activities, and developing policies with regards to the project implementation. Each SMC was comprised of head teachers, project coordinators, and class teachers from the four treatment schools; representatives of the Parent Teacher Associations (PTA) from the four treatment schools; Worldreader representatives; and district-level GES representatives. Now that iREAD 2 has ended, the SMC will continue to manage school e-reader programs at the four schools with minimized Worldreader support. To ensure this continuation of SMC activities, as iREAD 2 neared completion, Worldreader worked through the SMC to assist schools in creating transition plans that define the way forward for managing and financing their e-reader programs without Worldreader support. [6. Recommendations for Scaling](#) provides details on these transition plans.

3. Evaluation Objectives and Research Design

The final evaluation aims to measure the success of the program components mentioned above, and to determine causative and correlative relationships between the intervention and literacy outcomes, as captured through testing of children's reading progress. Specifically, it aims to address the following questions:

- What were the effects of the iREAD 2 intervention on standardized Ghanaian and English language literacy exams?
- How does the program affect student attitudes and habits towards reading? How do these attitudes and habits affect program success?
- What are the costs associated with implementing the program and how can it ensure program cost-effectiveness?

3.1 Research Design & Methodology

Selection Process

Of the 12 schools initially shortlisted after the application process, Worldreader chose eight schools and paired them based on their similarities in two main areas: academic performance, as measured by Basic Education Certificate Examination (BECE) results for the junior high schools (which the selected primary schools fed into), and participation in the educational opportunity program.³

Within each pair, treatment and control designations were then randomly assigned. The control schools are a vital part of the research design as they allow for comparison with the treatment schools. Control schools did not receive e-readers, teacher training, or extracurricular reading support.⁴

Baseline

Reading assessments for treatment and control students were conducted at three intervals: Baseline (January 2013), midterm (July 2013) and endline (June 2014). The baseline assessment aimed to sample as many of the 1,109 treatment and control students initially enrolled in the target grades as possible.

Midterm

The goals of the midterm report were piloting electronic data collection methods and providing a progress report on initial impacts of the project. With these in mind, a small random sample of 249 students conducted.

³The opportunity program is driven by the Student and Youth Travel Organisation (SYTO) Ghana. According to our liaison from Suhum GES, the program provides selected schools with a television set, DVDs, and learning materials for grades 1 to 6. Participation in this program ensures that a school has access to electricity.

⁴ It should be noted that since the conclusion of the program, most control schools have been added to Worldreader's project pipeline as candidates future projects.

TABLE 2
Worldreader's EGRA Sub-tests

Worldreader's EGRA Sub-tests

Twi	English
Letter sound recognition	Letter sound recognition
Familiar Word Decoding	Invented Word Decoding
Oral Reading Fluency	Oral Reading Fluency
Reading Comprehension	Reading Comprehension
Listening Comprehension	

Final Assessment

The final assessment again aimed to sample as many of the students in the treatment and control populations as possible. Because the midterm assessment used a small sample of students, baseline scores will serve as the main point of comparison for final assessment scores.⁵

The Early Grade Reading Assessment (EGRA)

The main hypothesis of iREAD 2 was that students who received the project intervention would have greater improvements in standardized literacy test scores than their control group counterparts.

To measure changes in literacy skills, Worldreader administered Akuapem-Twi² and English language versions of the Early Grade Reading Assessment (EGRA) to treatment and control group students for the baseline, midterm and final assessments. EGRA, a standardized international oral reading assessment, measures foundational reading skills such as phonemic awareness, fluency and comprehension. The development of these skills at an early age is vital for making the transition from “learning to read” to “reading to learn.”

For a full list of EGRA sub-tests performed as part of Worldreader's EGRA, see Table 2. The full protocol for Worldreader's EGRA in Twi and English can be found in Appendix 2.⁷

While many early literacy assessment methodologies exist, EGRA was specifically selected for iREAD 2 because of its utility in assessing the component skills that contribute to reading proficiency, and comparability of results with other USAID-funded projects across different countries, such as the PRIMR program in Kenya, which was implemented by RTI International with Worldreader as a subcontractor on the ICT intervention.

To minimize the possibility of student memorization of sub-test components, the project team randomized and re-ordered letters and words from the letter sound knowledge and invented/familiar word decoding sections with each test iteration, and selected new passages that were of comparable difficulty for the oral reading fluency, and reading and listening comprehension sub-tests. The Olinga Foundation and representatives from GES also consulted on the development of these instruments.

⁵ The baseline and midterm studies can be found on Worldreader's Learnings page: <http://www.worldreader.org/learnings>

⁶ Akuapem-Twi is the mother tongue of the vast majority of students at the treatment and control schools.

⁷ For more information on EGRA history and methodology, see <http://www.eddataglobal.org>

3.2 Data Collection and Analysis

While the baseline reading assessment was conducted using traditional paper tests, Worldreader utilized [Tangerine](#), a mobile EGRA administration tool developed by RTI International, for the final and midterm assessments.⁸ Tangerine is a web-based application used to design electronic versions of EGRA and later collect data on touch screen tablets without an internet connection. Tangerine saves all data on the tablets until they are in range of a wifi network, when data can then be uploaded to Tangerine's cloud, and later downloaded in an Excel file. Advantages of using this tool for data collection included:

- Automation of test administration, reducing variation between enumerators;
- Significant reduction in time required for data input, cleaning and processing (a reduction from approximately three months to three weeks);
- Less data input error;
- Elimination of ambiguity due to handwriting discrepancies.

Enumerators were trained on principles of phonics, EGRA methodology and Tangerine usage over two days in June. Additionally, a pre-test exercise was carried out at a nearby school so that enumerators could practice administering the exam to children (please see Appendix 3 for additional details of the enumerator training program.)

Due to student turnover and absenteeism, the final sample of students was 418 for the treatment group and 302 for the control for a total of 720 students ($n=720$).⁹ Table 3 shows the sample of students assessed with EGRA for the final assessment.¹⁰

⁸ Worldreader hypothesizes that the shift to electronic data collection may have had some influence on midterm and final scores due to reduction in enumerator error. However, this change should have affected each school equally.

⁹ 1,109 total students were initially identified for assessment in treatment and control schools. See Appendix 1 for a breakdown of the initial enrollment student enrollment in treatment and control groups by grade and school.

¹⁰ Missing baseline scores were input using a hot deck imputation method and students missing final assessment scores were excluded from the analysis.

TABLE 3
EGRA student Sample

	Pair One	Pair Two	Pair Three	Pair Four	Total
Treatment	Amanase Presby Primary B	Marfokrom Anglican D/A	Asuboi Methodist Primary	Suhum D/A Stream "C"	
TOTAL	111	100	80	127	418
P1	43	40	32	44	159
P2	35	41	25	45	146
P3	33	19	23	38	113
Boys	47	51	45	62	205
GIRLS	64	49	35	65	213
Control	Okorase Presby Primary M/E	Otoase D/A Primary	Okorase MA (DA) Exp Primary	Suhum Methodist Primary A	
TOTAL	80	65	83	74	302
P1	28	30	30	29	117
P2	21	19	26	18	84
P3	31	16	26	27	100
Boys	45	33	36	32	146
Girls	35	32	47	42	156
n=720					

Additional Data

To supplement data from standardized assessments, this report also analyzes additional quantitative and qualitative data, as outlined in Table 4.

TABLE 4
Additional Sources of Data

Source	Description	Sample
Student Focus Group/Surveys	Survey of student reading practices	117 treatment group students
Classroom Observation Assessment	Observations on teacher and student e-reader use in the classroom	11 treatment group classrooms
Project Reports	Quarterly reports, School Management Committee reports, workshop reports, meeting notes.	N/A
Inventory Record	Information on device breakages	N/A

Additionally, to assess changes in student habits, attitudes and practices towards reading, Worldreader carried out focus groups and surveys at treatment schools simultaneously with the reading assessments. Four enumerators and volunteers were selected to facilitate the focus groups and surveys, and received specialized training. The facilitators all had teaching backgrounds and were already comfortable working with children. Thirty randomly-selected students (ten students per grade) participated in the interactive focus group/survey sessions, which included coloring, drawing and other activities.¹¹ The focus group tool can be found in Appendix 2.

3.3 Limitations

While treatment and control schools were initially paired based on similarities in demographic characteristics and academic performance, with treatment and control designations being randomly assigned, the baseline evaluation revealed that control schools started off performing worse on all EGRA subtests than treatment schools. While this is problematic for the research design, the issue is taken into consideration in the analysis using a repeated measures analysis of variance (see 4. Findings and Analysis for further explanation of this method of analysis) and does not impact the validity of our results. In analyzing our results, we also took into consideration other conditions outside of Worldreader’s control which may have affected the study’s final *n* include: student absenteeism on test days, and student turnover, both of which affected students’ completion of the assessment series.

Finally, except for EGRA, most of the other measures, such as the student focus groups and parent surveys, have the limitation of not having a baseline measure or control group for comparison. Nevertheless, these tools generated interesting results and lessons that are worth sharing.

¹¹ Three student records were excluded due to reporting discrepancies for a final *n* of 117.

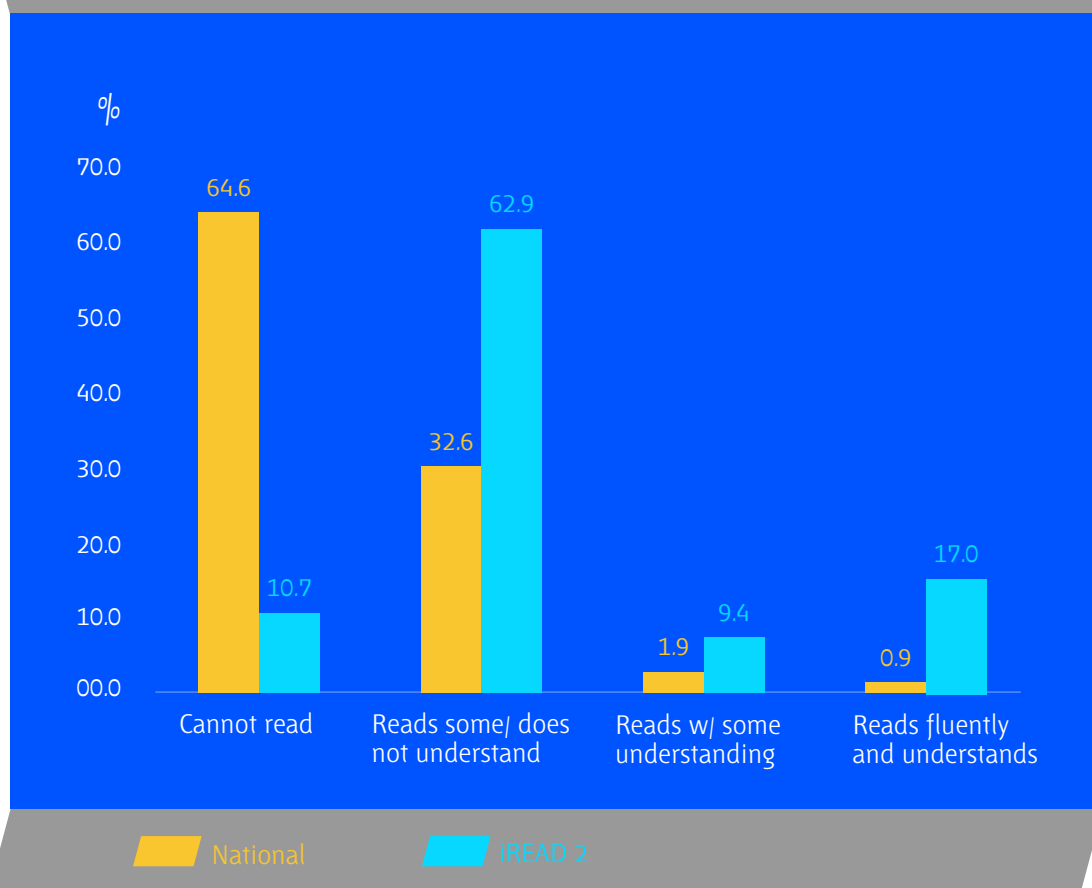
4. Findings and Analysis

The following sections analyze iREAD 2's impact on literacy scores, and present findings around student e-reader practices, observations of e-reader classrooms, and feedback on the program's challenges.

Overall, comparing the distribution of the treatment group's final reading levels (for P2 students) to the national averages reported in the 2013 National Education Assessment (NEA), we see that iREAD 2 students fared significantly better.¹² See Figure 1 for Akuapem-Twi and Figure 2 for English.¹³

FIGURE 1.

Distribution of students by performance level (Akuapem-Twi), NEA and iREAD 2

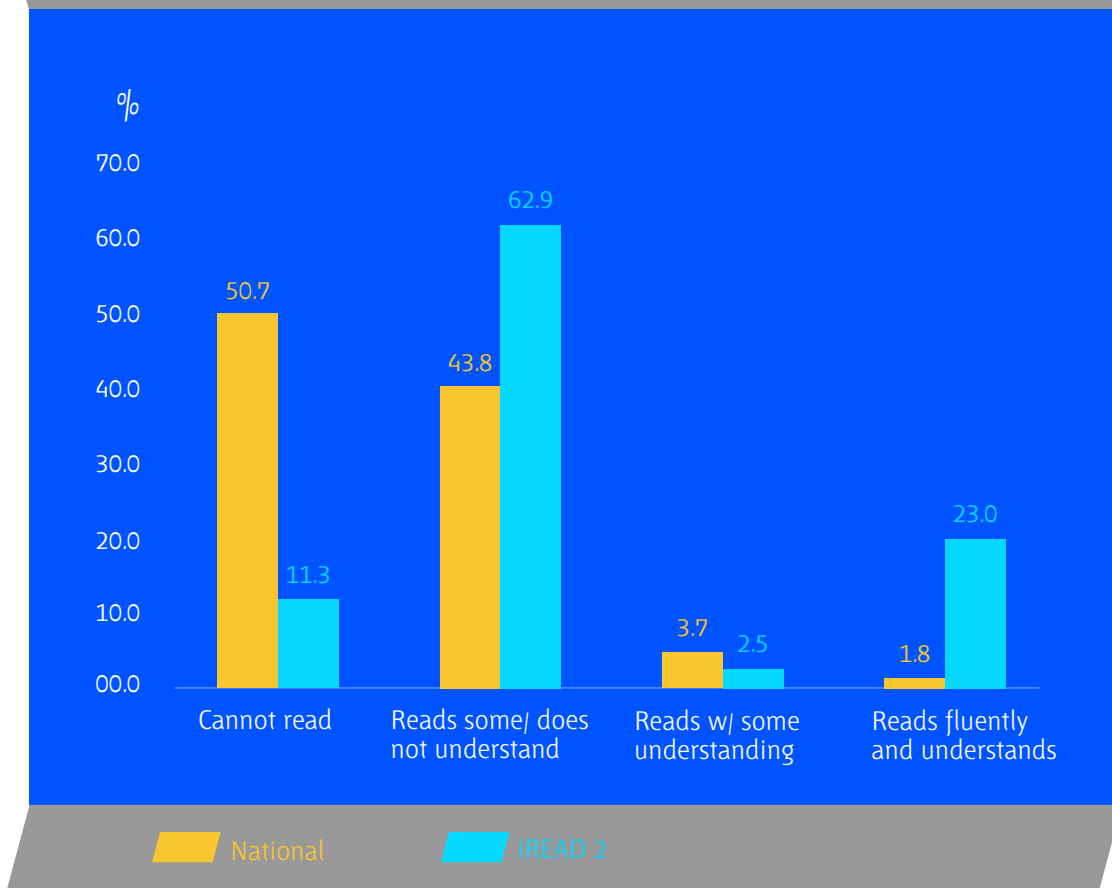


¹² While P1 –P3 students were assessed for iREAD 2, only P2 students were assessed for the NEA. As such, scores for P2 students from the treatment and control groups are used for comparisons to the national averages, however data for all three grades is reported throughout this paper.

¹³ The NEA was administered to students in their mother tongues and English. In the case of Akuapem-Twi, 689 students were included in the NEA sample whereas for English, 7,923 students were assessed.

FIGURE 2.

Distribution of students by performance level (English), national average and iREAD 2



It's interesting to note that in both cases, the proportion of P2 students who could not read at all was significantly lower in treatment schools than the national average (in Akuapem-Twi, 64.6% nationally versus 10.7% for iREAD 2). As the proportion of students in the next highest category, "Reads some words but not with understanding" is substantially higher in the treatment schools, it is logical to assume that some of the lowest performers have been "bumped up" a level.

However, it is also interesting that in both English and Twi, the proportion of students at iREAD 2 schools who could read fluently and understand the text was significantly higher than the national average: 17% versus less than 1% in Twi, for example.

These results paint a picture of the improvements happening in project schools. The following sections will attempt to shed more light on these changes and the factors driving them.

4.1 Changes in literacy skills

The quantitative analysis presented below focuses primarily on EGRA results for oral reading fluency, measured as correct words read per minute (CWPM), and reading comprehension. These measures build

Why do we use Correct Words per Minute (CWPM) to measure fluency?

Reading speed is a key contributor to reading fluency and eventually, comprehension. According to Abadzi, "In order to interchange information between the long-term and working memory effortlessly, readers must decode rapidly and automatically. (Willms, 2008 cited in Abadzi, 2011)." Abadzi further notes that, "in order to understand a simple passage given the capacity of short-term memory, average students should read a minimum of 45-60 words per minute. Existing research suggests that this standard is possibly usable worldwide (2011)."

off of lower-order skills, such as letter-sound knowledge and word decoding, which are critical for making the transition from learning to read to reading to learn.

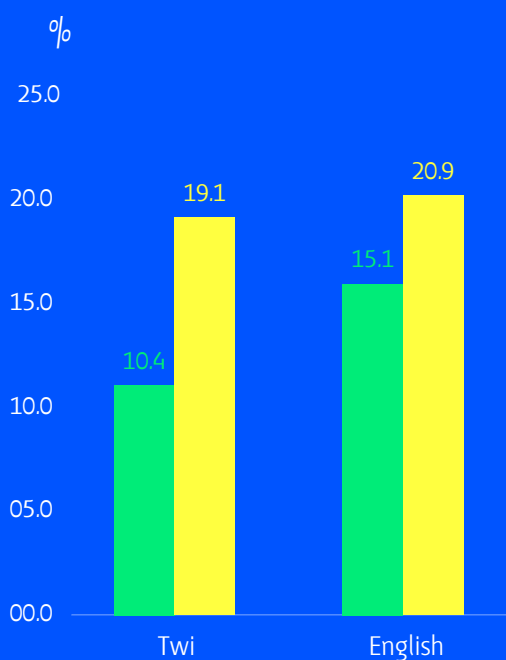
4.1.1 Effects on Oral Reading Fluency

Figure 3 shows that the baseline-final gains in Twi and English correct words read per minute (CWPM) among the treatment group far outstrip the gains of the control group. In Twi, treatment students gained an average of nearly 19 words per minute, whereas control students gained 10 words per minute; students in the treatment group improved nearly twice as much on measures of oral reading fluency in Twi.

Figure 3 also shows that students in the treatment group improved over 20 words per minute compared to the control group's 15 words.

Looking at the mean baseline and final scores for the treatment group in Figure 4 we can observe the improvement in the project schools in a different way. In Twi, the treatment improved the mean number CWPM from just under 15 words to 34 words per minute (a gain of 19 words per minute).

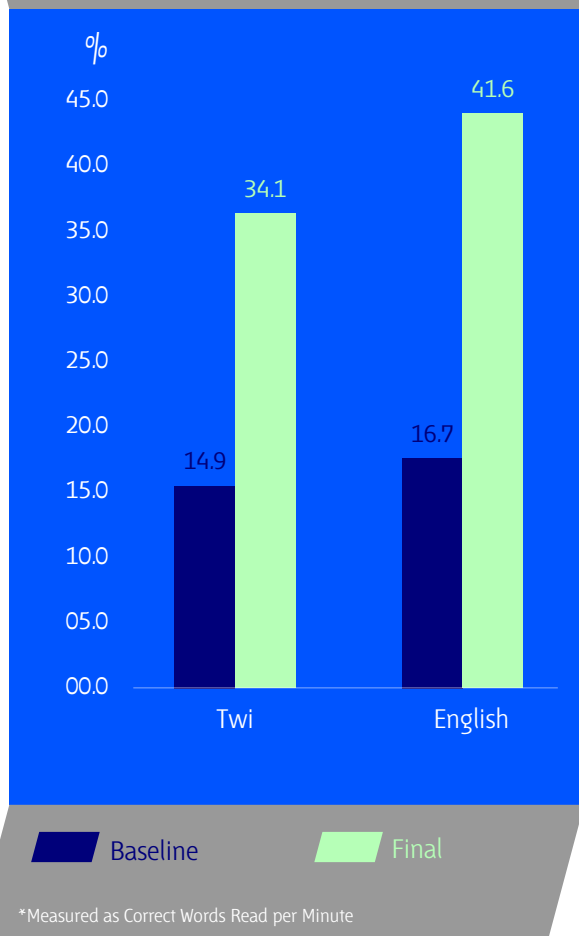
FIGURE 3.
Baseline - Final Mean Improvements in Oral Reading Fluency*, Twi and English



Control Treatment

*Measured as mean additional correct words per minute

FIGURE 4.
Treatment Baseline and Final Mean Scores,
Oral Reading Fluency*, Twi & English



Gains were similar in English, where the mean number of CWPM was 16.6 at the baseline and 41.63 words at the time of the final. It is interesting to note that students performed better in English than Twi. This report puts forward the following hypotheses to explain these results: 1) Students make the transition from Twi to English as the primary mode of instruction in P4. As such, those students who started the intervention in P3 and finished in P4 are likely driving up these results in English; 2) As 4.2 outlines, most students' surveyed reported that their favorite books were in English. It is likely that students practiced reading in English more than in Twi, and this contributed to their scores.

Mean scores and mean improvements by treatment/control group, grade and gender are reported in Appendix 1.

Accounting for Treatment/ Control Variance

To measure the significance of the variance between the treatment and control groups, a one-way analysis of variance (ANOVA) with repeated measures was conducted on gains in CWPM. This method increases statistical power by factoring between-subject differences out of the analysis (thereby addressing the baseline differences observed between treatment and control groups).

The repeated-measures analysis of variance revealed that the treatment had a significant effect on correct words read per minute in Twi, with $F(721, 1) = 52.53, p < .05$. See Table 5 for a summary of the test's output, along with the output from the same test run on English CWPM.

In other words, even after taking into account the initial difference between the treatment and control groups, these results are statistically significant.

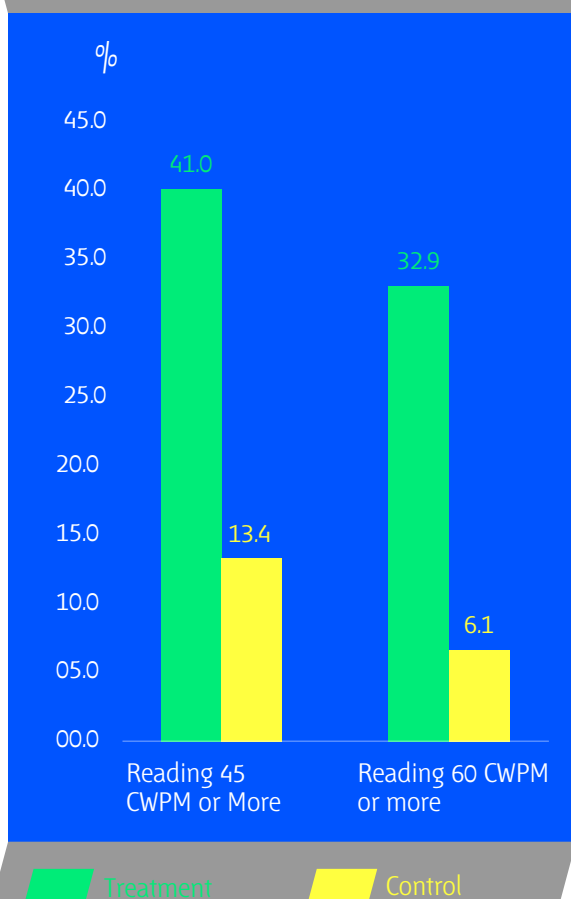
TABLE 5

Repeated Measures Analysis of Variance: Correct Words per Minute (Twi and English)

		Partial SS	F	Adjusted R-squared
Twi CWPM	Model	855253.31	3.87	0.59
	Treatment	51961.8427	52.53	
English CWPM	Model	1162763.39	5.59	0.69
	Treatment	64021.06	49.16	

FIGURE 5.

Distribution of third graders reading above 45 & 60 CWPM in English, Treatment & Control



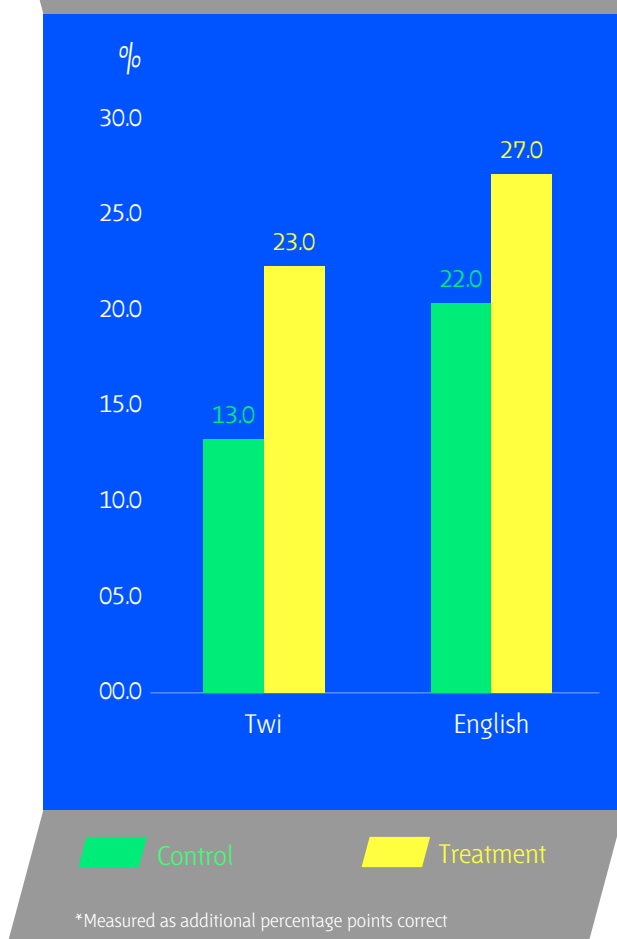
The adjusted R-squared value for Twi CWPM (.59) shows us that the model accounts for 59% of the variation in test scores between and within the treatment and control groups. The results are similar for CWPM in English ($F(721,1) = 49.16, p < .05$), with an adjusted R-squared value of (.69), meaning that 69% of the variation between treatment and control groups can be accounted for with the model.

The same analysis of variance was carried out for each sub-test, and the results were similar across the board. This means that the treatment contributed to a statistically significant improvement on each basic literacy skill. The outputs for the repeated-measures analysis of variance can be found in Appendix 1.

Measures of Minimum Proficiency

In general, students should reach a minimum level of reading proficiency and speed by the end of the third grade. One study in the US showed that children who reading below proficiency upon entering the fourth grade

FIGURE 6.
Mean Baseline - Final Improvement, Reading Comprehension*



are four times more likely to drop out of high school later (MoE, 2014).

A study from RTI found that Ghanaian students reading in English (not their mother tongue), answered three out of five corresponding reading comprehensions questions correctly when reading at a rate of 45 CWPM, and needed to be reading at a rate of more than 60 CWPM to answer 80 percent correctly (cited in Abdazi, 2011). According to Ghana's National Education Assessment, the mean CWPM for P2 students nationally was 9.2 CWPM in English, far below the minimum proficiency measure of 45 (MoE, 2014).

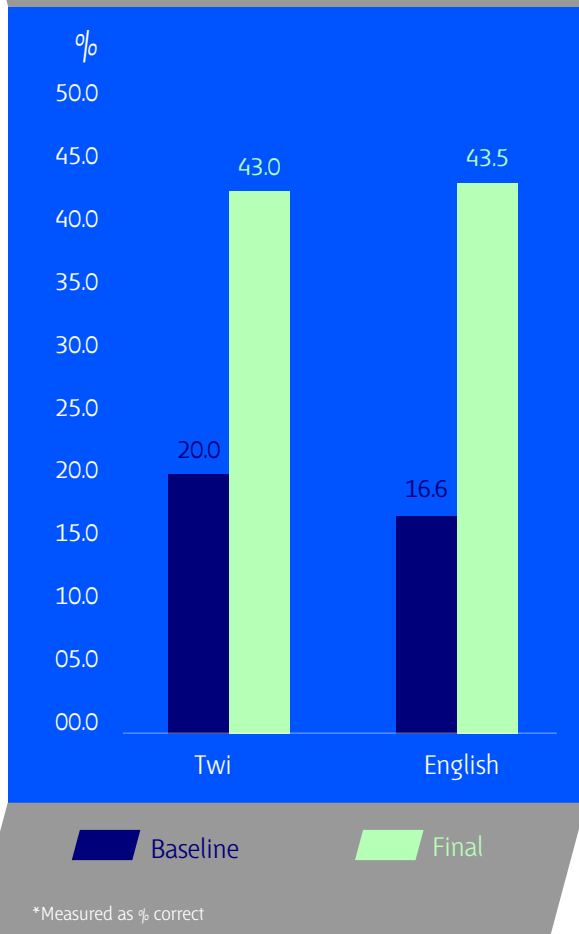
Figure 5 shows the percent of exiting third graders who reached the 45 and 60 CWPM marks in English by the end of the iREAD 2 intervention, compared to the same figure for control schools. As the table shows, 41% of treatment group students exiting the third grade reached 45 CWPM in English by the end of the intervention, and 32.9% could read above 60 CWPM, compared to just 13.4% and 6.1% for the control group.

To be sure, we should be striving towards an overwhelming majority of third graders in Ghana reaching minimum levels of proficiency. And moreover, students in the treatment group must develop further reading skills and continue to improve on reading speed to continue succeeding academically and build better comprehension skills. However, the data clearly show that treatment students did better than control students, and most students in Ghana, when it comes to reaching a minimum level of reading speed proficiency.

4.1.2 Effects on Reading Comprehension

The data show that these gains in CWPM also correspond to gains in reading comprehension. In terms of Twi reading comprehension, treatment students improved 23-percentage points compared to the Control group's 13. In English reading comprehension, treatment

FIGURE 7.
Treatment Group Baseline and Final Scores,
Mean Reading Comprehension



students improved 27% compared to the control's 22%.

In both cases, the treatment improved more than control, but of particular interest is that within the treatment group, reading comprehension doubled on average. Figure 7 further illustrates the immense gains of the treatment group. In Twi, students went from answering 20% of questions correctly to 43%. The gain in English is particularly noteworthy; students improved from answering just 16.6% of question correctly to 43.5%.

The significance of these results was also confirmed with a repeated measures analysis of variance, the results of which can be found in Appendix 1.

4.1.3 Treatment Effects by Performance Group

A particularly interesting outcome of the analysis is the treatment's impact on specific sub-groups of students. In Twi oral reading fluency, the distribution of scores shows that the frequency of students who could not read a single word decreased significantly (from 64.6% to just 8.6% of treatment students, across all grades). In the control group, 74.5% of all students could not read a single word at the baseline whereas 29.1% of could not read a single word on the final. This difference from baseline to treatment, and between treatment and control is striking.

By comparison, the National Education Assessment (NEA) found that on the oral reading fluency subtest, "in six out of the 11 Ghanaian languages included in the EGRA, more than 80% of [second grade] pupils scored zero (MoE, 2014)."

The NEA categorized student performance levels according to achievement on the oral reading fluency and reading comprehension sub-tests of its EGRA exercise. These are outlined in Table 6, and used by this report as benchmarks:

TABLE 6
Student Reading Achievement Groups

Cannot read	Oral reading fluency (ORF) = 0
Reads some words, but does not understand	ORF > 0 but reading comprehension (RC) <60%
Reads with some understanding	RC = 60%
Reads fluently and understands	RC ≥ 80% ¹⁴

TABLE 7
Mean improvement by performance level (treatment, Twi)

Baseline Performance Level	Mean
1- Could not read	20.9
2- Read some words, did not understand	20.5
3- Read with some understanding/ read fluently with understanding	12.1

n = 418

TABLE 8
Mean improvement by performance level (treatment, English)

Baseline Performance Level	Mean
1- Could not read	19.3
2- Read some words, did not understand	32.4
3- Read with some understanding/ read fluently with understanding	31.2

n = 418

Within the treatment group, the program led to the biggest improvement among students who “could not read at all” and “could read some with little understanding” at the time of the baseline. For example, on Twi CWPM the lowest performing students improved an average of nearly 21 words, whereas the middle performers improved 20 words and the high performers just 12. A one-way analysis of variance indicated a statistically significant between the high performers and the middle to low performers, where $F(415,2)=4.03$, $p < .05$. See Table 7 for more details.

In terms of English sub-tests, the treatment had the largest effect on students’ CWPM measure on the students in the middle of the pack (mean improvement = 32.4), followed by the highest performers (mean improvement = 31.2) and then the lowest (19.3), as demonstrated in Table 8. An analysis of variance showed the effect was significant, $F(415,2) = 13.53$, $p < .05$. Compare this to the control group where an analysis of variance on English CWPM gains revealed that performance group also had a significant impact on improvement, $F(299,2) = 10.03$, $p < .05$, but where the highest performing students repeated the most benefit (mean improvement = 39.3 words compared to just 14.4 for the lowest performing students).

¹⁴ Because the n on the highest performance level was very small, the two highest levels defined in the NEA were combined for the purposes of the following analysis.

Explaining Treatment Effects on Low Performing Students

The above data show that under the control condition, the highest-performing students improved the most. Under the treatment condition, the middle to low performing students improved the most. This is a particularly noteworthy result because it runs counter to a trend so common it dates back to Biblical times. West and Chew prefaced UNESCO's *Reading in the Mobile Era*, with this concept, known as "The Matthew Effect." The idea is derived from a passage in the Bible's Book of Matthew: "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath (Matthew 25:29, King James Version)."

Put simply: "those who have get more, and those who don't get less (West & Chew, 2014)." This trend is often seen in education projects: the lowest performing students reap the least benefits, while the higher performing students benefit the most.

In a study on a community teaching assistant intervention, Dufflo and Kiessel found that in most Ghanaian classrooms, "teachers must manage classes that include pupils with very different levels of preparation, hindering their ability to target instruction appropriately. In order to complete the curriculum, teachers often need to leave a large fraction of pupils behind (Dufflo, 2014).

Worldreader found this to also be the case for iREAD 2 schools; in the beginning, staff noted more limited progress and lower participation rates among lower performing students in extracurricular reading activities. To address this, at the start of the 2014 school year extracurricular activities were reorganized according to students' reading levels, with separate activities for each group. The shift ensured more targeted support to the low performers through specific lesson plans and increased volunteer presence. This specific support is key for making sure low performers don't fall behind and such targeting for achievement levels is rare in most Ghanaian classrooms for the reasons mentioned above. Worldreader hypothesizes that this programmatic modification contributed to the results observed above.

Such outcomes open up interesting opportunities for future Worldreader research into remedial literacy programs and other interventions targeting those who normally fall behind.

4.1.4 Student Behaviors Affecting Literacy Gains

Research suggests that the development of reading skills is highly correlated to specific behaviors and attitudes around reading, including practice reading daily and enjoyment of reading. As such, Worldreader collected data on reading habits from a sample of 117 treatment students, to better understand links between program success and specific student activities and characteristics.

Results from the focus groups show that the number of books read over the last day is positively correlated to success in the program (measured as final score on CWPM in Twi), $r = .19$ (115), $p < .05$. Of note is also the fact that having a favorite book on the e-reader is correlated to English reading comprehension, $r = .1487$ (115), $p < .05$. This is logical, given that most students' favorite books are in English. Correlations were present for other factors, though these were not significant.

"Reading more" (measured as self-reported number of books read before the intervention and after) was also correlated to higher reading comprehension scores, $r = 0.2668$ (76), $p < .05$.

However, when inputting these variables into a multivariate regression none came out as having a significant causal relationship. These mixed results open up potential for future research for Worldreader, which will be discussed further in [7. Lessons Learned and Conclusions](#).



Name: Enoch
Class: Primary 2

When Enoch's father comes home from work, he loves listening to his son read to him from the e-reader. The e-reader includes Twi and English stories, and even though Enoch's father doesn't understand the stories his son reads in English, he is very proud that Enoch is capable of reading English. Neither Enoch's father nor mother ever went to school. Enoch's father shares, "I don't want my children to end up like me, not able to read and write. But now that I see Enoch reading on his own all the time, I know that he won't." Enoch has read over 20 books on his e-reader, and loves sharing the device with his older sister, who reads to him.

4.1.5 Gender-effects

ICT for Development (ICT4D) and ICT for Education (ICT4E) interventions often generate greater treatment effects for boys and men. A study carried out in 2005 by the Gender and ICT Network (Reseau Genre et TIC), revealed that, globally, women's chances of benefitting from the advantages of the information society were one third less than men's (Mottin-Sylla, 2005; cited in Gillwald, 2010).

Given that background, it is notable that results of the iREAD 2 evaluation point to equally positive effects of the treatment for both boys and girls. Within both the treatment and control groups, boys and girls had similar gains. In Twi, girls improved more than boys on letter sound knowledge, oral reading fluency and reading comprehension, whereas boys and girls improved roughly the same amount on listening comprehension and girls less on familiar word decoding. The case was similar in English, where girls improved more than boys on all sub-tests, though gains in reading comprehension were almost identical. See Appendix 1 for a breakdown of scores by gender, grade and group.

A one-way analysis of variance showed that none of the observed variance in scores could be attributed to gender at any level of significance ($p > .05$).

While girls did substantially better than boys in the iREAD2 midterm assessment, this could be attributed to a number of reasons:

- Students who took the baseline assessment were not included in the final assessment. Camfed finds, though nearly equal numbers of boys and girls enter Grade 1, girls drop out faster until Grade 6 (2012). Imoro further found, "The poor performance of girls in school in addition to the non-existence of female role models within the local communities are factors that influence or fuel higher female dropouts from school (2009)." Thus, it is possible that some of the girls who were included in the midterm study have since dropped out and are hence, not included in this analysis. A disaggregated study of dropout rates has not been conducted for this report, however this is an area that might benefit from future research.
- The data could signal a macro-level shift towards more gender equality in the school environment overall. With gender as one of the Millennium Development Goals, an increasing amount of attention has been placed on girls' education. This could be creating a classroom environment that is more conducive to girls' success.

Unlike many other technology in education programs, it is clear that the iREAD2 e-reader program works for boys and girls. This conclusion is supported, not only by the data, but also by teacher observations. In a September 2013 report the Olinga Foundation noted an observation from the P1 teacher at Asuboi Primary: “the teacher, who had been teaching in the school for the past four years, mentioned that the project was really helping the children *especially girls* to read well. Surprisingly, for him, pupils who were unable to read were even catching up and always eager to read a passage during comprehension lessons.”

For an ICT4E program to have an impact on girls that is as high as the impact on boys is a promising sign that merits more investigation to shed light onto how and why e-reading programs increase gender equity when other interventions have failed. It might be of interest, also, to conduct more qualitative research on girls in e-reader programs to understand gender-differentiated effects, including effects on increased self-esteem, confidence, and motivation.

4.2 Reading Habits & Building a Reading Culture

4.2.1 Student survey on reading habits

To supplement the quantitative analysis of reading skills, Worldreader also held targeted focus groups to gather qualitative findings. Overall, student survey data indicates that the intervention met its objective of increasing access to and utilization of reading materials among students. Students in control schools reported reading an average of less than one book (.69) per student per day, whereas students at the treatment schools reported reading nearly three (2.89) books in one day. Additionally, 69% of students surveyed at treatment schools reported reading more now than before the program started (measured as number of books per day).

In addition, 3rd and 4th graders (n=78) were asked to draw their typical day before and after the program began.¹⁶ The number of students who reported reading (on e-readers or generally), writing or studying after school doubled, from 16 to 33. The number of students

¹⁶ 2nd graders were not asked to complete this task because they began school with e-readers in grade 1 and have thus, never attended school without e-readers).

Observations from the Community: SMC Program Highlights

At the close of iREAD 2, the School Management Committee reflected on the program, and identified the following as key benefits of the program:

- Improved literacy skills among students
- Improved quality of teaching, as teachers have received training and have robust teaching resources on their e-readers
- Improved confidence among students
- Increased school enrollment and attendance
- Increased time spent reading among students
- Increased community support for education and reading

A number of these benefits align with iREAD 2's expected outcomes. It is also exciting to see that iREAD 2 achieved several positive gains (such as improved student confidence, enrollment, and attendance) that were outside of the program's primary aims.

who reported using books during their school day (on the e-reader or paper books) also doubled, from 17 to 34. The reliability of this data is limited because students' memories may be less than accurate, and because there is no data from the control group to compare. Just as control group students improved in reading scores over two years, albeit at a slower rate than their treatment group counterparts, it would similarly be expected that control students would also use books more often now than two years ago when their reading skills were less developed.

However, the overall trend indicated by the data leads one to conclude that reading activities have increased in importance to the treatment students.

The National Education Assessment found that most P2 pupils in Ghana do not have English or Ghanaian language readers, and less than a third (31.0%) of schools sampled had a library. Consequently, only 34.7% of students surveyed for the NEA reported that they had read books on their own at school the day before (MoE, 2013). When asked how often they themselves read aloud at home, 6.3% of pupils said they read every day and 40.8% said they never did. These reports are not surprising given that only a few pupils (21.6%) said they brought reading books home from school, and 32.0% of pupils said that there were reading materials other than schoolbooks in their home, compared to 97% of iREAD 2 students who reported reading books in the previous 24 hours.

4.2.2 Findings from Parent Survey

Parents are vital partners for the success of any literacy program, because they help instill a culture of reading in children's lives outside of school.

Favorite Book: *At the Beach*

At the Beach is a leveled early grade reader published by Sam Woode Limited, a local Ghanaian publisher, and Worldreader. One of the most popular books among iREAD 2 students, *At the Beach* features simple language and repetition about a trip to the beach, in order to build students' confidence reading, and engage them in a topic everyone enjoys, playing at the beach!

Getting parents' buy-in and participation is key, as are on-going touch points between parents and the program. One treatment school, Suhum D/A, took the initiative to design and conduct a parent survey among members of 24 of their PTA in July 2013. While this data is taken from a subset of parents at only one of the treatment schools (and one of the higher performing ones), it provides insight into how students are using e-readers at home. Findings from this small survey include:

- Almost all (23) parents reported that their child brought the e-reader home frequently and frequently read the e-reader at home, supporting students' survey responses that they read nearly three books per day and read at home.
- 75% of parents reported that their child's siblings help him or her use the e-reader to learn at home, indicating that siblings are children's primary support for e-reading outside of school.
- 71% of parents do not permit their children to share their e-readers with friends for fear the e-reader might become lost or damaged. [5. Challenges](#) discusses rates of damaged and lost e-readers in greater detail.

The Olinga Foundation also reported, on Asuboi Primary, indicating: "It was noteworthy to know that the outstanding impact did not only affect the school but had also transcended onto parents who were enthused to see their children so attached to their kindles in the evenings instead of engaging in their usual roaming about (September 2013 Stakeholder Communication)."

4.2.3 Observations on Content

According to the final assessment student survey, 75% of students surveyed reported that their favorite book was a storybook while 14% listed textbooks (another 11% had no favorite book). 77% of students reported that their favorite book was on their e-reader (rather than a paper book). Other observations include:

- It was important to include material on the e-reader that spoke to the religious and spiritual needs of project-affected communities. Parents said that their skepticism about the program reduced once they saw these religious texts in digital form. Leaders of religious organizations within the community were so enthusiastic that they requested more books in this genre so that students and families could reference the e-readers during services.
- Beginning leveled readers were particularly popular, regardless of students' grade level. These feature simple words, repetition, rhyming and other techniques to help build students' confidence reading.
- 83% of students' favorite books were in English. This is interesting considering that English CWPM and reading comprehension were among the most-improved subtests for treatment students.
- Puzzles, games and interactive books (such as "Math Blender) were very popular among students.

4.3 Observations of E-Reader Classrooms

Between March and April 2014, Worldreader staff observed 11 treatment group classrooms across the four treatment schools for an hour each during lessons on either Twi or English language. These observations were conducted as part of regular unannounced field visits so teachers could not prepare.

Eight out of the 11 observed lessons used the e-readers for almost the entire hour; one lesson used the e-readers for about half the class period (30 minutes); and two lessons did not use the e-reader at all during the lesson.¹⁷ In the classroom that used e-readers for about half the class period, there were very few devices in the classroom (10 for a group of students that varied between 31-50 students as children came in and out), contributing to low usage. The number of students present in class during observations ranged from 22 to 52.

In the eight observed lessons that made strong use of the e-reader, the percentage of students who had devices in class ranged from 35% (12 of 34 students) to 92% (48 of 52 students), and averaged 66% across the eight lessons. During the eight observed lessons that made strong use of the e-readers, the observer rated teachers and students in each

¹⁷ Qualitative data indicates that reasons for these teachers not using e-readers in the classroom include teacher preference and lack of material for a particular subject on the e-reader.

classroom as either “comfortable” or “very comfortable” using the e-reader, and although a few students had difficulty using the devices, most operated the devices well. In all classrooms, teachers frequently walked around and inquired if students needed assistance; in six of eight classrooms, the observer noted that teachers spent sufficient and reasonable time addressing student e-reader issues, while in two classrooms the observer noted that teachers spent a burdensome amount of time. In seven of eight classrooms, teachers encouraged students to help their peers with e-reader usage issues. The observer rated that students were “engaged” or “very engaged” when using the e-readers in all eight classrooms.

The dominant teaching style across all eleven observed treatment classrooms was question and answer, in which teachers frequently engaged students by asking questions to check their understanding. The observer noted that students never asked teachers questions, which is in line with Ghanaian school culture. Aside from question and answer, other teaching methods observed included reading aloud, group discussion, copying from the board, and describing pictures. All teachers remained in the classrooms for the duration of the observations.

Routine monitoring visits by the Olinga Foundation confirmed that all four treatment schools used Olinga teaching methodologies alongside the NALAP curriculum. In September 2013, Olinga reported, “in all the schools visited, the teacher’s demeanor and attitude throughout the duration of the class was generally warm and friendly. The teachers attended to children who found it difficult operating the e-readers and helped the weak ones to sound out the words and letters generated.”

The Olinga Foundation monitors observed teachers leading literacy lessons using digital versions of NALAP textbooks and Olinga’s Enlightening the Heart Learners Book 1. Observed teaching techniques included explaining the objectives of the lesson, discussing difficult words, engaging students by posing questions to them, group reading from the e-reader, and inviting students to the board to identify the sound of letters and to construct their simple words.” Olinga monitors observed that the primary language of instruction was Twi.

5. Challenges

An analysis of School Management Committee and stakeholder meeting notes reveals the following challenges:

Device breakage

iREAD 2's average device breakage/missing rate over two school years was 19.5%, making breakage one of the project's main challenges. However, it is important to note that as e-reader manufacturers have improved the design of the e-reader to make it more durable, device breakages are reducing. In the period of one school year, iREAD 1's breakage rate over 2010-2011 was 40%; in comparison, iREAD 2's breakage rate for similar one year periods was significantly lower at 16% in 2012-2013, and 23% in 2013-2014, even though the devices are being used by younger children who are generally less careful when it comes to caring for and lending out the devices. Most incidences of breakage occurred outside the school grounds, and students reported they were caused by sharing e-readers with other children.

This reduction in e-reader breakage was caused, primarily by iREAD 2's use of more durable, updated models of e-readers than those used in iREAD 1. Worldreader continues to work closely with device and accessory manufacturers to make the devices more long-lasting in the hands of young children.

And newer devices are becoming even more durable. Worldreader's Project LEAP (Libraries, E-reading, Activities and Partnership), is a pilot program in Kenyan libraries that uses an even newer Kindle model (Paperwhites). This program has experienced no breakage despite the 200 devices being handled by 10,000+ library patrons over the first four months of the project.

The School Management Committee agreed that the following factors contributed to lower breakage rates at their schools:

- Not allowing students to take e-readers home (however, this significantly limits students' access to e-readers)
- Close teacher supervision of children's e-reader maintenance (for example, regular e-reader inspections and reminders on proper e-reader care)
- Engaging parents around ensuring their children maintain e-readers properly
- Strict damage policies (for example, not replacing damaged e-readers right away, and not allowing students who have broken e-readers twice in the past to take devices home)

In addition, Worldreader has implemented the following measures (across e-reader programs globally), which have helped reduce device breakage:

- An emphasis on caring for the device during training and project roll-out
- Holding community event to sensitize and engage the community during the launch phase
- The use of protective cases and skins for the e-readers



Emmanuel Arthur
(Teacher, Marjokrom Primary)

Mr. Arthur, who has been a teacher for 23 years, has observed school enrolment and attendance increase at Marjokrom Primary since the start of the iREAD 2 program. Before, some parents preferred that their children work on their farms rather than go to school. However, he says parents are now placing a greater emphasis on school after witnessing iREAD 2's effects on improving student reading performance and learning resources. Drawing upon teaching methodologies Mr. Arthur learned through the iREAD 2 program and the reading materials now available to him on the e-reader, he has developed two Twi books entitled *Sua Akenkan 1 & 2 (Learn How to Read)*. These books supplement limited government textbooks that tend to encourage rote reading. *Sua Akenkan 1 & 2* have been well received by other teachers, and are being distributed to schools throughout the district. Worldreader is exploring the possibility of digitizing Mr. Arthur's books for use in future e-reader projects.

Even with these reductions in breakage rates, a frequent concern of community members, government officials and educators is around the lifespan of the e-reader devices themselves. Although the devices do not last forever; we found that only 30% of e-readers were damaged or had any issues during the 2-year life of this project –with a trajectory of approximately 15% more devices needing to be replaced in Year 3; for a total replacement rate of about 45% in three years. In comparison, the government of Ghana's policy is to replace all textbooks for early grades every three years because of normal wear and tear on materials being used by children (Interviews with GES, 2013).

Additionally, although the physical devices had to be replaced, once e-books were already deployed, schools were able to simply re-download books and reading materials to new devices at no additional cost – which is not possible with physical books. Finally, through close partnerships with the private sector, Worldreader was able to get a 2-year warranty for all e-readers, which further reduced the replacement rates for actual e-readers down to just the cost of shipping for communities during the iREAD 2 program. Combined with the strikingly low breakage rates of new device models, these facts point to increasing durability and feasibility of using e-readers in school settings.

Younger students' difficulty navigating the e-reader

Teachers and classroom observers noted that younger students, particularly those in P1, had difficulty navigating to specific pages on the e-reader, making it time consuming for teachers to ensure that every student in the class was on the same page of a book. In the future, Worldreader will explore extra training sessions (with Worldreader staff and volunteers) for the youngest children, and refining training protocols to include new approaches such as interactive e-reader training posters that reinforce concepts in classrooms without teacher guidance. It's also important to note that these same observers pointed out children's natural affinity for technol-

ogy, and that once students master the basic concepts they adopt the e-readers quickly. One can assume that extra time and effort spent working with these younger children does pay off in terms of adoption of the technology.

[Influencing teacher engagement and methodologies](#)

While Worldreader and Olinga monitors noted positive changes in the use of new teaching methodologies, engaging teachers in the program continued to be a challenge in some schools. Schools in poorer areas are often less attractive to trained teachers, and because of this, those schools often have non-career teachers in the classrooms (generally young people who are completing their national service requirements and will then go on to work in other professions). Such teachers are may already be less engaged in lessons (e-reader or otherwise), which makes them difficult to motivate within the context of the e-reader program. While positive changes in all teachers were noted, the most positive gains were with teachers who already demonstrated higher than average levels of motivation.

Additionally, while reading speed is a key determinant of reading comprehension, teachers were sometimes observed focusing on improving reading speed exclusively, rather than improving CWPM with the aim of bettering students' comprehension skills. As most students are still below the 45 CWPM mark, developing fluency should still be a focus of the teaching methodologies, however Worldreader and Olinga should emphasize comprehension exercises and checking for understanding as part of the teacher training module. Simple techniques—such as pausing while students are reading aloud to ask them what has happened in the story—can keep them engaged and build comprehension skills.

[High enrollment rates following launch of e-reader interventions](#)

According to school administrators, enrollment at the four treatment schools swelled, as parents withdrew their students from other schools in order to enroll them in schools with the e-readers. While increased enrollment is positive and speaks to the convening power of technology to boost access to learning for children, the high enrollment numbers overwhelmed the schools. If in the future when e-reader programs are expanded on a large scale, high enrollment at a particular schools would not be an issue, as all schools in a given geography would have e-readers. Furthermore, enrollment increases have more cost implications in individual program models (where each student has his or her own e-reader), but in the classroom model changes in enrolment are easier to tackle. For transition plans with iREAD 2 schools, Worldreader recommended that schools keep some devices in reserve for new enrolment.

[Challenges that influence the effectiveness of iREAD 2 but are outside of iREAD 2's scope](#)

The School Management Committee identified a number of general education challenges that limited iREAD 2's effectiveness in improving literacy, including:

- Many students had illiterate parents, and therefore received limited help with reading and schoolwork at home.
- Some families did not prioritize education, could not afford costs associated with school, or preferred that students work on family farms; therefore some students may not have attended school regularly. Worldreader's focus on including the community through parent trainings and SMC input is attempting to address this.
- Some students dropped out due to family travel and relocation.

Challenges around continuing the e-reader programs after project close

As the project wound down, Worldreader collaborated with the four treatment schools to plan for ownership of the program being transferred entirely to the schools themselves. This is happening in a phased approach, with Worldreader still providing some support initially. However, the four treatment schools shared concerns over funding e-reader programs on their own. Expected cost implications include recruiting volunteers for extracurricular reading activities, providing security for devices to be stored in the school, providing remuneration to project managers, conducting training and general maintenance. Worldreader addressed these concerns along with other transition questions at project manager workshops held in September.

One of the key funding opportunities identified at the workshops was local district assemblies. For both iREAD1 and 2 the district education offices thoroughly reviewed the process with the schools and were very optimistic about this. Should such funding measures be approved, schools will be allowed to charge small fees for e-reader usage each term and within a specific time frame. These fees will be as small as GHS 1.00 (US \$0.30), but when applied to all students in the school, this will be useful revenue. One school, Marfokrom has already identified an alumnus of the school who will provide support, and another option is the cocoa farming and processing industry local to the schools. Such operations have Corporate Social Responsibility (CSR) programs that support local education initiatives, though further investigation is required.

6. Recommendations for Scaling

6.1 Government Adoption of Digital Books in Classrooms

Ghana Education Service (GES) has expressed strong interest in the iREAD 1 and 2 programs, and is considering transitioning away from paper books and towards digital books. At this time, GES officials have communicated two major reservations regarding scale-up at a national level. Both these concerns are shared by other stakeholders:

1. Concern that a nationwide e-reader program would be too expensive
2. Concern that the relatively small sample sizes of iREAD studies thus far do not yield sufficient evidence for scale-up

Given these concerns, our recommendations for scaling are outlined below.

6.2 Further exploration of digital vs. paper book costs

Based on the ever-decreasing cost of technology, Table 8 estimates that, the costs of delivering nine government textbooks per grade (45 textbooks in total) through e-readers—including the costs of purchasing e-readers and accessories, and hiring support such as school-level e-reader managers—would cost \$99 less per primary student over a 5 year period than delivering traditional paper books. The table below also shows substantial savings for delivering textbooks at the JHS and SHS levels. While the e-reader system for delivering books requires an upfront \$40 hardware cost that the traditional paper system does not, each digital book costs significantly less than paper books, with primary level textbook prices averaging \$.80 for digital books versus \$4.00 for paper books. Digital books cost less than paper books, as digital publishing reduces the transportation costs, storage costs, paper/ink costs, and over-printing risks associated with paper publishing.

These calculations assume that the program will take place at sufficient scale to support a purchase of Kindle Paperwhites at a price of \$40, to last for 5 years.¹⁸ While the calculations in Table 8 below also focus only on providing nine government textbooks to each student, there is potential for the government, as well as individual consumers (e.g. parents), to purchase additional books at significantly discounted digital prices.

¹⁸ Given the breakage data coming out of Project LEAP, Worldreader's newest pilot study in Kenya that utilizes the newest model of Kindle Paperwhites, Worldreader reasonably estimates a 5-year lifespan for new e-reader technology.

TABLE 8
Digital vs. Paper Book Cost Comparison

Government Purchasing Model		Av Price Text-books	Textbooks per year per student	N°. Years	Total Cost: Set of 45 text-books	Cost of e-readers	Cost of accessories & support	Total cost -5 yrs	Cost difference -5 yrs	Cost per year
Level	Model									
Primary	Paper	\$4.00 ¹⁹	9	5	\$180.00	\$0.00	\$0.00	\$180.00		\$36.00
	Electronic	\$0.80	9	5	\$36.00	\$40.00	\$5.00	\$81.00	\$-99.00	\$16.20
JHS	Paper	\$5.00	10	5	\$250.00	\$0.00	\$0.00	\$250.00		\$50.00
	Electronic	\$1.00	10	5	\$50.00	\$40.00	\$5.00	\$95.00	\$-155.00	\$19.00
SHS	Paper	\$6.00	8	5	\$240.00	\$0.00	\$0.00	\$240.00		\$48.00
	Electronic	\$1.20	8	5	\$48.00	\$40.00	\$5.00	\$93.00	\$-147.00	\$18.60

Prices in USD

This model assumes that the government is considering funding a full set of textbooks per child. We have found the reality to be that children are lucky if they have access to a single textbook. Therefore, we cannot discard the idea of an e-reader with a full set of books that will be shared among a number of children, which will be a significantly less expensive intervention. The Worldreader team is currently exploring opportunities to test the effectiveness of using e-readers shared among groups of approximately three to five children.

6.3 Generate Additional Evidence for Digital Reading in Classrooms through a phased roll-out

GES leadership shared that scale-up may need to occur in a phased approach, in which scale is achieved in a particular region before expanding to other regions in the country. A possible region for initial scale-up may be the Eastern Region, where iREAD interventions are currently operating. Additionally, Worldreader is exploring opportunities to expand to the North of the country.

This phased approach would allow Worldreader and other stakeholders to generate further evidence and learnings around digital reading in Ghana's schools. Areas of investigation for future research include examining the correlation between reading culture/habits & reading scores, gender dynamics, and the program's effects on low performers.

¹⁹ These figures, obtained from Worldreader's Ghana team, are consistent with what was observed by DFID, 2011 (as seen in Abadzi, 2013), where the average cost of a textbook was estimated at \$5.19.

6.4 Explore Alternative Digital Reading Models for Classrooms

iREAD 2 delivered digital books through an individual e-reader model, in which each student received his or her own e-reader to use in and outside of school. However, alternative shared e-reader models and Worldreader Mobile have the potential to deliver digital books at reduced costs.

E-reader deployment models that provide a shared classroom set of e-readers, rather than individual e-readers for each student to use in and out of school, have the potential to reduce costs by decreasing the number of devices required and reducing breakages that occur when devices are used outside of school. Worldreader has experience implementing shared e-reader models in Ghana and other countries, but to date has not rigorously assessed the impact of shared e-reader models on literacy outcomes. Worldreader submitted a proposal for an All Children Reading 2.0 award that would deploy and test the efficacy of a shared e-reader project model in the Volta region.

The main drawback of shared e-reader models is that students have less access to the reading materials on the device than students in individual e-reader models. One strategy for addressing this drawback is supplementing e-reader access to digital books with mobile phone access to digital books, or even projecting materials onto a screen for group lessons. Moreover, many of Worldreader's partner programs across sub-Saharan Africa have been using shared models the past four years, and report anecdotal gains in terms of student achievement similar to those in an individual model.

Digital Reading Models Chosen by the Four Treatment Schools at the Close of iREAD 2

At the close of iREAD 2, Worldreader worked through the School Management Committee to assist schools in creating transition plans that define the way forward for managing and financing their e-reader programs without iREAD 2 support. Worldreader also worked with the four schools to determine the financial implications of maintaining e-reader programs.

In order to expose a greater number of students to e-readers with a limited number of devices, all four schools moved away from the individual e-reader model towards shared e-reader models in which students have access to shared classroom or library sets of e-readers, with the possibility of checking devices out over weekends. Two of the four treatment schools (Asuboi and Suhum) chose to focus access to e-readers at the lower primary (P1-3) level, where they felt the devices could have the greatest impact on foundational reading skills among early grade readers. Amanase, however, chose to focus on upper primary, convinced it would be easier and more sustainable to have e-reader programming among older children who are less likely to break the devices and who have more advanced reading skills that allow them to explore a greater number of books on the devices. Marfokrom chose to focus its transitioned e-reader program on all primary students (P1-6).

Details of the shared e-reader models chosen by the four treatment schools are as follows:

- Suhum will provide a classroom set of e-readers in each lower primary (P1-3) classroom, which students will share at a 2:1 student to device ratio. The school will also allocate 10 e-readers to each upper primary (P4-6) classroom, which students will be able to access on a lending basis.

Worldreader Mobile

Worldreader Mobile is a free digital reading app that is compatible with the low-end, data-enabled feature phones that are widely used in Ghana. By leveraging the mobile phones that many Ghanaians already own and use, Worldreader Mobile is able to deliver digital books without providing hardware such as e-readers, and therefore costs the program only \$1.69 per user. In 2013, an average of 5,000 readers in Ghana and 335,000 readers globally used Worldreader Mobile per month. A UNESCO-sponsored survey of 4,000 Worldreader Mobile users across 7 developing countries, including Ghana, found that 33% of users read books aloud to young children from their phones. The survey also found that 20% of users were teachers and that 29% were caregivers to children under the age of 13, “indicating a largely untapped opportunity to support literacy development of children through mobile technology” (link to report). Community-level outreach has the potential to promote the use of mobile phone reading among parents, who can share mobile phone access to books with their children at home. Additionally, Worldreader Mobile could be a cost effective way to deliver educational resources to teachers. At this time, Worldreader is in the early stages of piloting Worldreader Mobile in classrooms, and has not yet generated evidence around Worldreader Mobile’s impact on students’ literacy.

- Amanase will provide a classroom set of e-readers for each upper primary (P4-6) classroom, which students will share at a 2:1 student to device ratio. The school will also create a library of 50 e-readers for students to access. Although no devices are reserved for lower primary, lower primary teachers may request library devices for use in their classrooms.
- Asuboi will provide a classroom set of e-readers in each lower primary (P1-P3) classroom, which students will share at a 2:1 student to device ratio. The school will also allocate 15 devices for upper primary students to access on a lending basis.
- Marfokrom will provide a classroom set of e-readers in each lower and upper primary (P1-6) classroom, which students will share at a 3:1 student to device ratio. The school will also allocate 20 devices for JHS students to access on a lending basis.

All four schools have planned to create a reserve of back-up e-readers to accommodate breakages and damages. All four schools have assigned project managers, librarians, and others to manage e-readers at their schools.

All schools have also committed to continuing extracurricular reading activities. Suhum and Asuboi schools have plans for recruiting volunteers for these activities, while Amanase and Marfokrom have yet to develop plans. Additionally, Suhum and Amanase plan to implement “Vacation Reading Schools” that allow students to access e-readers over long breaks when school is not in session. Additionally, schools are in planning to host various forms of community events to involve parents ensure they are equally aware of the handing over of the program to the community.

7. Lessons Learned and Conclusions

7.1 Lessons Learned and Recommendations

In line with the experimental nature of the ACR grants, Worldreader has taken away a few key lessons from iREAD 2's implementation that are useful considerations for future programming in Ghana and across the globe.

Technology has convening power: iREAD 2 demonstrates the power of technology to drive engagement, from students being excited and participatory in lessons on the e-reader to parents becoming involved in the program. Schools went through an extensive application process just to be a part of the trial, parents from other schools tried to enroll their children in iREAD2 schools, and iREAD 2 parents contributed to the program through the School Management Committee. This type of engagement is particularly important to keep in mind when designing projects with a technology component, in order to make sure the technology is actually adopted by the target community.

Practice is key for developing a reading culture: In-line with prevailing research, reading in the home and outside of school was important for developing a culture of reading to sustain children's learning in school through iREAD 2. Again, parents are key for supporting this practice of reading outside of school. With that in mind Worldreader will continue to engage parents in future programs through Worldreader Mobile, as well as outreach to parents and caretakers.

Engaging teachers and school administrators: Whereas e-readers greatly increased access to locally relevant reading materials for students, there was room for more growth in terms of implementation of new teaching methods and techniques, particularly with non-career teachers. Additional effort training, mentoring and providing additional technical assistance to teachers to fully leverage the new resources available on the e-readers would be worthwhile. Worldreader will continue to explore partnerships with local organizations that can provide this support and expertise when it comes to working with teachers.

Research design: Although Worldreader designated schools as treatment or control randomly, the treatment schools ended up with higher baseline EGRA scores than the control schools. This shows that national exams may not be a good proxy for early grade reading skills. This difference was accounted for in the final analysis (using a repeated measures analysis of variance), but for future programs baseline or pre-baseline reading assessments should be conducted *before* schools are assigned as treatment or control for more accurate pairing.

In conducting the EGRA, the use of electronic data collection (in this case through Tangerine) was well worth the investment in resources. It improved the quality of the data and efficiency of collection, and decreased logistical costs. For example, the project required less time to train enumerators than the literature around paper test collection suggests because the tool was easy, straightforward and enumerators understood its functions quickly.

Learning from device breakages: As is to be expected with any library or supplementary reading materials program, Worldreader did have to replace materials that the students handled – in this case, e-readers instead of physical books. However, Worldreader has been working with the device manufacturer (in this case, Amazon) to identify ways to strengthen the product, particularly for use in child-friendly environments. Moreover, newer versions of Kindles are proving



Daniel Ofosu Budu
(Teacher, Asuboi Methodist School)

Daniel, who has been teaching for eight years, has noticed that increased access to books through the e-reader has led to a tremendous improvement in students' reading performance. He says that clear gains in reading skills have motivated parents to send their children to school, motivated children to take more interest in school, and motivated teachers to work harder because they can see the fruits of their efforts. Daniel himself has been motivated to go beyond his regular teaching duties to form and lead after school reading groups. Daniel proudly says that he has never before seen children so enthusiastic towards reading.

to be even sturdier and more durable, which will reduce future program costs even further. Worldreader recommends that the development community continue to keep this learning loop open with the technology industry, and remain engaged to collectively address issues of durability and accessibility to technology together.

Where resources are even scarcer: Worldreader acknowledges that within Ghana, there are parts of the country that have lower socio-economic and educational indicators than where the pilot program took place. The iREAD 2 results indicate that digital reading programs can have an even greater impact in places with more need with some program modifications.

First, access to electricity is an issue for more deprived areas, but improvements in solar energy may help address this problem. Worldreader is currently testing low-cost, portable solar chargers for communities that live off electrical grids through a pilot study in Kenya. The findings of this study will be made available to the public to be used and improved upon in 2015.

Additionally, in an ideal world every child should have his or her own copy of each required textbook, but children all over the world are learning in resource-scarce environments. As we strive to get books into the hands of every child, Worldreader is exploring the use of shared sets of e-readers in classroom and library settings, and extending the reach of the e-reader programs through Worldreader Mobile, to help make digital libraries available through devices that families already own, specifically to encourage reading in the home. Worldreader recommends organizations keep open these shared resource options, as anecdotally, they have already shown potential to be extremely effective.

7.2 Conclusions

Overall, the results presented in this report point to the effectiveness of the iREAD 2 intervention for improving early literacy skills in Ghanaian primary students. This adds to a growing body of knowledge demonstrating that children with access to reading materials read better, and further points to e-readers as a sustainable and scalable way to increase access to reading materials.

As the global education community has focused on and dramatically improved access to education around the globe, we are faced with a critical challenge: resources—both financial and human—have not been able to keep pace with increased school enrollment rates. Books, teachers and other educational inputs continue to be scarce and this impacts quality of education and children’s ability to pick up foundational skills such as literacy and numeracy.

With each passing day, technology is becoming more affordable and quickly spreading to every corner of the globe. Providing each student in Ghana’s primary schools with 240 paper books, or even 40 books for that matter, is not feasible given the current resource situation in the country. However putting 240 digital books into the hands of students is not only perfectly feasible, but as the results of iREAD 2 demonstrate, can lead to dramatic improvements in literacy skills.

As prices for e-readers continue to plummet – from over \$300 per device 5 years ago to less than \$40 per device today – we are quickly approaching a world where it may be possible to get hundreds of books into the hands of every child with this technology.

7.2 Conclusions

But, more than just access, the iREAD 2 program has also shown that e-readers and libraries of digital books are useful tools for engaging teachers and communities. Working with e-readers in schools provided an opportunity to train engaged and interested teachers in updated and interactive teaching methodologies, and to develop strong working relationships with communities and parents. Technology truly has the power to convene whole communities, and when this power is harnessed towards getting kids reading more and better, we see a stronger culture of reading emerge.

We've only begun to unlock the potential of reading in the digital age. Further research into more cost-effective methods –such as shared e-readers and using mobile phones as a complementary delivery method–have to be investigated, particularly to reach poorer and more remote communities. Additionally, more research is needed on gender dynamics of digital reading interventions, along with student behaviors that contribute to literacy gains.

Such research will help take the iREAD 2 pilot activity to scale in a meaningful way. There is still more work to be done and questions to be answered to get us there, but by combining a focus on literacy and reading skills development with the promise of the digital age, we are closer than ever to solving the challenge of getting books into the hands of the children who need them, not only in Ghana, but across the globe.

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Appendix 1

1.1 - School Enrollment at Baseline

	PAIR ONE	PAIR TWO	PAIR THREE	PAIR FOUR	TOTAL
Treatment Group	Amanase Presby Primary B	Marfokrom Anglican DJA	Asuboi Methodist Primary	Suhum DJA, Stream "C"	
	P1: 51	P1: 38	P1: 39	P1: 48	P1: 163
	P2: 54	P2: 54	P2: 43	P2: 50	P2: 190
	P3: 54	P3: 48	P3: 42	P3: 52	P3: 188
	159 Students	141 Students	124 Students	141 Students	574 Students
Control Group	Okorase Presby Primary M/E	Otoase DJA Primary	Okroase MA (DA) Exp Primary	Suhum Methodist Primary A	
	P1: 42	P1: 28	P1: 42	P1: 42	P1: 129
	P2: 52	P2: 30	P2: 49	P2: 49	P2: 152
	P3: 53	P3: 45	P3: 46	P3: 46	P3: 170
	157 Students Total	103 Students Total	138 Students Total	137 Students Total	535 Students

Appendix 1

1.2 - Mean Scores by Group & Grade, Twi

TREATMENT												
	P1			P2			P3			Total		
	B	F	C	B	F	C	B	F	C	B	F	C
Letter Sound Knowledge	19.91	41.78	21.87	24.59	51.20	26.61	34.86	56.47	21.61	25.59	49.04	23.45
Familiar Word Decoding	6.52	22.20	15.68	14.67	27.63	12.96	22.20	32.65	10.45	13.61	26.92	13.31
Correct Words per Minute	6.22	23.59	17.37	16.26	35.41	19.15	25.40	47.26	21.86	14.96	34.11	19.15
Reading Comprehension	0.43	1.62	1.19	1.00	2.23	1.23	2.79	2.80	0.01	1.00	2.15	1.15
Listening Comprehension	0.05	4.44	4.39	0.12	4.50	4.38	1.80	4.34	2.54	0.13	4.43	4.30
<i>n</i> =	159			146			113			418		

CONTROL												
	P1			P2			P3			Total		
	B	F	C	B	F	C	B	F	C	B	F	C
Letter Sound Knowledge	8.39	8.93	0.54	10.02	22.01	11.99	19.45	36.9	17.45	12.54	25.09	12.55
Familiar Word Decoding	2.63	2.63	0	5.68	11.43	5.75	12.4	22.88	10.48	6.74	13.78	7.04
Correct Words per Minute	2.82	2.82	0	5.14	13.8	8.66	13.83	31.55	17.72	7.15	17.59	10.44
Reading Comprehension	0.14	0.14	0	0.31	1.13	0.82	1.21	1.8	0.59	0.543	1.19	0.647
Listening Comprehension	0.13	4.2	4.07	0.06	4.20	4.14	0.40	4.20	3.8	0.20	4.20	4
<i>n</i> =	117			84			101			302		

*Refers to student's class at time trial began (baseline)

B = Baseline

F = Final

C = Change

Appendix 1

1.3 - Mean Scores by Group & Grade, English

TREATMENT												
	P1			P2			P3			Total		
	B	F	C	B	F	C	B	F	C	B	F	C
Letter Sound Knowledge	16.04	37.92	21.88	22.97	45.18	22.21	30.50	51.41	20.91	22.37	44.10	21.73
Invented Word Decoding	4.33	17.17	12.84	9.96	23.02	13.06	17.37	28.00	10.63	9.82	22.14	12.32
Correct Words per Minute	5.34	26.58	21.24	15.51	43.52	28.01	33.88	60.36	26.48	16.61	37.42	20.81
Reading Comprehension	0.58	3.26	2.68	1.59	4.46	2.87	2.88	5.69	2.81	1.66	3.51	1.85
<i>n</i> =	159			146			113					

CONTROL												
	P1			P2			P3			Total		
	B	F	C	B	F	C	B	F	C	B	F	C
Letter Sound Knowledge	7.48	18.11	10.63	14.19	25.34	11.15	21.60	36.66	15.06	14.07	26.32	12.25
Invented Word Decoding	1.50	6.05	4.55	4.31	10.21	5.90	10.27	18.61	8.34	5.21	11.41	6.20
Correct Words per Minute	2.17	10.36	8.19	7.13	21.29	14.16	16.12	40.11	23.99	8.21	23.34	15.13
Reading Comprehension	0.12	1.59	1.47	0.48	2.88	2.40	2.58	4.57	1.99	0.74	2.90	2.16
<i>n</i> =	117			84			101			302		

*Refers to student's class at time trial began (baseline)

B = Baseline

F = Final

C = Change

Appendix 1

1.4 - Mean Scores by Group & Gender

TREATMENT												
	Twi						English					
	Girls			Boys			Girls			Boys		
	B	F	C	B	F	C	B	F	C	B	F	C
Letter Sound Knowledge	28.11	52.04	23.93	22.97	45.92	22.95	24.40	46.66	22.26	20.26	42.49	22.23
Familiar/Invented Word Decoding	13.79	27.79	14.00	13.42	26.02	12.60	10.18	22.78	12.60	9.44	21.48	12.04
Correct Words per Minute	14.87	34.66	19.79	15.07	33.55	18.48	17.66	42.76	25.10	15.54	40.46	24.92
Reading Comprehension	0.99	2.22	1.23	1.01	2.08	1.07	0.96	4.45	3.49	1.45	4.14	2.69
Listening Comprehension	0.13	4.41	4.28	0.13	4.45	4.32	NA	NA	NA	NA	NA	NA
<i>n</i> =	213			205			213			205		

CONTROL												
	Twi						English					
	Girls			Boys			Girls			Boys		
	B	F	C	B	F	C	B	F	C	B	F	C
Letter Sound Knowledge	14.69	27.29	22.95	10.26	22.73	12.47	16.44	28.63	12.19	11.54	23.87	12.33
Familiar/Invented Word Decoding	7.48	15.32	12.60	5.96	12.14	6.18	5.77	12.30	6.53	4.62	10.46	5.84
Correct Words per Minute	9.19	19.29	18.48	4.96	15.76	10.80	11.60	27.43	15.83	4.60	18.99	14.39
Reading Comprehension	0.62	1.31	1.07	0.46	1.05	0.59	0.91	3.25	2.34	0.57	2.62	2.05
Listening Comprehension	0.29	4.19	4.32	0.10	4.22	4.12	NA	NA	NA	NA	NA	NA
<i>n</i> =	156			146			213			146		

*Refers to student's class at time trial began (baseline)

B = Baseline

F = Final

C = Change

Appendix 1

1.5 - Shortened outputs, Analyses of Variance (ANOVA) with Repeated Measures

	LANGUAGE		PARTIAL SS	F	PROB > F	ADJUSTED R-SQUARED
Letter Sound Knowledge	Twi	Model	800986.836	5.53	.00*	0.69
		Treatment	114198.373	149.48	.00*	
	English	Model	663032.21	4.71	.00*	0.65
		Treatment	55920.8287	82.64	.00*	
Word Decoding	Twi	Model	402284.568	5.39	.00*	0.68
		Treatment	31582.9945	69.50	.00*	
	English	Model	299204.173	5.53	.00*	0.69
		Treatment	18471.0152	54.47	.00*	
Oral Reading Fluency	Twi	Model	855253.31	3.87	.00*	0.59
		Treatment	51961.8427	52.53	.00*	
	English	Model	1162763.39	5.59	.00*	0.69
		Treatment	64021.06	49.16	.00*	
Reading Comprehension	Twi	Model	3046.77699	3.80	.00*	0.79
		Treatment	154.075369	43.42	.00*	
	English	Model	11083.3973	4.09	.00*	0.6
		Treatment	439.011942	37.55	.00*	
Listening Comprehension	Twi	Model	6884.37562	11.84	.00*	0.84
		Treatment	1.71619956	2.12	0.14	

df = 721.1

* = p < .05

Appendix 1

1.7 - Additional Data on Breakages

1.7.1 - Breakage by Term	
Term	Rate Damaged/ Missing Over 1 Term
Feb - Apr 2013 (half term)	6%
May - Jul 2013	11%
Sep - Dec 2013	15%
Jan - Apr 2014	12%
Term Average	11%

1.7.2- Breakage by Grade	
Grade	Rate Damaged/Missing Over 2 Years
P1/P2	37%
P2/P3	34%
P3/P4	28%
TOTAL	33%
Term Average	11%

1.7.3- Breakage by School	
School	Rate Damaged/Missing Over 2 Years
Asuboi	34%
Amanse	33%
Suhum	36%
Markofrom	30%
OVERALL	33%

n=791

Appendix 2

ACR Final Assessment - Focus Group Note-taking Form

Use one note-taking form per student.

School: _____ **Date:** _____

Facilitator Name: _____

Student Name: _____

Student Gender: Male Female **Student Grade:** _____

1) Who lives in your house with you? Circle all that apply. Do not include siblings unless an older sibling is the primary caretaker.

Mother Father Grandmother Grandfather

Other: (please specify) _____

2) Ask the following for each family member listed by the student... Does your [insert name of family member] know how to read? Circle an answer for each family member.

Mother: Yes No Unsure

Father : Yes No Unsure

Grandmother: Yes No Unsure

Grandfather: Yes No Unsure

Other: Yes No Unsure

3) How many books have you read since yesterday morning? Write number: _____

4) What is your very favorite book? Write title: _____

5) Where is the book? Circle one: E-reader Paper

6) What is your favorite subject? _____

Why is it your favorite? _____

7) (Ask P-3 and P-4 students after Activity 3 starts): When you were in grade ____ [grade before e-reader program started]: How many books did you read in one day?

Insert number: _____

Appendix 2

ACR Final Assessment - Focus Group Protocol

[NOTE: FOCUS GROUPS SHOULD TAKE NO LONGER THAN 60 MINUTES.]

Each focus group should include 10 students (all from the same class). Use the focus group student list provided to select students.

Start by making the children comfortable. Speak to the children in Twi and remember to smile and welcome them all. Introduce yourself and explain what you are here to do:

“Hello everyone. Thank you for joining me today. My name is _____, and I am here to just have a little talk with you and do some fun activities. This is not a test. Nothing you say here will affect your marks in school. So if you all agree, let’s go ahead and get started. Are you ready?”

Go around the room and ask each student if they are ready, in order to obtain verbal consent. If you do not obtain consent from a particular student, say “Thank you,” and allow the student to leave.

The note-taker will record them.

Activity 1: Drawing a typical day/ Current school year

Provide each student with three pieces of paper and some pens/crayons.

Hold up a piece of paper. Say, “on this piece of paper I want you to draw a picture of what you normally do **before you leave for school**. We’re going to see how quickly we can all do this. We’re going to be very fast! I will give you a warning when we have one minute left.”

Give the students 3-5 minutes to draw. Provide students with a 1 minute warning.

After the allotted time, go around and collect the papers from the students. On the back of each paper, write the student’s name, “C” for “current year”, and “B” for “before school”. As you collect the drawings, you may need to ask the student about each to clarify what is in each drawing. Write notes on the back, in particular noting when an e-reader is present in each drawing. Repeat this process for every round of drawings (changing the second letter on the back of the to “D” for “During school” or “A” for “After school”).

After you have collected the first piece of paper, hold up a second piece of paper and have each student do the same. Say: “on this piece of paper I want you to draw a picture of what you normally do **when you are at school**.”

Appendix 2

ACR Final Assessment - Focus Group Protocol

After 3-5 minutes, repeat the same process of collecting the students' drawings. Hold up a third piece of paper and have each student to do the same. Say: "on this piece of paper I want you to draw a picture of what you normally do **after school**."

Activity 2: Individual questions

As students are completing drawings (during activities 1 and 3), go around and individually ask them the following questions:

- 1) Who lives in your house with you?
- 2) [If they answer mother, father, grandmother or grandfather, ask this question for each one...] Does your [insert name of family member] know how to read?
- 3) How many books have you read since yesterday morning?
- 4) What is your very favorite book?
- 5) Where is the book? (example: e-reader, paper, etc)
- 6) What is your favorite subject? Why is it your favorite?

Record these answers on the provided note-taking sheets along with the student's class and gender.

Activity 3: Drawing a typical day before the e-reader program

[This activity will only be conducted with P-3 and P-4 students.]

Before beginning, ask each student to stand up and do some stretching to wake up.

Begin activity 3: Ask students: "I want you to think waaaaay back to when you were much smaller, in ___ class [Insert class students were in before e-reader project began. For example, for P-3 students this would be P-1.]" You may ask them some questions to spark their memories. Such as, "Do you remember who your teacher was in P-1? Do you remember what your favorite food was? Do you remember a nursery rhyme you used to sing?"

Provide each with three pieces of paper.

Appendix 2

ACR Final Assessment - Focus Group Protocol

Hold up a piece of paper. Say, “on this piece of paper I want you to draw a picture of what you **used to** normally do **before you leaving for school when you were in [insert grade].**”

Give the students 3-5 minutes to draw. Provide students with a 2 minute warning and a 1 minute warning.

After the allotted time, go around and collect the papers from the students. On the back of each paper, write the student’s name, “P” for “past year”, and “B” for “before school”. As you collect the drawings, you may need to ask the student about each to clarify what is in each drawing. Write notes on the back, in particular noting when an e-reader is present in each drawing. Repeat this for each round of drawings.

After you have collected the first piece of paper, hold up a second piece of paper and have each student do the same. Say: “on this piece of paper I want you to draw a picture of what you used to normally do **when you were at school when you were in __ grade.**”

After 3-5 minutes, repeat the same process of collecting the students’ drawings. Hold up a third piece of paper and have each student to do the same. Say: “on this piece of paper I want you to draw a picture of what you used to normally do **after school when you were in __ grade.**”

Activity 4: Individual Questions

As students are completing drawings of what they **used to do**, go around and individually ask them the following question:

When you were in grade ___: how many books did you read in one day?

Record the students’ answers on the provided note-taking sheets along with the student’s class and gender.

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

ENGLISH

General Instructions

It is important to establish a playful and relaxed rapport with the children to be assessed, via some simple initial conversation among topics of interest to the child (see example below). The child should perceive the following assessment almost as a game to be enjoyed rather than an exam. It is important to read ONLY the sections in boxes aloud slowly and clearly.

Good morning. My name is ____ and I live in _____. I'd like to tell you a little bit about myself. [Number and ages of children; pets; sports; etc]

- 1. Could you tell me a little about yourself and your family? [Wait for response; if student is reluctant, ask question 2, but if they seem comfortable continue to verbal consent].**
- 2. What do you like to do when you are not in school?**

Verbal Consent

- Let me tell you why I am here today. I work with the Ministry of Education and we are trying to understand how children learn to read. You were picked by chance, like in a raffle or lottery.
- 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 a reading game. I am going to ask you to read letters, words and a short story out loud.
- Using this stopwatch, I will see how long it takes you to read.
- 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's all right.
- Do you have any questions? Are you ready to get started?

Check box if verbal consent is obtained: YES

(If verbal consent is not obtained, thank the child and move on to the next child, using this same form)

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

ENGLISH

1. Letter Sound Knowledge

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

Here is a page full of letters of the English alphabet. Please tell me the **SOUNDS** of as many letters as you can; not the **NAMES** of the letters, but the **SOUNDS**.

For example, the sound of this letter [point to A] is “AH” as in “APPLE”.

Let’s practise: Tell me the sound of this letter [point to V]:

If the child responds correctly say: **Good, the sound of this letter is “VVVV.”**

If the child does not respond correctly, say: **The sound of this letter is “VVVV.”**

Now try another one: Tell me the sound of this letter [point to L]:

If the child responds correctly say: **Good, the sound of this letter is “LLL.”**

If the child does not respond correctly, say: **The sound of this letter is “LLL.”**

Do you understand what you are to do?

When I say “Begin,” please sound out the letters as quickly and carefully as you can. Tell me the sound 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]. **If you come to a letter sound you do not know, I will tell it to you. If not, I will keep quiet and listen to you. Ready? Begin.**



Start the timer when the child reads the first letter. Follow along with your pencil and clearly mark any incorrect letters by tapping the letter on the tablet. Count self-corrections as correct. If you’ve already marked the self-corrected letter as incorrect, tap the letter again and go on. Stay quiet, except when providing answers as follows: if the child hesitates for 3 seconds, provide the sound of the letter, point to the next letter and say “Please go on.” Mark the letter you provide to the child as incorrect. If the student gives you the letter name, rather than the sound, provide the letter sound and say: [“Please tell me the **SOUND** of the letter”]. This prompt may be given only once during the exercise.

TO MARK INCORRECT ANSWERS TAP THE LETTER ONCE. The letter will turn blue and a line will be drawn through it. If you accidentally mark a letter incorrect, tap it again, and the letter will turn grey.

TO MARK THE LAST LETTER ATTEMPTED, TAP THE LETTER ONCE WHEN PROMPTED BY TANGERINE (after 60 seconds).

If the student does not get any of the letters on the first line correct, Tangerine will automatically discontinue the test.

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

ENGLISH

2. Invented word decoding

Show the child the sheet of invented words in the student stimuli booklet. Say,

Here are some made-up words. I would like you to read as many as you can. Do not spell the words, but read them. For example, this made-up word is: “ut”.

Let’s practise: Please read this word [point to the next word: dif].

[If the student says “dif”, say]: “Very good: “dif”

[If the student does not say “dif” correctly say]: This made-up word is “dif.”

Now try another one: Please read this word [point to the next word: mab].

[If the student says “mab”, say]: “Very good: “mab”

[If the student does not say “mab” correctly say]: This made-up word is “mab.”

When I say “begin,” read the words as quickly and carefully as you can. Read the words across the page, starting at the first row below the line. I will keep quiet and listen to you, unless you need help. Do you understand what you are to do? Ready? Begin.



Start the timer when the child reads the first word. Follow along and clearly mark any incorrect words by tapping the word once. Count self-corrections as correct. If you’ve already marked the self-corrected word as incorrect, tap the word again and go on.

Stay quiet, except when providing answers as follows: if the child hesitates for 3 seconds, provide the word, point to the next word and say “Please go on.” Mark the word you provide to the child as incorrect.

If the child gets the whole first line wrong, the test will be discontinued. After 60 seconds (when prompted by Tangerine), say “stop” and mark the last word attempted.

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

ENGLISH

3a. Oral passage reading

Show the child the story in the student stimuli booklet. Say,

Here is a short story. I want you to read it aloud, quickly but carefully. 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 & listen to you, unless you need help. Ready? Begin.



Start the timer when the child reads the first word. Follow along with your Start the timer when the child reads the first word. Follow along on your tablet and tap any incorrect words. Count self-corrections as correct.

*Stay quiet, unless the child hesitates for 3 seconds, in which case provide the word, point to the next word and say “**Please go on.**” Mark the word you provide to the child as incorrect.*

*At 60 seconds, say “**Stop.**” Mark the final word read by tapping it.*

Early stop rule: *If the child reads no words correctly in the first sentence, the test will be automatically discontinued. Stop the student and say “**thank you.**”*

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

ENGLISH

3b. Reading comprehension

When 60 seconds are up or if the child finishes reading the passage in less than 60 seconds, REMOVE the passage from in front of the child, and ask the first question below.

Give the child at most 15 seconds to answer the question, mark the child's response, and move to the next question.

Read the questions for each line up to the bracket showing where the child stopped reading.

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.

- 1. Where does Kofi come home from?*
- 2. Where does he go?*
- 3. What does he do there?*
- 4. Why does Grandma call him back?*
- 5. What must you always do when you meet people?*

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

ENGLISH

4a. Oral Passage Reading (timed)

Show the child the story in the student stimuli booklet. Say,

Here is another short story. I want you to read it aloud, quickly but carefully. 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 & listen to you, unless you need help. Ready? Begin.



Start the timer when the child reads the first word. Follow along with your Start the timer when the child reads the first word. Follow along on your tablet and tap any incorrect words. Count self-corrections as correct.

*Stay quiet, unless the child hesitates for 3 seconds, in which case provide the word, point to the next word and say “**Please go on.**” Mark the word you provide to the child as incorrect.*

*At 120 seconds, say “**Stop.**” Mark the final word read by tapping it. Remove the passage from in front of the child.*

Early stop rule: *If the child reads no words correctly in the first sentence, the test will be automatically discontinued. Stop the student and say “**thank you.**”*

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

ENGLISH

4b. Reading Comprehension

When 120 seconds are up or if the child finishes reading the passage in less than 120 seconds, **REMOVE the passage from in front of the child, and ask the first question below.**

Give the child at most 15 seconds to answer the question, mark the child's response, and move to the next question.

Read the questions for each line up to the bracket showing where the child stopped reading.

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.

1. Who has a very big drum?
2. Who wants lion's very big drum?
3. What does sky god say to the animals in the jungle?
4. Which two animals failed?
5. What reward did the crab get from sky god?

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

AKUAPEM TWI

General Instructions

It is important to establish a playful and relaxed rapport with the children to be assessed, via some simple initial conversation among topics of interest to the child (see example below). The child should perceive the following assessment almost as a game to be enjoyed rather than an exam. It is important to read ONLY the sections in boxes aloud slowly and clearly.

Verbal Consent

Ka kyere sukuunii no:

- **Ma me nka nea enti a mewɔ ha nne yi nkyere wo. Meɛ adwuma wɔ Asoɛ a ɛhwɛ Adesua ne Agodi so hɔ , na ye pɛ sɛ yehu ɔkwan a mmofra nam so sua akenkan. Wo ti ye, wɔ apaw wo aka ho te sɛ obi a wadi loto.**
- **Yehia wo mmoa wɔ dwumadi yi mu. Nanso wompe sɛ woyɛ a, ɔhyɛ biara nni mu.**
- **Ye rebedi akenkan agodi bi. Mereɛ ma wo akenkan nkyerɛwde, nsemfua ne ayɛɛm tiawa bi dennen wɔ Twi mu.**
- **Mede afiri a mikura yi bɛhwɛ mmere tenten a wode bɛ kenkan.**
- **Eyi nye ɔhwɛ enti ɛrennya nsunsuanso biara wɔ wo sukuu adesua mu.**
- **Bio sɛ wompe sɛ woyɛ a, ɔhyɛ biara nni mu. Sɛ yefi ase na sɛ wompe sɛ wubua ase mmisa bi a, yebeɛye atom.**
- **Wowɔ nsemfua bi? Woaboa wo ho sɛ yemfi ase?**

Check box if verbal consent is obtained: YES

(If verbal consent is not obtained, thank the child and move on to the next child, using this same form)

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

AKUAPEM TWI

1. Letter Sound Knowledge

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

Twɪ akyerɛwde pii wɔ nhoma yi so. Mepa wo kyɛw kenkan dodow biara a wubetumi wɔ nnyigyei mu kyere me.

Nhwɛso bi ne |A|. Ka na mintie.

Sɛ abofra no tumi ka no pɛpɛɛpɛ a, ma no amo.

Sɛ wantumi anka no pɛpɛɛpɛ a, ka |k| ma ontie.

Afei ka nea edi so yi |y|.

Mo, wɔka no |y| sɛ abofra no antumi anka no pɛpɛɛpɛ a, ka |y| ma ontie.

Afei ka nea edi so yi |L|.

Mo, wɔka no |y| sɛ abofra no antumi anka no pɛpɛɛpɛ a, ka |L| ma ontie.

Woate nea ɛɛ sɛ woyɛ no ase? Meka “Fi ase” pɛ a, kenkan akyerɛwde no mu biara nnyigyei ntɛmntɛm pɛpɛɛpɛ sɛnea wubetumi. Ka akyerɛwde yi nnyigyei kyere me. Fi ase fi ha na toa so sɛɛ. [Nhwɛso no akyi no, fa wo nsateaa si akyerɛwde a edi kan no so na twe ase fa kuw a edi kan no ase.] Sɛ wudu akyerɛwde bi a wunnim ne nnyigyei a, mɛkyere wo. Sɛ amma saa a, mɛyɛ komm atie wo.

Woaboa wo ho? Fi ase.



Start the timer when the child reads the first letter. Follow along with your pencil and clearly mark any incorrect letters by tapping the letter on the tablet. Count self-corrections as correct. If you've already marked the self-corrected letter as incorrect, tap the letter again and go on. Stay quiet, except when providing answers as follows: if the child hesitates for 3 seconds, provide the sound of the letter, point to the next letter and say “Please go on.” Mark the letter you provide to the child as incorrect. If the student gives you the letter name, rather than the sound, provide the letter sound and say: [“Please tell me the SOUND of the letter”]. This prompt may be given only once during the exercise.

TO MARK INCORRECT ANSWERS TAP THE LETTER ONCE. The letter will turn blue and a line will be drawn through it. If you accidentally mark a letter incorrect, tap it again, and the letter will turn grey.

TO MARK THE LAST LETTER ATTEMPTED, TAP THE LETTER ONCE WHEN PROMPTED BY TANGERINE (after 60 seconds).

If the student does not get any of the letters on the first line correct, Tangerine will automatically discontinue the test.

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

AKUAPEM TWI

2. Familiar Word Decoding

Show the child the sheet of invented words in the student stimuli booklet. Say,

Nsɛmfua bi ni. Mɛpa wo kyɛw kenkan dodow biara a wubetumi (ɛnsopɛle nsɛmfua no, na mmom kenkan) Nhwɛso bi ni, “mama”.

Yɛnsɔ eyi nhwɛ: mɛpa wo kyɛw kan aɛmfua yi [fa wo nsa si aɛmfua “Adua” so]:

(Sɛ abofra no ka no pɛpɛpɛ a, ma no amo: aɛmfua no yɛ “Adua.”)

(Sɛ abofra no anka no yiye a, ka kyerɛ no se: aɛmfua no yɛ “Adua.”)

Afei sɔ foforo hwɛ bio: mɛpa wo kyɛw kan aɛmfua ‘anomaa’ [Fa wo nsa si aɛmfua ‘anomaa’ so]:

(Sɛ abofra no kan no pɛpɛpɛ a, ma no amo: aɛmfua no yɛ “anomaa.”)

(Sɛ abofra no ankan no yiye a, ka kyerɛ no se: aɛmfua no yɛ “anomaa.”)

Sɛ meka “fi ase” a, kenkan nsɛmfua no ntɛmntɛm pɛpɛpɛ sɛnea wubetumi. Kenkan nsɛmfua no fi kuw a edi kan ne nea ɛtoatoa so wo ase no. Mɛyɛ komm atie wo gye sɛ ebia wuhia mmoa bi.

Woahu nea ɛɛ sɛ woyɛ no?

Woasiesie wo ho? Fi ase.



Start the timer when the child reads the first word. Follow along and clearly mark any incorrect words by tapping the word once. Count self-corrections as correct. If you've already marked the self-corrected word as incorrect, tap the word again and go on.

Stay quiet, except when providing answers as follows: if the child hesitates for 3 seconds, provide the word, point to the next word and say “Please go on.” **Mark the word you provide to the child as incorrect.**

If the child gets the whole first line wrong, the test will be discontinued. **After 60 seconds (when prompted by Tangerine), say “stop” and mark the last word attempted.**

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

AKUAPEM TWI

3a. Oral passage reading

Show the child the story in the student stimuli booklet. Say,

Αγεςεμ tiawa bi ni. Μερε σε wokenkan no dennen nteμntεμ περεερε σεnea εfata. Wokenkan wie a, wubebua nσεmmisa bi afa nea woakenkan no ho. Woate nea εσε σε woyε no ase? Meka se "Fi ase" a, kenkan αγεςεμ no yiye σεnea wubetumi. Μεγε komm atie nea worekan no, γε σε ebia wuhia mmoa bi. Woasiesie wo ho? Fi ase.



Start the timer when the child reads the first word. Follow along with your Start the timer when the child reads the first word. Follow along on your tablet and tap any incorrect words. Count self-corrections as correct.

Stay quiet, unless the child hesitates for 3 seconds, in which case provide the word, point to the next word and say "**Please go on.**" Mark the word you provide to the child as incorrect.

At 60 seconds, say "**Stop.**" Mark the final word read by tapping it.

Early stop rule: If the child reads no words correctly in the first sentence, the test will be automatically discontinued. Stop the student and say "**thank you.**"

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

AKUAPEM TWI

3b. Reading comprehension

When 60 seconds are up or if the child finishes reading the passage in less than 60 seconds, **REMOVE** the passage from in front of the child, and ask the first question below.

Give the child at most 15 seconds to answer the question, mark the child's response, and move to the next question.

Read the questions for each line up to the bracket showing where the child stopped reading.

Merebebisa wo nɛmmisa kakra afa ayɛɛm a woakan no ho. Bɔ mmɔden bua nɛmmisa no yiye sɛnea wubetumi.

1. Na Akokɔ no yɛ hena dea?
2. Dɛn mfaso na akokɔ no wura nyae wɔ akokɔ no ho da biara?
3. Dɛn nti na obiara pɛɛ se ɔto kosua no bi?
4. Dɛn nti na ɔyɛɛ nadwen se ɔbɛma akokɔ no aduan bebree?
5. Akokɔ no didii bebree no dɛn na ɛyɛɛ no?

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

AKUAPEM TWI

4a. Listening Comprehension

Remove the pupil stimuli booklet from the child's view. Read the directions to the child.

This is NOT a timed subtask. Read the entire passage aloud to the child ONE TIME ONLY. Read slowly (about 1 word per second).

Mereɔkan ayɛsɛm tiawa bi akyerɛ wo. Mɛkan no dennen prɛkorɛ. No akyi wubebua nɛmmisa afa ho. Mɛpa wo kyɛw tie no yiye na bua nɛmmisa no pɛpɛpɛ sɛnea wubetumi. Woate nea ɛɛ sɛ woyɛ no ase? [Twɛn ma abofra no ngye so.]

Da bi, Adanko srɛɛ Akokɔ ne Agyinamoɔ se, “Mubetumi aboa me ma madua m’aburow?” Akokɔ ne Agyinamoɔ buaa se, “Daabi! Yɛabrɛ!” Enti Adanko nkutoo duaa aburow no. Adanko de aburow no kaa banku. Akokɔ ne Agyinamoɔ bisaa se, “Yɛmmɛka wo ho mmoa wo nni banku no anaa?” Adanko se, “Daabi! Moabrɛ dodo, nti morentumi nnidi!”

Appendix 2

Ghana Early Grade Reading Assessment: Student Response Administrator Instructions and Protocol (Final)

AKUAPEM TWI

4b. Listening Comprehension

Ask all of the questions. Do not allow the child to look at the passage or the questions.

Mark each question as either Correct or Incorrect. Your selection will turn yellow. If the child does not answer after 10 seconds, mark as "No response," and continue to the next question.

Responses with a similar meaning to those provided should be marked correct. If a child says "I don't know," mark as "Incorrect".

Merebebisa wo nsemmisa kakra afa ayeseɛm a woakan no ho. Bɔ mmɔden bua nsemmisa no yiye sɛnea wubetumi.

1. Adanko sɛɛ mmoa bɛn?
2. Na Adanko pɛ sɛ odua dɛn?
3. Akokɔ ne Agyinamoa buaa se dɛn?
4. Dɛn na adanko de aburow no yɛɛ?
5. Akokɔ ne Agyinamoa bisaa se, "Yɛmmɛka wo ho mmoa wo nni banku no anaa no" dɛn na Adanko kae?

Appendix 3

All Children Reading (ACR) - M&E Training Agenda (DAY 1)



Trainer: Sarah Jaffe, Beatrice Asamoah, Yolanda Dsane & Julie Ortsin

Date: June 17th, 2014

Time: 8:00 AM – 5:00 PM



Time	Activity	Presenter
8:00AM - 8:30AM	Breakfast	
8:30 AM – 8:45AM	Participants sign-in	Julie/Yolanda
8:45AM – 9:15AM	Icebreaker and training overview	Sarah
9:15AM – 10:15AM	Introduction to Worldreader, iREAD2 and the Early Grade Reading Assessment (EGRA)	Beatrice, Sarah
10:15AM - 10:30AM	Break (Snack)	
10:30AM – 11:30 AM	Phonics Review and Practice in Twi and English	Julie
11:30AM – 12:00PM	Assessment Tips and Tricks: Data Collection Principles and Working with Children	Julie
12:00PM – 1:00PM	Introduction to EGRA Tools and Admin Protocol	Sarah, Beatrice, Julie
1:00 PM – 2:00 PM	Lunch	
2:00PM – 3:00PM	Introduction to the Google Nexus and Tangerine: Instruction and Practice Exercises	Sarah
3:00PM – 3:45 PM	Group Review of EGRA tool in Tangerine (Twi)	Sarah, Julie
3:45PM – 4:00PM	Break	
4:00PM – 4:45PM	Group Review of English EGRA in Tangerine (English)	Sarah
4:45PM – 5:00PM	Closing/ Q&A Session	Beatrice, Sarah

Appendix 3

All Children Reading (ACR) - M&E Training Agenda (DAY 2)



Trainer: Sarah Jaffe, Beatrice Asamoah, Yolanda Dsane & Julie Ortsin

Date: June 18th, 2014

Time: 8:00 AM – 5:00 PM



Time	Activity	Presenter
8:00AM - 8:30AM	Breakfast	
8:30AM - 8:45AM	Participants sign-in and collect name tags	Julie/Yolanda
8:45AM – 9:30AM	Introduction & Phonics Activity	Sarah, Julie
9:30 AM – 10:15 AM	Partner Exercise: Administering English EGRA	Sarah, Julie, Beatrice
10:15AM – 10:45AM	Break (Snack)	
10:45AM – 11:30AM	Partner Exercise: Administering Twi EGRA	Sarah, Julie, Beatrice
11:30AM– 12:30PM	Q&A, Test/pre-test logistics, Next Steps and Homework	Sarah
12:30PM – 1:30PM	Lunch	Sarah
Enumerators who will not be serving as focus group administrators may leave.		
1:30 PM – 5:00 PM	Focus Group Training	Sarah, Julie, Beatrice

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 1.



Slide 2.

Who are we?

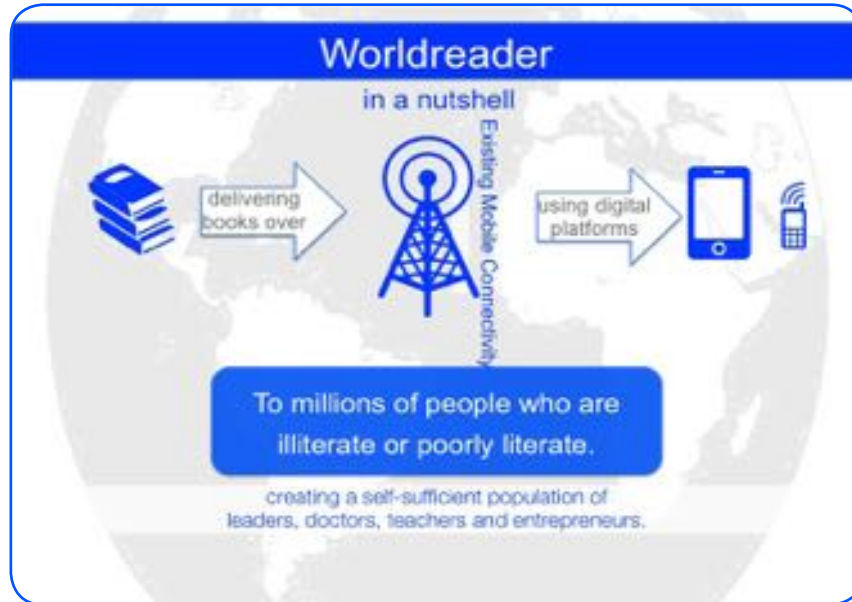
Worldreader is a non-profit organization on a mission to promote literacy by delivering the largest culturally relevant library to people who have no books. We do it digitally and inexpensively.

We know that 200 million children in Sub Saharan Africa are without books of their own

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 3.



Slide 4.

5000+ African and International Titles

from eleven different sub-Saharan countries... and counting!

We have already digitized 1700+ African books and signed agreements with various sub-Saharan publishers, and have developed partnerships with several international publishers, including Random House.

A grid of logos for various publishers and partners, including: ODKBO, KACHRO, Random House, Pearson, Afram, WOLLI, Longhorn Publishers, Harlequin, CK-12, MP, Pizzazz, Pearson, Simon & Schuster, Sub-Saharan Publishers, YOLA, SBP, and budding reader.

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 5.

Worldreader Mobile

a library in your pocket on a device you already own



Key Metrics

- On 4.5 million phones
- 163,000 active readers/month
- ~Sep 2013



Slide 6.

E-Reader Programs

currently in 9 African countries... and counting



Country	Children	Model
GHANA	3,600 children	Model: Individual
KENYA	5,000 children	Model: Classroom/ Library
UGANDA	300 children	Model: Classroom
RWANDA	150 children	Model: Library
TANZANIA	1,080 children	Model: Classroom
SOUTH AFRICA	1,210 children	Model: Classroom/ Library
ZAMBIA	600 children	Model: Classroom/ Library
ZIMBABWE	345 children	Model: Library
MALAWI	280 children	Model: Library

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 7.

Ghana Programs

Working towards regional expansion

- ☐ Eastern Region (Direct)
 - ACR : -611 (partner project)
 - IREAD : -990
- ☐ Upper West Region
 - Device: 100
 - Model: Individual
- ☐ Volta Region
 - Device: 300
 - Model: Individual
- ☐ Ashanti Region
 - Device: 300
 - Model: Individual/library
- ☐ Western Region
 - Device: 300
 - Model: Individual + Library
- ☐ Accra Region
 - Device: 75
 - Model: Library



Slide 8.

E-reader Programs

	iREAD	ACR
Key Partner	Presently Worldreader donor funded	USAID Worldvision Australian Aid
Target	Upper Primary & Junior High School	Early Grade Readers
Specific Towns in Eastern Region	Kade and Adeiso	Suhum, Amanase, Asuboi and Marfokrom
# Classrooms	20	12
Length (years)	4	2
Model	Individual	

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 9.

iREAD 2 (All Children Reading) Project



Slide 10.

iREAD 2 (All Children Reading) Project

The All Children Reading Project aimed to:

- Select four pairs of comparable schools (control & treatment groups) using randomized match-pairing methodology to produce reliable data.
- Introduce e-readers to 600 students in Primary 1, 2, and 3 student and teachers in the treatment schools
- Provide a wide range of English and Ghanaian language content written by Ghanaian authors (~240 books on each device)

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 11.

Schools	Location
Treatment Schools (receiving e-readers)	
Amanase Presby Prim Stream "B"	Ayensuano
Marfokrom Anglican Primary	Ayensuano
Asuboi Methodist Primary	Ayensuano
Suhum DA Stream "C"	Suhum
Control Schools (Not receiving e-readers)	
Okroase Presby Primary School	Suhum
Otoase D/A Primary	Ayensuano
Okroase MA (DA) Exp Primary	Suhum
Suhum Methodist Primary A	Suhum

Slide 12.

- iREAD 2 (All Children Reading) Project
- Other Components
- Strengthening use of phonics and other literacy instruction techniques in conjunction with the e-reader.
 - Expanding after school reading activities using e-readers as part of carefully crafted lessons plans that target specific language skills
 - Exposing students to e-readers over a two year period. This would allow Worldreader to better appreciate the e-reader's effect on student literacy over time

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 13.

Training Workshops
Head teachers, teachers and students



Slide 14.

Training Workshops
- Parents -



Madam Catherine, P2 teacher, leads Parent technical training in Suhum


Appendix 3

Enumerator Training Presentation (June 2014)

Slide 15.

Engaging the Community

Community Launches





School Management Committee

Slide 16.

Out-of-classroom Experience

Learning to READ



Promoting a reading culture

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 17.

iREAD 2 (All Children Reading) Project

Monitoring and Evaluation

- Conduct baseline, midterm and final evaluations to determine the effects of iREAD 2 interventions on selected treatment schools versus control schools
- Use Early Grade Reading Assessment (EGRA) in Akuapem Twi and English to measure the progress of student literacy.

Anticipated Results

That students receiving e-reader interventions would have more access to reading materials, more interest in reading, and greater improvement in standardized reading scores than their control group counterparts.

Slide 18.

Kids reading more....



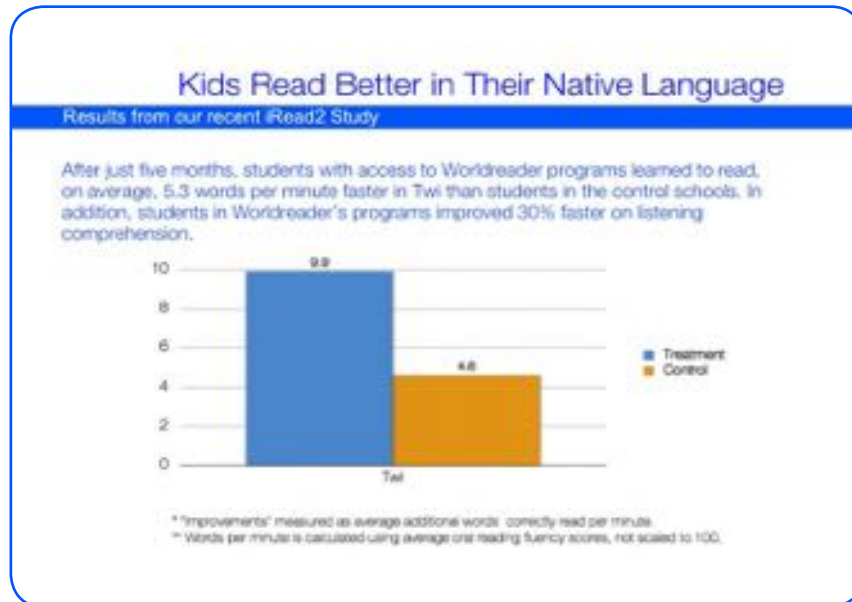
- At the Cocoa Farm
- Kofi Has Malaria
- Ananse and the Pot of Wisdom
- The Fake Beggar

And many more relevant books from both local and international publishers

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 19.



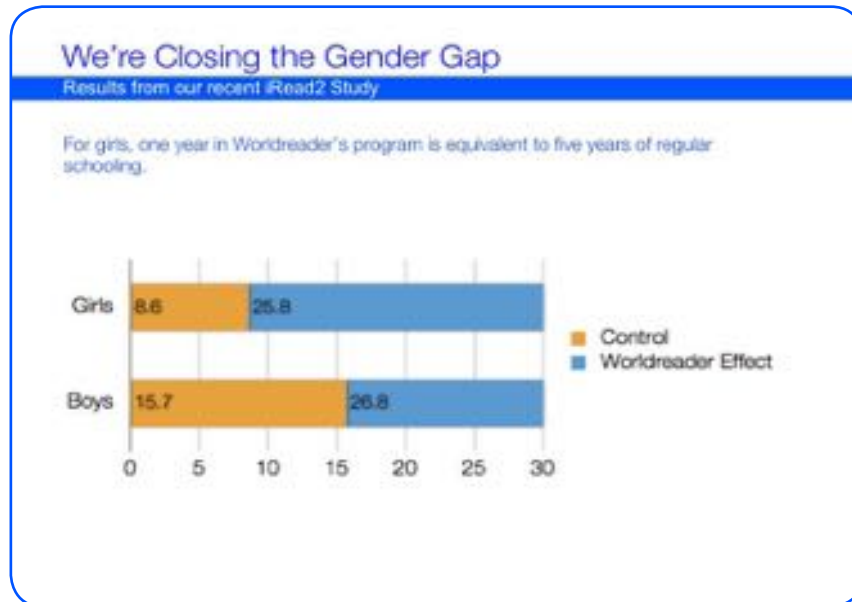
Slide 20.



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Enumerator Training Presentation (June 2014)

Slide 21.



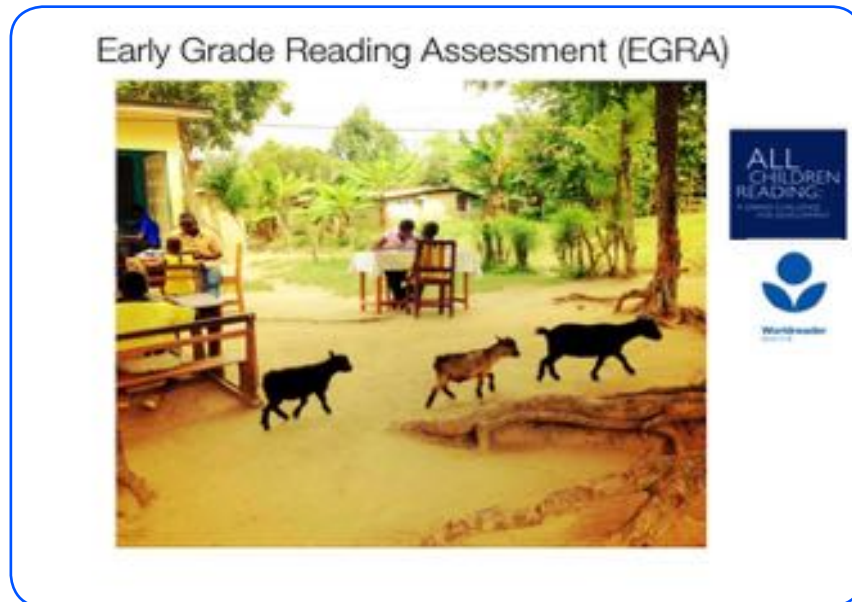
Slide 22.



Appendix 3

Enumerator Training Presentation (June 2014)

Slide 23.



Slide 24.

Agenda

- Introduction - Focus on Early Reading
- EGRA - Measuring Learning
- Components of EGRA
- Questions & Answers

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 25.

Introduction- Focus on Early Reading

- 50% of schools in sub-Saharan Africa have few, or no books at all.
- 1 in 19 countries in Africa have adequate schoolbook provision.*
- Recent evidence indicates that learning to read both early and at a sufficient rate (with comprehension) is essential for learning to read well
- Acquiring literacy becomes more difficult as students grow older; children who do not learn to read in the first few grades are more likely to repeat and eventually drop out.

* World Bank data

Slide 26.

Early Grade Reading Assessment (EGRA)-Measuring Learning

- Simple, effective, and low-cost measures of student learning outcomes
- Measures how well early grade primary students have acquired essential reading skills
 - (a) recognizing the sounds made by different letters of the alphabet
 - (b) reading simple words
 - (c) reading sentences aloud and understanding them
 - (d) understanding material read aloud

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 27.

Components of Worldreader's EGRA

1. **Letter decoding:** Provide the name of upper and lowercase letters in random order

1	2	3	4	5	6	7	8	9	10
e	f	d	R	m	i	w	r	i	H
o	n	F	a	e	A	t	T	e	y
n	G	W	o	C	t	i	H	e	o
r	E	s	Y	n	U	S	t	s	e
D	t	i	o	t	p	i	i	s	d
L	N	i	E	i	x	k	r	z	A
n	w	a	O	H	e	P	d	t	s
s	o	E	h	e	m	a	M	b	E
J	r	c	s	v	h	R	u	B	a
u	E	G	N	a	T	i	h	A	O

Slide 28.

Components of Worldreader's EGRA

Non-Word Decoding: Be able to sound out simple nonsense words, by drawing associations with the spelling of the word and the corresponding sounds

Early Reading Skill: Alphabetic Principle

Example: ut dif mab

1	2	3	4	5	
fut	lus	dit	leb	gak	(5)
huz	jod	kib	lek	lob	(10)
nom	rop	hig	reg	san	(15)
tup	ral	wix	nep	nad	(20)
lut	yod	sim	fat	sig	(25)
en	mon	nup	sen	kad	(30)
faw	lew	paf	sal	zuv	(35)
ved	kag	vom	ritz	gof	(40)
maz	kol	ver	et	beb	(45)
fib	lef	yag	lim	dov	(50)

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 29.

Components of Worldreader's EGRA

Oral Reading Fluency: The ability to read easily, smoothly and with minimal effort.

One day, Ama lost her pencil. She was worried. It was almost class time. She looked in her desk and on her seat. The pencil was not there. She ran to the playground. She looked under the big tree. It was not there. She told her teacher she had lost her pencil. The teacher pointed to Ama's ear. Ama laughed.

Slide 30.

Components of Worldreader's EGRA

Reading Comprehension: The ability to understand and retain what one reads.

Story 1: WHERE IS AMA'S PENCIL	QUESTIONS	CORRECT RESPONSE	INCORRECT RESPONSE	NO RESPONSE
One day, Ama lost her pencil. She was worried. It was almost class time. 14	What did Ama lose? [Ama lost her pencil.]			
She looked in her desk and on her seat. The pencil was not there. 28	Where did Ama look for her pencil? [in the desk, on her seat]			
She ran to the playground. She looked under the big tree. It was not there. 43	Where did Ama run? [the playground]			
She told her teacher she had lost her pencil. The teacher pointed to Ama's ear. Ama laughed. 60	Where was Ama's pencil? [On her ear] Why did Ama laugh? [Because the pencil was on her ear]			

Time remaining on stopwatch at completion (number of SECONDS):

Check this box if exercise stopped due to no correct answers in the first line.

Appendix 3

Enumerator Training Presentation (June 2014)

Slide 31.

Components of Worldreader's EGRA

Listening Comprehension: * The ability to understand and retain heard information

Dawumadi : Otie akekan ntease		Sheet None			None
<p>● Meredi kaa aye of m tiwa bi akvert wo. Mi kaa an densen pef kapf : Iaa akyi wubelaa utf munita afa ba. Mepa wo kyf w tie no tyte na bua utf munita no pef pef of sea wubetum. Wubetum of of of woyf wa aye?</p>					<p>⊗ If a child does not answer within 30 SECONDS.</p>
<p>● Da bi na akoko nini redidi w bor fere dua bi ase. Anomaa bi kosiil dua no so. Bor fere a abere no baako tew bi bor fam fim! Ehu ke se kaa akoko nini. Na > fef m se: "Owia atew ar?" Anomaa no buua se: "Woboa f ye bor fere f aye owia"</p>					
Thafa na na akoko nini redidi?	[bor fere dua bi ase]	<input type="radio"/> Correct	<input type="radio"/> Incorrect	<input type="radio"/> No Response	
Hera na akosiil dua no so?	[anomaa bi]	<input type="radio"/> Correct	<input type="radio"/> Incorrect	<input type="radio"/> No Response	
De n na f tew wa f fam fim?	[bor fere a abere]	<input type="radio"/> Correct	<input type="radio"/> Incorrect	<input type="radio"/> No Response	
De n na f kaa akoko nini?	[hu]	<input type="radio"/> Correct	<input type="radio"/> Incorrect	<input type="radio"/> No Response	
Adi n ni na akoko nini kaa akoko nini?	[na orim of bor fere]	<input type="radio"/> Correct	<input type="radio"/> Incorrect	<input type="radio"/> No Response	
<p>> Number attempted:</p>					
<p>> Number Incorrect:</p>					

*Twi Assessment only

Slide 32.

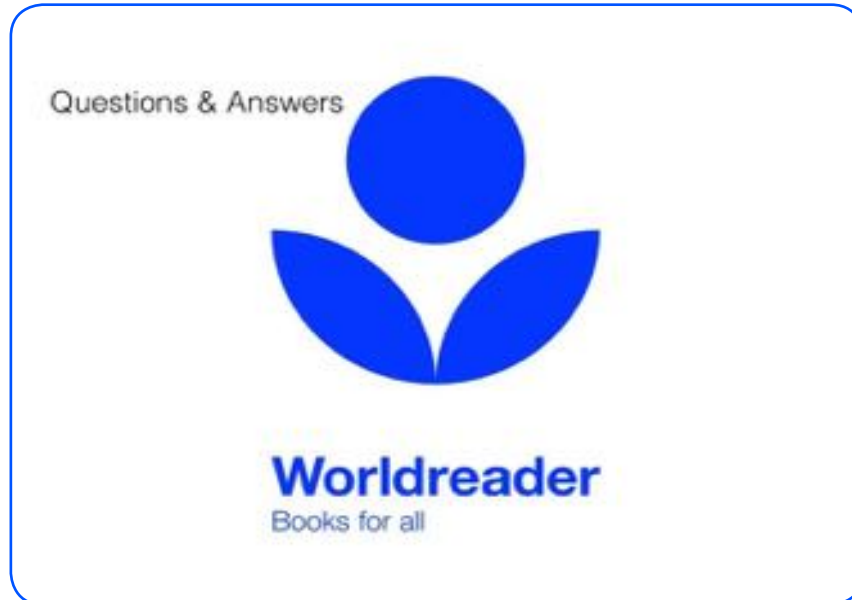
Other EGRA Components of (not in Worldreader's assessment)

- Letter Name Knowledge
- Phonemic Awareness
- Dictation

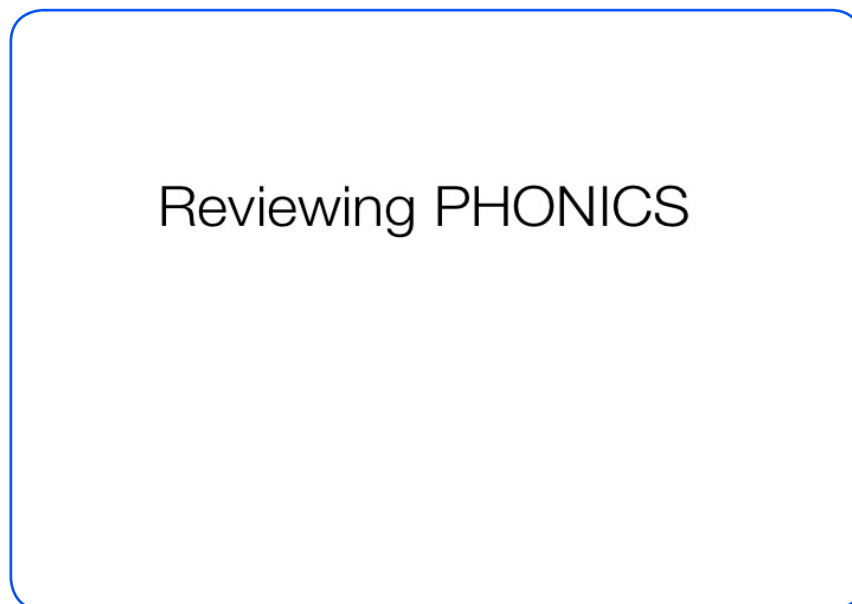
Appendix 3

Enumerator Training Presentation (June 2014)

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Appendix 3

Enumerator Training Presentation (June 2014)

Slide 35.

Example : A y L

n	e	s	a	ε	m	n	k	a	a
S	a	A	r	l	u	Y	ε	w	t
n	a	ε	s	s	u	a	i	w	ɔ
a	n	n	b	n	w	a	e	h	e
N	k	o	u	d	t	i	e	k	b
a	y	a	a	u	m	o	m	a	N
b	h	o	p	n	o	m	p	ε	w
ɔ	i	r	g	a	f	L	ε	k	e
a	k	l	y	r	d	n	o	i	m
n	b	ɔ	e	d	n	ɔ	f	e	i

Slide 36.

Example : Mama adua anomaa

mama	akura	Dɔtedan	ho	Daa
ya	Ata	aba	me	Fεfε
ne	hɔ	yεnbɔ	biara	bere
sε	ase	so	Da	saa
di	Nanso	yi	Enti	wɔ
wɔn	Fati	ka	mu	Ananse
Den	ma	wɔ	nsu	bi
kae	nso	akyi	akwakoraa	ni
de	foro	na	Kyerεε	εyε
no	se	Nana	ara	ketewa

Appendix 3

Enumerator Training Presentation (June 2014)

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Example : A v L

i	m	i	g	r	n	t	l	a	S
x	n	n	O	s	d	a	Y	t	o
B	e	f	M	a	h	t	w	C	R
e	w	o	e	v	y	D	a	E	E
d	t	L	H	O	u	l	F	Q	s
E	A	u	P	o	N	m	p	A	G
s	e	W	a	i	r	N	r	I	e
T	e	e	o	k	H	E	h	s	U
R	I	r	J	t	t	c	z	b	T
n	I	i	A	s	s	o	H	e	H

Slide 38.

Example : ut dif mab

bis	tep	heg	lop	zay
daf	zeg	sab	pog	dap
rov	noz	jeb	zil	wim
lal	wog	fal	pef	jif
mak	kom	wis	raz	vap
mip	pug	gat	zin	mof
vob	yot	pab	laj	fik
bem	ruk	pim	dix	het
fem	yut	kar	mep	cur
lep	reb	pos	guz	jol

Appendix 4



Extra-Curricular Reading Activity LESSON PLAN 1

Comparison can be good and bad. It can help us to aim higher in life in order to achieve feats we had not imagined. It can also make us feel so down that we resign to our fate. What is important is what one believes one is capable of because in whatever situation one finds oneself, one could be better or worse off.

Objective

To instill in children the idea of realizing their innate potentialities and build on them to be even better than those who are higher life's ladder.

Estimated Total Time: 1hour 30minutes

Resources: E-readers

As always, sort children into groups.

Activity 1: Comparison

Period ; 25 minutes

a. Let students compare the following animals. Starting with the first pair, Elephant & Mouse, ask them to describe the Elephant and have a student come up to draw it on the board. Again, have another student come up to draw a mouse on the board. Let them tell you the differences based on the drawings. Now, assign each group with a pair from the list and ask them to share their comparisons with the class.

- Elephant & mouse
- Snake & pig
- Bird and tortoise
- Horse & cat.

b. Select any two children with striking **differences** for comparison eg

- One tall and one short.
- One boy and one girl
- One in bright coloured clothes and another in dark coloured clothes.

Again, let the children discuss (together) the differences between each pair.

Lesson: Differences among people do not make some superior over others.

Activity 2: Silent Reading

Period: 15 minutes

Let children open their e-readers to the story **Suma went Walking**. Assist those who struggle to do so. Ask them to read silently for this period.

Even though not all students can read, it is very important that they develop the habit of at least trying to read.

Activity 3: Think Questions

Period: 20 minutes

After having students silently read, ask them the following questions about the stories. Even the students who couldn't read may be able to answer some of these questions using the pictures. Write the questions on the board and explain in Twi.

1. Mention any of the five animals Suma saw when she went walking.
2. Where do you think Suma went for her walk?
3. Mention any five of the words used in the story to describe Suma.

Activity 4: Model Reading & Oral Response

Period 25 minutes

Read the story to the children. Please model good reading by sounding all the words correctly and giving clues when you get to some of the adjectives used to describe Suma and the animals in the story. Read loudly, clearly and with expressions.

Now, let children give you answers to the questions raised earlier and discuss what their impressions are about the story.

Summary and Conclusion

Period: 5 minutes

Discuss some of lessons learnt from the story. Explain the fact that all the words used to describe Suma in the story are called **ADJECTIVES** because they are describing somebody. Adjectives also describe things.

Appendix 4



Extra-Curricular Reading Activity LESSON PLAN 2

Reading exposes us to all kinds of information including lessons in life.

Objectives

- Children must give five reasons why we must be ourselves.
- Children must give five disadvantages of trying to be someone else.

Estimated Time: One Hour

Resources: Facial paint and painting brushes

Activity 1: Painting Faces

Period: 15 minutes

Put children in groups of 4 each and give each group some paint and brushes and ask them to paint designs on each other's faces.

Each member of the group must have this washable paint on their faces in whatever designs they desire.

After the paintings, call some children to the front of the class and let the others describe that child as he/she looks with the facial paintings.

Activity 2: Discussions

Period: 10 minutes

Let the children wash half (left side) of their faces and let others tell whether the right side of their faces is the same colour as the left side.

(This is to differentiate between the real face and the painted face, which is unreal)

1. Ask children to tell instances when people they know pretended to be what they were not.
2. Let children tell whether it ended positively or negatively.
3. Have they personally done that before and what were the outcomes?

Activity 3: Silent reading

Period: 10 minutes

Have children read the story silently, find answers to the questions given and also keep note of unfamiliar words in the story.

Activity 4: Explaining unfamiliar words

Period: 10 minutes

Write down unfamiliar words identified by students on the board. Explain these words to the children. Use the e-reader's dictionary to help the younger ones to learn its usage and also use dramatization and pictures from the story.

Activity 5: Model Reading

Period: 5 minutes

Give a model reading of the passage, with dramatizations where possible. Also read fluently. As you get to parts of the story, which give answers to the questions asked, read **in a suggestive way to draw their attention to the information.**

Activity 6: summary and conclusion

Period: 10 minutes

Summarize the story by asking the children to answer the following questions

1. Ask children to find out a case of pretense in the story and how it ended in, **"The Blue Fox"**
2. Children must give five reasons why we must be ourselves.
3. Children must give five disadvantages of trying to be someone else.

ADVISE

Just be yourself or that will haunt you forever as it is directly linked to lying.

Appendix 4



Extra-Curricular Reading Activity LESSON PLAN 3

Reading with meaning is only achieved through repeated practice. It is the only way your listeners though do not have access to the text, can completely appreciate what information is being relayed.

Objective

At least five children should be able to read a paragraph meaningfully by the end of the session.

Estimated Time: One Hour

Resources: e-readers

Activity 1

Period: 5 minutes

Give a gist of the story **“The Blue Fox”** and then ask them the following questions to which they will find answers as they read;

1. What made the fox look different from how he originally looked?
2. Why do you think the fox enjoyed his new look?

Activity 2

Period: 10 minutes

Let children read the text of **“The Blue Fox”** and write down unfamiliar words they come across as they read.

(this is to enable the children to identify words they have not seen before or cannot mention).

Activity 3

Period: 15 minutes

Let children mention or spell the unfamiliar and unknown words they have written down.

Guide them to pronounce the words properly and let them use the dictionaries in the e-readers to find the meanings of words other children cannot explain.

To ascertain understanding, allow children to use the words in sentences.

Activity 4

Period: 25 minutes

At the model reading stage, let about 5 children volunteer to read the first two paragraphs as you correct mispronunciations of the reader.

After each child reads, the moderator reads the first two paragraphs fluently and with meaning such that children will start reading meaningfully.

Activity 5

Period: 5 minutes

Get the children to answer these two questions;

1. What made the fox look different from how he originally looked?
2. Why do you think the fox enjoyed his new look?

Conclude by asking the children to mention the words they identified earlier from the text with emphasis on correct pronunciation.

Appendix 4



Extra-Curricular Reading Activity LESSON PLAN 4

In reading to make sense out of it for yourself and to your audience, all punctuation marks must be observed.

Objective

At least ten children should be able to read a paragraph, meaningfully observing all punctuations by the end of the session.

Estimated Time: One Hour

Resources: e-readers

Activity 1

Period: 10 minutes

Put the following punctuation marks (not in words but in symbols) on the blackboard and ask children to identify them;

1. Full stop – (.)
2. Comma – (,)
3. Question mark – (?)
4. Exclamation mark – (!)
5. Quotation marks – (“ ”)

(These are the five most common ones we encounter daily during our reading).

Let children understand that these symbols must be observed during reading in order to achieve the meaning and tone with which the author intends (wants) to speak to us.

Activity 2

Period: 20 minutes

1. **Full stop**- is used at the end of sentences or indirect questions. Anytime you see this symbol, you have to stop, take a breath and start with the next sentence. **(One day, a great famine came over the village of Asembeba. The rains had been disappointing this year as well.)** – Use this as an example.
2. **Commas** – you observe a short pause and then continue with the next word. **(e.g. Ananse lived with his wife and their four children called Ntikuma, Big Head, Big Stomach and Long Legs).**
3. **Question mark** – anytime you see this symbol at the end of a sentence, it means it is a question and so the last word of the sentence should be sounded in a tone that suggests an answer is required. **(Mama, can we get going?)**

4. Exclamation mark - this is normally where you are stressing something you are sure of or giving a command. **(They often arrived home, only to find pans empty, all of the food gone!) Also as an example – GO!**

5. Quotation marks – these shows where the actual words of the character starts and ends. Normally, we change our normal voice we use in reading to depict that what we are reading are the actual words from the character. **(“Mum, can we get going?”, one of the boys says impatiently).**

Activity 3

Period: 10 minutes

Compare these two sentences;

1. Ananse eats shoots and leaves. (this means that Ananse eats shoots and leaves)
2. Ananse eats, shoots and leaves. (this means that Ananse firstly eats, shoots and then leaves the scene of the shooting)

The writer of these sentences does not directly speak these distinctions to us. The meaning comes from where the punctuation marks are. In this way, we can determine that the **SHOOTS & LEAVES** are meals consumed and not a crime committed or vice versa.

Activity 4

Period: 20 minutes

Let children read a paragraph each of Ananse and the wisdom pot as you ensure they read observing punctuation marks, especially the five discussed earlier. Occasionally, give a model reading for them to appreciate the idea.

Appendix 4



Phonics Lesson Plan (1) – Primary 1

Objectives

- To check prior knowledge
- To teach children a new letter sound each session, commencing with letter sound 's'
- To encourage good sight recognition of letter 's'
- To introduce/ reinforce letter formation 's'
- To consolidate learning through themed short stories
- To encourage consolidation through themed play

Resources

- Letter 's' flash cards; large and small – e.reader
- Picture flash cards involving objects beginning with letter 's' – e.reader
- Chalk, whiteboard pens, coloured writing instruments for scribing
- Big books
- Children's own sound book

Lesson

- Using illustrated flashcard introduce letter 's' ensuring not to mention the name of the letter but the sound; 'ssss'
eg. Does anybody know what sound this letter makes?
- Practise repeating the sound with the chn', picking some individual chn' to demonstrate
- Elicit that this is a sound that a snake makes
- Practise air scribing ensuring to face the correct way to avoid inverting the letter
- Call chn' to come to the front and demonstrate; saying and scribing simultaneously
- Read Big Book story if available and check for understanding through questioning
- Chn, could be asked to find any words that begin with the 's' sound. This could alternatively be done using an e.reader (early reader) book, selected prior to the lesson.
- Chn' colour in letter 's' in sound books and/or practise tracing over prepared worksheet
- Chn' can then move to themed play areas

L. Mensah 22.11.12

Appendix 4



Phonics Lesson Plan (2) – Primary 1

Objectives

- To revise letter sound 's'
- To teach children letter sound 'a'
- To encourage good sight recognition of letter 's' and 'a'
- To introduce/ reinforce letter formation 'a'
- To consolidate learning through themed short stories
- To encourage consolidation through themed play

Resources

- Letter 'a' flash cards; large and small – e.reader?
- Picture flash cards involving objects beginning with letter 'a' – e.reader?
- Chalk, whiteboard pens, coloured writing instruments for scribing
- Big books
- Children's own sound book

Lesson

- Revise 's' letter sound through; flashcards, scribing, children's names beginning with 's' etc.
- Using illustrated flashcard introduce letter 'a' ensuring not to mention the name of the letter but the sound; 'a' as opposed to 'ay'
- e.g. *Does anybody know what sound this letter makes?*
- Practise repeating the sound with the children, picking some individual children to demonstrate
- Elicit that this is a special letter called a vowel
- Practise air scribing ensuring to face the correct way to avoid inverting the letter
- Call children to come to the front and demonstrate; saying and scribing simultaneously
- Read Big Book story if available and check for understanding through questioning
- Children could be asked to find any words that begin with the 'a' sound. This could be done using an e.reader (early reader) book, selected prior to the lesson or through games*
- Children colour in letter 'a' in sound/ activity books and/or practise tracing over prepared worksheet
- Children can then move to themed play areas

L. Mensah 22.11.12

Appendix 4



Phonics Lesson Plan (3) – Primary 1

Objectives

- To revise letter sounds 's' and 'a'
- To encourage good sight/ sound recognition of letters 'a' and 's'
- To teach children the new letter sound 't'
- To consolidate learning through themed short stories
- To encourage consolidation through themed play

Resources

- Letter flashcards for 'a' and 's'
- Letter 't' flash cards; large and small – e.reader?
- Picture flash cards involving objects beginning with letter 't' – e.reader?
- Chalk, whiteboard pens, coloured writing instruments for scribing
- Big books
- Children's own sound/activity book

Lesson

- Revise 's' and 'a' letter sound through flashcards, scribing, chn's names beginning with 's' etc.
- Using illustrated flashcard introduce letter 't' ensuring not to mention the name of the letter but the sound; 't' as opposed to 'tee'
- e.g. *Does anybody know what sound this letter makes?*
- Practise repeating the sound with the chn', picking some individual chn' to demonstrate
- Practise air scribing ensuring to face the correct way to avoid inverting the letter
- Call chn' to come to the front and demonstrate; saying and scribing simultaneously
- Revisit procedure for letters 's' and 'a'
- Read Big Book story - if available and check for understanding through questioning
- Chn' could be asked to pick out the letter 't' from a range of flashcards this can be repeated for 's' and 'a'*
- Chn' colour in letter 't' in sound/activity books and/or practise tracing over prepared worksheet
- Chn' can then move to themed play areas

L. Mensah 22.11.12

Appendix 4



Phonics Lesson Plan (4) – Primary 1

Objectives

- To revise letter sounds 's', 'a' and 't'
- To encourage good sight/ sound recognition of letters 's', 'a' and 't'
- To teach children the new letter sound 'i'
- To consolidate learning through themed short stories
- To encourage consolidation through themed play

Resources

- Letter flashcards for 's', 'a', 't' and 'i'
- Letter 'i' flash cards; large and small – e.reader?
- Picture flash cards involving objects beginning with letter 'i' – e.reader?
- Chalk, whiteboard pens, coloured writing instruments for scribing
- Big books
- Children's own sound/ activity book

Lesson

- Revise 's', 'a' and 't' letter sound through flashcards, scribing, chn's names beginning with 's', 'a' and 't' etc.
- Using illustrated flashcard introduce letter 'i' ensuring not to mention the name of the letter but the sound; 'i' as opposed to 'iy'
- e.g. *Does anybody know what sound this letter makes?*
- Practise repeating the sound with the chn', picking some individual chn' to demonstrate
- Practise air scribing ensuring to face the correct way to avoid inverting the letter
- Call chn' to come to the front and demonstrate; saying and scribing simultaneously
- Revisit procedure for letters 's', 'a' and 't'
- Read Big Book story - if available and check for understanding through questioning
- Chn' could be asked to pick out the letter 'i' from a range of flashcards this can be repeated for 's' 'a' and 't'*
- Chn' colour in letter 'i' in sound/activity books and/or practise tracing over prepared worksheet
- Chn' can then move to themed play areas

L. Mensah 22.11.12

Appendix 4



Phonics Lesson Plan (5) – Primary 1

Objectives

- To revise letter sounds 's', 'a', 't' and 'i'
- To encourage good sight/ sound recognition of letters 's', 'a', 't' and 'i'
- To teach children the new letter sound 'p'
- To consolidate learning through themed short stories
- To encourage consolidation through themed play

Resources

- Letter flashcards for 's', 'a', 't' and 'i'
- Letter 'p' flash cards; large and small – e.reader?
- Picture flash cards involving objects beginning with letter 'p' – e.reader?
- Chalk, whiteboard pens, coloured writing instruments for scribing
- Big books
- Children's own sound/ activity book

Lesson

- Revise 's', 'a', 't', 'i' and 'p' letter sound through flashcards, scribing, chn's names beginning with 's', 'a' and 't' etc.
- Using illustrated flashcard introduce letter 'p' ensuring not to mention the name of the letter but the sound; 'p' as opposed to 'pee'
- e.g. Does anybody know what sound this letter makes?*
- Practise repeating the sound with the chn', picking some individual chn' to demonstrate
- Practise air scribing ensuring to face the correct way to avoid inverting the letter
- Call chn' to come to the front and demonstrate; saying and scribing simultaneously
- Revisit procedure for letters 's', 'a', 't', 'i' and 'p'
- Read Big Book story - if available and check for understanding through questioning
- Chn' could be asked to pick out the letter 'p' from a range of flashcards this can be repeated for 's', 'a', 't' and 'i'*
- Chn' colour in letter 'p' in sound/activity books and/or practise tracing over prepared worksheet
- Chn' can then move to themed play areas

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Appendix 4



Phonics Lesson Plan (6) – Primary 1

Objectives

- To revise letter sounds 's', 'a', 't', 'i', and 'p'
- To encourage good sight/ sound recognition of letters 's', 'a', 't', 'i', 'p' and 'n'
- To teach children the new letter sound 'n'
- To consolidate learning through themed short stories
- To encourage consolidation through themed play

Resources

- Letter flashcards for 's', 'a', 't', 'i', 'p' and 'n'
- Letter 'n' flash cards; large and small – e.reader?
- Picture flash cards involving objects beginning with letter 'n' – e.reader?
- Chalk, whiteboard pens, coloured writing instruments for scribing
- Big books
- Children's own sound/ activity book

Lesson

- Revise 's', 'a', 't', 'i', 'p' letter sounds through flashcards, scribing, children's names beginning with 's', 'a', 't', 'i', 'p' and 'n' etc.
- Using illustrated flashcard introduce letter 'n' ensuring not to mention the name of the letter but the sound; 'n' as opposed to 'en'
- e.g. Does anybody know what sound this letter makes?*
- Practise repeating the sound with the children, picking some individual children to demonstrate
- Practise air scribing ensuring to face the correct way to avoid inverting the letter
- Call children to come to the front and demonstrate; saying and scribing simultaneously
- Revisit procedure for letters 's', 'a', 't', 'i', 'p' and 'n'
- Read Big Book story - if available and check for understanding through questioning
- Children could be asked to pick out the letter 'n' from a range of flashcards this can be repeated for 's', 'a', 't', 'i', 'p' and 'n'*
- Children colour in letter 'n' in sound/activity books and/or practise tracing over prepared worksheet
- Children can then move to themed play areas

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