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IREAD GHANA STUDY

MID-TERM EVALUATION REPORT

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IREAD GHANA STUDY: MIDTERM EVALUATION REPORT

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1. EXECUTIVE SUMMARY

Introduction

The iREAD Ghana Study is a Global Development Alliance (GDA) between the United States Agency for International Development (USAID) and Worldreader, a non-profit organization. The iREAD Ghana Study is a pilot study that aims to give Ghana public school students access to books through e-reader technology, which is an electronic device that can house thousands of books. ILC Africa, an Africa-based private organization, serves as the Monitoring and Evaluation (M&E) advisory team within the larger iREAD Ghana Study spanning from October 2010 to July 2011. This report serves as the official mid-term evaluation on progress within the study.

The objectives of the iREAD Ghana Study mid-term evaluation were to collect data to help answer the following 3 key questions:

- Are Ghana public school students reading better, demonstrating greater literacy performance? And if yes, how are they reading better since they were provided with the e-readers.
- How is the e-reader affecting student reading habits? Are they spending more time reading a greater number and variety of books?
- Are e-readers sustainable? Do they comprise a cost-effective intervention over a period of at least five years?

Data collected during the mid-term will also inform program development and scale-up efforts.

Methodology

In order to effectively isolate, define, and justify the interventions affecting experimental student groups, the iREAD team designed an experiment with three groups including one control group and two distinct treatment groups:

- 1) No E-reader Group (NE)
- 2) E-Reader Group (E)
- 3) E-Reader + Out-of-Classroom Exploration Group (E+OCE)

The iREAD Ghana Study currently involves 473 project-affected persons, of which 419 students are students from three senior high schools (SHS), three junior high schools (JHS), and three primary schools. A total of 419 students were involved in the mid-term evaluation, including 113 primary students, 135 JHS students, and 171 SHS students. An additional 40 teachers and administrators across the nine project-affected schools were engaged in the evaluation as well as 14 stakeholders and volunteers.

Findings

At the point of the midterm evaluation, findings show that select groups of students groups are reading better, but the full influence of the e-reader is not entirely clear or conclusive at this stage in the pilot study. At the halfway mark of this study, the primary and SHS level students in the (E+OCE) group are experiencing greater improvements in scores than other groups. This may be a preliminary indication that the e-reader intervention coupled with OCE activities could lead to improved reading ability. However, improvements in scores are inconsistent across groups and grade levels. This may be due to the early stage of the intervention. More months of e-reader exposure and further investigation into key areas are necessary before any definitive conclusions can be drawn.

Overall, the study is providing a solid platform on which Worldreader and stakeholders can learn the anticipated and unanticipated effects of the e-reader.

The following points are initial conclusions that can be drawn from mid-term data:

- The greatest improvements in test scores were realized in schools with e-readers **and** OCE interventions, however test scores are somewhat inconclusive and students may require more exposure to the device, which they will obtain before the final examinations
- Primary students experienced greater improvements in test scores than other grade levels at this time
- Students are achieving their overall best when OCE activities are incorporated alongside e-readers
- Overall, students are accessing more books and they are self-reporting that they are reading more
- Students are reading from various genres and sources of literature to which students did not previously have access
- Students are taking reading material outside of the classroom and completing some of their homework assignments, thus enhancing the overall academic experience

Recommendations

Although the study is at the mid-term phase, the iREAD M&E team has collated a series of recommendations regarding the pilot project as well as learning with e-readers in general. These initial recommendations can help to shape future programming efforts.

PILOT PROJECT ACCOUNTABILITY

- Keep working to identify the determinants of improved reading ability in order to tailor e-reader programming
- Focus on discovering and demonstrating ways to limit the number of broken e-readers in order to ensure cost sustainability via long e-reader lives
- Determine how the e-reader can strategically assist students to excel on standardized exams
- Strengthen OCE activities by organizing them for each (E+OCE) school every Saturday, without exception in order to effectively evaluate their value
- Conduct parent outreach to emphasize the importance of weekend OCE activities with the (E+OCE) group

LEARNING WITH E-READERS

- Conduct more training with primary students early on when introducing e-readers since they have the most difficulty acquiring mastery of the devices
- Conduct additional training for teachers on incorporating e-readers into lesson plans to prepare them for issues like student distraction and to help them take full advantage of the e-reader's benefits
- Ensure that every student in each class is provided the same set of books so that lessons can be planned and executed with greater ease
- Provide lights with e-readers to maximize their utility outside of school
- Provide cases when distributing e-readers
- Give every integrated science teacher an e-reader so that the devices can be incorporated into class and homework
- Provide troubleshooting assistance and engage students to address reported "technical difficulties"
- Use volunteers and out of classroom exploration activities to work not only with motivated students but also with less enthusiastic and engaged students who may have more difficulty with English but who can nevertheless realize value in the e-reader
- Incorporate local-language literature onto e-readers when possible in order to engage students better

2. BACKGROUND OF THE iREAD PROJECT

2.1. INTRODUCTION

The iREAD Ghana Study is a Global Development Alliance (GDA) between the United States Agency for International Development (USAID) and Worldreader, a non-profit organization. The GDA program is a USAID initiative that promotes strategic private-public partnerships that benefit both private sector interests and USAID's development objectives. Recognizing that private sources in total invest more capital in developing countries than public sources, USAID is committed to exploring non-traditional assistance models that leverage innovative partnerships to stimulate new, sustainable development practices.

The iREAD Ghana Study is a pilot study that aims to give Ghana public school students access to books through e-reader technology, which is an electronic device that can house thousands of books. The iREAD program aligns with USAID's Strategic Objective 8 (SO8) to "Improve the Quality of and Access to Basic Education." iREAD supports SO8 Intermediate Result 2 to "Improved Quality of Education," through the following expected results:

- Increased number and variety of books and other supplementary reading materials read by the participants of the study
- Improved student performance on standardized tests of reading, writing, and English proficiency among study participants
- Reduced waiting periods in classrooms for classroom material
- Reduced net cost of production, translation, and distribution of supplemental reading material

ILC Africa, an Africa-based private organization, serves as the Monitoring and Evaluation (M&E) advisory team within the larger iREAD Ghana Study spanning from October 2010 to July 2011. From November 2010 to November 2011, the ILC Africa M&E team will collect data related to student and classroom performance in the form of four formal evaluations (baseline, mid-term, end-of-school year, and final) and ongoing monthly monitoring reports.

This report serves as the official mid-term evaluation on progress within the study.

2.2 ASSESSMENT OBJECTIVES

The objectives of the iREAD Ghana Study mid-term evaluation were to collect data to help answer the following 3 key questions:

- Are Students Reading Better?
- How is the E-Reader Affecting Student Reading Habits?
- Are E-Readers Sustainable?

Data collected during the mid-term will also inform program development and scale-up efforts.

3. METHODOLOGY

3.1. RESEARCH DESIGN

The aim of the iREAD Ghana study is to measure the effects of the e-reader on study participants in terms of reading performance, technology skills, and overall student behavior. Additionally, the study allows for a comparison of costs between the traditional paper book system and the e-reader system. In order to effectively isolate, define, and justify the interventions affecting experimental student groups, the iREAD team designed 3 distinct experimental groups:

- 4) No E-reader Group (NE)
- 5) E-Reader Group (E)
- 6) E-Reader + Out-of-Classroom Exploration Group (E+OCE)

Table 1.0 below describes the iREAD Ghana Study research design and provides descriptions of the (NE), (E), and (E+OCE) groups.

Table 1.0 – Research Design

	No E-Reader (NE) Group in Suhum District, Ghana	E-Reader (E) Group in Kade, Ghana	E-Reader & Out-of-Classroom Exploration (E+OCE) Group in Adeiso, Ghana
Primary Form 4	Teacher Mante Presbyterian Primary	Presbyterian Primary in Kade	Presbyterian Primary in Adeiso
Junior High School (JHS) Form 1	Teacher Mante D/A JHS	Presbyterian JHS in Kade	Presbyterian JHS in Adeiso
Senior High School (SHS) Form 1	Presbyterian SHS in Suhum	Kade Secondary Technical School	Presbyterian SHS in Adeiso

No E-reader Group (NE)

The No E-Reader (NE) group is comprised of three control schools (primary, JHS, and SHS) located in the town of Suhum, Ghana. The (NE) students did not receive e-readers, and iREAD personnel did not inform (NE) schools of the e-reader activities taking place in the (E) and (E+OCE) schools until after the end of the study. Ideally, (NE) students would have no knowledge of e-reader activities taking place in the two nearby towns, but there is always a possibility for interaction between students and groups. Since (NE) students will not be receiving any interventions, it is anticipated that students in the (NE) schools will demonstrate less improvement in standardized test scores and reading habits. Additionally, it is assumed that the costs and associated logistics to provide traditional paper books will exceed that of the iREAD experience.

It should be noted that there were several changes made to the control group in order to obtain three student groups of equal standing. The baseline evaluation revealed that two (NE) schools – Okorasi D/A Experimental Primary School and D/A Experimental ‘C’ Junior High School – scored significantly higher on standardized tests than their (E) and (E+OCE) counterparts. Differences in scores indicated that the control group already exhibited stronger reading competency at the onset of the project, and therefore was not starting at the same level as the (E) and (E+OCE) groups. These findings meant that the growth of the (E) and (E+OCE) groups would not be fully appreciated against the control group because the control group started out at a higher reading level. In response to these findings, two replacement schools (Teacher Mante D/A JHS and Teacher Mante Presbyterian Primary in Suhum District) were selected because these students had similar baseline standardized test scores to the (E) and (E+OCE) groups.

E-Reader Group (E)

The (E) group is also comprised of three schools (primary, JHS, and SHS) approximately 30 minutes away from the (NE) school group in the town of Kade, Ghana. Students in the (E) group have received e-readers preloaded with a set of books. They have also received training on the functional use of the e-reader and have been given opportunities to receive and download additional books onto their e-readers. Additionally, the teachers of students in the (E) group have received e-readers preloaded with a set of books. Due to (E) students’ access to e-readers, it is expected that the (E) group will make faster gains in reading and overall academic achievement than those with no access to e-readers. And since literacy is best impacted from grades 1 to 4 of the primary school years, it is expected that the (E) group at the primary school level will make the highest gains in reading improvement.

E-Reader + Out-of-Classroom Exploration Group (E+OCE)

Finally, the (E+OCE) group is comprised of three schools (primary, JHS, and SHS) located in the town of Adeiso, Ghana. The (E+OCE) group has received the same interventions as the (E) group. However, in addition to (E) group interventions, students in the (E+OCE) group have also participated in out-of-classroom interventions led by volunteers, beginning in December 2010. Out-of-classroom activities can be defined as guided extracurricular activities utilizing the e-reader and mentors to encourage reading and writing.

There may be several limitations to evaluating progress within the (E+OCE) group given its program design. The (E+OCE) program requires flexibility to explore and experiment with different types of OCE interventions as the program moves along. Therefore, no concrete (E+OCE) plan was presented at the onset of the project. Since this group is designed as an exploratory group, activities and results have been documented as and when they occur throughout the project.

However, since the (E+OCE) group is benefitting from the greatest number of interventions (presence of e-readers and the variety of OCE activities), the project expects that the (E+OCE) group will demonstrate the highest reading and academic achievement across all groups.

Incorporating Teachers into iREAD

The mid-term evaluation study involved teachers who directly benefited from iREAD interventions. More specifically, these teachers were:

- Class teachers of the project-affected streams of primary 4 students
- English teachers who teach the project-affected streams of JHS 1 and SHS 1 students
- Social Studies teachers who teach the project-affected streams of JHS 1 and SHS 1 students
- Integrated Science teachers who teach the project-affected streams of JHS 1 and SHS 1 students

The teachers of the (E) and (E+OCE) groups received e-readers, training, access to downloaded materials and technical e-reader support from Worldreader staff. Teachers were also trained to incorporate the e-reader into their every day curriculum.

3.2. THE SELECTION PROCESS

With the assistance of the Ghana Education Service, Worldreader selected nine project-affected schools from the communities of Suhum District, Kade, and Adeiso.

The Worldreader team was guided by the following criteria:

- A public school that is located within three hours driving from Accra for logistical purposes, but still representative of non-urban schools
- An approximate 1:1 ratio of male students to female students
- Access to electricity and mobile networks to facilitate e-reader use
- An established base of teachers and administrators with demonstrated interest in the iREAD Ghana Study

The iREAD Ghana Study currently involves 473 project-affected persons, of which 419 students are students from 3 SHS, 3 JHS, and 3 primary schools. A total of 419 students were involved in the mid-term evaluation, whereby 113 were primary students, 135 were JHS students, and 171 were SHS students. *It should be noted that the number of participating primary students was comparatively lower than other grade levels because they tend to be in smaller class sizes than JHS and SHS student streams.*

Of the 473 project-affected persons within the study, forty teachers and administrators across the nine project-affected schools were engaged in the evaluation as well as fourteen stakeholders and volunteers. In addition to teachers, the M&E Team also interviewed administrators who had valuable input on costs of books and other relevant issues.

Table 2.0 – Summary of Participants from the Mid-term Evaluation

Level	(NE) Group	(E) Group	(E+ OCE) Group	Total
Primary 4	42	36	35	113
JHS 1	30	43	62	135
SHS 1	57	67	47	171

Sub total	129	146	144	419
Teachers & Administrators				40
Stakeholders & Volunteers				14
TOTAL				473

The specific grade levels for students in the iREAD study are Primary 4, JHS 1, and SHS 1. At the primary school level, Primary 4 was chosen because it is the first grade level at which schools teach English language reading and writing. At the middle school level, JHS 1 was chosen so that Worldreader could digitize textbooks and materials starting from the beginning of JHS experience. By the time JHS 1 would complete its first year and begin its second year, Worldreader would have had time to digitize second year content for students to use while still offering first year content to newly-entering first year students. This scenario also applies to that of the senior high school grade level. Additionally, Worldreader selected first year JHS and SHS students because they tend to experience less stress than final year students who are preparing for BECE and WASSCE exams. This would allow first years (JHS and SHS) to devote more time and energy to learning new technology and reading content.

As a general rule, Worldreader has refrained from incorporating math and science subjects into this particular study because the diagrams and symbols associated with math and science do not display well on today's e-reader technology. Therefore, Worldreader has chosen to focus on subjects that are more reading intensive (i.e., English and Social Studies). As a result of these decisions, Worldreader tends to give more focus to students in the General Arts stream at the SHS level.

3.3. DATA COLLECTION METHODS

For the mid-term evaluation, ILC Africa used a mixed-methods approach comprised of the following data collection methods:

- a. Semi-structured Questionnaires
- b. Key Informant Interviews with Teachers, Administrators, Stakeholders, and Volunteers
- c. Focus Groups with Teachers and Students
- d. Assessments in the Form of Standardized Tests
- e. Case Studies
- f. Data from On-Line E-reader Accounts
- g. Secondary Data from Worldreader and Other Stakeholders

This combination of methods provided rich data for the M&E team to gain a broad understanding of student reading performance, student reading habits, and the sustainability of e-readers in the classroom.

Semi-Structured Questionnaires- Data entry staff coded data and entered data into a customized Microsoft Access Database called ReadME. The M&E team then used Microsoft Access to calculate frequencies, averages, and other numbers that are presented in this report.

Key Informant Interviews with Teachers, Administrators, Stakeholders, and Volunteers- Handwritten notes from key informant interviews were typed into the ReadME database. Audio tapes of the interviews were transcribed and filed for future reference.

Focus Groups with Teachers and Students- Similar to key informant interviews, handwritten notes from focus groups were typed and entered into the ReadME database. Audio tapes of the focus groups were transcribed and filed for future reference.

Assessments in the Form of Standardized Tests- Standardized tests were administered to all students as a way to measure student progress. The team marked the multiple choice sections of exams as well as the free response and essay sections of exams. For the free response and essay sections, the team developed a grading rubric for consistent scoring. Students' total scores and sub-scores were then manually recorded onto scores sheets. The numbers from these score sheets were then entered into the ReadME database. The team then used Microsoft Access to calculate frequencies, averages, and other numbers that are presented in this report.

Case Studies - Based on Worldreader and teacher recommendations, the M&E Team selected one exemplary student from each (E) and (E+OCE) school to take part in a video interview. Scripts from the raw footage was transcribed and filed for future reference.

Data from On-Line E-reader Accounts - The M&E Team logged onto students' online accounts to capture information on student downloads. Data was compiled and analyzed in Microsoft Excel.

Secondary Data from Worldreader and Other Stakeholders - The M&E Team incorporated Worldreader and volunteer activity updates into the midterm evaluation. Financial information and project challenges were of particular importance to this report.

The M&E team administered data collection tools at the study site. Focus groups, paper-based questionnaires, and standardized tests were administered on-site. Additional semi-structured interviews with stakeholders were conducted via video teleconference, email, or telephone. All data collected on paper forms were then entered into a Microsoft Access database entitled ReadME. This new database system houses all monitoring and evaluation data for the project, including the mid-term evaluation data from this report.

Samples of data collection tools are found in Appendices A through J.

3.4. LIMITATIONS

Overall, the M&E team identified various factors that could affect the potential impact of e-readers, such as:

- **Late e-reader access:** Students received access to e-readers in late November/early December. As a result, students will have access to e-readers for 7 months as opposed to 11 months, and students will not have access to e-readers for the entire academic year (September to July). Expected student reading performance may be lower in this shortened time period.
- **Delayed decision-making to split (E+OCE) SHS Students into streams:** Worldreader intended to provide e-readers to one of students at each grade level. However, the (E+OCE) SHS administration was not able to split its 105 students into two desired streams until February 2011. Worldreader was faced with the option of delaying the launch of e-readers at that school. Instead, Worldreader chose to pair students up and provide 1 e-reader to 2 student e-readers. Three months into the seven-month study, students were split into one manageable group of 50 students with a 1:1 student to e-reader ratio.
- **Introduction of e-readers near exam time:** The stress of exams and limited teacher guidance may have limited students' ability to utilize the e-reader in the first month of use. Worldreader launched e-readers from 29th November to 2nd December 2010, which was the last week of classes before students took end-of-term exams. As a result, teachers had less than a week to introduce the e-reader to students before exams and vacation.
- **Limited number of e-readers for Integrated Science teachers:** Since Worldreader's focus is English and Social Studies, Worldreader has not provided all project-affected high school Integrated Science teachers in (E) and (E+OCE) groups with e-readers at this time. In December, (E) and (E+OCE) high school Integrated Science teachers had 1 e-reader to share among 4 teachers, while in January 2011 there were 2 e-readers to share among 4 teachers.
- **Late start of OCE activities:** Although ideally planned for September, OCE activities for primary and JHS levels did not begin until December 2010, and OCE activities for SHS students did not begin until February 2011. As a result, OCE volunteers have less than an entire academic year to build rapport with students and have the anticipated positive effects on student reading performance.
- **E-readers do not include reading materials for all school subjects:** While e-readers contain content for English, Social Studies, and Integrated and Science, they do not contain adequate content for other school subjects. Not all subject content is digitized, and therefore students do not have a fully integrated e-reader experience with all subjects.
- **English language limitations:** While English is the official language of Ghana, English is the second language for most if not all project-affected students and teachers. English language limitations were an issue during the evaluation, especially for primary students who use English for the first time in primary class 4.

- ***Potentially unsupportive home environments:*** As many project-affected students are from agricultural families, their home environments may not appreciate reading as an activity. For example, students may spend more time at home performing family chores and agricultural tasks rather than engaging with their e-readers. Additionally, students whose parents have limited English and literacy skills may be unable to actively incorporate the device into home life.
- ***Unexpectedly high e-reader breakage rate at (E+OCE) schools:*** There have been an unexpectedly high number of damaged e-readers at (E+OCE) schools. In late March 2011, roughly 70 students out of 180 (E+OCE) students did not have e-readers while they waited for Worldreader to replace their damaged e-readers. Reduced time with e-readers may affect reading performance and other expected benefits. In contrast, (E) group students have experienced minimal damages. Worldreader suggests that there may be two factors contributing to e-reader breakage with (E+OCE) schools— 1) a difference in the quality of dust-resistant e-reader cases at (E+OCE) schools, and/or 2) low involvement of school administrators and community leaders in (E+OCE) schools.
- ***Lack of e-reader use in English class for (E+OCE) SHS students:*** Worldreader communicated to schools that English teachers, Social Studies teachers, and Integrated Science teachers who instructed (E) and (E+OCE) SHS students would receive access to e-readers and training on using the e-readers. (E+OCE) SHS students have not been using e-readers in their English class. Since (E+OCE) SHS students have missed valuable e-reader contact hours in a school subject directly related to reading, their reading performance may be affected.
- ***Change in the number of students from baseline to midterm:*** The group of students throughout the study changes because of students dropping out or enrolling in the project-affected schools.
- ***Disruptions caused by nationwide teacher strikes:*** Due to nationwide teacher strikes, classes were not in session for two or more weeks across the month of March, depending on the school. This interruption may also affect the impact of e-readers on students.
- ***Limited class time at (E+OCE) JHS:*** The Worldreader Operations Manager observed that (E+OCE) JHS students were not in school during many of his weekly visits. Rather than attending classes, these students were frequently seen weeding plots of land during school hours. These weeding activities may reduce class time and limit the e-reader's impact on (E+OCE) JHS students. Additionally, the (E+OCE) JHS school buildings were used as a local examination center from 21st to 25th March 2011. As a result, classes were not in session that week, further reducing class time and access to the device. The degree of setbacks unique to this school was not noticed at any of the other schools in the study.
- ***Reduced access to e-readers outside of school for (E+OCE) SHS students.*** After the first two months of the project, Worldreader became aware that (E+OCE) SHS students

were often bullied by older high school students to use their e-readers. In response, Worldreader and the school sensitized students on the need to allow project-affected students to primarily use the e-readers. For a few weeks all (E+OCE) SHS students had to leave e-readers with project coordinators at the school to avoid bullying in dormitories or at home. By April, all students began taking e-readers home once again.

While many of these limitations are limitations of the study itself (i.e., there was a late start to project implementation), many others are limitations that could similarly occur outside of the study. For example, English language limitations, unsupportive home environments, difficulties with coordination, and even teacher strikes are not unique to the project schools, so the imperfect study setting likely offers a more realistic picture of e-reader impact as well as some of the problems Worldreader could face in scaling up.

In addition to the general limitations of the study, there are also limitations related to data collection methods for the mid-term evaluation:

- ***Differences in class size:*** The pools of students in primary schools are smaller than those of the other levels, so natural variations in test scores might be expected regardless of changes in actual reading ability to a limited extent. Differences in class sizes across grade levels at all of the schools could also affect how much of an impact e-readers have.
- ***Limitations of questionnaire data:*** Students with limited English skills, especially at the primary and JHS levels, may have had difficulty understanding the questionnaire, which was in English. To help this issue, the evaluation team verbally administered the questionnaire to primary school students and translated certain questions into Twi to help students understand what was being asked. At JHS schools, where the questionnaire was administered in writing, teachers similarly translated certain questions into Twi for students to understand. Nonetheless, use of English may have led some students to misunderstand questions and give inaccurate answers. Some students at the primary level did not understand certain concepts on the questionnaire, resulting in missing data. For example, many primary students did not understand what was meant by “romance” as a genre of books, even when the concept was translated into Twi. Students may have given answers that they thought would please the investigators. For example, when asked whether they liked or disliked reading, students may have been influenced to indicate that they liked reading due to interviewer bias.
- ***Limitations of key informant interview:*** At the JHS and SHS levels, the evaluation team interviewed teachers of English, Social Studies, and Integrated Science, given that e-reader content focuses on these subjects. As a result, other subjects are underrepresented in the mid-term data.
- ***Limitations of student logs:*** Some students misunderstood the purpose and use of the data logs. Students sometimes recorded that they read during dates that were prior to the project start date or in the future, or recorded dates that did not chronologically follow each other. It is also possible that students are under the impression that they

should fill every line on the form, even though the M&E Team reminds students that they should leave the space blank if they did not read on that particular day. Some students misunderstood certain questions. A high number of books read for school also indicate that students might be including reading during school hours, rather than only reporting reading from outside of school.

- **Limitations of focus group data:** Focus groups included participants from (E) and (E+OCE) groups only, and therefore did not include perspectives from the (NE) group. In primary student focus groups, students tended to give the same answer rather than a variety of answers. They may have lacked the confidence to give answers that differed from their peers. In student focus groups, certain students who were class prefects or who had confidence tended to participate more than other students who were reluctant to speak. Students may have been reluctant to speak freely about some of their e-reader habits for fear that their responses might be shared with their teachers who disapprove of activities such as downloading music, playing games, and browsing social networking sites on the e-reader.
- **Limitations of standardized testing data:** ILC Africa administered three levels of standardized examinations at the primary, JHS, and SHS levels. Standardized tests that are culturally and contextually appropriate only exist at the JHS 3 and SHS 3 levels; however, students within the study are two grades below the grade in which the test is officially administered. Therefore, the BECE exam designed for JHS 3 students was administered to JHS 1 students. It should be expected that the reading and content level are above the average competency of a JHS 1 student. Similarly the WASSCE exam designed for SHS 3 students was administered to SHS 1 students. It should be expected that the reading and content level are above the average competency of a SHS 1 student. Also, there are differences between standardized tests from the baseline to mid-term. For example, the reading comprehension section of the BECE exam was free response in the baseline version of the exam but multiple choices in the mid-term version of the exam. These differences are explored in more in depth in the “Are Students Reading Better?” section of the report. Additionally, classrooms in which testing took place were crowded, making it possible for students to cheat and take answers from others’ papers without proctor intervention.
- **Control group students influenced by the study’s presence:** Students in the control (NE) group may be reporting a higher number of average books read per week simply because the M&E team is monitoring how much they read. When assisting students with weekly logs, ILC Africa staff observed teachers at control schools expressing ideas such as, “Reading is good for your mind. If you read a lot and list a lot of books, who knows, you might get a scholarship and go to America.” This promotion of reading at the control schools indicates that the filling of student weekly logs itself may increase student reading, and that students in the control groups may read more during the study than on average.
- **Case study data:** Interviews were conducted in English, and students may have had difficulty expressing themselves in English, which is not their first language. Students

may have given answers that they thought would please the investigators due to interviewer bias.

- ***Online e-reader account data:*** *Although the Amazon website is helpful in providing download data, information is only available on the last ten items downloaded, and the information is sometimes incomplete. The data offers valuable insights into what material students are actually accessing, but does not give a complete picture of student habits.*

4. SUMMARY OF IREAD ACTIVITIES

Leading up to October 2010, Worldreader set the groundwork for the iREAD Ghana Study. Worldreader began agreements with several publishers, which have granted Worldreader permission to use their books as part of the iREAD Ghana Study. Worldreader has digitized books from several Ghanaian publishers, and made these books available at Amazon's Kindle Store. Worldreader's Ghanaian Publishing Partners are as follows:

- Sub-Saharan Publishers
- Regener8
- Smartline Publishing Ltd.
- EPP Books Services Ltd.
- Sam Woode Ltd.
- Woeli Publishing Ltd.
- Afram Publications Ltd.
- Evans Brothers Ltd.

Worldreader is committed to digitizing local Ghanaian books, believing that students will learn to love reading when they have books that relate to their own culture and surroundings. In addition to local publishers, Worldreader has also developed partnerships with international publishers Random House Inc. and Small Bar Press. Additionally, a number of international authors are contacting Worldreader directly to donate books.

In October 2010, Worldreader also finalized (E) and (E+OCE) school selection and began training for teachers. Teacher training had two major components – 1) training on the functional use of the e-reader and 2) training on incorporating e-readers into the classroom. Training on the functional use of the e-reader focused on navigating the device and ensuring that teachers felt comfortable using the e-reader before the devices were introduced to students. Training on incorporating the e-reader into the classroom focused on lesson planning, identifying aspects of the syllabus that could benefit from use of the e-reader, and specific activities and teaching methods that could make effective use of the e-reader.

In late November and early December 2010, Worldreader launched e-readers among (E) and (E+OCE) students. Before receiving e-readers, students and their families were invited to a launch event. At this launch event, leaders in the community and representatives from Worldreader spoke in both English and Twi on the significance of the iREAD Ghana Study and the importance of reading. Students and their parents signed pledges promising to take effective use of their e-readers and to keep their e-readers safe. In the week following the launch, teachers trained students in the functional use of the e-reader. Although there was initially some concern that primary students might not be mature enough to take their e-readers home, within a week of the launch, teachers trusted primary students to take their devices outside of school. Shortly before December/January vacation, volunteers from Lincoln Community School began OCE activities at (E+OCE) primary and JHS schools.

In January 2011, Worldreader implemented a large scale “push” of books, in which Worldreader downloaded books from the internet and downloaded them onto students’ e-readers. Prior to this large scale push, e-readers were pre-loaded with approximately 15 books and Worldreader had pushed an additional 1 to 2 books every week via cell phone signals. Since it is not appropriate to rely on the cell phone signal to send mass amounts of books, Worldreader conducted the large scale push in January 2011 in which Worldreader collected all e-readers, transported the devices to Accra, and pushed about 70 additional books via high speed Wi-Fi available in the capital city. Since this large scale push, Worldreader continues to push 1 to 2 books weekly.

In February 2011, volunteers from Ashesi University and the Writer's Project of Ghana began working with (E+OCE) students on Saturdays as part of OCE activities. Also in February, Worldreader held incentive parties consisting of snacks and music for (E) schools, since these schools did not experience any e-reader losses. Not just students with e-readers but all students in (E) schools took part in the incentive parties to show that the program appreciated the entire school community's efforts in keeping the e-readers safe.

In March 2011, one of Worldreader's co-founders held a feedback workshop with (E) and (E+OCE) teachers in which teachers shared their challenges, suggestions, and best practices regarding the e-reader. For most of April 2011, students enjoyed end of semester vacation. Then in May 2011, Worldreader distributed lights so that students could read in evenings, even if they did not have access to electricity.

Throughout the duration of the project, the Worldreader Operations Manager has visited (E) and (E+OCE) schools on a weekly basis to provide program support, including troubleshooting technical difficulties, organizing OCE activities, addressing theft and loss, meeting with teachers, and responding to program concerns. Worldreader staff, based in Spain, have regularly visited schools every few months.

Throughout the project, Worldreader has also been engaged in ongoing dialogue with Amazon to adapt e-readers to the context of Ghanaian classrooms. Worldreader has discussed a range of issues with Amazon, including:

- Disabling e-reader functions that distract students or that are problematic. For example, Worldreader is exploring ways to disable functions on the e-reader such as music, internet, and de-registration.
- Developing more durable e-readers with sturdier screens and other adjustments that would reduce breakages.
- Designing an e-reader management system that can control and monitor large numbers of e-readers on one account so that, for example, all 87 (E) and (E+OCE) primary students could be connected to one single account. In the current system, only 5 e-readers can be connected to one account.

5. FINDINGS & ANALYSIS

The Findings section presents feedback from the overall perspective of the mid-term evaluation team as well collective viewpoints from Worldreader and the study's teachers and administrators. Standardized test scores play a significant role in these findings, supported by student log self-reported data, key informant interview data, focus group feedback, online account information, and a desktop literature review.

Findings are presented in three major categories:

1. STANDARDIZED TEST SCORES: ARE STUDENTS READING BETTER?
2. ACTIVITY DATA: HOW IS THE E-READER AFFECTING STUDENT READING HABITS?
3. ARE E-READERS SUSTAINABLE?

5.1. STANDARDIZED TEST SCORES: ARE STUDENTS READING BETTER?

Overall, select groups of students groups are reading better, but the full influence of the e-reader is not entirely clear or conclusive at this stage in the pilot study. At the halfway mark of this study, the primary and SHS level students in the (E+OCE) group are experiencing higher reading scores than other groups (Table 3.0). This may be a preliminary indication that the e-reader intervention coupled with OCE activities could lead to improved reading ability. However, improvements in scores are inconsistent across groups and grade levels. This may be due to the early stage of the intervention. More months of e-reader exposure and further investigation into key areas are necessary before any definitive conclusions can be drawn.

Table 3.0 – Change in Standardized Test Scores from Baseline to Mid-Term

	(NE) Group			(E) Group			(E+OCE) Group		
	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease
Primary	17/68 (24.7%)	17/56 (31%)	+6%	26/68 (37.7%)	24/56 (42.1%)	+4%	18/68 (26.4%)	24/56 (42%)	+16%
JHS	17/82 (20.3%)	20/100 (19.7%)	-1%	19/82 (23%)	20/100 (19.6%)	-3%	20/82 (24.4%)	23/100 (23.4%)	-1%
SHS	36/134 (27%)	45/134 (33.6%)	+7%	35/134 (26.2%)	41/134 (30.9%)	+5%	41/134 (30.8%)	54/134 (40.4%)	+10%

(n=419)

Table 3.0 summarizes standardized test scores and baseline to mid-term growth for groups and grade levels within the study. Standardized testing data is based on 419 students within the study. See Appendix K- **Number of Standardized Test-Takers** for a table that stratifies the number of students that took the exams and their associated grade levels and groups. Although changes in scores are variable across groups and grade levels, two important findings can be identified at this stage:

- 1) The greatest improvements in test scores were realized in schools with e-readers **and** OCE interventions;
- 2) Primary students experienced a greater average improvement in test scores than other grade levels.

Based on this finding, it appears e-readers have had some initial impact on reading ability, but only when accompanied by other outside interventions. Primary school reading scores have improved the most over the span of the interventions, with scores increasing 16% – in less than five months – in the (E+ OCE) group. Scores in the (E) group also increased but the (NE) groups out-performed the (E) groups at all grade levels. Later testing scores will have to confirm levels of reading improvement suggested by these test scores.

Improvements in the (E+OCE) Primary and SHS group are especially promising considering some limitations faced by the iREAD project. For example, the (E+OCE) SHS group shared e-readers in a 2:1 ratio early in the study, experienced high rates of breakages, and did not use e-readers in English class for several months into the project. The section “OCE Activities” later in the report discusses the OCE interventions in detail.

Another major question posed by the midterm score results is why scores failed to improve at the JHS level but improved at other grade levels, despite effusive praise of the e-readers from JHS teachers and JHS students gathered from interviews and focus groups. A number of variables, differing across schools, may explain this decrease. For instance, the format of the mid-term BECE was different than the baseline BECE exam. The JHS exam had the most significant changes in testing structure from baseline to mid-term. The most major format changes were that the reading comprehension section in the mid-term exam was multiple choice whereas it was originally free response. Also, the literature subsection was eliminated in the mid-term exam but present in the baseline. In terms of other contributing factors, students at the (E+OCE) JHS were also frequently seen weeding during class hours, significantly limiting their exposure to structured e-reader use in the classroom.

Several additional factors may have additionally affected these scores overall, namely:

- The introduction of logs to document daily reading within the control (NE) groups may have positively influenced (NE) students to read more, thereby lessening the reading improvement gap between active and control groups.
- Select West African standardized tests are not necessarily perfectly standardized from test to test, so increases or decreases in scores could be attributed to circumstances such as changes in the level of difficulty of the test, changes in sub-question types, or changes in the testing format (i.e., multiple choice to free answer etc...)
- Class sizes of primary students are smaller than those of the other grade levels, so fluctuations in scores for each group may be less reliable indicators of changes in actual reading ability to some extent.
- Due to teacher strikes, Worldreader estimated that students in active schools received only 45-60% of expected classroom time with the e-readers leading up to the midterm examinations (see Appendix L – Letter From Worldreader dated 24th March, 2011).

The e-reader’s inability to produce *strong* improvements in reading ability across all grade levels could be a result of its early stage as an intervention. Indeed, the fact that other supporting information (to be discussed in the report) points toward positively affecting reading habits, data will have to be closely analyzed within the final report for more definitive conclusions.

EQUAL PROGRESS FOR ALL STUDENTS?

At the onset of the project, there was some debate as to whether weaker students or stronger

students would most benefit from the device. With the opportunity to now compare baseline scores to mid-term scores, the data supplies some tentative findings.

In the traditional environment of the (NE) group, weaker students appear to make larger gains in improvement. However, the active groups of (E) and (E+OCE) show that progress is mostly equal across student capacity levels, however but the data is slightly inconclusive at this time. For example, students at the primary school level showed an average increase of 17-18% in the lower third and upper third of the class. At the SHS level, the (E) group showed an average increase of 4-6% in the lower and upper third of the class. These findings are somewhat inconclusive and more time may be needed with the e-reader intervention to show results.

Table 4.0 – Change in Score by Capacity of Student

	(NE) Group			(E) Group			(E+OCE) Group		
	Lower Third	Middle Third	Upper Third	Lower Third	Middle Third	Upper Third	Lower Third	Middle Third	Upper Third
Primary	+11%	+9%	1%	+7%	+9%	+5%	+17%	+7%	+18%
JHS	+6%	-7%	-5%	0%	-4%	-4%	-1%	-6%	-2%
SHS	+11%	+11%	6%	+6%	+8%	+4%	+12%	+10%	+7%

(n=419)

One significant finding, however is that the upper third of the primary students in the (E+OCE) group performed very well on the midterm test in addition to the lower third. It will be important to watch this group to see if the most proficient (and perhaps motivated) primary students are in a particularly advantageous position.

PRIMARY LEVEL PERFORMANCE ON THE SEA EXAM

When stratifying primary level tests by question type (avg. listening comprehension sub-score, avg. reading comprehension sub-score, avg. grammar sub-score, avg. writing sub-score, avg. joint-script sub-score, and vocabulary), there are 2 sub-scores that appear the most affected. Reading comprehension and grammar have been most influenced with double-digit percentage improvement as against the other sub-scores. For example, the active (E+OCE) group indicates an average 16% increase in reading comprehension and an average 18% increase in grammar.

The sub-scores help to show that the e-reader may have the potential to impact specific aspects of reading such as reading comprehension and grammar but not necessarily writing and listening. Again, final testing scores will have to confirm levels of reading improvement suggested by these test scores.

Table 5.0 – Change in Standardized Test Scores from Baseline to Mid-Term (Primary Level)

	(NE) Group			(E) Group			(E+OCE) Group		
	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease
Avg. Total Score	17/68 (24.7%)	17/56 (31%)	+6%	26/68 (37.7%)	24/56 (42.1%)	+4%	18/68 (26.4%)	24/56 (42%)	+16%
Avg. Listening Comprehension Sub-Score	3/10 (29.8%)	3/10 (31.2%)	+1%	4/10 (41%)	4/10 (37%)	-4%	4/10 (36.4%)	4/10 (40.9%)	+5%
Avg. Reading Comprehension Sub-Score	1/3 (27%)	2/6 (37.7%)	+11%	1/3 (48.9%)	3/6 (46.4%)	-3%	1/3 (26.2%)	3/6 (41.9%)	+16%
Avg. Grammar Sub-Score	12/33 (36.6%)	11/33 (34.3%)	-2%	19/45 (41.3%)	16/33 (47%)	+6%	13/45 (27.9%)	15/33 (45.6%)	+18%
Avg. Writing Sub-Score	1/5 (18.7%)	1/5 (10%)	-9%	2/6 (25%)	1/5 (15.1%)	-10%	1/6 (15.5%)	1/5 (17.1%)	+2%
Avg. Joint-Script Sub-Score	0/4 (0%)	NA	NA	0/4 (0%)	NA	NA	0/4 (0%)	NA	NA
Vocabulary	NA	1/2 (35.7%)	NA	NA	1/2 (40.5%)	NA	NA	1/2 (51.4%)	NA

(n=113)

JHS PERFORMANCE ON THE BECE EXAM

When stratifying JHS level standardized tests by question type (avg. grammar sub-score, avg. vocabulary sub-score, avg. literature sub-score, avg. essay sub-score, avg. reading comprehension sub-score), there is one sub-score that is most affected. As compared to the other sub-scores, reading comprehension appears to have been most influenced with double-digit percentage improvement. For example, all groups at the JHS level saw increases in reading comprehension, (NE) 11%; (E) 14%; and (E+OCE) 11%. This may also be attributable to changes in the format of the section of this test from free response to multiple choice. Or, this could be a reflection of an increase in reading across all groups. Most importantly, the e-reader tool or OCE interventions did not appear to impact standardized test scores as did occur at other grade levels. It is the opinion of the evaluation team that the changes in testing format have affected the entire JHS cohort across control and active groups. The final exam reading scores of the JHS group will be studied in close detail to ultimately provide a clearer picture.

Table 6.0 – Change in Standardized Test Scores from Baseline to Mid-Term (JHS Level)

	(NE) Group			(E) Group			(E+OCE) Group		
	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease
Avg. Total Score	17/82 (20.3%)	20/100 (19.7%)	-1%	19/82 (23%)	20/100 (19.6%)	-3%	20/82 (24.4%)	23/100 (23.4%)	-1%
Avg. Grammar Sub-Score	4/15 (23.9%)	4/15 (29.4%)	+6%	5/15 (30.7%)	5/15 (30.8%)	+0%	5/15 (31.7%)	5/15 (32.5%)	+1%
Avg. Vocabulary Sub-Score	5/17 (29.4%)	4/15 (26.2%)	-3%	5/17 (27.2%)	3/15 (21.6%)	-6%	5/17 (28.6%)	4/15 (23.4%)	-5%
Avg. Literature Sub-Score	2/8 (28.2%)	NA	NA	2/8 (27.5%)	NA	NA	2/8 (29.5%)	NA	NA
Avg. Essay Sub-Score	4/30 (12.4%)	8/60 (13.6%)	+1%	5/30 (16%)	8/60 (13.6%)	-2%	5/30 (17.9%)	12/60 (19.5%)	+2%
Avg. Reading Comprehension Sub-Score	2/10 (20.8%)	3/10 (32.1%)	+11%	3/12 (22.3%)	4/10 (36%)	+14%	3/12 (21.9%)	3/10 (32.7%)	+11%

(n=135)

SHS PERFORMANCE ON THE WASSCE EXAM

When stratifying SHS level standardized tests by question type (avg. vocabulary sub-score, avg. grammar sub-score, avg. diction sub-score, avg. essay sub-score, avg. reading comprehension sub-score), there is one sub-score that is most affected as against the other sub-scores. Diction appears to have been most influenced with a 33-40% improvement. Only in the grammar section did both the active groups perform better against the control group. The other sub-scores have also been positively affected in the double digits, which is unlike improvements seen in the SEA and the BEA exams. SHS students, did however witness improvement in reading comprehension like the JHS and Primary students, but these improvements were less notable.

Table 7.0 – Change in Standardized Test Scores from Baseline to Mid-Term (SHS Level)

	(NE) Group			(E) Group			(E+OCE) Group		
	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease
Avg. Total Score	36/134 (27%)	45/134 (33.6%)	+7%	35/134 (26.2%)	41/134 (30.9%)	+5%	41/134 (30.8%)	54/134 (40.4%)	+10%
Avg. Vocabulary Sub-Score	11/37 (30.5%)	5/36 (48.8%)	+18%	11/37 (29.6%)	4/36 (42.2%)	+13%	11/37 (31%)	5/36 (49.6%)	+19%

Avg. Grammar Sub-Score	6/21 (28.2%)	10/22 (34.9%)	+7%	3/21 (16.6%)	11/22 (35.7%)	+19%	7/21 (33.8%)	14/22 (46.7%)	+13%
Avg. Diction Sub-Score	1/10 (12.1%)	5/10 (49.3%)	+37%	1/10 (5.7%)	5/10 (45.7%)	+40%	2/10 (17.3%)	5/10 (50.7%)	+33%
Avg. Essay Sub-Score	14/30 (48%)	7/30 (18.1%)	-30%	13/30 (42.4%)	5/30 (14.5%)	-28%	14/30 (46%)	11/30 (30.6%)	-15%
Avg. Reading Comprehension Sub-Score	3/36 (9.5%)	12/36 (34.3%)	+25%	7/36 (20.5%)	11/36 (31.1%)	+11%	7/36 (19.8%)	13/36 (36%)	+16%

(n=171)

TEACHER PERSPECTIVES ON READING PERFORMANCE

During interviews and focus groups, the majority of teachers agreed that the e-reader has improved English language skills to some degree. A number of teachers stated that students’ reading and writing performance have improved greatly in comparison with the previous term. One JHS teacher personally felt that as high as 95% of his students have made significant improvement. Other teachers were more moderate in their praise of the e-reader’s influence on reading. As one primary teacher explained, those students who actually read are improving. However, those students who cannot read or who are uninterested in reading are not reading and therefore are not experiencing any benefit in terms of improvements in English skills and reading habits. Another primary teacher estimated that 2/3 of her students’ English skills have improved. Teachers made these observations based on their general impressions of student performance in the classroom, assignments, and exams.

The concern for the M&E team here is that that standardized test scores may not necessarily capture these observed improvements. iREAD stakeholders may need to reevaluate the mechanisms used to capture the benefits of the tool by potentially studying the anticipated and unanticipated benefits captured within this study.

OUT OF CLASSROOM EXPLORATION (OCE) ACTIVITIES

In general, OCE activities take place at (E+OCE) schools on Saturdays. The project coordinator, along with other volunteers, develops activity plans that use the e-reader to enhance literacy by focusing on reading comprehension and grammar. For example, volunteers might read books with students and then ask reading comprehension questions, with small prizes for correct answers. Other times, students might be asked to identify certain parts of speech within the stories on their e-readers. When asking reading comprehension questions, volunteers often prompt students with open-ended higher level inference questions. For example, students are asked to predict what might happen next, why a character may have acted a certain way, etc.

OCE activities also occasionally involve writing activities. Writer’s Project of Ghana volunteers mentor students to write short stories and poems by encouraging students to express themselves. Volunteers from the Writer’s Project of Ghana are currently in the process of reading students’ works and plan to give feedback on their next visit to the (E+OCE) schools.

All of the volunteers were recruited by the project coordinator, an education professional. They receive support from the project coordinator but they developed some independence as they gained familiarity with e-readers and students.

Sample lesson plans from OCE activities can be found in Appendices M and N.

The OCE extracurricular enrichment activities are purely voluntary for students, and not all students in the (E+OCE) group attend. Teachers also do not attend. According to a Worldreader estimate, about 15-20 primary students, 17-20 JHS students, and 20-30 SHS students are usually in attendance at the sessions which last from 9am until 12pm on Saturdays. The Worldreader Ghana operations manager estimated that somewhat more than half of the students in each grade attended sessions on a regular basis; other students came only on some Saturdays. Table 8.0 outlines OCE activities to date.

Table 8.0 OCE Activities Prior to Mid-Term Examination

Date	Activities
December 11	Lincoln Community School Mentoring (JHS)
February 5	Ashesi University Student Mentoring (SHS)
February 12	Ashesi University Student Mentoring (SHS)
February 19	Lincoln Community School Mentoring (Primary & JHS) Writer’s Project of Ghana Workshop (SHS) Ashesi University Student Mentoring (SHS)
February 26	Ashesi University Student Mentoring (SHS)
March 26	Ashesi University Student Mentoring (SHS)

Overall volunteers praised the iREAD program for increasing students’ interest in reading and education, improving English language skills, improving technological skills, providing students with an opportunity to access large numbers of books, and motivating teachers. Their praise was based on interaction with the limited number of students who attended OCE activities

Volunteers shared that on an academic level, OCE activities benefit students by improving their reading comprehension, vocabulary, grammar, and writing skills. Outside of academics, volunteers believe that iREAD study participants are exposed to new perspectives by interacting with university students as well as published Ghanaian literary writers. At the same time, OCE program leaders believe that OCE activities boost student confidence as students teach their mentors how to use the e-readers and realize that they can be mentors as well. Most volunteers agree that (E+OCE) students enjoy OCE activities and are eager for volunteers to return. One volunteer observed that Ghanaian classrooms often focus on rote memorization, and he hopes that through OCE activities students will explore texts beyond surface details.

5.2. ACTIVITY DATA: HOW IS THE E-READER AFFECTING STUDENT READING HABITS?

Mid-term data suggests that students have more access to reading material and may be reading more. This conclusion can be linked to the introduction of the e-reader device, however the assessment team cannot confirm at this time as to whether having greater access translates into reading more. Data to support these findings come from student log self-reported data, online Amazon accounts, focus groups, questionnaires, and secondary data. Table 9.0 below indicates that student log data is currently at half its desired rate. Responses, therefore, represent approximately half of the e-reader student experience.

Table 9.0 - Percentage of Weekly Log Completion by Group

Groups	Weekly Log Completion by Group
No E-Reader Group (NE)	46%
E-Reader Group (E)	56%
E-Reader Group, Out of Classroom Exploration (E+OCE)	49%

(n=3,813)

ACCESSING MORE BOOKS

Students “access” books by opening and presumably reading at least some of each book. Student log data reveal that students self-reported accessing a significantly higher number of e-reader than paper books. Students at the primary school level appear to have accessed a higher number of books on average, but the length of these books are generally shorter at the primary school level. Although, this data is dependent on self-reporting and may not be entirely accurate, it is general reflection of student reading behavior.

Table 10.0 Ratio of Paper Books to E-books

Level	(NE) Group	(E) Group	(E+ OCE) Group
Primary	NA	1:26	1:10
JHS	NA	1:7	1:6
SHS	NA	1:7	1:3

(n=17,487)

READING MORE BOOKS

Students also self-reported the number of books that they read daily. This information was used to calculate the average number of books they read each week, from December to March. The assessment team began to discover some unrealistic self-reporting. These figures are presented in Table 11.0. Indeed, after the unrealistic reports of books read in the initial months of the study, the M&E team conducted “honesty modules” where students were encouraged to be more truthful in self-reporting. Given this intervention, the expected result was a decrease in the number of books read from December to January, however, information presented after January more accurately reflects the patterns in students’ reading habits.

Table 11.0 - Average Number of Books Completed per Week

Level	(NE) Group				(E) Group				(E+ OCE) Group			
	Dec	Jan	Feb	Mar	Dec	Jan	Feb	Mar	Dec	Jan	Feb	Mar
Primary	15.3	2.5	1.8	0.6	2.5	.5	1.9	2.3	4.4	2.6	3.5	5.8
JHS	6.6	3.9	3.4	1.2	1.6	2.1	1.7	2.0	3.3	2.2	2.4	1.9
SHS	2.7	3.0	4.0	2.7	2.5	2.3	1.9	.8	2.4	1.8	1.6	2.0

Figure 1.0 - Average Number of Book Read per Week among (NE) students (self-reported)

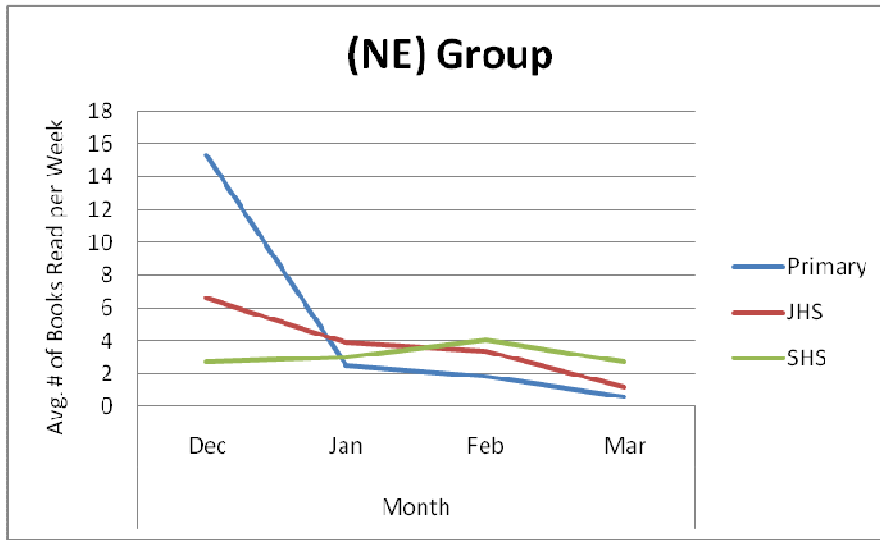


Figure 2.0 - Average Number of Book Read per Week among (E) students (self-reported)

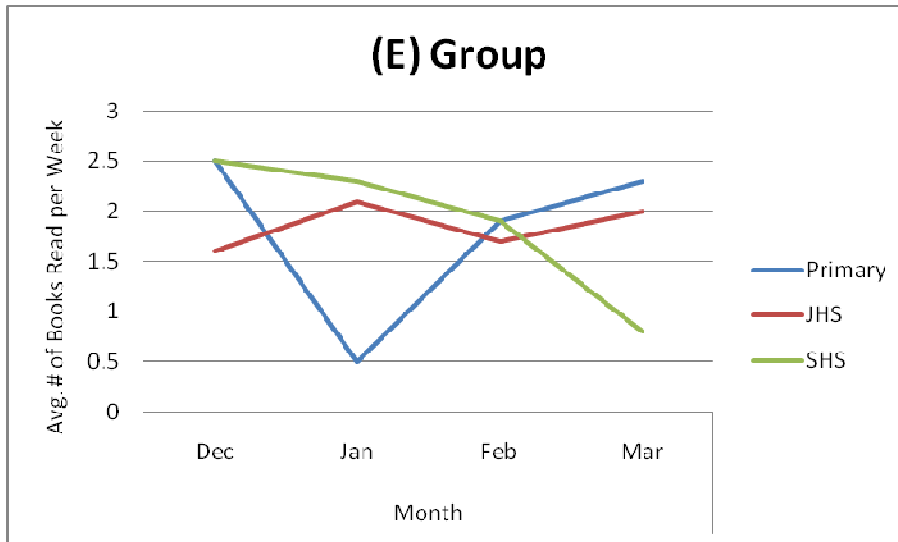
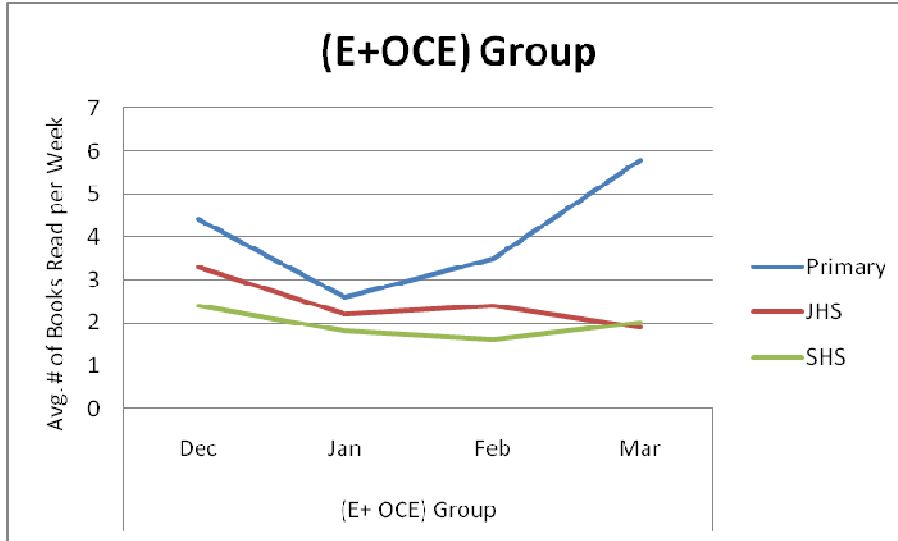


Figure 3.0 – Average Number of Book Read per Week among (E+OCE) students (self-reported)



It is important to note that the data from January to March is consistent with the changes in the (E+OCE) group’s standardized test scores. The primary 4 students who saw the greatest improvement in test scores also more than doubled the average number of books they read from January to March. Changes in the number of books read by the JHS 1 and SHS 1, however, both seem to stabilize around an average of 2 books per week. The question that remains then is the decrease over time in the number of books read by the SHS students. One possible explanation may be that students are reading increasingly longer books which are taking them longer to read and therefore reducing the number of books they read each week. Nonetheless, reading rates across the (E) group are inconclusive as they fluctuate across grade levels at very small percentages.

A preliminary finding from this data may be that e-readers enable students at the primary school level to read more. At this point in time the data on the JHS and SHS are more inconclusive.

It is also important to note that there are clear limitations to self-reported student logs. When students are aware that adults, other than their teachers, are checking to see how much they read, there is an incentive to please them by indicating that they are reading more. At the (NE) group schools in particular, this effect may be amplified. Unaware that their school is being used as a control group, teachers and administrators may believe that the study is monitoring students’ reading habits with the purpose of evaluating the quality of the school and its staff and may therefore be encouraging students to read more. When assisting students with weekly logs, ILC Africa staff observed teachers at control (NE) group schools expressing ideas such as, “Reading is good for your mind. If you read a lot and list a lot of books, who knows, you might get a scholarship and go to America.” This promotion of reading at the control schools indicates that the filling of student weekly logs itself may increase student reading, and that students in the control groups may read more during the study than on average.

The M&E team used students’ feedback on whether they like reading to determine if there have been any changes in their interest (see Table 12.0). The largest decrease in the percentage of

students who like reading was found among primary students in the control (NE) group. Students within this group could be growing to dislike reading, perhaps, due to pressures from administration to read more because they are part of a study. The active (E+OCE) group, however, displayed a growth in interest across all three grade levels, with the greatest increase occurring at the primary level. Data on changes in the percentage of (E) group students who like reading is interesting when placed alongside their standardized test scores. Although the JHS1 students test scores fell by 3%, their interest in reading slightly increased. Possibly with more exposure to the e-readers, this increasing interest may translate into improved scores.

Table 12.0 - Change in Percentage of Students Who Like Reading

	(NE) Group			(E) Group			(E+OCE) Group		
	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease
Primary	97.8%	90.2%	-7.6%	86.7%	84.6%	-2.1%	87.8%	93.8%	+6.0%
JHS	87.2%	85.7%	-1.5%	94.6%	95.5%	+1.1%	94.6%	100.0%	+3.4%
SHS	100.0%	100.0%	--	98.6%	96.7%	-1.9%	98.6%	100.0%	+1.4%
Primary, JHS, SHS Combined	95.1%	94.5%	-0.6%	94.9%	92.3%	-2.6%	94.9%	97.9%	+3.0%

(n=491)

Table 13.0 also shows that students in the active (E) and (E+OCE) groups, with the exception of the Primary (E+OCE), are also reading more books for fun outside of school. The active (E+OCE) group has slightly higher instances of reading for fun outside of school. For example, at the SHS level, the E+OCE group experienced a .4 increase suggesting that there may be specific interventions at the (E+OCE) SHS level that improve students' interest in reading for fun, and, therefore improve the overall profile of the students.

Table 13.0 - Change in Frequency of Reading for Fun Outside of School

	(NE) Group			(E) Group			(E+OCE) Group		
	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease	Baseline	Mid-Term	Increase/Decrease
Primary	2.2	1.9	-0.3	2.1	2.2	+0.1	2.2	2.2	--
JHS	2.2	1.9	-0.3	2.3	2.4	+0.1	2.1	2.3	+0.2
SHS	2.2	2.3	+0.1	2.2	2.4	+0.2	1.8	2.2	+0.4

Rating Scale is [1- Never, 2- Sometimes, 3- Often, 4- Very Often]

(n=491)

ADDITIONAL OBSERVATIONS

In addition to reading, students also use their e-readers for a number of activities including browsing the internet and playing games. However, game-playing appears to have no direct link

to student performance on standardized tests. See Appendix O - Frequency of Playing Games on the E-Reader for activity data on game-playing.

Moreover, while students report that having the e-reader has boosted their self-confidence, there appears to be no direct link between students' standardized test score performance and self-reported self-confidence levels. See Appendix P – Change in Student Self-reported Self-confidence Levels for data on student self-confidence levels.

WHAT ARE STUDENTS READING EXACTLY?

The ILC Africa M&E Team's questionnaire data shows that students are interested in 2 major genres of books:

- 1) Books about school subjects (45.9%)
- 2) Fiction Books (21.1%)

From the online Amazon account, Table 15.0 indicates that students find interest in subscriptions (20.3%) and samples (8.8%). Of the reading materials that students download on their own – “News,” “Fiction & Poetry,” “Magazines, Blogs, and Other Subscriptions,” and “Games” – emerge as the most popularly downloaded content. This interest is above and beyond the content that Worldreader pushes onto devices (62.8%). Online Amazon accounts provide an accurate picture of students' downloads, and are more reliable than the students' self-reported reading logs. However, the Amazon accounts do not reveal how many books the students are reading each week.

In focus groups, students also commented that it is much easier to access reading material of personal interest now that they have an e-reader. However, they also said that additional reading material of interest was not yet offered through the e-reader. Some focus group participants suggested that they wanted more African stories, magazines, local and international newspapers, inspirational books, and comedic reading material. The downloading data shows that students downloaded a relatively small number of free complete books, corroborating what was heard from students. While a substantial percent of downloads were of book samples, the much more limited availability of complete books most likely indicates that the fully available books are less interesting to students.

Even though, at this point, many students prefer Ghanaian story books, materials of international interest are increasingly becoming popular among students. E-readers are also providing students with a greater international reach of reading material. The fact that they are downloading *The New York Times*, *USA Today*, and *El País* etc., points out that students can access reading materials which were previously inaccessible to the students. Even when students are not able to digest foreign language material like *El País*, the e-reader puts students in contact with other cultures and societies, which they can learn from.

Tables 14.0, 15.0, and 16.0 describe download information in more detail.

Table 14.0 – Descriptions of Download Types

Category
Worldreader - Books provided by Worldreader.
Subscriptions - Materials that students subscribe to on their own, which could include newspapers, magazines, blogs, "jokes of the day," etc. Since students aren't able to pay any money, they only have 14-day trial subscriptions of these materials.
Samples - Samples of books that students download on their own. Since students don't have the capability to pay, they cannot download the complete versions of these books.
Games - Games that can be played on the e-reader, which students download on their own. Some games, such as word games, might be considered educational, while others may not be.
Amazon - Messages from Amazon.
Complete Books - Free complete books that students download on their own.
Calendars - Various Kindle calendars that students download on their own.

Table 15.0- Types of Student Downloads, Based on Last 10 Downloads

Category	(E)			(E+OCE)			(E) and (E+OCE) Combined
	P	JHS	SHS	P	JHS	SHS	
Worldreader	49.1%	57.2%	68.5%	56.5%	67.4%	62.2%	62.8%
Subscriptions	29.2%	18.2%	18.4%	24.0%	17.8%	22.7%	20.3%
Samples	10.2%	12.8%	9.0%	9.7%	5.4%	8.8%	8.8%
Games	7.4%	5.7%	1.9%	2.6%	3.8%	2.0%	3.4%
Amazon	1.4%	2.9%	0.8%	3.2%	4.6%	3.1%	2.7%
Complete Books	1.9%	2.5%	1.4%	3.9%	0.6%	1.3%	1.7%
Calendars	0.9%	0.7%	--	--	0.5%	--	0.3%

(n=2787)

Table 16.0 – Stratified Listing of Student Downloads*, Based on Last 10 Downloads

Category	(E)			(E+OCE)			(E) and (E+OCE) Combined
	P	JHS	SHS	P	JHS	SHS	
News	31.8%	18.2%	20.0%	35.3%	21.2%	23.0%	20.6%
Fiction & Poetry	16.2%	13.8%	21.5%	17.1%	13.7%	17.6%	16.7%
Magazine, Blog, or Other Subscriptions	8.0%	12.4%	27.3%	6.9%	16.6%	19.8%	14.2%

Games	19.3%	19.7%	8.7%	8.8%	17.9%	8.0%	11.7%
Non-Fiction & Advice	9.1%	16.8%	8.7%	13.7%	6.0%	6.4%	8.5%
Sports	4.5%	1.5%	8.7%	5.9%	13.9%	5.3%	6.0%
Kindle-Related	5.7%	5.1%	13.3%	4.9%	7.3%	3.7%	5.8%
Religious	1.1%	9.5%	7.3%	5.9%	3.3%	3.7%	4.6%
Cars	10.2%	4.4%	2.7%	5.9%	5.3%	4.8%	4.4%
Science & Technology	4.5%	5.8%	2.7%	4.9%	5.3%	7.0%	4.4%
Foreign Language	3.4%	4.4%	0.7%	7.8%	1.3%	0.5%	2.2%
Calendars	2.3%	2.2%	--	--	2.0%	--	0.8%

(n=944)

*Student downloads include Subscriptions, Samples, Games, Complete Books, and Calendars. Student downloads do not include materials that Worldreader or Amazon downloads onto devices.

GHANAIAN BOOKS vs. INTERNATIONAL BOOKS

Overall, the majority of focus group students preferred Ghanaian books to international books. Many students reported that they simply could not understand international books because the vocabulary, diction, and content were too unfamiliar. As one student expressed, it is too difficult to imagine stories that take place in Europe. The length of international books also posed a problem for many students, as one high school student exclaimed, "It takes a month to read one of those books!"

Questionnaire results reported that almost all students read "some books by Ghanaian authors but not more than half." In focus group discussions, students who preferred Ghanaian books explained that the works were easier to read. These students further explained that Ghanaian books were generally short in length and written in simple and familiar Ghanaian English. Students also expressed that they enjoyed Ghanaian books because they took place in familiar settings and taught the reader more about Ghanaian culture. Students appreciated that Ghanaian books often incorporated phrases in local languages and included illustrations. Students also liked that Ghanaian stories tended to provide advice and moral lessons.

Other students preferred books by international authors. Students who wanted to improve their English disliked the local language phrases and typographical errors found in Ghanaian books and preferred the advanced vocabulary and "proper" British or American English found in many international books. These students enjoyed lengthier books and appreciated the opportunity to learn about other cultures and lifestyles. Some students commented that international books tended to have more adventurous or imaginative stories.

The preference for Ghanaian books by Ghanaian authors is clearly supported in the five most commonly read books among (E) and (E+OCE) students' across all three grade levels (primary/JHS/SHS).

The five most commonly read books among (E) and (E+OCE) primary students are all Ghanaian story books for beginner students:

1. *At the Beach* by Barbara Baddoo
2. *All About Me* by Barbara Badoo
3. *At the Cocoa Farm* by Barbara Badoo
4. *Come and Play* by Barbara Baddoo
5. *Long Long Ago* by Pamela Aba Woode

The five most commonly read books among (E) and (E+OCE) JHS students are all Ghanaian story books for intermediate students:

1. *Ananse's Magic Drum* by Michael Ofori Mankata
2. *Kofi Has Malaria* by Barbara Badoo
3. *The Golden Forest* by Michael Ofori Mankata
4. *No Empty Dream* by Ida Fynn Thompson
5. *My Brother the Footballer* by Diana McBagonluri

Four of the five most commonly read books among (E) and (E+OCE) SHS students are Ghanaian story books for intermediate readers. One of the five most commonly read books, *Every Word*, is in fact not a book but an educational word game on the e-reader that students frequently list on their self-reported logs. The popularity of *Every Word* suggests the e-reader's potential to engage students through educational games. The titles of the five most commonly read books among (E) and (E+OCE) SHS students are as follows:

1. *The Shark* by Peggy Oppong
2. *My Brother the Footballer* by Diana McBagonluri
3. *The Golden Forest* by Michael Ofori Mankata
4. *Every Word* by Amazon Digital Services
5. *Happiness at Last* by Marian Aryiku

Both JHS and SHS students commonly read intermediate level books, indicating that SHS students are most comfortable reading materials that are at an intermediate level. SHS students may also be drawn to intermediate level books because there are no Ghanaian storybooks on the e-reader that are at an advanced level. Only international adult classics and materials that students download on their own are at an advanced level.

E-READERS IN THE CLASSROOM: TEACHERS' PERSPECTIVES

Teachers agreed that the e-reader has been of great benefit for lesson planning and classroom preparation. Through Worldreader-provided textbooks, the internet, and other materials available on the e-reader, teachers have more resources to draw upon when planning lessons. As several teachers expressed, they no longer rely solely on the few outdated textbooks that were previously available. Additionally, the e-reader is light and portable, so teachers no longer have to search through libraries, pay to use internet cafes or materials (e-readers have some limited browsing functionality), or carry heavy books. Since their work is made more efficient and easy, teachers say they have more time to develop the quality of their lessons.

During teacher interviews, many (E) and (E+OCE) teachers described that they often begin classes by introducing a topic and then asking students to use their e-readers. Teachers sometimes have students read e-reader passages silently, and other times have students read aloud together as a class. Then teachers frequently reinforce the reading by having students answer questions based on the passage. Other teachers will expand upon certain points made in

the passage and give supplementary notes. One primary school teacher designates Fridays as the day when students will read an e-reader story aloud together. Science teachers mentioned that they sometimes integrate the e-reader into the classroom by having students open up to a particular diagram. Additionally, several teachers mentioned that the dictionary function on the e-reader is very valuable when going over key words or coming across new vocabulary in class. A few teachers give small prizes to students who perform well on reading exercises.

Since only one stream in schools has e-readers, several teachers commented that they additionally provide (E) and (E+OCE) students with the notes taken from paper books. Alternatively, some teachers say they have one set of lesson plans and notes for students with e-readers and a separate set of lesson plans and notes for students without e-readers. Yet another teacher explains that she gives all of her students notes based on e-books and internet research on the e-reader, so that all students with or without the e-reader can benefit from her e-reader resources.

Teachers also noted some challenges associated with incorporating e-books into the classroom. First, teachers have had to take various measures to deal with student distraction. Many have complained about the amount of time students use the e-readers for entertainment purposes such as listening to music. In primary classrooms in particular, teachers noted that making sure all of their young students are on the right page in an e-book can be time consuming. One teacher also expressed frustration that came with planning lessons at times: when he told students to turn to a certain location in an e-book, he realized that not all students had the same set of books downloaded onto their devices. Alternately, some students have begun to forget to bring their e-readers to class.

Problems and limitations with e-readers themselves have disrupted class lessons at times as well. Breakages and permanent freezing have required students to share devices, according to teachers. Similarly, charging issues have led to temporary sharing.

Teachers had mixed comments regarding giving reading assignments at home. Several teachers explained that they assign homework involving the e-reader. For example, one JHS teacher shared that as homework, he asks students to read chapters and answer the comprehension questions that follow the chapters. Similarly, another JHS teacher asks students to read a story at home so that it can be discussed in class. However, other teachers do not give specific assignments for students to complete at home. One JHS teacher explained that she initially assigned topics for student to read after school. However, she realized that many students did not do the reading, perhaps due to lack of light at home to read in the evening, lack of time to read due to household responsibilities, or lack of motivation to do the assignment. Now this teacher only recommends that students read certain passages rather than making reading at home mandatory. Several other teachers similarly recommend but do not require topics for students to read at home. In order to motivate students to read at home, some teachers visit students' homes occasionally if the student lives nearby. Teachers also mentioned that they regularly ask students how many books they've read, and ask students to summarize books to ensure students are telling the truth about what they are reading.

Teachers also added that the e-reader has enhanced their sources for personal reading. One teacher was excited that he can now receive news faster through the e-reader's internet capabilities. Apart from e-books related to school subjects, teachers mentioned that they

enjoyed reading storybooks, newspapers and news sites, and biblical materials. One teacher shared that he even uses the e-reader to conduct internet research for his personal degree program. Finally, a few teachers expressed that the e-reader has helped them to feel better about technology.

The evaluation team also analyzed a total of 104 teacher weekly logs spanning the start of the project in December 2010 to March 2011. Key findings from teacher weekly logs are as follows:

- (E) and (E+OCE) teachers report actively using the e-reader for 34% of class time.
- 49% of (E) and (E+OCE) logs indicate that teachers use teaching methods or lesson plans encouraged by Worldreader. This high percentage indicates that teachers found Worldreader’s methods to be valuable. Some of the methods and lesson plans used include the following:
 - Reading aloud method to test the reading ability and fluency of the students
 - Discussion method to promote active participation
 - Child centered method in which a student leads the class rather than the teacher
 - Group method in which students work together and help each other
 - Competition method. For example students competed to find the meanings of words in a particular e-book
 - Indicating locations on the chalkboard so that students' can follow along more easily
- (E) and (E+OCE) teachers report using paper books for 50% of class periods. At the high school level, teachers still frequently draw upon government books and required paper books that students bought when they paid tuition. One JHS social studies teacher often uses privately published social studies paper books in addition to the e-reader social studies textbook. Finally, some teachers who have both electronic and paper copies of the same book will have students use both versions in class. This is especially true for a primary school teacher who sometimes prefers students to use the paper version since it is easier for students to locate pages when using paper books than electronic books.

E-READERS AND THE GOVERNMENT CURRICULUM

Worldreader has provided 8 textbooks on the e-reader, which cover the subjects of English, Citizenship Education/Social Studies, and Integrated Science (Table 17.0). E-reader textbooks at the primary and JHS levels are government published textbooks while e-reader textbooks at the SHS level are privately published. Six out of the eight e-reader textbooks have been used by teachers the previous year, while two out of the eight textbooks are new to teachers.

Table 17.0 – Textbooks on the E-Reader

Level and #	Subject	Title of Textbook on the E-Reader	Government or Private Publisher
1) Primary	Citizenship Education	Citizenship Education in Ghana for Primary Schools 4	Government
Comments: This book is the same book that teachers were using in paper form the year before.			
2) Primary	English	An English Course for Primary Schools	Government

Comments: Even though the textbook on the e-reader is a government book, it is different from the book designated by the Ghana Education Service for (E) and (E+OCE) districts. Since districts have exams based on district books, this is problematic. While the e-reader book covers grammar aspects of the district syllabus, it does not adequately cover the reading comprehension aspects of the district syllabus. As a result, one primary teacher explained that she uses the paper district book as the main English textbook and uses the e-reader textbook as supplementary material.			
3) JHS	English	Easy Learning English Language for JHS	Government
Comments: This book is the same book that teachers were using in paper form the year before.			
4) JHS	Social Studies	Mastering Studies for JHS	Government
Comments: This book is the same book that teachers were using in paper form the year before.			
5) JHS	Integrated Science	Integrated Science for JHS	Government
Comments: This book is the same book that teachers were using in paper form the year before. Even though it is the government textbook, it does not adequately cover the syllabus and teachers recommend that the iREAD program add additional science materials to the e-reader.			
6) SHS	English	Effective English for SHS	Private
Comments: Teachers did not use this book in paper version last year. Moreover, to supplement this textbook, students still need to buy required paper novels that are part of the syllabus, such as "Grief Child" and "In the Chest of a Woman."			
7) SHS	Social Studies	Mastering Social Studies for SHS 1	Private
Comments: This book is the same book that teachers were using in paper form the year before. One social studies teacher observed that the privately published social studies textbook on the e-reader is more appropriate for her students' level, while the government paper book is at a higher, more university-like level.			
8) SHS	Integrated Science	Easy Learning Integrated Science for SHS	Private
Comments: This book is the same book that teachers were using in paper form the year before. Teachers commented that this textbook does not cover all areas of the syllabus well. For example, a physics teacher pointed out that certain calculations such as those for density are not covered by the book. Another teacher explained that in all honesty, only the internet on the e-reader is beneficial for him because the aspects of integrated science that he teaches are not addressed in the provided textbook.			

All (E) and (E+OCE) students have a copy of the e-books listed above for their grade level, which they can use individually in class and at home. This is one of the major benefits that the e-reader brings. Outside of the study, not all students have copies of these paper textbooks. Therefore, access to paper books at the midpoint in the school year has still not reached a 1:1 ratio. Only one interviewed teacher has received additional government paper textbooks for her subjects since the baseline evaluation in December 2010. SHS students have individual copies of

textbooks because they are not government issued; students and are required to pay cash for them.

In addition to the e-textbooks listed in Table 17.0 above, teachers have also used various supplemental materials from the e-reader that they had not used the year before, including:

- Local storybooks (The Shark, Ananse and the Pot of Wisdom, At the Beach, and others)
- International storybooks (Gulliver's Travels, Treasure Island, Magic Tree House Series, and others)
- Educational games (Every Word)
- The e-reader's dictionary

Outside of the study, teachers often do not have paper supplementary materials to give to students. Since many students cannot afford supplementary materials, teachers can only recommend but not require that students read certain passages. Having the e-reader allows teachers to confidently push supplementary materials to students without concerns about access and cost.

A LIBRARY EXPERIMENT IN ACTION

The iREAD program took the decision to provide five e-readers to the (E+OCE) SHS library. By making these e-readers available to the entire school, Worldreader hoped to test a model for giving many students an opportunity to use the devices. The librarian at the (E+OCE) SHS however reported that although students are aware that e-readers are available in the library, students do not seem to be borrowing them. The librarian observed that since students in non-e-reader streams have friends who are part of the (E+OCE) stream, they prefer to borrow e-readers from their friends and feel no need to come to the library.

5.3. ARE E-READERS SUSTAINABLE?

This cost analysis compares the costs of three interventions over the span of 5 years:

- **Minimal intervention** that provides 8 paper textbooks (provided each year) to 500 students
- **Intermediate intervention** that provides 8 paper textbooks (provided each year) and a library of 50 different paper books (provided one time) to 500 students
- **E-reader intervention** that provides e-readers and 200 books (provided each year) to 500 students

The average annual cost per student for the **minimal intervention** is **\$55**. This intervention is the cheapest as it provides only 8 paper textbooks (provided each year) to 500 students. The reading achievement would potentially remain the status quo, thus not significantly revolutionizing the Ghanaian academic experience.

The average annual cost per student for the **intermediate intervention** is **\$83** and involves the provision of paper books only. While this intervention is cheaper than the e-reader intervention, it falls short of the e-reader intervention in several ways. Namely, the intermediate intervention does not expose students to as wide of a range of books nor does it enable students to have a degree of choice in books. Most importantly, the intermediate option does not provide access to technological device or to the internet, and it is not as portable or convenient as the e-reader.

The average annual cost per student for the **e-reader intervention** is **\$313**. This intervention is the most expensive, but it also provides the most access to a variety of books, as well as other benefits such as access to technology, internet, and educational games.

At an initial review of costs, e-readers may not be the most financially sustainable option at this time. However, e-readers comparatively provide extra benefits to paper text books such as timely access to books, access to reading material beyond the classroom, access to technology and the internet, international reading materials, convenience and portability. The key next step is to continue to explore ways to reduce the associated costs of the e-reader so that a sustainable price per student can be attractive to funders.

DETAILS OF COST ESTIMATES

The introduction of e-readers into classrooms is associated with high variable and fixed costs throughout the first year, totaling \$782,000 USD (approximately 992,755 GHC*). Since the project involves approximately 500 students, the total average cost of receiving the e-reader in Year 1 of **\$1,328 per student**. This initial cost is high given the investment in the device, logistics, and personnel to set-up the system. Fixed costs associated with the first year include the purchase of the device, ruggedization (case + light), shipping, customs, and technical equipment.

During subsequent years, the annual cost of sustaining the program falls substantially to an estimated \$29,706 based on expected recurring costs of replacement devices, digitization, and quality assurance administrative costs. Therefore, the cost comes down to **\$59 per student**

from years 2 to 5. See Appendix S for details on Worldreader’s iREAD budget, on which estimates for recurring and non-recurring costs are based.

Comparatively, providing a paper-book bundle of 8 textbooks to each student for all of their classes based on Ghana’s rough nationwide curriculum is much cheaper but doesn’t provide any *extra* reading material for students. Based on the average costs for textbooks across grade levels, providing 8 textbooks to every student would cost about \$55.

Table 18.0 - Providing Textbooks to Every Student, Every Year

Textbooks for every student each year	
Cost per student per year	\$55.44
Total number of books provided to each Student	8
Average cost per book	\$6.93
Total cost of providing 8 books per student per year to 500 students	\$27,720

As an alternative to the e-reader, a library of 50 books per student could be established as an intermediate intervention accompanied by provision of the 8 textbooks that students could optimally have each year. Based on an estimated average storybook book cost of \$2.78 and textbook cost of \$6.93 (See Appendix T and U for cost calculations and book bundles used to estimate cost)

Table 19.0 - Cost Comparison of E-readers to Paper Books over a 5-year Trajectory)

Cost Comparison Of E-readers to Paper Books										
	E-reader Active (E) and (E+OCE) Group					Traditional Paper Books Control (NE) Group				
	Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5
Cost per student per year	\$1,328	\$59	\$59	\$59	\$59	\$194.44	\$55.44	\$55.44	\$55.44	\$55.44
Total number of books provided to each Student	200	200	200	200	200	58	8	8	8	8
Cost of program per book supplied	\$6.64	\$3.0	\$3.0	\$3.0	\$3.0	\$3.35	\$6.93	\$6.93	\$6.93	\$6.93
Average cost of intervention over 5 years	\$ 156,172					\$41,620				
Total cost of intervention for 500 students (over a five-year period)	\$782,000 (200 books in each e-reader)					\$208,100 (50 books and 8 textbooks for each students first year. The following years only 8 textbooks)				
Average cost per student per year (over a five-year period)	\$313 per student					\$83 per student				

Primary, JHS, and SHS level students are being assigned correspondingly 8, 10 and 8-9 textbooks. The total average cost of these books was 83 GHC (or \$55.44) per student, based on the market place price provided by EPP bookstore. This figure took into consideration the 1 to 2 publishers that were allocated to provide these books (See Appendix V – Government-Issued Paper Textbooks). According to the market price, on average each primary school textbooks cost 6 GHC (\$4), while each recommended JHS textbook costs 10 GHC (\$6.67) and SHS textbook costs 15 GHC (\$10). It is important to note that book prices at EPP Bookstore are more suitable for middle and upper class student body. At the primary school level, textbooks are printed locally and sold at cheaper and more affordable prices.

Table 20.0 Market Place Documentation of Textbook Costs

	SHS	JHS	Primary
Cost per book in GHC	15 GHC	10 GHC	6 GHC
Quantity assigned	8	10	8-9

IMPORTANT CONSIDERATIONS

- The cost calculations performed are based on the market price of new textbooks and supplementary reading material in Accra, which may be different from prices elsewhere in the country, prices of used books, or government prices. The market prices are used since a hypothetical intervention would circumvent and supplement the government, which is not currently providing an adequate number of textbooks or providing textbooks that students can take home.
- E-reader costs are falling rapidly and are expected to continue falling, so e-readers could become more sustainable over time. Although Kindles currently cost Worldreader \$180 each, some analysts estimate that Kindles will cost \$80 by 2013.¹
- E-readers provided as part of the iREAD study come with limited internet access, and continued access in the future is an important benefit of the e-readers, allowing students and teachers to download books on their own. Free access to internet could potentially be eliminated by a new pricing scheme.
- The major assumption in the premise of the cost estimate is that it is worthwhile to provide students with access to a wide range of reading materials, in this case, 200 books per year. Because of high fixed and overhead costs associated with the e-reader, its costs are more justified if access to the large number of books is deemed necessary.

¹ <http://mediamemo.allthingsd.com/20110118/waiting-for-the-80-kindle-hang-on-till-2013/>

- The average cost estimates of e-books are very low and are a main advantage of the e-readers. Sustainability will depend on Worldreader's ability to continue to download cheap (or free) e-books onto the devices. It is still too early to tell how e-readers are affecting the need for continued access to some paper books. About half of interviewed (E) and (E+OCE) teachers reported that they have not spent any of their own money to give students access to reading materials since the start of the iREAD project. Most interviewed teachers explained that while students may be buying textbooks on their own without teachers' knowledge, in general, students are not spending money on classroom reading materials since the start of the iREAD project in December 2010. Several interviewed teachers asserted that the e-reader has reduced the amount of money that students spend on reading materials by providing free access to books. However, a small number of teachers mentioned that students were indeed asked to still spend money on recommended books ranging from 5 to 30 GHC. Since students and teachers tend to buy most textbooks and reading materials at the beginning of the school year, rather than after December when the e-reader was introduced, it is difficult to determine whether teachers' and students' reduced spending is directly due to the e-reader within this pilot study. To reduce these costs, however, all books required in the curriculum should be digitalized and downloaded onto the e-reader.
- Although e-readers are currently designed for individuals and small groups, manufacturers are beginning to develop e-readers for classrooms and large groups. Once manufacturers design a system in which hundreds or thousands of e-readers can be managed at once, e-readers may become an efficient and transparent means of distributing reading material nationwide, reducing the logistical costs of distributing updated syllabi and textbooks.

6. STUDENT CASE STUDIES

A look at selected students helps to demonstrate the potential that e-readers have to improve test scores for some students but not others. These case studies also show that e-readers can strongly influence student personal reading habits without initially affecting test scores.

Kaizer Mawuko, a primary student in the (E+OCE) group, began with a score just above “proficiency” on the baseline SEA exam but increased his score by 24 percentage points, and much of this increase can be attributed to his access to more books through the e-reader device.

On the other hand, Darkwa Bright, a JHS student in the (E) group, has also openly embraced the e-reader, but his test scores dropped on the BECE exam.

There is a possibility, however, that test scores will eventually reflect increased reading levels but access to the device over a 4-month period may not be adequate to affect standardized test scores across the board for all students.

Name: Kaizer Mawuko
Group: (E+OCE) Group at the Primary Level
School: Presbyterian Primary in Adeiso
Age: 11 years
Baseline SEA Score: 38/68 (56%)
Mid-Term SEA Score: 45/56 (80%)
<i>Kaizer explains that before receiving the e-reader, he would read one or two books occasionally and then stop. However, now that he has the e-reader, Kaizer proudly shares that he reads as many as five books in a day after school. Kaizer is also proud that he has learned so many new words from reading through the e-reader’s dictionary. Kaizer’s favorite e-reader book is Story Time. With enthusiasm, Kaizer retells the story of how a tiny ant saves a crow’s life. Kaizer explains that the story taught him that when someone helps you, you should also help that person in return, because no matter how small you are, there is still something you can do to thank the person who helped you. At home, Kaizer’s brother knows how to use the e-reader. However, Kaizer’s parents are often too busy with work to take the time to learn how to use the device. Since they do not have the time to use the e-reader, Kaizer sometimes reads aloud to them. When he grows up, Kaizer wants to be an accountant, and Kaizer is confident that the e-reader will help him to pass his exams so that he can reach his aims. Kaizer states confidently, “Reading is the gateway to knowledge.”</i>

Name: Darkwa Bright
Group: (E) Group at the JHS Level
School: Presbyterian JHS in Kade
Age: 13 years
Baseline BECE Score: 34/82 (41%)
Mid-Term BECE Score: 37/100 (37%)
<i>Bright is eager to share that he loves the e-reader. Some of his favorite e-books include the Magic Tree House Series and Ananse books. Apart from reading, Bright especially enjoys using the e-reader to browse the internet so he can search for the answers to teachers' questions through Google. Bright also regularly plays word games on the e-reader. At home, Bright shares his e-reader with his grandmother, who likes to read newspapers on the device. Bright's favorite school subject is integrated science, as Bright aspires to become a doctor. He believes that the e-reader will help him achieve his dream by improving his English skills and increasing his vocabulary. Bright is full of pride when he mentions that he has learned new words such as "hypocrite" and "eloquent."</i>

A closer look at another two students shows that the e-reader provides access to numerous books of various genres. It should be noted, however, that having access to more books does not necessarily mean students are reading more. An SHS student in the (E) group, George Ampofo is turning this access to more books into actual reading of more books now that he has access to inspirational book. His case demonstrates the importance of data on students reading tastes as students are more likely to read genres that they like. Additionally Rita Stephens, a SHS student at the (E+OCE) group, shares that she is reading various genres of books and playing different e-games with the e-reader.

Name: George Ampofo
Group: (E) Group at the SHS Level
School: Kade Secondary Technical School
Age: 20 years
Baseline WASSCE Score: 65/134 (49%)
Mid-Term WASSCE Score: 76/134 (57%)

George has always loved reading. Even before the iREAD program began, George was in the habit of reading regularly. George always set aside time to study his textbooks, and in his leisure time, George would read the few storybooks owned by his little sisters. Now that George has the e-reader however, he reads more voraciously than ever before. Through the e-reader's vast library of books, George is finally able to access a large range of his favorite type of books—inspirational books. George explains that reading is a means for him to learn valuable lessons from other people's experiences. One of his favorite titles is "19 Minutes in Heaven," which tells the touching story of a boy who came back from heaven. In addition to reading, George also uses the e-reader to conduct research using Google and to find the meanings of words through the dictionary. At home, George shares the e-reader with his junior sisters, junior brother, and illiterate mother. Previously, George's junior brother never made time for books, but now his brother regularly asks for books to read on the e-reader. George is happy to report that his brother's reading skills are improving.

Name: Rita Stephens
Group: (E+OCE) Group at the SHS Level
School: Presbyterian SHS in Adeiso
Age: 16 years
Baseline WASSCE Score: 49/134 (37%)
Mid-Term WASSCE Score: 63/134 (47%)

The e-reader's built in dictionary gave Rita, a first year SHS students, an opportunity to finally look into a word that her JHS teacher always used: eradicate. Through the dictionary and text-to-speech function on the e-reader, Rita shares that she has improved her pronunciation so that she is no longer afraid of making mistakes when she reads aloud in front of people. Rita also loves that the e-reader is portable and allows her to conveniently choose from a vast array of books wherever she goes. In the morning Rita reads the Bible on the e-reader. After school, in her leisure time, she enjoys storybooks such as the Magic Tree House series and Serwah, Saga of an African Princess. Aside from reading, Rita frequently plays word games and browses the internet on the e-reader. Rita wants to be a lawyer in the future. Through the e-reader, she has been able to access reading materials and websites related to law in Ghana.

7. ONGOING CHALLENGES

STAKEHOLDER PERSPECTIVES ON THE CHALLENGES OF SCALING UP THE IREAD PROGRAM

The M&E Team interviewed stakeholders, representing USAID, the Ghana Ministry of Education, World Bank, and a publishing company. Stakeholders were excited about the potential of the e-reader, noting that e-readers could provide students reliable access to all required government textbooks. They also explained that e-readers could motivate students to read more. One stakeholder pointed out that e-readers could be an effective way to provide materials, but that e-readers do not actually teach reading, and initiatives to teach reading would need to be addressed separately from the iREAD program.

A representative from the World Bank shared that the biggest hurdle in scaling up the iREAD project would be the unit cost of the devices. The representative explained that 70 GHC (about \$45) could buy a set of paper books that last 10 years while it costs \$180 to buy an e-reader that may break very quickly. The World Bank representative explained that at current prices, the government or donors might use e-readers in very select deprived areas if the e-reader shows results, but it would be unrealistic for all schools to have e-readers.

The USAID representative similarly focused on the cost of the device. He explained that it is unrealistic for the Government of Ghana, USAID, or other donor agencies to buy e-readers for everyone. Therefore, in order to scale up the project, it would be critical to develop an effective business model that takes advantage of a strong private/public partnership mixed with financial appeals to poor families. For example, the government and donor agencies could subsidize e-readers for targeted populations, and families could pay 1 GHC (about \$0.66) per week over two years in order to pay some of the costs of the device.

The Ministry of Education representative focused on the challenge of putting the Ministry's curriculum on the e-reader. Currently, only five government textbooks are on the e-reader. In order for the Ministry to support e-readers on a large scale, the Ministry would want the e-reader to include all government textbooks, including math and science textbooks, as well as government syllabi and lesson plans. The representative also explained that larger scale-up would need to address concerns at the field level such as charging issues, stolen and missing e-readers, and high e-reader breakage rates.

Finally, the representative from a local publishing company emphasized that in order to scale-up the project, project personnel would need to better communicate with publishers, since some local publishers are reluctant to move their books into electronic formats.

TEACHER AND STUDENT PERSPECTIVES ON CHALLENGES

Through interviews, focus groups, logs, and questionnaires, teachers and students identified the following challenges regarding the e-reader, some of which have already been mentioned in the report:

- **Device Breakages.** E-readers are fragile and being dropped once can cause the machine to shut down. Sometimes non-e-reader students who borrow a friend's e-reader may not be familiar with the device and break it accidentally. A primary teacher reported that at one point, there were so many breakages in her class that students had to share e-readers at a 5:1 student to device ratio. In April 2011 Worldreader created a stock of replacement e-readers so that when a student's device breaks, he or she can use a replacement e-reader while the broken e-reader is being repaired. In total, 54 repaired e-readers were returned to students in February, and 65 were returned in April.
- **Lack of light.** The most commonly cited challenge was that the e-reader needed a light either built into the device or to supplement the device so that students with limited access to electricity could read in the evening. Worldreader addressed this challenge by distributing lights in May 2011.
- **Student emphasis on the entertainment aspects of the e-reader.** Many teachers complained that rather than focusing on reading, students rather use the e-reader to play games, chat online, and play music, etc. (E+OCE) SHS focus group students were especially open in sharing that they enjoyed listening to music on the e-reader as much if not more than reading on the e-reader.
- **Students are not always at the right location/page in e-books.** Turning to particular locations in an e-book is more complicated than doing so in a paper book. One primary teacher shared that it can be very difficult and time consuming to ensure that everyone in a group of 40 young children is at the correct location in an e-book. Additionally, students at all grade levels sometimes read ahead or open other materials during class, forcing teachers to randomly check students to supervise that they are using their e-readers appropriately.
- **E-readers can distract students in class.** A primary teacher explains that even though she has students put e-readers under their desks when it's not time to use them, students use them anyway. In contrast, JHS teachers share that they had expected e-readers to be a distraction, when really they have not been.
- **Students lack motivation to read at home.** In focus group discussions, some teachers mentioned that a number of students are still not reading, even though they have access to the e-reader. The SHS coordinator of the (E+OCE) group mentioned that when he charges e-reader devices, he skims through the devices to see which books students are accessing, and observes that the majority of students are not accessing any books. Also, since students live in scattered and sometimes distant places, it is difficult for teachers to visit student's homes and promote reading and effective e-reader use among students' families.
- **Some students are losing interest in the e-reader.** Some students are even forgetting to bring the e-reader to class.
- **Teacher plans.** Teachers create separate lesson plans and notes for e-reader and non-e-reader classes who are taking the same exam can be time consuming for teachers.
- **Teachers share e-readers.** Integrated Science teachers at the SHS level share 2 e-readers among 4 teachers, which make research, lesson planning, and practicing with the device difficult.
- **Lack of uniformity in loaded books.** Not every student in a class has the same set of books. Sometimes a teacher may want a class to read a particular e-book together just to

realize that many students do not have the title, perhaps due to accidental de-registration or book deletion.

- **Charging issues.** Devices need to be charged frequently, and sometimes lessons delay because the teacher has to wait for students to charge their devices before he or she can begin. Additionally, since there are not enough chargers for each student to take home, students have to charge at the school, which can be time consuming for teachers and inconvenient during vacation when students are not in school. One teacher who serves as a project coordinator observes that he spends an average 40 minutes every school day charging students' e-readers.

In addition to challenges with the e-reader, teachers continue to face challenges outside the scope of the iREAD program. For example, teachers struggle to manage large classes of 30-70 students, which make it difficult for teachers to control classes, provide individual attention, and cater to the needs of students with varying levels of capability. Additionally, student attendance is inconsistent, students have difficulty with the English language, and school infrastructure is poor.

GAPS IN STUDENT ENTHUSIASM

Although, many students are very excited to read because of their e-readers, there are students who are not motivated by the device. Motivated students who did not previously have access to many books can now read much more. On the other hand, some students are not as enthusiastic about their e-readers. These students may be less enthusiastic because they have difficulty with the English language, are poor readers, and are from home environments that do not value reading.

8. WORLDREADER PERSPECTIVES

The evaluation team surveyed members of the Worldreader team, which included the 2 Co-Founders, the Director of Research, the Director of Communications, the Director of Digital Publishing, and the Operations Manager. Several Worldreader staff observed that many students in the active e-reader groups appear to be reading much more fluidly in terms of words per minute, although Worldreader didn't measure reading fluency systematically. This measurement will be further explored in the final evaluation.

Established educational studies support that repeated guided oral reading procedures were found to be effective in improving reading fluency, word recognition, comprehension, and overall reading achievement for children at a variety of grade levels². Worldreader staff also observed that students are giving more elaborate answers to reading comprehension questions than they did at the start of the project. Even when students are not able to answer in English, they can give elaborate answers in local languages. Worldreader staff also feels that students are learning new content knowledge through greater access to textbooks and research through the internet. In addition, students are more confident when participating in class, perhaps because of the e-reader.

READING MORE FROM WORLDREADER'S PERSPECTIVE

The Worldreader team shared that student and teacher attitudes towards e-readers continue to be overwhelmingly positive at this point in the project. Worldreader staff observed that teachers have been sharing positive anecdotes and best practices related to the e-readers. Students are downloading material, reading more, and beginning to integrate the e-reader into their daily routines. For example, one Worldreader team member shared that some students are taking the e-reader everywhere they go. A Worldreader staff member was particularly impressed to see a student reading on the e-reader while he was selling MTN phone credit cards after school. Worldreader staff has noticed that students are also sharing the device with friends and family, spreading the reach of program to the community.

Several Worldreader staff commented that the e-reader impacts students differently. Their observation is that for some students, it seems as if the e-reader will be a life changing experience while for others it seems that the e-reader will be peripheral to their lives.

WORLDREADER PERSPECTIVES ON CHALLENGES

Worldreader staff reported e-reader damage as one of the project's most pressing challenges. In late March 2011, as many as 70 project-affected students did not have e-readers due to breakages. In response, Worldreader has taken the following measures:

² National Reading Panel, "Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature on Reading and Its Implications for Reading Instruction. Chapter 3: Fluency". National Reading Panel, Bethesda, MD. Reports of the Subgroups. Chapter 3: Fluency (NIH Publication No. 00-4754), 2000.

- Worldreader has created a stock of extra e-readers so that when e-readers do break, the student can use a replacement e-reader while the broken device is being repaired.
- Worldreader and teachers are educating students on proper e-reader care.
- Worldreader is in the process of providing (E+OCE) students with the same e-reader cases as Kade (E) students, since the cases currently used by (E) students appear to be more dust-resistant and durable in the Ghanaian context.
- Worldreader is in dialogue with Amazon to test more durable e-reader designs. For example, Worldreader is concerned that the screens of the current devices are too fragile. Amazon is developing versions of the device that would have stronger screens.

While there is not 100% security, Worldreader staff agreed that loss and theft are at minimal levels. In comparison to the challenge of e-reader damage, theft and loss have been minor challenges. Two of the e-readers have gone missing. One case of e-reader theft has even been reported to the police, since a thief broke into a student's room and stole the e-reader along with other valuables. Another concern is that people have been offering to buy students' e-readers in the marketplace, but thus far no student has sold his or her e-reader.

Other challenges highlighted at the field level include:

- **De-registration of e-readers.** Students accidentally de-register their e-readers, which prevents them from downloading books. To address this challenge, Worldreader is working with Amazon to disable the de-registration function.
- **Charging problems.** While e-readers can potentially last for up to four weeks on one charge, in reality students frequently enable the wireless function on the e-reader, and this wireless function consumes the battery very quickly. As a result, students need to charge their e-readers often. Currently, students charge their e-readers through designated teachers or e-reader prefects, but Worldreader hopes to find an efficient method of having individuals charge e-readers on their own. At this time, Worldreader is exploring solar charging options.
- **Issues that are out of Worldreader's control.** For example, nationwide teacher strikes disrupted school for several weeks, limiting the potential impact of the e-reader.

9. CONCLUSIONS

In conclusion, the iREAD M&E team has summarized some preliminary conclusions and lessons learned from the midterm evaluation:

- The greatest improvements in test scores were realized in schools with e-readers **and** OCE interventions, however test scores are somewhat inconclusive and students may require more exposure time to the device
- Primary students experienced greater improvements in test scores than other grade levels at this time
- Students are achieving their overall best when OCE activities are incorporated alongside e-readers
- Students are accessing more books and they are self-reporting that they are reading more
- Students are reading from various genres and sources of literature to which students did not previously have access
- Students are able to take reading material outside of the classroom and complete homework assignments, thus enhancing the overall academic experience

Overall, the study is providing a solid platform on which Worldreader and stakeholders can learn the anticipated and unanticipated effects of the e-reader.

10. RECOMMENDATIONS

Although the study is at the mid-term phase, the iREAD M&E team has collated a series of recommendations regarding the pilot project as well as learning with e-readers in general. These initial recommendations can help to shape future programming efforts.

RECOMMENDATION	JUSTIFICATION
Pilot Project Accountability	
Determine how the e-reader can strategically assist student to excel on standardized exams	In order to achieve specific educational results, the program should design interventions that specifically target improvement on standardized tests
Focus on discovering and demonstrating ways to limit the number of broken e-readers	This will help to ensure cost-effective sustainability
Strengthen OCE activities by organizing them for each (E+OCE) school every Saturday, without exception	(E+OCE) primary and SHS groups experienced greater improvement in test scores than their counterparts in the (E) and (NE) groups, indicating that OCE activities contribute to higher reading performance. Therefore, OCE activities should occur more regularly to maximize impact and ensure a reliable evaluation of the activities
Conduct parent outreach to emphasize the importance of weekend OCE activities with the (E+OCE) group	This could increase turnout at OCE activities, which appear to have an impact on students who attend at this stage
Give every integrated science teacher an e-reader	While the pilot study focuses on English and Social Studies classrooms, Integrated Science classrooms are also involved. Integrated Science teachers at the SHS level seem to feel neglected, as they do not have e-readers at a 1:1 ratio despite attending iREAD teacher trainings and meetings. Additionally, providing Integrated Science teachers with e-readers at a 1:1 ratio would allow the iREAD pilot study to better determine the successes and shortcomings of e-readers in non-humanities settings.
Learning with E-Readers	
Conduct more training with primary students early on when introducing e-readers	Some primary students in particular expressed difficulty using their e-readers. Also, primary teachers expressed frustration with ensuring that each student is at the correct location in a book and that students avoid accidental book deletion and device de-registration.
Conduct additional training for teachers on incorporating e-readers into lesson plans to prepare them for issues like student distraction and to help them take full advantage of the e-reader's benefits	This would help teachers master more advanced e-reader functions and make class time more efficient. Additional training could also help teachers better manage minor technical difficulties in the absence of the Worldreader Operations Manager

Ensure that every student in each class is provided the same set of books	Currently, it is difficult when a teacher wants the class to open to a particular book that isn't on all students' e-readers. Teachers need to help students avoid accidental book deletion and e-reader de-registration, which affects whether or not students have all of the books that they should. Additionally, Worldreader needs to work with Amazon to disable problematic functions and make accidental deletion less likely.
E-readers need additional books that are more appropriate for primary student's reading levels	Current books tend to be above primary students' reading levels, and primary students are able to go through their books quickest
Provide lights with e-readers	Without a light, students with limited access to electricity have difficulty reading in the evening.
Provide cases when distributing e-readers	These will provide effective protection from breakage and save money in the long run
Provide troubleshooting assistance and engage students to address reported "technical difficulties"	Students are consistently reporting a diverse range of technical difficulties on their student logs
Use volunteers and out of classroom exploration activities to work not only with motivated students but also with less enthusiastic and engaged students who may have more difficulty with English but who can nevertheless realize value in the e-reader	Efforts to broaden the e-reader's impact could help improve more students' reading ability and test scores
Incorporate local-language literature onto e-readers when possible	Although reading comprehension of English is a primary goal of introducing e-readers, this could help to engage students

MOST COMMON REQUESTS

In addition to the recommendations, a list of most common requests from students and teachers are identified below:

- E-readers need additional books for leisure
- E-readers need Ghanaian story books for advanced readers
- E-readers need a dictionary with simplified language
- More effort it needed to edit books to screen out typos and mistakes, which are common in Ghanaian books.
- E-readers should entertain the idea to publish student stories
- Provide chargers for each individual students to take home, so that students can charge on their own rather than depending on teachers or class prefects
- Update e-readers to a colored screen rather than the current black and white screen
- Remove the e-reader's music capabilities so that students can focus more on the device's educational aspects (teacher recommendation).
- Censor internet access so that students cannot access inappropriate material
- Improve the device's capability to display diagrams and pictures
- Provide ear pieces for the e-reader

- Make the device slightly larger so that it is the size of an average textbook
- Add a strap to the e-reader case so that students can hang it over their shoulder
- Make the e-reader case more durable to better prevent damages
- Develop a way for the device to track how much time students spend on reading vs. entertainment (music, games, and internet)
- Make the network faster for downloading books
- Decrease freezing on the e-reader
- Design the e-reader screen to be more durable
- Touch screen could improve the e-reader device
- The text-to-speech function should read with a Ghanaian/British accent and have a slower speed option. Also, the text-to-speech function should better pronounce local names and words. For example, the common local name “Yaa” is currently pronounced as if it were an acronym, YAA
- The background of the device should be bright white rather than light gray.