

**iREAD Ghana Study**

**Baseline Evaluation Report**

**January 2011**

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## 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, an electronic tablet that has the potential to house thousands of books.

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 that spans from October 2010 to July 2011.

### Methodology

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

- Semi-structured Questionnaires
- Key Informant Interviews with Teachers, Administrators, and Stakeholders
- Focus Groups with Teachers and Administrators
- Assessments in the Form of Standardized Tests

This combination of methods provided rich data that allowed the M&E team to gain a broad understanding of study participant socio-economic backgrounds, reading material access, level of comfort with technology, reading performance levels, reading habits, and associated program costs and logistics.

### Findings

The main findings from the baseline study are as follows:

- The gender balance of the study’s participants is roughly equal, with 48.7% males and 51.3% females.
- Most students, 61%, are of the Akan ethnic group.
- 7.8% of students report that they speak English with their families. 64.3% students speak Twi at home.
- 94.6% of students are Christian (94.6%)

- The mothers of a quarter (25.4%) of students have never schooled beyond the primary level. The student group with the most educated mothers is the (NE) JHS group, where 96.7% of mothers schooled beyond the primary school level.
- 35.2% of students' fathers have never schooled beyond the primary level. However, 28.1% have schooled beyond secondary school.
- Almost three quarters of students' mothers are traders (72.7%)
- The most common occupation among fathers is farmer (39.5%)
- The average number of siblings in a student's family is 5

### **Access to Books and Technology**

- Students across the nine schools do not have their own copy of required books to use in the classroom for 62.5% of their subjects. Students also have limited access to books at home, as they do not have access to classroom books at home for 81.5% of their subjects.
- Primary students have an average of 3.6 books at home, JHS students 8.6 books, and SHS 11.0 books. (NE) JHS students had the highest average number of books at home (16.3 books)
- 43% of students have never used a computer
- Most teachers list inadequate teaching materials as the greatest challenge that affects their ability to deliver quality teaching. Other challenges include large class sizes and limited physical infrastructure.

### **Student Reading Performance**

- The highest possible score was 68 out of 68 points at 100% accuracy. The overall average across primary levels in the (NE), (E), and (E+OCE) groups was 27 out of 68 points or 40%. Further stratified by group, the average score for (NE) primary school was 49%, (E) primary school (38%), and the (E+OCE) school (26%).
- The highest possible score was 82 out of 82 points at 100% accuracy. The average total BECE exam score was 30 out of 82 points or (37%), where the (NE) students scored 42%, the (E) students scored 23%, and the (E+OCE) students scored 24%. These scores reveal that the average score of the (NE) group JHS is 18-19 percentage points higher than the other two schools.
- The highest possible score was 134 out of 134 points at 100% accuracy. The average total WASSCE exam score was 41 out of 134 points or (31%), where the (NE) students scored 27%, the (E) students scored 25%, and the (E+OCE) students scored 31%. SHS student scores across the three groups appear to be at par at the onset of the project, with a slight variance of 2-4% percentage points between groups.

### **Student Reading Habits**

- Student attitudes towards reading are overwhelming positive, as 97.6% of students reported that they liked reading
- 70.0% of students report reading for fun outside of school often or very often.
- 49.7% of students report that they read aloud to someone outside of school often or very often.

- 43.9% of students listen to someone read aloud to them outside of school often or very often
- 61.6% of students talk to friends and family about what they are reading often or very often.
- 54.2% of students enjoy storybooks. Storybooks are somewhat less popular among primary students, who largely list English books as their reading material of choice.
- 78.9% of students report having good or excellent self-confidence

### **Incorporating E-Readers into the Classroom**

- Teachers are excited that e-readers will help students read more, read better, improve students' technological skills, benefit the entire community, and create equal opportunities for disadvantaged students.
- Teachers discussed several potential challenges related to the e-reader. These challenges included concern that e-readers could become lost, stolen, or damaged; that technical difficulties could limit e-reader use; and that e-readers could distract students during class.
- Worldreader discussed several benefits to the e-reader to include the prospect of having access to such a wide breadth of reading material, having improved language skills, understanding school material better, and transforming into a culture of literacy and reading
- Worldreader also discussed several potential challenges related to the e-reader. These challenges included varying degrees of success with the e-reader, moderate gains in standardized test scores; bullying of younger e-reader participants, theft of devices, and damage of devices.

### **Evaluating Costs and Logistics**

- Although GES states that order numbers of books per are set 15-20% higher than the actual enrollment numbers, thereby creating a 'buffer' or excess of books. Baseline evaluation data reveal that students across the nine schools do not have their own copy of required books to use in the classroom for 62.5% of their subjects. Students also have limited access to books at home, as they do not have access to classroom books at home for 81.5% of their subjects.
- Unlike primary and junior high schools, senior high schools do not have a nationwide set core curriculum. Each SHS differs in the courses it offers its students.
- The costs that schools pay for reading materials vary greatly by grade level and particular school.
- When the resources provided by the government and by schools are inadequate, some teachers feel compelled to spend their own money on reading materials. Overall, 57% of teachers within the evaluation reported that they have spent their own money this year (2010/2011) or last year (2009/2010).
- In total, 76.7% of students reported that they or their families paid for reading materials related to schooling this year (2010/2011), and 66.0% of students reported that they or their families paid for reading materials last year (2009/2010).
- At retail, the cost of the device is \$190. Worldreader has a slight discount and purchases e-readers at \$180 each. This price of the device continues to decline, and some analysts estimate that kindles will cost \$80 by 2013.<sup>1</sup>

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

- Since Worldreader has distributed about 36,830 books thus far, the average net cost is \$10.41 per book, including the value of in-kind donations. Without including the value of in-kind donations, the average net cost is \$5.97 per book. However, the average net cost of the purchase and distribution of paper books, at this time, is roughly estimated at \$.16 per book. Several books, however, have yet to logistically reach their final destination to the classroom, 5 months into the school year. Also, the paper books are designated for one student per year and must be re-purchased each additional year. Whereas the e-book is a digital purchase that does not need to be re-purchased in the subsequent years. More cost benefit-analysis will be conducted in the mid-term report to better compare paper books to e-books.

As a result of the baseline evaluation, the evaluation team makes the following summary recommendations with justification:

	<b>Recommendations</b>	<b>Justification</b>
<b>1</b>	Re-assess the comparison of the current (NE) control group to the active (E) and (E+OCE) groups by finding an alternate control group at par with active groups	The expectation of the research design was that all three experimental groups began at approximately equal levels of reading performance. However, the baseline reading performance of the three experimental groups is not approximately equal, thereby limiting the study's ability to measure (E) and (E+OCE) progress against (NE) progress.
<b>2</b>	Ensure a 1:1 ratio of e-readers to students	Select students are sharing the device, yet the study aims to evaluate student use of e-readers at a 1:1 ratio.
<b>3</b>	Ensure that students take the e-reader home and have meaningful homework assignments using the e-reader	In order to improve student reading performance, students need to spend more time reading outside the classroom, particularly at home and through guided homework assignments.
<b>4</b>	Continue to use English and local languages to administer evaluations	Given that English is not primarily spoken at home, evaluations should continue to take place in several languages to ensure maximum understanding of questions.
<b>5</b>	Gain access to more specific cost and logistics information to determine a better cost-benefit analysis	Government-related costs associated with the logistics and supply of books was not made available to the evaluation team. More effort and time should be invested in securing comprehensive cost information related to the net cost of paper books in select regions of Ghana.
<b>6</b>	Carefully differentiate between (E) and (E+OCE) groups	At the point of the baseline evaluation, there are no real differences between the (E) and (E+OCE) groups. It is recommended that the (E+OCE) clearly document and implement its interventions that lead to clear and measurable results.

## 1.0 INTRODUCTION

### 1.1 BACKGROUND AND PURPOSE

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, an electronic tablet that has the potential to 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 that spans from October 2010 to July 2011. However 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.

### 1.2 OBJECTIVES OF THE STUDY

The objectives of the iREAD Ghana Study baseline evaluation were to collect preliminary, baseline data pertaining to study participants and their surroundings. Key topic areas of this first evaluation included data on:

- Access to books and technology
- Student reading performance
- Student reading habits
- Perspectives on incorporating the e-reader into the classroom
- Cost-benefit analysis of paper books to e-books

The data collected will inform program development and assist the Worldreader team and the M&E team to measure real program results.

## 2.0 METHODOLOGY

### 2.1 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 will allow 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 developed a research design consisting of 3 distinct experimental groups:

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

At the time of the baseline evaluation, none of the three groups had received iREAD interventions. Therefore, any differences between the three experimental groups determined from the baseline are caused by factors outside of the iREAD Ghana Study. The subsequent mid-term, end-of-school year, and final evaluations will illustrate how the interventions have influenced reading performance, technology skills, and overall student behavior among (NE), (E), and (E+OCE) groups.

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

**Table 1.0 - iREAD Research Design**

	<b>NE in Suhum, Ghana</b>	<b>E in Kade, Ghana</b>	<b>E+OCE in Adeiso, Ghana</b>
	<b>No E-Reader</b>	<b>E-Reader</b>	<b>E-Reader &amp; Out of Classroom Exploration</b>
<b>Primary</b>	P-1		
		P-2	
			P-3
<b>Junior</b>	J-4		
		J-5	
			J-6
<b>Senior</b>	S-7		
		S-8	
			S-9

#### Listing of Schools

P-1	Okorasi D/A Experimental Primary School in Suhum
P-2	Presbyterian Primary in Kade
P-3	Presbyterian Primary in Adeiso
J-4	D/A Experimental 'C' Junior High School in Suhum
J-5	Presbyterian Junior High School in Kade
J-6	Presbyterian Junior High School in Adeiso
S-7	Presbyterian Senior High School in Suhum
S-8	Kade Secondary Technical School
S-9	Presbyterian Senior High School in Adeiso

#### Descriptions of the (NE), (E), and (E+OCE) Groups

##### No E-reader Group (NE)

The No E-Reader (NE) group is comprised of three control schools (primary, JHS, and SHS), and is located in the town of Suhum, Ghana. The NE students will not receive e-readers, and iREAD personnel will 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.

##### E-Reader Group (E)

The (E) group is also comprised of three schools (primary, JHS, and SHS), and is approximately 30 minutes away from the (NE) school group in the town of Kade, Ghana. Students in the (E) group will receive e-readers preloaded with a set of books. They will also receive training on the functional use of the e-reader and be given opportunities to receive and download additional books onto their e-readers. Additionally, the teachers of students in the (E) group will receive 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 will receive the same interventions as the (E) group. However, in addition to (E) group interventions, students in the (E+OCE) group will also participate in out-of-classroom interventions led by volunteers, beginning in February 2011. Out-of-classroom activities can be defined as guided extracurricular activities that utilize the e-reader in innovative ways to encourage reading and writing. OCE activities might include storytelling contests, singing popular song lyrics from the e-reader, assigning students to read e-books to someone at home, and other activities.

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

However, since the (E+OCE) group will benefit from the greatest number of interventions, the project expects that the (E+OCE) group demonstrates the highest reading and academic achievement across all groups.

### **Incorporating Teachers into iREAD**

The teachers of the (E) and the (E+OCE) groups will also receive training on the functional use of the e-reader. They will learn how to use the e-reader alongside the curriculum in the classroom and gain opportunities to download additional books onto their e-readers; documentation of their growth and progress will also be made available.

## **2.2 SELECTION OF STUDY PARTICIPANTS**

The iREAD baseline evaluation involved 571 project-affected persons, whereby 509 project-affected persons were students from 3 senior high schools (SHS), 3 junior high schools (JHS), and 3 primary schools. Of the project-affected persons within the study, sixty two (62) teachers and administrators at the nine (9) project-affected schools were engaged in the evaluation.

**Table 2.0 – Summary of Participants from the Baseline Evaluation**

<b>Level</b>	<b>(NE) Group</b>	<b>(E) Group</b>	<b>(E+ OCE) Group</b>	<b>Total</b>
<b>Primary</b>	36	30	42	<b>108</b>
<b>JHS</b>	63	40	69	<b>172</b>
<b>SHS</b>	58	70	101	<b>229</b>
<b>Sub total</b>	<b>157</b>	<b>140</b>	<b>212</b>	<b>509</b>
<b>Teachers &amp; Administrators</b>	<b>62</b>			<b>571</b>

A total of five hundred and nine (509) students were involved in the baseline evaluation, whereby one hundred and eight (108) were primary students, one hundred and seventy two (172) were JHS students, and two hundred and twenty nine (229) were SHS students. The number of participating primary students was comparatively lower than other levels because they tend to be in smaller class sizes than JHS and SHS streams. The number of SHS students was comparatively higher because some students had yet to fully split students into smaller streams.

### **Selecting Schools**

With the assistance of the Ghana Education Service, Worldreader selected nine project-affected schools from the towns of Suhum, Kade, and Adeiso according to the following criteria:

- A public school that is located close to 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

### Selecting Grade Levels and Streams

The specific grade levels for students in the iREAD study are Primary 4, JHS 1, and SHS 1. Primary 4 was chosen because it is the first grade level at which schools teach English language reading and writing. JHS 1 and SHS 1 were chosen so that Worldreader could digitize textbooks and materials starting from the beginning of JHS and SHS. By the time JHS 1 and SHS 1 students would complete their first year and begin their second year, Worldreader would have had time to digitize second year content for them to use while still offering first year content to newly-entering first year students. Additionally, Worldreader factored these grade levels because first year JHS and SHS students tend to experience less stress than final year students who are preparing for BECE and WASSCE exams, allowing first year students to devote more time and energy towards learning new technology and reading content.

As a general rule, Worldreader has refrained from incorporating math and science subjects for this particular study because the diagrams and symbols associated with math and science don't 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 opposed to more quantitative subjects. As a result of these management decisions, the General Arts stream will receive more focus within this study.

### Selecting Teachers and Administrators

As indicated in the summary of participants from the baseline evaluation, a total of sixty-two (62) teachers and administrators across nine project affected schools were interviewed. Table 3.0 below further outlines teachers and administrators and the specific type of data collection method

**Table 3.0 – Summary of Teacher and Administrator Participants from the Baseline Evaluation**

Level	Data Collection Method	(NE)	(E)	(E+OCE)	Total
Primary	Focus Group	0	2	3	5
Primary	Interview	3	3	2	8
JHS	Focus Group	0	6	5	11
JHS	Interview	4	5	6	15
SHS	Focus Group	0	7	11	18
SHS	Interview	6	9	8	23
<b>Total*</b>		<b>13*</b>	<b>25*</b>	<b>24*</b>	<b>62*</b>

*\*Many teachers and administrators participated in multiple focus groups and interviews. Therefore, the total is not necessarily the sum of the column.*

The baseline study involved two major groups of teacher and administrators. The first group consisted of teachers who would directly benefit from iREAD interventions. The second group consisted of teachers and administrators who would not directly benefit from iREAD interventions.

More specifically, the first group included the following:

- 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 will receive e-readers, training, access to downloaded materials, and technical e-reader support from Worldreader. These teachers are also expected to incorporate the e-reader into their curriculums.

The second group included the following:

- Teachers who teach non-project-affected streams of students
- Teachers who teach subjects aside from English, Social Studies, and Integrated Science at the JHS and SHS levels
- Administrators

At (NE), (E), and (E+OCE) schools, the M&E team interviewed a small number of teachers and administrators who would not directly benefit from iREAD interventions but may have valuable input into establishing the baseline evaluation.

## 2.3 DATA COLLECTION METHODS

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

- Semi-structured Questionnaires
- Key Informant Interviews with Teachers, Administrators, and Stakeholders
- Focus Groups with Teachers and Administrators
- Assessments in the Form of Standardized Tests

This combination of methods provided rich data that allowed the M&E team to gain a broad understanding of study participant socio-economic backgrounds, reading material access, level of comfort with technology, reading performance levels, reading habits, and associated program costs and logistics.

Details on data analysis for the baseline data collection methods are as follows:

**Student Questionnaires-** The project data analyst coded data and entered data into Microsoft Excel. Student names were then matched to a unique student reference IDs so that data could be imported into the ReadME database. The team then used Microsoft Access to calculate frequencies, averages, and other numbers that are presented in this report.

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

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

**Standardized Testing-** Standardized tests were administered to all students as a way to benchmark any future 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 excel and imported into the ReadME database. The team then used Microsoft Access to calculate frequencies, averages, and other numbers that are presented in this report.

## 2.4 DATA ANALYSIS

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 will house all monitoring and evaluation data for the project, including the baseline evaluation data from this report.

## 2.5 LIMITATIONS OF THE BASELINE EVALUATION AND THE STUDY

### Limitations of the Baseline Evaluation

- *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, especially younger students, did not know the answers to certain questions on the questionnaire, resulting in missing data. For example, some primary students did not know their parents' highest levels of education.
  - 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 Data*
  - At the JHS and SHS levels, the evaluation team primarily focused on interviewing teachers of English, Social Studies, and Integrated Science, given that e-reader content would be focused on these subjects. As a result, other subjects are underrepresented in the baseline data.
  - Some teachers that were interviewed only had a few months of teaching experience at the time of the interview. As a result, they could not answer questions regarding the year before. Additionally, teachers who were new to the school may not have given the comprehensive answers that more experienced teachers were capable of providing.

- *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.
  - Focus group participants included teachers and administrators who attended the first iREAD training program, including those who would and would not benefit from iREAD interventions. As a result, ILC Africa gained only the perspectives of highly motivated teachers who attended the very first training session.
  
- *Limitations of Standardized Testing Data*
  - ILC Africa administered three levels of standardized examinations for the primary, JHS, and SHS levels. Standardized tests that are culturally and contextually appropriate only exist at the JHS 3 and SHS 3 levels. Therefore, the BECE exam designed for JHS 3 students was administered to JH1 students in the baseline evaluation. 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 in the baseline evaluation. It should be expected that the reading and content level are above the average competency of a SHS 1 student.
  - Classrooms in which testing took place were crowded, making it possible for students to cheat and take answers from others' papers without proctor intervention.

### **Limitations of the Study**

The M&E team has identified additional factors that could prohibit the potential impact of e-readers:

- *Standardized test score differences between (NE), (E), and (E+OCE) groups:* There were significant differences in the competencies of the (NE), (E), and (E+OCE) groups at the onset of the study. The most significant of these differences was that the (NE) control group's standardized test scores were significantly higher than those of active (E) and (E+OCE) groups. These differences in scores indicate that the control group already exhibited stronger reading competency and is not starting at the same level as the active groups. These findings mean that the growth of the active group may not be fully appreciated against the control group because the control group started out at a higher reading level.
  
- *Late start date of e-reader access:* Students will not have access to e-readers for the entire academic year (September to July). Rather, 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 10 months. Student reading performance may be affected in the shortened time period.
  
- *Lack in decision-making to split (E+OCE) SHS Students into streams:* Worldreader intended to provide e-readers to one stream at each (E) and (E+OCE) school. However, the (E+OCE) SHS administration was not able to split its 105 students into two desired streams. Worldreader was faced the option of delaying the launch of e-readers at the (E+OCE) SHS indefinitely until the streams were split. Instead, Worldreader chose to launch the program on time with roughly twice the number of students anticipated, providing e-readers students in groups of

2. If and when the streams are split, Worldreader will provide one stream of approximately 60 students with e-readers at a 1:1 student to e-reader ratio.

- *Introduction of e-readers near exam time:* Worldreader launched e-readers from 29<sup>th</sup> November to 2<sup>nd</sup> 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. The stress of exams and limited teacher guidance could have influenced students' ability to utilize the e-reader in the first month of use.
- *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 they had 2 e-readers to share among 4 teachers. High school Integrated Science teachers expressed concern that sharing e-readers limits their ability to practice using the e-reader and to prepare lesson plans that incorporate the e-reader into their daily classroom learning activities.
- *Late start of OCE activities:* Although ideally planned for September, OCE activities will not begin until February 2011, 5 months into the academic year. As a result, OCE volunteers would have less than 7 months, rather than an entire academic year, to build rapport with students and have 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 don't contain adequate content for other school subjects. Not all subject content is digitized because Worldreader plans to use a phased approach to negotiate with publishers and secure subject material.
- *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 4 students who use English for the first in the classroom in the school system.
- *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 e-readers. Additionally, students whose parents have limited English and literacy skills may be unable to actively incorporate the device into home life.

## 3.0 FINDINGS

### 3.1 SOCIO-ECONOMIC CHARACTERISTICS OF PARTICIPANTS IN THE STUDY

#### Socio-Economic Characteristics of Students

Understanding the social and economic indicators of participants helps to put the iREAD Ghana Study into a meaningful context. The evaluation team collected data on socio-economic

characteristics through student questionnaires. Table 4.0 highlights that a total of 503 students participated in the evaluation, whereby 113 were primary students, 169 were JHS students, and 221 were SHS students.

**Table 4.0 - Number of Student Questionnaire Participants**

Level	(NE) Group	(E) Group	(E+OCE) Group	Total
Primary	38	34	41	113
JHS	61	40	68	169
SHS	56	70	95	221
<b>Total</b>	<b>155</b>	<b>144</b>	<b>204</b>	<b>503</b>

Table 5.0 below outlines average students across levels and groups. Further analysis of student data revealed that the average age across the Primary 4 groups was 11.1 years; at the JHS groups, 13.5 years; and the SHS groups, 16.6 years. Across the (NE), (E), and (E+OCE) groups, however, (NE) control group was younger than that of the active (E) and (E+OCE) groups. On average, the (NE) primary group was 7 months younger; the (NE) JHS group was 10 months younger; and the (NE) SHS group was 2 months younger than the other active groups.

**Table 5.0 - Average Student Ages across Levels and Groups**

Level	(NE) Group	(E) Group	(E+OCE) Group	Grand Average
Primary	10.7	11.5	11.1	11.1
JHS	13.0	13.9	13.8	13.5
SHS	16.4	16.5	16.7	16.6

(n=503)

Table 6.0 examines the average student years in school; higher average years in school indicate that students may be starting school at an earlier grade level or stage, repeating grades, or interrupting studies for a time period. The average student years in school at the primary level across groups is similar, approximately 4 years. Differences in average years in school varied more at the JHS and SHS levels, however. At the JHS level, the average years in school for the (E+OCE) JHS group was the highest. The (E+OCE) JHS group was almost one more year than the (E) JHS group and 2 more years than the (NE) JHS group. At the SHS level, the (E) SHS group had the highest average student years in school. The (E) SHS group was a half-year more than the (NE) SHS group and one more year more than the (E+OCE) SHS group.

**Table 6.0 - Average Student Years in School**

Level	(NE) Group	(E) Group	(E+OCE) Group	Grand Average
Primary	4.1	4.6	4.2	4.3
JHS	6.9	7.8	8.9	7.9
SHS	10.9	11.4	10.1	10.7

**N= 503**

Table 7.0 outlines students' gender, ethnicity, religion, languages spoken at home, languages spoken fluently, school interruption rates, parents' education levels, and parents' occupations.

Table 7.0 - Student Soci-Economic Characteristics

	(NE) Group			(E) Group			(E+OCE) Group			TOTAL
<b>Gender</b>										
	(NE) Group			(E) Group			(E+OCE) Group			
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	
Male	55.3%	49.2%	33.9%	32.4%	57.5%	42.9%	41.5%	41.2%	69.5%	<b>48.7%</b>
Female	44.7%	50.8%	66.1%	67.6%	42.5%	57.1%	58.5%	58.8%	30.5%	<b>51.3%</b>
<b>Ethnicity</b>										
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	TOTAL
Akan	68.4%	60.7%	57.1%	70.6%	85.0%	81.4%	65.9%	44.1%	36.8%	<b>61.1%</b>
Ewe	13.2%	13.1%	12.5%	14.7%	5.0%	5.7%	19.5%	39.7%	32.6%	<b>19.6%</b>
Ga	7.9%	3.3%	14.3%	8.8%	0.0%	2.9%	9.8%	5.9%	12.6%	<b>19.6%</b>
Krobo	5.3%	11.5%	7.1%	5.9%	5.0%	2.9%	2.4%	1.5%	2.1%	<b>4.7%</b>
Northern	0.0%	1.6%	5.4%	0.0%	2.5%	4.3%	2.4%	7.4%	7.4%	<b>4.3%</b>
Guan	0.0%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	<b>0.8%</b>
Hausa	0.0%	0.0%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	<b>0.6%</b>
Benin	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.2%</b>
Fante	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.2%</b>
Frafra	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	<b>0.2%</b>
Nigerian	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	<b>0.2%</b>
Togolese	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.2%</b>
Twɔ	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	<b>0.2%</b>
<b>Religion</b>										
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	TOTAL
Christian	94.7%	98.4%	92.9%	97.1%	100%	97.1%	90.2%	91.2%	92.6%	<b>94.6%</b>
Muslim	5.3%	1.6%	7.1%	2.9%	0.0%	2.9%	9.8%	8.8%	6.3%	<b>5.2%</b>
Traditional	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	<b>0.2%</b>
<b>Languages and Local Dialects Spoken with Family</b>										
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	TOTAL
Twɔ	57.9%	68.9%	62.5%	73.5%	79.5%	79.4%	58.5%	59.7%	50.0%	<b>64.3%</b>
Ewe	13.2%	8.2%	8.9%	14.7%	2.6%	5.9%	26.8%	26.9%	20.2%	<b>14.7%</b>
English	0.0%	11.5%	12.5%	8.8%	0.0%	1.5%	0.0%	6.0%	18.1%	<b>7.8%</b>
Ga	2.6%	8.2%	12.5%	8.8%	0.0%	0.0%	9.8%	3.0%	14.9%	<b>7.2%</b>
Akuapem	10.5%	18.0%	0.0%	0.0%	5.1%	1.5%	2.4%	4.5%	1.1%	<b>4.6%</b>
Fanti	5.3%	1.6%	5.4%	2.9%	7.7%	2.9%	2.4%	0.0%	5.3%	<b>3.6%</b>
Krobo	0.0%	3.3%	5.4%	2.9%	2.6%	4.4%	0.0%	0.0%	1.1%	<b>2.2%</b>
Akan	2.6%	0.0%	1.8%	0.0%	0.0%	2.9%	0.0%	0.0%	4.3%	<b>1.6%</b>
Hausa	0.0%	0.0%	3.6%	0.0%	0.0%	1.5%	2.4%	1.5%	3.2%	<b>1.6%</b>
Larteh	10.5%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	<b>1.2%</b>
Asanti	0.0%	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.6%</b>
Baasare	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	<b>0.6%</b>
Frafra	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	2.4%	0.0%	1.1%	<b>0.6%</b>
Other*	0.0%	1.6%	1.8%	0.0%	2.6%	0.0%	0.0%	1.5%	2.2%	<b>1.20%</b>
<b>Languages and Local Dialects Spoken Fluently</b>										
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	TOTAL
Twɔ	65.6%	47.2%	44.6%	82.5%	82.4%	63.6%	62.7%	75.0%	51.1%	<b>61.7%</b>
English	32.8%	38.9%	48.2%	0.0%	11.8%	27.3%	13.4%	7.5%	41.5%	<b>27.1%</b>
Ewe	1.6%	11.1%	0.0%	5.0%	11.8%	1.5%	11.9%	15.0%	7.4%	<b>6.7%</b>
Akuapim	21.3%	8.3%	0.0%	2.5%	0.0%	0.0%	4.5%	0.0%	1.1%	<b>4.3%</b>
Ga	3.3%	0.0%	8.9%	0.0%	2.9%	0.0%	6.0%	10.0%	1.1%	<b>3.4%</b>

## Baseline Evaluation Report on the iREAD Ghana Study

<b>Fanti</b>	1.6%	2.8%	1.8%	10.0%	5.9%	1.5%	0.0%	2.5%	1.1%	<b>2.4%</b>
<b>Other*</b>	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%	2.5%	5.5%	<b>2.2%</b>
<b>Krobo</b>	1.6%	5.6%	3.6%	0.0%	5.9%	0.0%	0.0%	2.5%	1.1%	<b>1.8%</b>
<b>Akan</b>	0.0%	0.0%	0.0%	0.0%	0.0%	4.5%	0.0%	2.5%	4.3%	<b>1.6%</b>
<b>Hausa</b>	0.0%	0.0%	1.8%	0.0%	0.0%	1.5%	0.0%	2.5%	3.2%	<b>1.2%</b>
<b>School Interruption</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
Have stopped going to school for a period of 4 months or more	100.0%	86.1%	91.1%	74.4%	76.5%	95.6%	95.5%	90.2%	97.9%	<b>92.0%</b>
Have never stopped going to school for a period of 4 months or more	0.0%	13.9%	8.9%	25.6%	23.5%	4.4%	4.5%	9.8%	2.1%	<b>8.0%</b>
<b>Mother/Female Guardian's Highest Level of Education</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
No Schooling	2.6%	0.0%	12.5%	26.5%	7.5%	7.1%	17.1%	14.7%	17.9%	12.3%
Primary	7.9%	3.3%	10.7%	11.8%	10.0%	15.7%	19.5%	20.6%	11.6%	13.1%
JHS	52.6%	36.1%	46.4%	29.4%	47.5%	62.9%	26.8%	39.7%	42.1%	45.5%
SHS	21.1%	41.0%	25.0%	23.5%	22.5%	8.6%	19.5%	19.1%	18.9%	22.7%
Higher than SHS	7.9%	18.0%	5.4%	0.0%	5.0%	4.3%	4.9%	2.9%	5.3%	6.4%
<b>Father/Male Guardian's Highest Level of Education</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
No Schooling	0.0%	1.7%	5.5%	7.4%	5.4%	7.2%	9.1%	9.1%	11.0%	6.8%
Primary	9.7%	0.0%	1.8%	7.4%	10.8%	10.1%	0.0%	7.6%	5.5%	28.4%
JHS	38.7%	11.7%	32.7%	33.3%	35.1%	37.7%	36.4%	39.4%	24.2%	30.9%
SHS	32.3%	21.7%	34.5%	40.7%	24.3%	21.7%	45.5%	21.2%	29.7%	5.8%
Higher than SHS	19.4%	65.0%	25.5%	11.1%	24.3%	23.2%	9.1%	22.7%	29.7%	28.1%
<b>Mother/Female Guardian's Occupation</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
Trader	66.7%	77.0%	73.2%	63.6%	62.2%	70.8%	81.3%	72.1%	77.8%	<b>72.7%</b>
Farmer	3.3%	1.6%	12.5%	15.2%	21.6%	13.8%	9.4%	23.5%	15.6%	<b>13.6%</b>
Other**	20.0%	8.3%	7.1%	15.2%	8.1%	10.8%	6.2%	1.5%	4.4%	<b>7.8%</b>
Teacher	3.3%	11.5%	5.4%	3.0%	8.1%	1.5%	3.1%	2.9%	1.1%	<b>4.2%</b>
Seamstress	6.7%	1.6%	1.8%	3.0%	0.0%	3.1%	0.0%	0.0%	1.1%	<b>1.7%</b>
<b>Father/Male Guardian's Occupation</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
Farmer	6.9%	13.1%	25.0%	50.0%	55.3%	53.0%	15.6%	63.2%	47.2%	<b>39.5%</b>
Other**	27.70%	37.8%	41.0%	21.8%	10.4%	15.2%	34.3%	13.3%	5.3%	<b>23.6%</b>
Teacher	10.3%	21.3%	12.5%	6.3%	21.1%	15.2%	3.1%	5.9%	9.0%	<b>11.9%</b>
Trader	3.4%	11.5%	3.6%	9.4%	7.9%	12.1%	18.8%	10.3%	5.6%	<b>8.9%</b>
Driver	31.0%	13.1%	8.9%	6.3%	5.3%	4.5%	6.3%	4.4%	9.0%	<b>8.9%</b>
Businessman	0.0%	1.6%	5.4%	0.0%	0.0%	0.0%	3.1%	0.0%	9.0%	<b>3.0%</b>
Carpenter	13.8%	0.0%	3.6%	3.1%	0.0%	0.0%	12.5%	2.9%	13.8%	<b>2.8%</b>
Mason	6.9%	1.6%	0.0%	3.1%	0.0%	0.0%	6.3%	0.0%	1.1%	<b>1.5%</b>
<b>Number of Siblings</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>

0-1	2.8%	8.3%	3.6%	0.0%	0.0%	4.5%	5.3%	6.1%	5.6%	4.5%
2-3	47.2%	51.7%	25.0%	21.2%	25.0%	26.9%	23.7%	25.8%	25.8%	30.1%
4-5	30.6%	25.0%	25.0%	33.3%	45.0%	40.3%	34.2%	36.4%	38.2%	34.4%
6-7	11.1%	13.3%	35.7%	36.4%	22.5%	17.9%	26.3%	22.7%	18.0%	21.9%
8-9	2.8%	1.7%	8.9%	3.0%	5.0%	7.5%	7.9%	6.1%	7.9%	6.0%
10+	5.6%	0.0%	1.8%	6.1%	2.5%	3.0%	2.6%	3.0%	4.5%	3.1%
<b>Total (n)</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
<b>Total (n)***</b>	38	61	56	34	40	70	41	68	95	503

\*Languages grouped under "Other" are those that have 1-2 total instances over the 9 schools.

\*\*Occupations grouped under "Other" are those that have 1-7 total instances over the 9 schools.

\*\*\*The total (n) may vary slightly by category because missing information was not included in the analysis.

**Gender** - Overall, the gender balance of the study participants was roughly equal, with 48.7% male representation and 51.3% female. None of the nine schools have less than 30% of a particular gender represented at their schools. While at 3 of the schools, there are more male students, and at 6 of the other schools, there are more females. The school with the greatest gender imbalance is the (E+OCE) SHS (Presbyterian Senior High School in Adeiso), which has 69.5% male students and 30.5% female students.

**Ethnicity** - As expected, the majority of students are Akan (61%), which is the largest ethnic group in Ghana and makes up 49% of the general Ghanaian population (Ghana Demographic Health Survey 2008). The next most common ethnicities were Ewe (19.6%) and Ga (19.6%), which are the two next most common ethnic groups in Southern Ghana.

**Languages** – Only 7.8% of students report that they speak English with their families. At 3 schools – the (NE) primary, (E) JHS, and (E+OCE) primary – no students reported speaking English with their families. This suggests that English is not the native language of most students in the study, and that most students in the study do not regularly use English outside of school.

As expected, most students (64.3%) speak Twi at home, which is an Akan language. After Twi, the next most commonly spoken languages at home were Ewe (14.7%) and Ga (7.2%). Other languages that students report are various Akan dialects (Akuapem, Fante, and Ashanti) and other local Ghanaian languages (e.g. Akim, Anum, and Kotokoli).

In addition to language(s) spoken at home, many students indicated fluency in other languages. 61.7% of students reported that they were fluent in Twi. Smaller percentages of students listed that they were fluent in other Ghanaian languages, such as Ewe and Ga, and various Akan dialects, such as Akuapem and Fanti. Also, 27.1% of students reported that they were fluent in English. The percentage of fluent English speakers may be higher since respondents may not have felt it necessary to list English fluency on an English questionnaire.

**Religion**- The majority of students indicated that they were Christian (94.6%), which is the predominant religion in Southern Ghana. A minority of students were Muslim (5.2) and only 1% of students were Traditionalist.

**School Interruption** - A small percentage (8.0%) of students have at some point stopped going to school for a period of 4 months or more. School interruption rates were highest among (E) primary and (E) JHS students, where almost one quarter of students reported they had stopped going to school for a period of 4 months or more. Being absent from school for extended periods may slow students progress as they may have trouble retaining the skills and knowledge when they are not continuously in school. It is also important to note that school interruption within the (E) group is

most likely due family obligations in farming. The (E) group presented some of the highest percentages of farmers as parent occupation; this choice in career may influence children to interrupt studies to help with farming duties.

**Parents' Education** - Almost half of mothers of students in the study (45.5%) attained their highest level of education at JHS. Whereas, one quarter of mothers (25.4%) did not attend school beyond the primary school level. This figure is somewhat lower than the average for the Eastern region, where the Ghana Demographic and Health Survey states that 34.7% of women aged 15-69 have not gone beyond the primary school level.<sup>2</sup> However, 6.7% of mothers across all nine schools did attend school at the secondary school, which is almost double the average of Eastern region usually at 2.7%.<sup>3</sup> Given that parents, particularly mothers, have an influence on education and learning in the home, it is also important to note that mothers from the (NE) control group had higher levels of education than the active groups (E) and (E+OCE). This may reflect on the reading habits and competencies of students.

The fathers of about a third (35.2%) of the students have never schooled beyond the primary level. This figure is double the average for the Eastern Region, where 16.7% of men aged 15-49 have never schooled beyond the primary level.<sup>4</sup> However, the percentage of fathers who have schooled beyond secondary school (28.1%) is quadruple the Eastern regional average of 6.7%.<sup>5</sup> Thus, students' fathers had a wide range of educational backgrounds. The (NE) JHS control group that contains the most educated mothers is also the group that contained the most educated fathers, where 65.0% of fathers have schooled beyond high school and only 1.7% of fathers have never schooled beyond primary.

Students whose parents have a limited education may lack academic support at home, whereas students with well-educated parents may be likely to receive help with reading and homework. The high education of select (NE) control groups may be a contributing factor to why (NE) control standardized test scores are higher than those of the active (E) and (E+OCE) JHS streams.

**Parents' Occupations** - Almost three quarters of students' mothers were listed as 'traders' (72.7%). The next most common occupation was 'farmer' (13.6%), followed by 'other' (7.8%) (e.g., beautician, caterer, fish monger, nurse, bank official, baker, etc...), followed by 'teacher' at (4.2%), and 'seamstress' at (1.7%). The (NE) primary and (NE) JHS schools had the least percentage of mothers in the agricultural sector, with 1.6% and 3.3% of mothers working as farmers, respectively.

The most common occupation among fathers was 'farmer' (39.5%). The next most common occupation was 'other' (23.6%) (e.g., accountant, blacksmith, butcher, civil servant, and pastor, etc...), followed by 'teacher' at 11.9%, followed by 'trader' at 8.9%, and 'driver' at 8.9%. Similar to the mothers' occupations, the (NE) primary and (NE) JHS schools had the least percentage of fathers in the agricultural sector, with 6.9% and 13.1% respectively.

These low 'farmer' percentages contrast to (E) and (E+OCE) groups which illustrate high percentages of fathers as farmers, 47.2 to 63.2% respectively. It was also noted that an especially high percentage of fathers were drivers (31.0%) at the (NE) primary school. Further research and correlation will be carried out to determine any linkages to the role of fathers as drivers to the profile of (NE) students.

**Number of Siblings** - The majority of students in the study had large families, where 65.5% of students had 4 or more siblings. A small percentage of students (9.1%) had 8 or more siblings.

<sup>2</sup> Ghana Demographic Health Survey 2008, Table 3.2.1, page 33

<sup>3</sup> Ghana Demographic Health Survey 2008, Table 3.2.1, page 33

<sup>4</sup> Ghana Demographic Health Survey 2008, Table 3.2.2, page 34

<sup>5</sup> Ghana Demographic Health Survey 2008, Table 3.2.2, page 34

Overall, students in the study had an average of 5 siblings. These figures suggest that the e-reader could affect the entire family, including as many as 5 siblings per household.

### Socio-Economic Characteristics of Teachers and Administrators

A total of 62 teachers and administrators participated in the baseline, where 51 participants were teachers and 11 were administrators. More specifically, 8 teachers worked at the primary level; 19 at the JHS level; and 32 teachers at the SHS level. The primary level involved the lowest number of teachers because primary school teachers represent multiple school subjects; teachers are more numerous as at higher grade levels because they represent more complex subjects.

As described in the methodology section, the study focused on English, Social Studies, and Integrated Science at the JHS and SHS levels because English and Social Studies are more reading intensive. Table 8.0 below describes teachers and administrators by school and subject.

**Table 8.0 – Teacher and Administrator Baseline Participants by Subject and School**

Level	(NE)	(E)	(E+OCE)	TOTAL
<b>Primary</b>	<b>TOTAL: 3</b>	<b>TOTAL: 4</b>	<b>TOTAL: 4</b>	<b>TOTAL: 11</b>
	Class Teachers: 2	Class Teachers: 3	Class Teachers: 3	Class Teachers: 8
	Administrators: 1	Administrators: 1	Administrators: 1	Administrators: 3
<b>JHS</b>	<b>TOTAL: 4</b>	<b>TOTAL: 8</b>	<b>TOTAL: 7</b>	<b>TOTAL: 19</b>
	Integrated Sci: 1	Integrated Sci: 2	Integrated Sci: 2	Integrated Sci: 5
	Soc. Studies: 1	Soc. Studies: 1	Soc. Studies: 1	Soc. Studies: 3
	English: 1	English: 1	English: 1	English: 3
	Other: 0	Other: 3	Other: 2	Other: 5
Administrators: 1	Administrators: 1	Administrators: 1	Administrators: 3	
<b>SHS</b>	<b>TOTAL: 6</b>	<b>TOTAL: 13</b>	<b>TOTAL: 13</b>	<b>TOTAL: 32</b>
	Integrated Sci: 1	Integrated Sci: 3	Integrated Sci: 4	Integrated Sci: 8
	Soc. Studies: 1	Soc. Studies: 1	Soc. Studies: 2	Soc. Studies: 4
	English: 2	English: 3	English: 1	English: 6
	Other: 1	Other: 3	Other: 5	Other: 9
Administrators: 1	Administrators: 3	Administrators: 1	Administrators: 5	
<b>TOTAL</b>	<b>TOTAL: 13</b>	<b>TOTAL: 25</b>	<b>TOTAL: 24</b>	<b>TOTAL: 62</b>

Additional characteristics of the teacher/administrator reveal that approximately three quarters of the teachers in the baseline were male (73%). The most male-dominated group was the (NE) control group with 90% male teachers. The group with the most gender balance was the (E) group, with 60% male teachers. Details on the gender of teacher are listed below in Table 9.0.

**Table 9.0 – Stratification of Teacher Gender**

	(NE)	(E)	(E+OCE)	Grand Average
<b>Male</b>	9/10 (90%)	12/20 (60%)	16/21 (76%)	37/51 (73%)
<b>Female</b>	1/10 (10%)	8/20 (40%)	5/21 (24%)	14/51 (27%)
<b>Total (n)</b>	10	20	21	51

Table 10 summarizes years of teaching experience by group. Overall, teachers in the study had an average of 11.7 years of experience. The average years of teaching experience was highest for the (NE) group at 15.6 years, followed by the (E+OCE) group at 13.8 years, and the (E) group at 6.8 years. (E+OCE) group's low average years of teaching experience is largely due to the fact that there are 3 teachers in the group with 1 or less years of experience, and there are no teachers in the group with over 15 years of experience. Preliminary baseline data suggest that more experienced teachers can yield stronger students academically, but the evaluation team will continue to study this trend into the mid-term report.

**Table 10.0 – Stratification of Years of Teaching Experience**

	(NE)	(E)	(E+OCE)	Grand Average
<b>Average Years of Teaching Experience</b>	15.6 years	13.8 years	6.8 years	11.7 years
<b>Range of Teacher Years of Experience</b>	5-32 years	0-35 years	0-15 years	0-35 years
<b>Total (n)</b>	10	20	21	51

## 3.2 ACCESS TO BOOKS AND TECHNOLOGY

### Access to Required Reading Materials

Students have limited access to required reading materials across all schools. On average, students across nine schools do not have their own copy of required books to use in the classroom for 62.5% of their subjects.

On average, students across the nine schools share required books for 43.6% of their subjects; and student feedback reveals that students are less likely to share books as they get older. The book sharing average for the primary level is highest at 62.3%, JHS level at 51.1%, and the SHS level at 30.6%. This indicates that students do not have adequate access to required reading material for maximum achievement in their studies.

Even when students do have access to books at school, they do not have the privilege to take books home; students do not have access to classroom books for use at home for 81.5% of school subjects. As students become older, they are somewhat more likely to have books to take home. The average percentage of subjects for which students are able to books home is 96.7% at the primary level, 84.7% at the JHS level, and 73.1% at the SHS level. Since students largely do not have books to take home, it is difficult for teachers to assign reading homework, and students are unable to study textbooks on their own time.

Tables 11, 12, and 13 provide details on student access to required reading materials.

**Table 11.0 - Percentage of Subjects for which Students Do Not Have their own Copy of Required Books to Use in the Classroom**

Level	(NE) Group	(E) Group	(E+OCE) Group	Grand Average
<b>Primary</b>	61.5%	75.7%	47.7%	60.7%
<b>JHS</b>	43.6%	69.9%	63.5%	58.0%

<b>SHS</b>	68.5%	55.5%	75.2%	66.8%
<b>Grand Average</b>	56.7%	63.7%	66.0%	62.5%

(n= 506)

**Table 12.0 - Percentage of Subjects for which Students Share Copies of the Required Books in the Classroom**

<b>Level</b>	<b>(NE) Group</b>	<b>(E) Group</b>	<b>(E+OCE) Group</b>	<b>Grand Average</b>
<b>Primary</b>	55.3%	71.5%	60.6%	62.3%
<b>JHS</b>	49.7%	66.5%	43.6%	51.1%
<b>SHS</b>	25.5%	37.0%	28.5%	30.6%
<b>Grand Average</b>	41.4%	52.1%	39.2%	43.6%

(n= 497)

**Table 13.0 - Percentage of Subjects for which Students Do Not Have Classroom Books to Take Home**

<b>Level</b>	<b>(NE) Group</b>	<b>(E) Group</b>	<b>(E+OCE) Group</b>	<b>Grand Average</b>
<b>Primary</b>	94.5%	95.9%	99.2%	96.7%
<b>JHS</b>	64.6%	94.5%	97.5%	84.7%
<b>SHS</b>	96.1%	50.7%	76.0%	73.1%
<b>Grand Average</b>	82.1%	72.3%	87.8%	81.5%

(n= 495)

**Primary Teachers' Perspectives on Access to Required material**

All primary level teachers interviewed and focus group participants reported that for many subjects there were an insufficient number of books. While schools send beginning of term statistics of enrollment to the government, teachers don't necessarily receive adequate numbers books. For example, one teacher reported in a focus group that his classroom has 35 books for 47 students, because there were 35 students the year before and the school never received additional books for the larger class size. Sometimes two students share one book, while at other times, three or four students may share one book. One teacher related that she only had 10 English textbooks for 40 students. Additionally, certain subjects such as Religious & Moral Education may not have any textbooks, so the teachers are forced to research materials on their own.

In addition to having students share books, teachers sometimes write notes on the board and require that students copy when there are not enough books for the class. Teachers report that they rarely make photocopies due to financial constraints.

**JHS Teachers' Perspectives on Access to Required material**

Although it is not reflected in student questionnaire responses, (E) group teachers reported that their classrooms generally have enough books for each student to have a book. These teachers' concerns, however, were that students were not permitted to take books home. As a result, students cannot read assigned passages at home in preparation for class, but rather are limited to read during class hours only.

In contrast, select JHS teachers from the (NE) and (E+OCE) groups reported that there were an insufficient number of books this year and last year. Teachers reported ratios of students to books as high as 3:1. Teachers commented that such sharing limited student learning as students cannot read independently in class and cannot take textbooks home.

10 out of 12 interviewed JHS teachers reported that they use a combination of the government textbooks and additional materials, while 2 teachers (an integrated science teacher and social studies teacher) reported that they use privately published books rather than the government

textbooks because the private books cover the syllabus more comprehensively. This data suggests that more comprehensive reading material may need to be provided to both teachers and students.

### **SHS Teachers' Perspectives on Access to Required material**

SHS teachers reported that aside from a few subjects such as Visual Arts that do not lend themselves to textbooks, they had the required government books for core subjects. However, interviews and focus group discussions revealed that government books were problematic for one or more of the following reasons:

- *Copies of books are limited:* For example, at Presbyterian SHS in Adeiso, the school only owned 10 copies of the government Integrated Science book, which the school makes available to students through the school library. Similarly, at Presbyterian SHS in Suhum, there are only enough Integrated Science books for approximately 35% of students.
- *Books do not cover material adequately:* Teachers comment that books can be outdated and difficult for students to comprehend. For example, one English teacher explained that the government English textbook was not effective, and so he asked his students to buy a private book called "Gateway to English." Another English teacher, who teaches form 4, explained that the government textbook was outdated and only covers material up to form 3.
- *Books arrive late:* For example, one teacher described that the government social studies book didn't arrive until March last year, and it hasn't arrived yet this year, 5 months into the school year. In order to cover the syllabus, he asked the school to bill students for a private social studies book. Another teacher similarly explained that government core grammar books didn't arrive until April of last year, and haven't arrived this year, 5 months into the school year.

Most SHS teachers who were interviewed (13 of 18) ensured that each student had a copy of a quality textbook by using a private billing system for private textbooks. Since the books are billed, students are required to buy the books.

In contrast, 3 of 18 teachers asked students to buy particular private books, but the school does not automatically bill students for these books. One teacher felt successful in this, as most of his students were in the process of buying the books he had recommended. The other two teachers, however, were concerned that because students were not being billed for books, the majority of students were not buying the books and therefore are using no textbook at all.

Finally, 2 of 18 SHS teachers had challenges with the government book but have not asked students to buy any books to use in its replacement. One teacher was hoping that the government books for her subject will arrive in January 2011, so that she could begin using them at that time. The other teacher asked his students to borrow government textbooks from the library, since they were in limited supply.

At each of the 3 SHS schools, there was a bookstore that supplied the books for which students were billed. At the (NE) and (E) SHS schools, these bookstores also distributed government books if the books were available. Students borrow government books from bookstores for free, but must return the books to the store at the end of the school year.

### **Access to Supplementary Reading Material**

The evaluation team questioned teachers and administrators about the availability of supplementary reading materials at their school. The primary schools did not own supplementary reading materials for students. In contrast, all three JHS schools had school libraries, and JHS students had the opportunity to borrow library books during library period. SHS schools varied greatly, where the (E) school spent much on reading materials for its library while the (E+OCE) school had a more moderate library and the (NE) school had no library at all.

### **Primary Teachers' Perspectives on Access to Supplementary Reading Materials**

Primary teachers and administrators explained that sometimes NGOs supplied supplementary materials for students to keep and take home. However, their schools did not purchase or own supplementary materials for students to use.

Teachers described that they research supplementary information on their own and list the titles of books that students should consider buying in lesson notes. However, teachers commented that at public schools, it was difficult to persuade students' parents to buy books because parents generally felt that the government would or should provide books. Sometimes a teacher might distribute supplementary reading material by writing excerpts of material onto the board for students to copy.

Administrators at each of the project-affected primary schools explained that their schools did not buy supplementary books.

### **JHS Teachers' Perspectives on Access to Supplementary Reading Materials**

JHS focus group participants explained that supplementary materials were available to students through the schools' libraries, which have single copies of a variety of books. There is a library period once or twice a week during which students are encouraged to visit the library to browse books and request books home to take home. Since library books are generally storybooks unrelated to specific course syllabi, some teachers prefer to cover additional subject material during library period rather than spend the period reading fiction books. To make library period more effective, some teachers suggested that schools should have designated library teachers who can guide and supervise students in making the best use of library time.

Teachers sometimes ask children to buy supplementary books that relate to the course, and will list specific passages they should read if the family can afford to purchase the book. However, most students don't buy the supplementary books and the teachers feel they cannot expect the students to buy them due to financial constraints. For example, one integrated science teacher mentioned that very few of his students had bought the science textbook to use at home, and that approximately 35% had bought the cheaper pamphlets to study. Some teachers may provide summaries of supplementary material through class notes. Teachers rarely make photocopies of supplementary material due to financial constraints.

### **SHS Teachers' Perspectives on Access to Supplementary Reading Materials**

Interviews with SHS administrators revealed that school libraries varied greatly among the three schools. The library at the (E) SHS has 2,000 books, and the school regularly spends large amounts of money to provide newspapers. Meanwhile, the library at the (E+OCE) SHS has 1,000 books and hasn't purchased any reading materials this year. In stark contrast is the (NE) SHS, which does not have a library and does not spend any money on reading materials.

The librarian at the (E) SHS reports that the school library contains roughly 2,000 books, approximately 1,000 of which are textbooks and 1,000 of which are fiction books. In addition to these books, the library also contains newspapers. Most books are donated from abroad, as the majority of books are donated from the Church of Latter Day Saints. However, the librarian explained that the books that teachers and students find most useful are those books that the school buys from the Ghana Library Board, which sells African Writers series books and other relevant titles to school libraries. In order to improve the library, the librarian suggested that the school invest in bookshelves and chairs to make the library appealing to students. He also commented that books are outmoded and should be replaced with new stock. Additionally, one of his wishes was that the school could afford computers so that students could research information from the internet.

At the (E+OCE) SHS, the librarian estimated that the library contained around 900-1000 books, 700-800 of which are textbooks, and roughly 200 of which are fiction books. He estimated that there were about 10 government books per school subject, although books for certain subjects like Agriculture were outdated. Students were not permitted to take library books outside of the library.

In contrast to the (E) and (E+OCE) SHS schools, there was no library at the (NE) SHS, and administrators reported that the school didn't spend any money on reading materials.

#### Access to Books at Home

Students reported having few books at home, as illustrated by Table 14.0 below. Primary students reported having the fewest books with an average of only 3.6 books, where JHS had 8.6, and SHS had 11.0. SHS students most likely had more books than younger students because they were billed for textbooks that they can take home.

Of the nine schools, the school with the highest average number of books was 16.3 books at the (NE) JHS and 12.8 at the (NE) SHS. One reason for this high number of books at home may be that the (NE) JHS is the school with the most educated parents. This also affects standardized test scores that illustrate higher averages within the (NE) groups.

**Table 14.0- Average Number of Books in Home**

Level	(NE) Group	(E) Group	(E+OCE) Group	Grand Average
Primary	4.5	2.1	4.0	3.6
JHS	16.3	2.6	5.3	8.6
SHS	12.8	9.8	10.9	11.0
<b>Grand Average</b>	12.2	6.0	7.6	8.6

(n= 459)

Not only do students have few books at home, but they also rarely borrow books. As shown in Table 15.0 below, 41.9% of students report that they have never borrowed a book from their teachers, school, or library. Primary students borrow books the least at 70.7-85.5%. The primary years are the time when reading interventions can have the most effect on a student's academic potential; however, it has been observed that these years are when students have access to the least amount of books. On the contrary, high school students are the most likely to borrow books often or very often, ranging from 50.0% to 73.9%.

**Table 15.0 - Frequency of Borrowing Books from Teachers, School, or Libraries**

	(NE) Group			(E) Group			(E+OCE)			TOTAL
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	
<b>Never</b>	80.6%	43.9%	21.4%	85.3%	47.2%	29.4%	70.7%	51.6%	9.8%	41.9%
<b>Sometimes</b>	2.8%	5.3%	16.1%	2.9%	16.7%	20.6%	4.9%	10.9%	16.3%	12.0%
<b>Often</b>	16.7%	45.6%	50.0%	11.8%	22.2%	44.1%	22.0%	32.8%	50.0%	36.8%
<b>Very often</b>	0.0%	5.3%	12.5%	0.0%	13.9%	5.9%	2.4%	4.7%	23.9%	9.3%

*(n=484)*

### Access to Technology

Students have limited access to technology, as 43.0% of students have never used a computer. The (NE) SHS group had the least access to computer, with 90.2% of students reporting they have never used a computer, followed closely by the (NE) JHS group, with 88.2% students reporting they have never used a computer. The school with the most access to computers was the (E) JHS group, with 42.1% of students reporting that they used a computer very often. Table 16.0 provides further details on frequency of computer use.

**Table 16.0 - Frequency of Computer Use**

	(NE) Group			(E) Group			(E+OCE)			TOTAL
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	
<b>Never</b>	32.4%	88.2%	90.2%	13.6%	7.9%	54.8%	39.3%	37.3%	41.3%	43.0%
<b>Sometimes</b>	64.9%	8.8%	7.3%	49.2%	23.7%	29.0%	48.2%	46.3%	40.2%	37.2%
<b>Often</b>	2.7%	2.9%	0.0%	16.9%	26.3%	11.3%	7.1%	9.0%	4.3%	8.8%
<b>Very often</b>	0.0%	0.0%	2.4%	20.3%	42.1%	4.8%	5.4%	7.5%	14.1%	10.9%

*(n= 486)*

### Greatest Challenges Affecting Teaching Quality

All interviewed teachers agreed that lack of teaching materials was a major problem for schools. They also listed other concerns, including high student to teacher ratios and limited infrastructure. Teachers' concerns revealed the need for better reading and educational materials, and provided insight into other challenges that may continue to affect teachers' ability to deliver quality teaching even after classrooms incorporate the e-reader. Below, their concerns are detailed by grade level.

#### Primary Level – Greatest Challenges

All interviewed primary teachers reported that the greatest challenge affecting their ability to deliver quality teaching was inadequate teaching materials. For example, since photocopies are expensive, teachers tend to distribute notes through the long time consuming process of writing on the board. Additionally, teachers have limited supplies of learning materials such as abacuses, letter cards, numeral cards, pictures, etc...

#### Junior High School - Greatest Challenges

When asked the greatest challenge or challenges that affect their ability to deliver quality teaching, most JHS teachers (9 of 12) mentioned lack of educational materials. At school, textbooks and other materials are often insufficient, and two or more students may have to share one textbook. Sometimes teachers have to spend valuable class time having students copy from the board in order to distribute information. At home, students lack access to books, as schools don't provide textbooks for students to take home and parents often cannot afford to buy textbooks to address this gap.

Teachers have to research supplementary materials on their own because provided textbooks do not adequately cover the content specified in the syllabus. Aside from reading materials, other educational resources, such as science labs, measuring tools, and visual aids are also inadequate.

Several teachers (3 of 12) cited the high student to teacher ratio as a significant challenge. Teachers generally manage classes of 40-75 students. This makes it difficult for teachers to control classes, provide individual attention, and cater to the needs of students with varying levels of capability.

Finally, other challenges included:

- Student are often tardy and their attendance is inconsistent
- Student have difficulty with the English language, which is a second language for most students
- Students' home lives and personal lives can detract from their studies
- The classroom environment is limited in terms of classroom space, desks, and infrastructure
- There is lack of continuous assessment to mark students
- There is a lack of incentives to motivate teachers

### **Senior High School – Greatest Challenges**

When asked the greatest challenge or challenges that affect their ability to deliver quality teaching, the most common response among interviewed SHS teachers (8 of 18 teachers) was the lack of educational resources. Teachers were frustrated with government books that are often limited in number, inadequate in material, and late in arriving to schools. Lack of textbooks was problematic, and as one teacher explained, "Materials are not available. I'm forced to spend my own money to buy effective books, because if I don't buy them, my teaching will not be effective." Aside from textbooks, teachers also expressed that Teaching Learning Materials (TLM), such as wall charts, diagrams, flip charts, tape recorders, and lab equipment were lacking.

The next most common response (4 of 18 teachers) was that infrastructure was inadequate. Teachers complained that there were not enough desks for all students. One teacher reported that because SHS has been changed from a 3 year program to a 4 year program, his school had a shortage of space and rooms, and similarly, another teacher was concerned that classrooms were congested. A few teachers felt that at least some of these infrastructural problems would be addressed this academic year. As one SHS teacher explained, his school was transitioning from an old school building to a new school building.

3 out of 18 teachers mentioned large class sizes as one of their greatest challenges. At the time of the interviews, select iREAD Ghana study streams ranged from 60 to 100 students, making it difficult for teachers to manage classes and share the e-reader.

Finally, other challenges mentioned by 1-2 teachers included:

- Varying student ability levels. Teachers worried that they might leave some students behind, as teachers find it difficult to give lagging students individual attention due to large class sizes.
- Students lack basic skills they should have learned at the primary or JHS level, forcing teachers to spend much class time reviewing basic concepts.
- Students prefer local languages, and are not comfortable with the English language.

- Since many students live far from the school, they don't stay long after school, and so the school does not offer extracurricular activities such as a Writer's Club that could interest students in writing and help them to improve academically.
- Students tend not to study at home or read outside of class.

### 3.3 STUDENT READING PERFORMANCE

The evaluation team administered the English Language sections of regional/national standardized tests that reflect local curriculums. Specifically, the team administered the following:

- School Education Assessment (SEA) for primary students
- Basic Education Certificate Examination (BECE) for junior high school students
- West African Senior School Certificate Examination (WASSCE) for senior high school students

The SEA exam is an assessment designed by the USAID-funded Ghana Basic Education Comprehensive Assessment System (BECAS) project. The SEA exam is intended to show how well Primary 4 students understand core objectives within the English curriculum.

The BECE exam is an assessment designed by the West African Examination Council (WAEC). Test takers are usually JHS 3 students, and scores from the BECE exam are primarily used by high schools as a factor in determining high school admission.

Like the BECE, the WASSCE exam is also designed by WAEC. Test takers are usually SHS 3 students, and scores from the WASSCE exam are primarily used by universities as a factor in determining university admission.

For the baseline evaluation, excerpts from the SEA, BECE, and WASSCE exams were used to establish levels of student English Language performance. Subsequent evaluations will measure progress against these baseline scores.

In total, team administered standardized tests to 509 students, 108 of which were primary students, 172 of which were JHS students, and 229 of which were SHS students. Table 17.0 summarizes the number of students who took standardized tests.

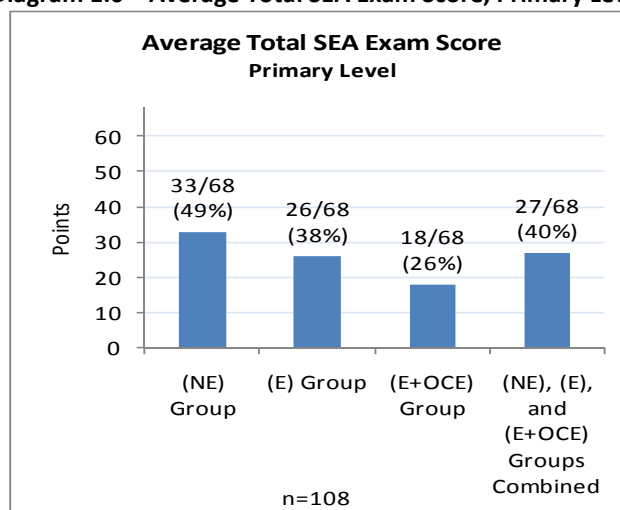
**Table 17.0 – Summary of Standardized Test-takers**

Level	(NE) Group	(E) Group	(E+OCE) Group	Total
Primary	36	30	42	108
JHS	63	40	69	172
SHS	58	70	101	229
<b>Total</b>	<b>157</b>	<b>140</b>	<b>212</b>	<b>509</b>

#### Primary Student Performance in the SEA Exam

Diagram 1.0 illustrates the average total SEA exam scores across (NE), (E), and (E+OCE) groups, as well as the average for all three groups.

**Diagram 1.0 – Average Total SEA Exam Score, Primary Level**



The highest possible score was 68 out of 68 points at 100% accuracy. The overall average across primary levels in the (NE), (E), and (E+OCE) groups was 27 out of 68 points or 40%. Further stratified by group, the average score for (NE) primary school was 49%, (E) primary school (38%), and the (E+OCE) school (26%). The variance between these three scores reveals that the schools are not starting at the same reading level competency at the baseline. The (NE) group scored 11 percentage points higher than the (E) group, and a significant 23 percentage points higher than the (E+OCE) group. There may be implications on the comparison of the active group to the control with such a difference in reading capability at the onset of the project

Table 18.0 additionally outlines average sub-scores from the SEA exam. The greatest variance can be found in the Grammar sub score, where the (NE) group scored an average of 11 points higher than the (E+OCE) group and 6 points higher than the (E) group.

**Table 18.0– Average Total Score and Sub-Scores for SEA Exam, Primary Level**

	(NE) Group	(E) Group	(E+OCE) Group	(NE), (E), and (E+OCE) Groups Combined
<b>Avg. Total Score</b>	33/68 (48.8%)	26/68 (37.7%)	18/68 (26.4%)	27/68 (39.6%)
<b>Avg. Listening Comprehension Sub-Score</b>	4/10 (44.7%)	4/10 (41%)	4/10 (36.4%)	5/10 (45%)
<b>Avg. Reading Comprehension Sub-Score</b>	2/3 (50.9%)	1/3 (48.9%)	1/3 (26.2%)	2/3 (50%)
<b>Avg. Grammar Sub-Score</b>	24/45 (53.3%)	18/45 (40.0%)	13/45 (27.9%)	19/45 (41.3%)
<b>Avg. Writing Sub-Score</b>	3/6 (48.1%)	2/6 (25%)	1/6 (15.5%)	3/6 (50%)
<b>Avg. Joint-Script Sub-Score</b>	0/4 (0%)	0/4 (0%)	0/4 (0%)	0/4 (0%)

Table 19.0 analyzes the distribution of SEA scores as opposed to averages. Only 6% of (NE) students earned a score below 30%. In stark contrast, (33%) of (E) group students earned below a score of 30%, 71% of (E+OCE) students scored below 30%. In terms of the highest scores, 22% of (NE)

students scored above 60% while only 7% of the (E) students and 2% (E+OCE) students scored above 60%.

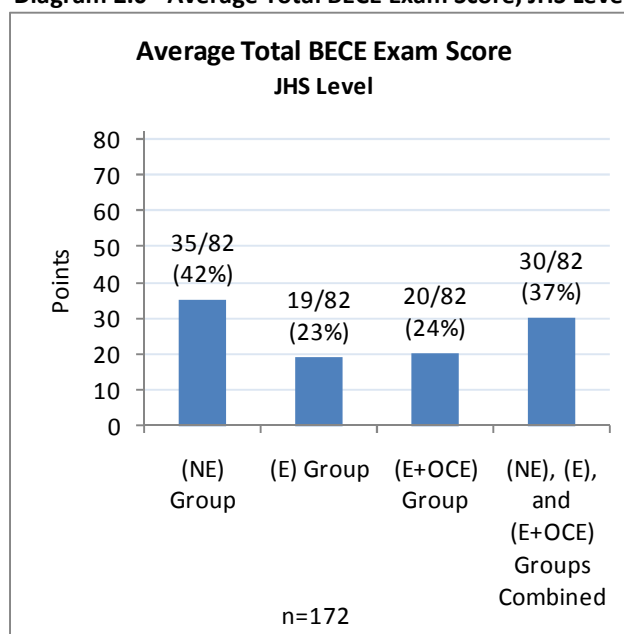
**Table 19.0 – Score Distribution for SEA Exam, Primary Level**

		(NE) Group		(E) Group		(E+OCE) Group		(NE), (E), (E+OCE) Groups Combined	
Score Range in Points	Score Range in Percent	# of Students	% of Students	# of Students	% of Students	# of Students	% of Students	# of Students	% of Students
0-10	0-15%	0	0%	1	3%	6	14%	7	7%
11-20	16-29%	2	6%	9	30%	24	57%	35	32%
21-30	31-44%	14	39%	10	33%	9	21%	33	31%
31-40	45-59%	12	33%	8	27%	2	5%	22	20%
41-50	60-74%	8	22%	2	7%	1	2%	11	10%
51-60	75-88%	0	0%	0	0%	0	0%	0	0%
61-68	90-100%	0	0%	0	0%	0	0%	0	0%
<b>Total (n)</b>		<b>36</b>		<b>30</b>		<b>42</b>		<b>108</b>	

### JHS Student Performance on the BECE Exam

Diagram 2.0 illustrates the average total BECE exam scores across (NE), (E), and (E+OCE) groups, as well as the average for all three groups.

**Diagram 2.0 - Average Total BECE Exam Score, JHS Level**



The highest possible score was 82 out of 82 points at 100% accuracy. The average total BECE exam score was 30 out of 82 points or (37%), where the (NE) students scored 42%, the (E) students scored 23%, and the (E+OCE) students scored 24%. These scores reveal that the average score of the (NE) group JHS is 18-19 percentage points higher than the other two schools.

Table 20.0 below additionally outlines average sub-scores from the BECE exam. (NE) average sub-scores are higher than (E) and (E+OCE) scores for every sub-section. The average (NE) Essay sub-score is over double the average (E) and (E+OCE) sub-scores, and similarly, the (NE) average Reading Comprehension sub-score is double that of the (E) and (E+OCE) sub-scores.

The (E) and (E+OCE) groups showed weaknesses in writing, with an average of 5 out of 30 points. A significant number of (E) and (E+OCE) group students earned low essay scores because they could not produce essays that fulfilled the prompt. For example, some students wrote incoherent sentences or only a few sentences that were unrelated to the essay topic. These deficient essays revealed that English proficiency among certain students as very low.

**Table 20.0 – Average Total Score and Sub-Scores for BECE Exam, JHS Level**

	(NE) Group	(E) Group	(E+OCE) Group	(NE), (E), and (E+OCE) Groups Combined
<b>Avg. Total Score</b>	35/82 (42.5%)	19/82 (23.0%)	20/82 (24.4%)	30/82 (36.7%)
<b>Avg. Grammar Sub-Score</b>	8/15 (51.2%)	5/15 (30.7%)	5/15 (31.7%)	7/15 (43.3%)
<b>Avg. Vocabulary Sub-Score</b>	7/17 (39.7%)	5/17 (27.2%)	5/17 (28.6%)	7/17 (38.7%)
<b>Avg. Literature Sub-Score</b>	3/8 (34.7%)	2/8 (27.5%)	2/8 (29.5%)	4/8 (43.8%)
<b>Avg. Essay Sub-Score</b>	11/30 (37.6%)	5/30 (16%)	5/30 (17.9%)	11/30 (35.2%)
<b>Avg. Reading Comprehension Sub-Score</b>	6/12 (52.9%)	3/12 (22.3%)	3/12 (21.9%)	6/12 (50%)

Table 21.0 illustrates the score distribution for baseline exam takers as opposed to averages. Only 1 student (2%) in the (NE) group scored below 25%. In contrast, well over half of students in the (E) group (61%) scored below 25%, and (56%) of the (E+OCE) group scored below 25%. In terms of higher scores, one fourth of (NE) JHS students scored above 50%, while 0 (E) students scored above 50%, and 1 (E+OCE) student scored above 50%.

Since WAEC designed the BECE exam for students completing JHS 3, it was expected for scores to average at a lower percentage than normal, yet the comparative percentages between groups provides a contextual understanding.

**Table 21.0 – Score Distribution for BECE Exam, JHS Level**

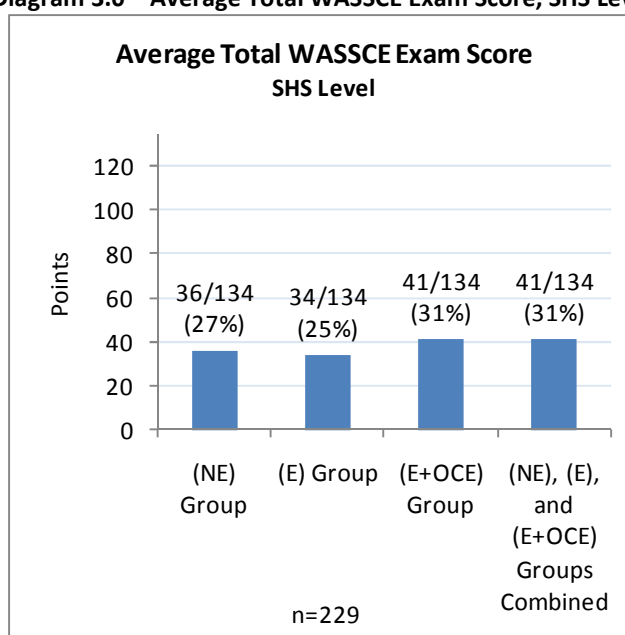
		(NE) Group		(E) Group		(E+OCE) Group		(NE), (E), (E+OCE) Groups Combined	
Score Range in Points	Score Range in Percent	# of Students	% of Students	# of Students	% of Students	# of Students	% of Students	# of Students	% of Students
0-10	0-12%	0	0%	5	13%	7	10%	12	7%
11-20	13-24%	1	2%	19	48%	32	46%	52	30%
21-30	26-36%	18	29%	15	38%	22	32%	55	32%
31-40	38-49%	29	46%	1	3%	7	10%	37	22%
41-50	50-61%	11	18%	0	0%	0	0%	11	6%
51-60	62-73%	3	5%	0	0%	1	1%	4	2%
61-70	74-85%	1	2%	0	0%	0	0%	1	1%

71-82	87-100%	0	0%	0	0%	0	0%	0	7%
Total (n)		63		40		69		172	

### SHS Student Performance on the WASSCE Exam

Diagram 3.0 illustrates the average total WASSCE exam scores across (NE), (E), and (E+OCE) groups, as well as the average for all three groups.

**Diagram 3.0 – Average Total WASSCE Exam Score, SHS Level**



The highest possible score was 134 out of 134 points at 100% accuracy. The average total WASSCE exam score was 41 out of 134 points or (31%), where the (NE) students scored 27%, the (E) students scored 25%, and the (E+OCE) students scored 31%. SHS student scores across the three groups appear to be at par at the onset of the project, with a slight variance of 2-4% percentage points between groups.

Table 22.0 further outlines average sub-scores from the WASSCE exam. There are no clear dominating groups at the SHS level. For the Grammar sub-section, the (E) group's sub-score is half that of the (NE) and (E+OCE) groups' scores. However, for the Reading Comprehension section, the (NE) group scored lowest at 4 points below the (E) and (E+OCE) groups.

**Table 22.0 – Average Total Score and Sub-Scores for WASSCE Exam, SHS Level**

	(NE) Group	(E) Group	(E+OCE) Group	(NE), (E), and (E+OCE) Groups Combined
<b>Avg. Total Score</b>	36/134 (27%)	34/134 (25.1%)	41/134 (30.8%)	41/134 (30.5%)
<b>Avg. Vocabulary Sub-Score</b>	11/37 (30.5%)	11/37 (28.4%)	11/37 (31%)	13/37 (34.5%)
<b>Avg. Grammar Sub-Score</b>	6/21 (28.2%)	3/21 (15.2%)	7/21 (33.8%)	8/21 (35.7%)
<b>Avg. Diction</b>	1/10 (12.1%)	0/10 (4.3%)	2/10 (17.3%)	4/10 (35%)

Sub-Score				
<b>Avg. Essay Sub-Score</b>	14/30 (48%)	12/30 (41.6%)	14/30 (46%)	10/30 (34.1%)
<b>Avg. Reading Comprehension Sub-Score</b>	3/36 (9.5%)	7/36 (19.4%)	7/36 (19.8%)	10/36 (26.4%)

Table 23.0 outlines the distribution of WASSCE scores as opposed to averages. The (E+OCE) group had 19% of students scoring above 37%, while in contrast the (NE) and (E) groups only had 5% of students scoring above 38%.

**Table 23.0 – Score Distribution for WASSCE Exam, SHS Level**

		(NE) Group		(E) Group		(E+OCE) Group		(NE), (E), (E+OCE) Groups Combined	
Score Range in Points	Score Range in Percent	# of Students	% of Students	# of Students	% of Students	# of Students	% of Students	# of Students	% of Students
0-10	0-7%	0	0%	0	0%	0	0%		0%
11-20	8-15%	1	2%	4	6%	3	3%	8	4%
21-30	16-22%	16	28%	28	40%	12	12%	56	25%
31-40	23-30%	24	41%	24	34%	34	34%	82	36%
41-50	30-37%	14	24%	10	14%	33	33%	57	25%
51-60	38-45%	2	3%	1	1%	15	15%	18	8%
61-70	46-52%	1	2%	3	4%	3	3%	7	3%
71-80	53-60%	0	0%	0	0%	1	1%	1	0%
81-90	60-67%	0	0%	0	0%	0	0%	0	0%
91-100	68-75%	0	0%	0	0%	0	0%	0	0%
101-110	75-82%	0	0%	0	0%	0	0%	0	0%
111-120	83-90%	0	0%	0	0%	0	0%	0	0%
121-134	90-100%	0	0%	0	0%	0	0%	0	0%
<b>TOTAL (n)</b>		<b>58</b>		<b>70</b>		<b>101</b>		<b>229</b>	

### 3.4 STUDENT READING HABITS

A total of 503 students responded to questionnaires that included questions on student reading habits. Table 24.0 describes student attitudes toward reading, reading activities out of school, reading material, and level of self-confidence.

**Table 24.0 – Summary of Student Reading Habits**

	(NE) Group			(E) Group			(E+OCE) Group			TOTAL
<b>Liking vs. Disliking Reading</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
<b>Like reading</b>	100%	100%	100%	86.7%	94.6%	98.6%	87.8%	100%	100%	97.6%
<b>Dislike reading</b>	0.0%	0.0%	0.0%	13.3%	5.4%	1.4%	12.2%	0.0%	0.0%	2.4%
<b>Frequency of Reading for Fun Outside of School</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>

Never	10.8%	10.0%	12.5%	17.6%	17.5%	14.9%	12.2%	14.7%	38.7%	18.3%
Sometimes	18.9%	13.3%	7.1%	5.9%	22.5%	17.9%	4.9%	11.8%	6.5%	11.7%
Often	54.1%	63.3%	69.6%	64.7%	47.5%	58.2%	68.3%	69.1%	49.5%	60.1%
Very often	16.2%	13.3%	10.7%	11.8%	12.5%	9.0%	14.6%	4.4%	5.4%	9.9%
<b>Frequency of Reading Aloud to Someone at Home</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
Never	35.1%	27.6%	25.0%	63.6%	20.5%	29.4%	48.8%	52.9%	37.4%	37.1%
Sometimes	8.1%	17.2%	21.4%	6.1%	28.2%	11.8%	4.9%	8.8%	12.1%	13.2%
Often	43.2%	37.9%	42.9%	27.3%	41.0%	38.2%	39.0%	32.4%	38.5%	37.9%
Very often	13.5%	17.2%	10.7%	3.0%	10.3%	20.6%	7.3%	5.9%	12.1%	11.8%
<b>Frequency of Listening to Someone Outside of School Read</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
Never	30.3%	38.6%	35.7%	39.4%	25.7%	42.6%	48.8%	50.0%	45.7%	41.2%
Sometimes	9.1%	15.8%	17.9%	6.1%	34.3%	16.2%	9.8%	10.3%	15.2%	14.9%
Often	54.5%	38.6%	46.4%	48.5%	28.6%	32.4%	41.5%	32.4%	29.3%	37.3%
Very often	6.1%	7.0%	--	6.1%	11.4%	8.8%	--	7.4%	9.8%	6.6%
<b>Frequency of Talking to Friends or Family About What One Is Reading</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
Never	30.6%	3.4%	7.1%	52.9%	16.2%	10.4%	39.0%	34.8%	14.9%	20.7%
Sometimes	11.1%	19.0%	21.4%	11.8%	29.7%	17.9%	12.2%	15.2%	19.1%	17.8%
Often	52.8%	60.3%	55.4%	35.3%	37.8%	61.2%	41.5%	40.9%	52.1%	50.1%
Very often	5.6%	17.2%	16.1%	--	16.2%	10.4%	7.3%	9.1%	13.8%	11.5%
<b>Types of Reading Materials that Students Like</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
Storybooks	37.8%	80.0%	65.5%	20.7%	23.7%	64.7%	15.8%	47.5%	72.8%	54.2%
English	43.2%	1.7%	9.1%	58.6%	50.0%	0.0%	73.7%	33.9%	4.3%	23.1%
Math	10.8%	0.0%	0.0%	24.1%	26.3%	0.0%	47.4%	1.7%	1.1%	8.6%
Newspaper	0.0%	23.3%	18.2%	0.0%	0.0%	14.7%	0.0%	1.7%	1.1%	7.6%
Science	18.9%	0.0%	5.5%	10.3%	21.1%	0.0%	2.6%	5.1%	2.2%	8.6%
Textbooks	2.7%	10.0%	1.8%	0.0%	7.9%	7.4%	0.0%	0.0%	17.4%	6.7%
Bible	0.0%	0.0%	0.0%	3.4%	2.6%	26.5%	0.0%	0.0%	1.1%	4.4%
RME	27.0%	0.0%	0.0%	10.3%	2.6%	0.0%	2.6%	1.7%	0.0%	3.4%
Social Studies	0.0%	0.0%	10.9%	0.0%	7.9%	1.5%	0.0%	5.1%	1.1%	2.9%
Twi	8.1%	0.0%	0.0%	3.4%	2.6%	0.0%	7.9%	3.4%	0.0%	2.1%
Notebooks	0.0%	1.7%	0.0%	17.2%	0.0%	4.4%	0.0%	0.0%	3.3%	2.5%
Magazines	0.0%	10.0%	1.8%	0.0%	2.6%	0.0%	0.0%	0.0%	3.3%	2.3%
Other*	8.1%	5.0%	18.2%	13.8%	2.6%	1.5%	23.7%	6.8%	15.2%	10.3%
<b>Self-Confidence</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
I have very little confidence	5.3%	3.3%	7.1%	67.6%	10.0%	7.1%	34.1%	2.9%	3.2%	12.6%
I have some self-confidence	21.1%	3.3%	14.3%	14.7%	47.5%	14.3%	36.6%	19.1%	7.4%	18.5%
I have good self-confidence	18.4%	44.3%	55.4%	11.8%	35.0%	37.1%	9.8%	60.3%	35.8%	40.0%
I have	18.4%	44.3%	19.6%	2.9%	7.5%	40.0%	2.4%	16.2%	49.5%	28.9%

<b>excellent self-confidence</b>										
<b>Total (n)</b>										
	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>P</b>	<b>JHS</b>	<b>SHS</b>	<b>TOTAL</b>
<b>Total (n)**</b>	38	61	56	34	40	70	41	68	95	<b>503</b>

\*Types of reading material grouped under other have 1-6 instances over the 9 schools.

\*\* The total number may vary slightly by category because missing information was not included in the analysis.

Student attitudes towards reading are overwhelming positive, as 97.6% of students reported that they liked reading. Students had the opportunity to explain why they liked or disliked reading. A number of students, especially primary students, gave answers like “I like reading” and “I enjoy reading.” Most students shared that they liked reading because it helped them to gain more knowledge, improve their English skills, or pass exams. While a number of students explained that reading would help them achieve their chosen profession. Some students mentioned that they liked reading for religious reasons, as reading the Bible taught them morals and helped them learn about God. The few students who disliked reading explained that reading was difficult for them.

Overall, 70.0% of students reported reading for fun outside of school often or very often, 11.7% sometimes, and 3.7% never. The school with the highest number of students reporting that they never read for fun outside of school was the (E+OCE) SHS, with 38.7% of students.

Roughly half of all students interviewed reported that they regularly engage people outside of school in reading activities. 49.7% of students reported that they read aloud to someone outside of school often or very often. 43.9% of students listen to someone read aloud to them outside of school often or very often, and 61.6% of students talk to friends and family about what they are reading often or very often. These percentages suggest that students will share their e-reader experiences with friends and family.

While the frequency of engaging in reading aloud, listening to someone read aloud, and discussing what one reads varies somewhat across schools, these variances do not seem to be based on grade level. However, the group that talks about what they have read with family and friends the least is the (E) Primary group, with 64.7% of students reporting that never or sometimes do so.

Overall, 54.2% of students enjoy storybooks. Storybooks are especially popular at the (NE) JHS and (E+OCE) JHS levels, where 80.0% and 72.8% of students reported that like storybooks. Storybooks are somewhat less popular among primary students, who largely prefer English books. English books are most enjoyed at the (E+OCE) primary school level, where 73.7% of students list that they like English books. Aside from storybooks and English books, other popular genres include academic reading such as Math, Science, and other academic textbooks. A number of students listed that they enjoy newspapers, especially at (NE) JHS and (NE) SHS levels where close to one fifth of students enjoyed reading them. The (E) SHS group was especially religious; as over a quarter of students shared that they enjoyed reading the Bible.

Finally, most students surveyed (78.9%) reported having good or excellent self-confidence. The students reporting the least self-confidence were those at the (E) primary school where 67.6% of students shared that they had very little self-confidence, although it is possible that these young students did not fully comprehend the concept of self-confidence during the evaluation. It is interesting to note that levels of low self confidence correlate to low standardized test scores in the majority of the students.

### 3.5 INCORPORATING E-READERS INTO THE CLASSROOM

A total of 41 teachers in the (E) and (E+OCE) groups shared their plans for the e-reader and their predictions on the benefits and challenges of incorporating the e-reader into the classroom. Teachers were excited that e-readers would help their students read more and read better, while exposing students to technology. Teachers also had several realistic concerns on the safety of the devices, technical difficulties, and other issues. Teachers' perspectives on the e-reader are included below, followed by perspectives from the Worldreader team.

#### Teachers' Plans for E-readers

During focus groups and interviews, teachers shared their plans for the e-readers. Rather than creating completely new lessons, many teachers explained how they would incorporate the e-reader into their current lesson plans. Some of their plans to use the e-reader were as follows:

- Use the e-reader as a resource to access supplementary reading material
- Use the e-reader's dictionary function to enhance student vocabulary
- Assign reading assignments for students complete at home, so that students can cover material beyond what is covered during class time
- Have students read aloud as a class
- Discuss passages from the e-reader as a class
- Alternate lecture and e-reader activities to prevent students from becoming bored

#### Teachers' Perspectives on the Benefits and Challenges of E-readers

During focus group discussions, teachers expressed their ideas on how the e-reader would impact students.

*Reading More and Reading Better* - In order to improve literacy, teachers at all levels were passionate that students needed access to more books, newspapers, and other reading materials. Teachers were enthusiastic that the e-reader would provide this access and help students to read more inside and outside of school.

In the classroom, teachers were hopeful that e-readers would increase student enthusiasm for learning. Primary school teachers predicted that the e-reader would encourage students to come to school to hear stories.

Teachers were also excited that e-readers would save class time, since an entire classroom of students could easily turn a page. Thus, teachers would no longer need to dictate passages for students to write down or have students copy passages from the board in order to distribute information. Additionally, e-readers would give students an opportunity to read ahead during their free time. Since every student would have an e-reader in class and at home, teachers were excited that students could learn independently rather than rely primarily on classroom time.

Outside of the classroom, teachers hoped e-readers would help students to discover the joy of leisure reading. Access to a vast array of books would allow students to explore their interests and broaden their scopes of knowledge.

Through increased reading, teachers expected that students would improve their English proficiency, learn more, perform better on exams, gain greater opportunities, and possess a stronger understanding of the world in general.

*Access to Technology* - Teachers foresaw that the e-reader would help students become more familiar with technology. By using e-readers on a regular basis, students would gain technological skills that they could later apply to other forms of technology, such as computers.

Teachers also predicted that the novelty of the e-reader's technological aspect would interest students and boost student morale to learn.

*Benefiting the Entire Community* - Teachers stressed that students would not be the only beneficiary of iREAD activities, since students were very likely to share e-readers with their siblings, parents, friends, and families. The entire community would benefit from greater access to books and information.

*Creating Equal Opportunities* - Teachers emphasized that the e-reader would allow poor students from rural areas to access the same educational resources as rich students from urban areas. Teachers predicted that e-readers would increase the confidence of rural students and thereby help them to pursue greater opportunities.

In terms of challenges, teachers were in consensus that the e-reader would have a great positive effect on their students. At the same time, teachers were realistic and recognized that e-readers could present challenges.

Many teachers expressed that maintaining the safety of the e-readers would be a challenge. Primary teachers had mixed views on whether students should take the e-readers home or keep the e-readers at the schools. The teachers who argued that students should use the devices only during school hours cited that in the past, students had lost supplementary materials that were loaned to them. Keeping the devices at school would limit the risks of loss, theft, and damage that have happened with paper books. However, the overall aim of the study is to increase access of reading materials, particularly at home, and so the debate of access versus safety was constantly under question.

Other primary teachers wanted the students to take the devices home so that they could read on their own time. These teachers suggested that teachers inspect students' e-readers every morning when they came to school and every afternoon when they leave to ensure that the devices would be in good condition. Additionally, teachers would invite parents to learn about the e-readers and support their children in taking proper care of the e-readers. After some discussion, the primary teachers who were reluctant towards allowing the e-readers to go home began to agree that students should be permitted to take the devices so long as there was close supervision.

At the JHS and SHS levels, teachers suggested that schools conduct an informational session on the e-readers. At this session, they would record parents' contact information and stress that the entire community should work together to keep the e-readers safe.

Aside from concerns over the safety of the device, other teacher concerns were as follows:

- The e-reader might distract students, since students might be tempted to use the e-reader at inappropriate times. For example, students might read storybooks for leisure during lectures.
- Students might use the e-reader to access inappropriate material, such as pornography.

- Technical problems may make e-readers difficult to use. For example, there could be challenges with charging batteries and maintain the devices.
- Students might not be able to read at night when they go home if they do not have electricity or a source of light.
- Students may have difficulty adapting to new technology at first.
- Students might begin to prefer school subjects that are on the e-reader and show less interest towards subjects like math, which are not on the e-reader.
- Students may stop valuing print books.
- Students may not use the e-reader. Since students often don't read paper books, they may not want to read electronic books either.
- Engagement with the e-reader might cause students to neglect their house chores, and this could negatively affect their parents and family life
- Teachers might spend so much time cooperating with the iREAD study through e-reader trainings, interviews, standardized testing, monitoring, etc. that they might not have sufficient time to prepare lessons and focus on teaching.

### **Worldreader's Perspectives on the Benefits and Challenges of the E-reader**

The evaluation team surveyed 6 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.

The Worldreader team shared that teachers' and students' reception of the e-reader devices have been overwhelmingly positive. Although a few members of Worldreader had anticipated some reluctance or apathy towards the project, they explained that experienced the opposite, as both teachers and students were very excited. Several members of the team acknowledged that part of teacher and student initial excitement may be due to the novelty of a new gadget. However, a greater part of excitement seems to be from the prospect of having access to such a wide breadth of reading material. One team member added that students highly value their education, and that they are very enthusiastic that the e-reader will improve their education. Another team member commented that all of the teachers within the study are full of ideas and feedback on the iREAD program, and that this demonstrates that they are very invested in making the study a success.

The Worldreader team was very optimistic that the iREAD project would have a profound positive effect on students. All team members agreed that students would read more, and thereby improve their language skills, improve their learning, and help students gain new opportunities. One team member visits the schools on a weekly basis, where he observes students reading and discussing what they read. He observed that students are excited that the device is small and portable, so that they can choose to read from a vast library of books no matter where they are. This team member related that students were already telling him that they understand their school material better, after only a short period of having the e-reader.

Several team members explained that they were aware that not all students would benefit to the same degree. One team member reasoned that excellent students would experience some degree of success whether they had the e-reader or not, and that academically poor students may not improve no matter what resources they are offered. Therefore, it may be the mediocre students who would probably experience the greatest improvement in reading.

Another team member predicted that there would be a significant percentage of students who would demonstrate a dramatic difference between baseline and end-of-school year reading

performance and reading habits.

Yet another team member predicted that while he is optimistic, he is realistic and realizes that gains in test scores may be moderate. Nonetheless, he is very hopeful that outside of improving test scores, e-readers would encourage students to read more, and encourage a culture of literacy and reading. By helping students to discover the joy of reading and inciting a new thirst for knowledge, he hopes that e-readers will help students gain the keys to success.

Similarly, another team member was excited that greater access to textbooks would transform the curriculum. However, he was most excited about students having the opportunity to explore and access their reading interests.

Finally, one team member shared that ultimately, everyone would have equal access to e-readers so that everyone had equal opportunities. She predicted that in the future, e-readers would be common and small ecosystems of businesses related to the e-reader would emerge (i.e., e-reader repair shops).

In terms of challenges, a few Worldreader team members had some concerns. One team member was concerned that primary students may be too young to protect their e-readers from jealous older students. To minimize jealousy, another team member explained that Worldreader has provided 5 e-readers for each (E) and (E+OCE) school's library so that any student in the school could borrow an e-reader. Additionally, Worldreader has sensitized schools on the concept of a pilot so that students understand why they may not have received an e-reader.

Other team members, however, were not too concerned about theft or loss because they were of the opinion that community events, the involvement of community leaders, and a community pledge would keep theft and loss to a minimum. One person explained that in the few cases in which e-readers had gone missing, the community has had a frenzied reaction. This reaction demonstrated that the community was committed to keeping the e-readers safe.

One person commented that in the future, when the iREAD project is scaled up and e-readers are used in less tight-knit communities, theft and loss may become larger issues than they are for the pilot study. To curb theft and loss in the future, one team member expressed that he would like e-reader manufacturers to design a system in which e-reader owners can remotely turn off devices and make them useless when they are lost or stolen. Such a system could be very possible considering that e-reader owners have devices' serial numbers and SIM card numbers.

Many Worldreader team members saw damage as a greater issue than theft or loss, especially since manufacturers did not design e-readers for children or for dusty, tropical environments. However, as one person stated, "[E-reader damage] is the kind of problem I want to have because we can fix the device. Changing human behavior is harder." Worldreader plans to work with e-reader manufacturers to make the e-reader more durable.

Overall, the Worldreader team agreed that there is a real sensibility among students and teachers to take care of the device. Worldreader plans to reward streams that experience zero loss and theft on a monthly basis with small incentives such as snacks and minerals.

### **3.6 EVALUATING COSTS AND LOGISTICS**

#### **Evaluating the Costs and Logistics of Distributing Paper Books (Diagram 4.0)**

### *Distribution to Primary and Junior High Schools*

Through interviews with government officials, the evaluation team was able to document the ideal scenario for the distribution of books and the primary and junior high levels. The Government of Ghana's role in providing textbooks and other reading materials is overseen by two different entities, the Ministry of Education (MOE) and the Ghana Education Service (GES). The MOE award contracts out to private publishers who print and distribute the government issued textbooks and reading materials every five (5) years. The distribution of the books is overseen by GES. Each primary and JHS submits enrollment figures to the Regional District Office three times in the school year, on November 15<sup>th</sup>, February 15<sup>th</sup> and June 15<sup>th</sup>. Based upon these enrollment numbers from the Regional District Office, GES sets the order numbers and sends it to the publishers. The publishers then deliver the books to the district office, and ultimately the schools. Usually, order numbers are set 15-20% higher than the actual enrollment numbers thereby creating a 'buffer' or excess of books. Some of these excess books are kept in the district office, and the remainder is sent to a GES regional warehouse. Access to books in the regional warehouse is granted by GES only when the Regional Director from the district office makes a formal request. Delivery of the regional warehouse books to the District office is made by GES and not the publishers.

### *Distribution to Senior High Schools*

Unlike primary and junior high schools, senior high schools do not have a nationwide set core curriculum. Each SHS differs in the courses it offers its students. After orders and distribution numbers are placed with the publishing company, the company bypasses the district office and supplies the Senior High Schools directly. Enrollment numbers are supplied by the schools directly to GES. Any excess books are sent directly to the GES regional warehouse.

Diagram 4.0- Purchase and Distribution of Books and Reading Materials for Primary and Junior High Schools

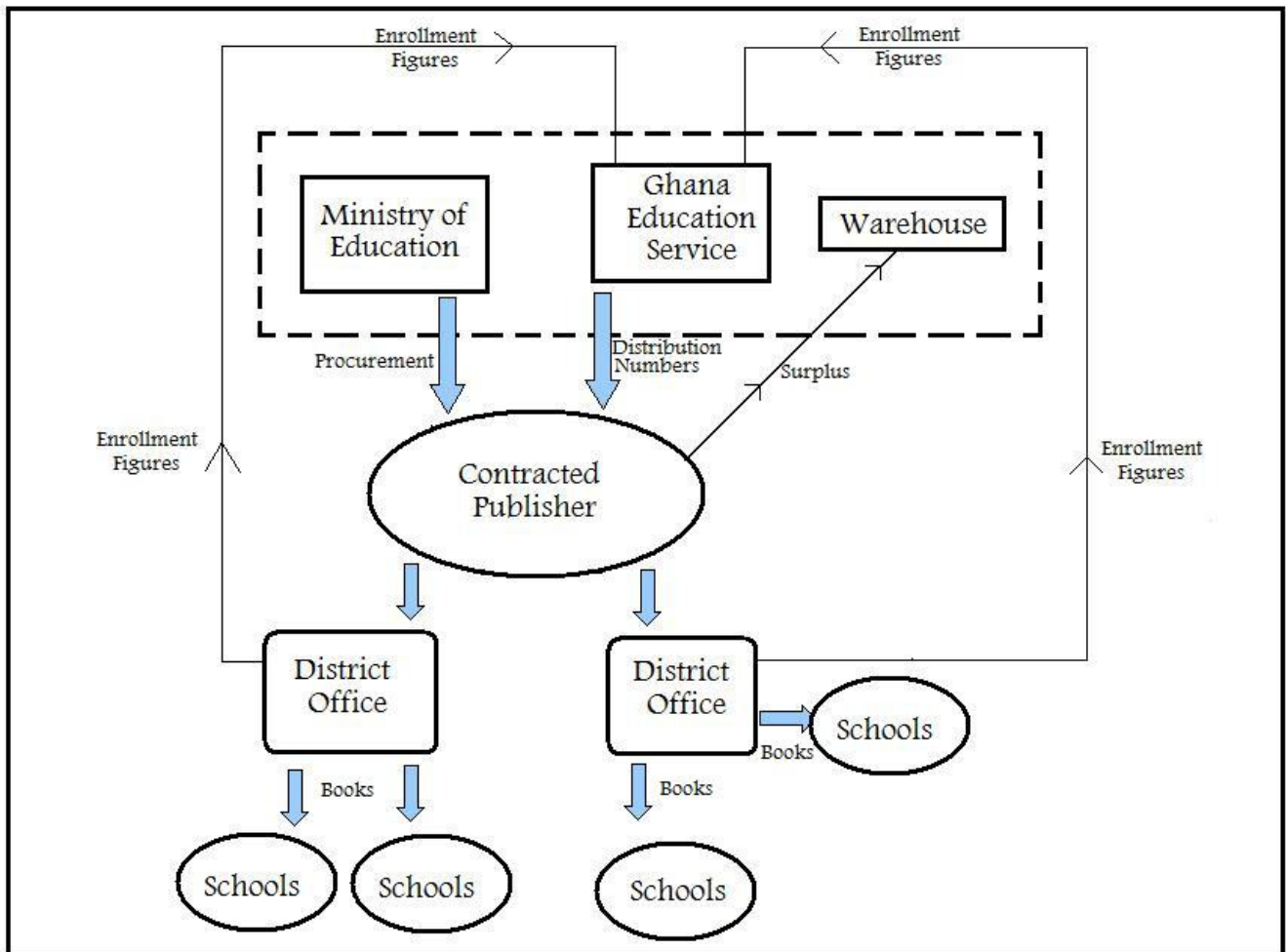
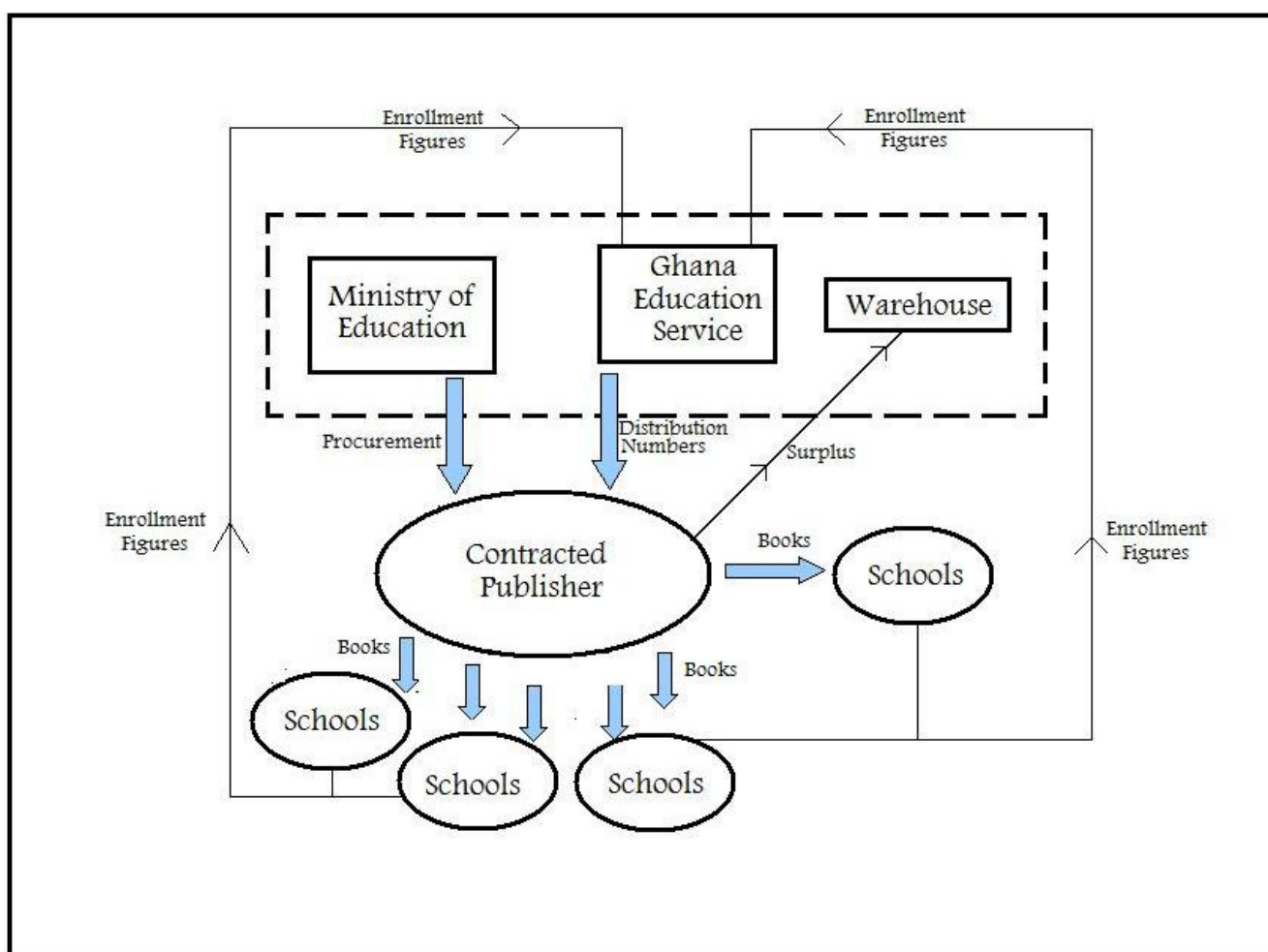


Diagram 5.0 -Purchase and Distribution of Books and Reading Materials for Senior High Schools



### Costs Paid by Government

Government-related costs associated with the logistics and supply of books was not made available to the evaluation team. However, proxy data was provided by the U.S. Agency for International Development (USAID). NALAP, an initiative of the Ghana Education Service (GES) and USAID, paid \$1,267,000 for the distribution of 7.818 million books to district offices for 21,000 schools in total.

### Costs Paid by Schools

The costs that schools pay for reading materials vary greatly by grade level and particular school. Administrators at primary schools explained that their schools do not pay for books, since the government provides the government textbooks for free, and the schools do not buy additional supplementary books.

At the JHS level, administrators described that their schools sometimes use funds from the government's capitation grant to purchase books to supplement the free government textbooks. The (NE) JHS spent 600 GHC of the capitation grant on reading materials last year, and plans to spend 300 GHC of the grant on reading materials this year. In contrast, the (E) JHS spent 10 GHC on reading materials last year, and no money this year. Similarly, the (E+OCE) JHS didn't spend any money on reading materials either this year or last year. Administrators explained that aside from reading materials, capitation grants support stationery costs, sports and culture costs, and other school needs.

At the SHS level, school money spent on reading materials varied greatly. At the (NE) SHS level, where there is no library, administrators report that the school doesn't spend any money on reading materials. The librarian at the (E) SHS reported that the school library spends 900 GHC per month on newspapers. The librarian also reported that the school bought one box of fiction and non-fiction books this year and another box of fiction and non-fiction books last year, although he was uncertain of the price. At the (E+OCE) SHS, the librarian reports that the school hasn't bought any new books, although last year the school bought a few new integrated science books.

### Costs Paid by Teachers

When the resources provided by the government and by schools are inadequate, some teachers feel compelled to spend their own money on reading materials. Overall, 57% of teachers within the evaluation reported that they have spent their own money this year (2010/2011) or last year (2009/2010).

**Table 25.0 - Proportion of Teachers Reporting that They Spent Their Own Money on Student Reading Materials Last Year and/or This Year**

Level	(NE) Group	(E) Group	(E+OCE) Group	Grand Average
Primary	1/2	1/2	0/1	2/5 (40%)
JHS	3/3	3/4	4/5	10/12 (83%)
SHS	3/5	1/6	4/7	8/18 (44%)
<b>Total</b>	7/10 (70%)	5/12 (42%)	8/13 (62%)	20/35 (57%)

At the primary level, 2 of the 5 teachers reported using their own money to buy educational materials. One teacher said he spent about 5 GHC per week while the other did not specify an amount. The teachers who did not spend their own money commented that their school sometimes acquires supporting materials through the capitation grant.

At the JHS level, the majority of interviewed teachers (9 of 12) spent their own money on classroom materials last year. Teachers' estimated amounts spent last year ranged from 5 GHC to 300 GHC, but averaged 41 GHC. As of November 2010 when the evaluation team interviewed teachers, 10 of 12 teachers reported having spent personal funds for classroom materials this year. Estimated amounts for this year also ranged from 5 GHC to 300 GHC, and averaged 48 GHC. Most teachers explained that they spent this money buying copies of textbooks or pamphlets for self reading to prepare lesson plans. As several teachers explained, a teacher has to buy additional textbooks if he wants his

students to pass because provided textbooks alone do not cover the syllabus adequately. The teacher who reported that he spent 300 GHC explained that he bought 5-6 books every year related to the various math and science subjects he teaches. In addition to textbooks, some of the money teachers spent on classroom materials went towards Teaching Learning Materials (TLM) such as charts, graph paper, manila cards, and card board.

At the SHS level, 8 of 18 teachers reported having spent personal funds this year and/or last year. The 5 teachers who paid for reading materials this year spent an average estimate of 37 GHC, with estimated amounts ranging from 10 GHC to 120 GHC. The 5 teachers who paid for reading materials last year spent an average estimate of 200 GHC, with amounts ranging from 10 GHC to 550 GHC. Teachers spent money on photocopying pamphlets and diagrams, buying textbooks for self-reading, and buying copies of supplemental textbooks to give as prizes to good students.

10 of 18 teachers reported they didn't spend personal funds this year or last year. One teacher explained that he didn't need to spend his own money, since his department spent about 800 GHC to photocopy pamphlets related to science subjects for forms 2-4. Other teachers explained that students reimbursed photocopying costs or made photocopies on their own.

### Costs Paid by Students and Their Families

In total, 76.7% of students reported that they or their families paid for reading materials related to schooling this year (2010/2011), and 66.0% of students reported that they or their families paid for reading materials last year (2009/2010). This year, the schools with the highest percentages of paying students were the (NE) SHS students with 100.0% of students paying this year, followed by (NE) JHS with 93% of students paying. The school with the lowest percentage of paying students was the (E+OCE) JHS, with 56.7% of students paying this year and only 22.4% of students paying last year.

**Table 26.0 Percentage of Students Reporting that they or their Families Paid for Books, Photocopies, or Reading Materials**

	(NE) Group			(E) Group			(E+OCE) Group			TOTAL
	P	JHS	SHS	P	JHS	SHS	P	JHS	SHS	
<b>This Year (2010/2011)</b>										
<b>Paid for reading materials this year</b>	78.9%	93.0%	100%	75.0%	80.0%	82.9%	70.6%	56.7%	60.0%	76.7%
<b>Did not pay for reading materials this year</b>	21.1%	7.0%	--	25.0%	20.0%	17.1%	29.4%	43.3%	40.0%	23.3%
<b>Last Year (2009/2010)</b>										
<b>Paid for reading materials last year</b>	88.9%	87.5%	97.1%	45.0%	79.5%	69.0%	89.7%	22.4%	54.7%	66.0%
<b>Did not pay for reading materials last year</b>	11.1%	12.5%	2.9%	55.0%	20.5%	31.0%	10.3%	77.6%	45.3%	34.0%

(n=352)

Over the three groups, primary students report paying an average of 7GHC this year, and 3 GHC last year. At the JHS level, students spent an average 86 GHC this year and 88 GHC last year, and at the

SHS level, students spent an average of 155 GHC this year and 66 GHC last year. Tables 27.0 and 28.0 provide the average amounts that students paid.

**Table 27.0 - Average Cost of Reading Materials Paid by Student during the 2010/2011 School Year (GHC)**

Level	(NE) Group	(E) Group	(E+OCE) Group	Grand Average
Primary	7 GHC	7 GHC	2 GHC	7 GHC
JHS	226 GHC	19 GHC	2 GHC	86 GHC
SHS	91 GHC	67 GHC	98 GHC	250 GHC
<b>Grand Average</b>	305 GHC	48 GHC	46 GHC	155 GHC

(n=231)

**Table 28.0 - Average Cost of Reading Materials Paid by Student during the 2009/2010 School Year (GHC)**

Level	(NE) Group	(E) Group	(E+OCE) Group	Grand Average
Primary	9 GHC	8 GHC	4 GHC	3 GHC
JHS	179 GHC	25 GHC	11 GHC	88 GHC
SHS	451 GHC	81 GHC	90 GHC	89 GHC
<b>Grand Average</b>	141 GHC	37 GHC	30 GHC	66 GHC

(n=216)

More than half of students did not answer the two questions about the amount of money paid because they couldn't recall specific figures, resulting in low total (n) for these questions. Those who did provide answers may have remembered inaccurately, as responses to these two questions vary sharply from 10 GHC to several thousand GHC within the same school. Therefore, in order to gain another perspective, the evaluation team asked teachers how much they estimated that students spent.

At the primary level, teachers reported that students generally did not spend money on reading materials. Sometimes students spent some money on books and photocopies, but these expenses were generally optional. Only a few students choose to buy books on their own.

At the JHS level, teachers reported that pamphlets usually cost around 2-3 GHC, while textbooks might cost around 2-20 GHC per book, depending on the subject. One teacher estimated that each year, a student might spend 25-30 GHC total on photocopies, pamphlets, and books for all subjects. Often, only a portion of students buy materials.

At the SHS level, teachers explained that students are often billed for textbooks, which may cost around 5-20 GHC per book. Teachers may also strongly recommend that students buy particular books, but in the end it is the student's decision whether or not he or she buys the books. Students sometimes pay photocopying costs of less than 2 GHC per class that require it. In general, students use the books they buy in Form 1 during all years of high school.

### **Evaluating the Costs and Logistics of Distributing E-books**

Worldreader initially shipped 428+ e-readers to Ghana from Europe. In Accra, Worldreader loaded initial sets of books onto 428+ e-readers over high speed Wi-Fi, since it would take a long amount of time to download books over Wi-Fi. It took each e-reader about 30-60 minutes to download the initial set of 15 books.

Worldreader loaded books onto kindles in groups of five. Currently, Amazon has a family account set-up in which up to six kindles can be connected with one email account. Therefore, Worldreader grouped kindles in groups of 5 and set up 100+ accounts to cover 428+ e-readers. Setting up so many accounts was a time-consuming process. Worldreader hopes that in the future, Amazon will develop

a system in which more than 5 kindles can be associated with one account. Ideally, Worldreader would have liked to set up 4 accounts – one account for primary students, one account for JHS students, one account for primary students, and one account for teachers – rather than 100+ accounts. Four accounts would also make it easier for Worldreader to monitor, in bulk, what students are downloading, since currently Worldreader has to log into 100+ accounts to view that information.

Worldreader initially provided approximately 15 books on e-readers to begin. Since then, Worldreader has pushed 1-2 books every week to students via cell phone signals. Worldreader emails Amazon the titles of the book, and subsequently Amazon manages the process of sending books by bulk onto students' e-readers. After the books have been sent, students can check their devices and access the new books.

Since it can take 45-60 minutes to download one book on Ghana's week cell phone signals, it is not appropriate to rely on the cell phone signal to send mass amounts of books.

In January 2011, Worldreader implemented a large scale of about 70 additional books onto each e-reader. To achieve this, Worldreader collected the e-readers and transported them to Accra in order to take advantage of high speed Wi-Fi available in the capital city. It took about 48 hours for Worldreader staff and volunteers to manually un-pack e-readers, charge e-readers, and download the books.

In the future, Worldreader plans to distribute books through a combination of small scale weekly pushes via the cell phone signal and large scale pushes via high speed Wi-Fi in Accra, Ghana.

### **Costs of Distributing E-Books**

The three main cost drivers of the iREAD project are:

1. Cost of Devices
2. Cost of Content
3. Cost of Oversight

At retail, the cost of the device is \$190. Worldreader has a slight discount and purchases e-readers at \$180 each. This price of the device continues to decline, and some analysts estimate that kindles will cost \$80 by 2013.<sup>6</sup> In addition to the costs of the devices, Worldreader pays shipping costs for donated e-reader cases at about \$5 per unit. There are no significant duty/custom costs.

Content cost has been low due to donations. Worldreader has agreements with several publishers to digitize their books in exchange for permission to use publishers' books in the iREAD project. Additionally, the delivery costs of content is minimal. Weekly pushes have no delivery costs, because books are delivered remotely via cell phone signal. Some transportation costs are involved in the large scale pushes.

As of January 2011, Worldreader has additionally spent \$30,000 on local oversight support. Table 29.0 below summarizes preliminary figures for the cost of providing e-readers in the study:

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<sup>6</sup> <http://mediamemo.allthingsd.com/20110118/waiting-for-the-80-kindle-hang-on-till-2013/>

**Table 29.0 – Preliminary Worldreader Budget**

No.	Budget Item	Cost (USD)
1	Devices, including shipping and an allocation from broken and defective units	\$130,000
2	Content acquisition and digitization costs	\$20,000
3	Local oversight support	\$30,000
4	Set-up, training, and on-going remote support	\$40,000
5	In-kind donations, which include e-books and e-reader cases	\$163,584
	<b>TOTAL</b>	<b>\$383,584</b>

*Note: The numbers outlined above are rough estimates, and may change. Subsequent evaluations will present more precise and definite figures as the project processes.*

As of January 2011, Worldreader has distributed approximately 36,380 books to 428 students and teachers, averaging 85 books per person. The 85 books include about 83 books pushed by Worldreader as well as roughly 2 free books that students and teachers choose to download themselves.

### Comparing the Cost of Paper books to E-Books

Although the true number of books has yet to be distributed through the e-reader, the evaluation team will attempt to compare the current cost of paper books to e-books. This estimate represents a rough estimation of paper sbooks to e-books given data available as of January 30th 2011.

Since Worldreader has distributed about 36,830 books thus far, the average net cost is \$10.41 per book, including the value of in-kind donations. Without including the value of in-kind donations, the average net cost is \$5.97 per book. The cost per book will become significantly lower as Worldreader distributes additional books throughout the duration of the project while incurring minimal additional costs beyond the budget outlined above. Students and teachers are also continuing to download free books at no additional cost.

However, the average net cost of the purchase and distribution of paper books at this time is roughly estimated at \$.16 per book. Several books, however, have yet to logistically reach their final destination to the classroom, 5 months into the school year. Also, the paper books are designated for one student per year and must be re-purchased each additional year. Whereas the e-book is a digital purchase that does not need to be re-purchased in the subsequent years.

More cost benefit-analysis will be conducted in the mid-term report to better compare paper books to e-books.

## 4.0 CONCLUSIONS

The main findings from the baseline study are as follows:

### Socio-Economic Characteristics of Study Participants

- The gender balance of the study's participants is roughly equal, with 48.7% males and 51.3% females.
- Most students, 61%, are of the Akan ethnic group.
- 7.8% of students report that they speak English with their families. 64.3% students speak Twi at home.
- 94.6% of students are Christian (94.6%)

- The mothers of a quarter (25.4%) of students have never schooled beyond the primary level. The student group with the most educated mothers is the (NE) JHS group, where 96.7% of mothers schooled beyond the primary school level.
- 35.2% of students' fathers have never schooled beyond the primary level. However, 28.1% have schooled beyond secondary school.
- Almost three quarters of students' mothers are traders (72.7%)
- The most common occupation among fathers is farmer (39.5%)
- The average number of siblings in a student's family is 5

### Access to Books and Technology

- Students across the nine schools do not have their own copy of required books to use in the classroom for 62.5% of their subjects. Students also have limited access to books at home, as they do not have access to classroom books at home for 81.5% of their subjects.
- Primary students have an average of 3.6 books at home, JHS students 8.6 books, and SHS 11.0 books. (NE) JHS students had the highest average number of books at home (16.3 books)
- 43% of students have never used a computer
- Most teachers list inadequate teaching materials as the greatest challenge that affects their ability to deliver quality teaching. Other challenges include large class sizes and limited physical infrastructure.

### Student Reading Performance

- The highest possible score was 68 out of 68 points at 100% accuracy. The overall average across primary levels in the (NE), (E), and (E+OCE) groups was 27 out of 68 points or 40%. Further stratified by group, the average score for (NE) primary school was 49%, (E) primary school (38%), and the (E+OCE) school (26%).
- The highest possible score was 82 out of 82 points at 100% accuracy. The average total BECE exam score was 30 out of 82 points or (37%), where the (NE) students scored 42%, the (E) students scored 23%, and the (E+OCE) students scored 24%. These scores reveal that the average score of the (NE) group JHS is 18-19 percentage points higher than the other two schools.
- The highest possible score was 134 out of 134 points at 100% accuracy. The average total WASSCE exam score was 41 out of 134 points or (31%), where the (NE) students scored 27%, the (E) students scored 25%, and the (E+OCE) students scored 31%. SHS student scores across the three groups appear to be at par at the onset of the project, with a slight variance of 2-4% percentage points between groups.

### Student Reading Habits

- Student attitudes towards reading are overwhelming positive, as 97.6% of students reported that they liked reading
- 70.0% of students report reading for fun outside of school often or very often.
- 49.7% of students report that they read aloud to someone outside of school often or very often.

- 43.9% of students listen to someone read aloud to them outside of school often or very often
- 61.6% of students talk to friends and family about what they are reading often or very often.
- 54.2% of students enjoy storybooks. Storybooks are somewhat less popular among primary students, who largely list English books as their reading material of choice.
- 78.9% of students report having good or excellent self-confidence

### **Incorporating E-Readers into the Classroom**

- Teachers are excited that e-readers will help students read more, read better, improve students' technological skills, benefit the entire community, and create equal opportunities for disadvantaged students.
- Teachers discussed several potential challenges related to the e-reader. These challenges included concern that e-readers could become lost, stolen, or damaged; that technical difficulties could limit e-reader use; and that e-readers could distract students during class.
- Worldreader discussed several benefits to the e-reader to include the prospect of having access to such a wide breadth of reading material, having improved language skills, understanding school material better, and transforming into a culture of literacy and reading
- Worldreader also discussed several potential challenges related to the e-reader. These challenges included varying degrees of success with the e-reader, moderate gains in standardized test scores; bullying of younger e-reader participants, theft of devices, and damage of devices.

### **Evaluating Costs and Logistics**

- Although GES states that order numbers of books per are set 15-20% higher than the actual enrollment numbers, thereby creating a 'buffer' or excess of books. Baseline evaluation data reveal that students across the nine schools do not have their own copy of required books to use in the classroom for 62.5% of their subjects. Students also have limited access to books at home, as they do not have access to classroom books at home for 81.5% of their subjects.
- Unlike primary and junior high schools, senior high schools do not have a nationwide set core curriculum. Each SHS differs in the courses it offers its students.
- The costs that schools pay for reading materials vary greatly by grade level and particular school.
- When the resources provided by the government and by schools are inadequate, some teachers feel compelled to spend their own money on reading materials. Overall, 57% of teachers within the evaluation reported that they have spent their own money this year (2010/2011) or last year (2009/2010).
- In total, 76.7% of students reported that they or their families paid for reading materials related to schooling this year (2010/2011), and 66.0% of students reported that they or their families paid for reading materials last year (2009/2010).
- At retail, the cost of the device is \$190. Worldreader has a slight discount and purchases e-readers at \$180 each. This price of the device continues to decline, and some analysts estimate that kindles will cost \$80 by 2013.<sup>7</sup>

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<sup>7</sup> <http://mediamemo.allthingsd.com/20110118/waiting-for-the-80-kindle-hang-on-till-2013/>

- Since Worldreader has distributed about 36,830 books thus far, the average net cost is \$10.41 per book, including the value of in-kind donations. Without including the value of in-kind donations, the average net cost is \$5.97 per book. However, the average net cost of the purchase and distribution of paper books, at this time, is roughly estimated at \$.16 per book. Several books, however, have yet to logistically reach their final destination to the classroom, 5 months into the school year. Also, the paper books are designated for one student per year and must be re-purchased each additional year. Whereas the e-book is a digital purchase that does not need to be re-purchased in the subsequent years. More cost benefit-analysis will be conducted in the mid-term report to better compare paper books to e-books.

## 5.0 RECOMMENDATIONS

As a result of the baseline evaluation, the evaluation team makes the following summary recommendations with justification:

	<b>Recommendations</b>	<b>Justification</b>
<b>1</b>	Re-assess the comparison of the current (NE) control group to the active (E) and (E+OCE) groups by finding an alternate control group at par with active groups	The expectation of the research design was that all three experimental groups began at approximately equal levels of reading performance. However, the baseline reading performance of the three experimental groups is not approximately equal, thereby limiting the study's ability to measure (E) and (E+OCE) progress against (NE) progress.
<b>2</b>	Ensure a 1:1 ratio of e-readers to students	Select students are sharing the device, yet the study aims to evaluate student use of e-readers at a 1:1 ratio.
<b>3</b>	Ensure that students take the e-reader home and have meaningful homework assignments using the e-reader	In order to improve student reading performance, students need to spend more time reading outside the classroom, particularly at home and through guided homework assignments.
<b>4</b>	Continue to use English and local languages to administer evaluations	Given that English is not primarily spoken at home, evaluations should continue to take place in several languages to ensure maximum understanding of questions.
<b>5</b>	Gain access to more specific cost and logistics information to determine a better cost-benefit analysis	Government-related costs associated with the logistics and supply of books was not made available to the evaluation team. More effort and time should be invested in securing comprehensive cost information related to the net cost of paper books in select regions of Ghana.
<b>6</b>	Carefully differentiate between (E) and (E+OCE) groups	At the point of the baseline evaluation, there are no real differences between the (E) and (E+OCE) groups. It is recommended that the (E+OCE) clearly document and implement its interventions that lead to clear and

		measurable results.
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**Appendix 1.0 – List of Key Informants**

No.	Informant Name	School
1	Tetteh Eric Okley	Presbyterian Junior High School in Adeiso
2	Isaac Asiedu	D/A Experimental 'C' Junior High School in Suhum
3	Jules Agbavor	D/A Experimental 'C' Junior High School in Suhum
4	Bernard Tetteh	D/A Experimental 'C' Junior High School in Suhum
5	Yeboah Cyntura	D/A Experimental 'C' Junior High School in Suhum
6	Owiredu Gyamera	Kade Secondary Technical School
7	Gabriel Akoto	Kade Secondary Technical School
8	Sylvester Arnold	Kade Secondary Technical School
9	Amissah Albert	Kade Secondary Technical School
10	Patience Amenyegah	Kade Secondary Technical School
11	Kissi Samuel Derick	Kade Secondary Technical School
12	La-Danso Frank	Kade Secondary Technical School
13	Yeboah Attah	Kade Secondary Technical School
14	Samuel Tetteh Drah	Kade Secondary Technical School
15	Ofori Richard	Kade Secondary Technical School
16	Kurankyi Oscar	Kade Secondary Technical School
17	Linda Boadiwaa	Kade Secondary Technical School
18	Comfort Oparebea	Kade Secondary Technical School
19	Christiana Bonsieh	Okorasi D/A Experimental Primary School in Suhum
20	Odonokor Fred Tetteh	Okorasi D/A Experimental Primary School in Suhum
21	Mr. Isaac Martey	Okorasi D/A Experimental Primary School in Suhum
22	Samson Arhin	Presbyterian Junior High School in Adeiso
23	Mohammed Aminu	Presbyterian Junior High School in Adeiso
24	Veronica Amoah	Presbyterian Junior High School in Adeiso
25	Asiedu Eugene	Presbyterian Junior High School in Adeiso
26	Bonsi Francis	Presbyterian Junior High School in Adeiso
27	Gligui David	Presbyterian Junior High School in Adeiso
28	Michael Anyang-Mintah	Presbyterian Junior High School in Kade
29	Osusu Danquah Seth	Presbyterian Junior High School in Kade
30	Samuel Obiri Adjei	Presbyterian Junior High School in Kade
31	Prince Boadu	Presbyterian Junior High School in Kade
32	Sam Kwakye	Presbyterian Junior High School in Kade
33	Emma S. Coleman	Presbyterian Junior High School in Kade
34	Gyapong Samuel	Presbyterian Junior High School in Kade
35	Martha Afi Doe	Presbyterian Junior High School in Kade
36	Cynthia Obiribea	Presbyterian Primary in Adeiso
37	Patrick Ofori Ansah	Presbyterian Primary in Adeiso
38	Vincentia Lawer	Presbyterian Primary in Adeiso
39	Sarah Appiah	Presbyterian Primary in Kade
40	Lydia Acheampong Mensah	Presbyterian Primary in Kade
41	Elizabeth Obeney	Presbyterian Primary in Kade
42	Abiso Dzifa Jacqueline	Presbyterian Primary in Kade

43	Okyere Frank Akwah	Presbyterian Senior High School in Adeiso
44	Kwakye Gyeketey	Presbyterian Senior High School in Adeiso
45	Leticia Ama Sika Apeku	Presbyterian Senior High School in Adeiso
46	Emmanuel Offei Boateng	Presbyterian Senior High School in Adeiso
47	Patrick Owosu	Presbyterian Senior High School in Adeiso
48	Sedegah Samuel	Presbyterian Senior High School in Adeiso
49	Manteaw Joseph	Presbyterian Senior High School in Adeiso
50	Boadu Evans	Presbyterian Senior High School in Adeiso
51	Ampofo Timmar	Presbyterian Senior High School in Adeiso
52	Ofori-Atta, Jacob D.	Presbyterian Senior High School in Adeiso
53	Addo-Darko W.	Presbyterian Senior High School in Adeiso
54	Hellen Hall	Presbyterian Senior High School in Adeiso
55	Jacobson Agasi	Presbyterian Senior High School in Adeiso
56	Manteaw Joseph	Presbyterian Senior High School in Adeiso
57	Alex Obisaw	Presbyterian Senior High School in Suhum
58	Wilson Tei	Presbyterian Senior High School in Suhum
59	Offei Eric	Presbyterian Senior High School in Suhum
60	Isaac Asare	Presbyterian Senior High School in Suhum
61	Joshua Agbe	Presbyterian Senior High School in Suhum
62	Prosper Kof Kpedekpo	Presbyterian Senior High School in Suhum

## Appendix 2.0 – Data Collection Form: Student Questionnaire

Interviewer (for primary students only): \_\_\_\_\_

Student Name: \_\_\_\_\_

School Name: \_\_\_\_\_

G1. Are you male or female? \_\_\_\_\_

G2. How old are you? \_\_\_\_\_

G3. What is your ethnicity? \_\_\_\_\_

G4. What is your religion? \_\_\_\_\_

G5. What language(s) and local dialect(s) do you speak with your parents and family?

\_\_\_\_\_

G6. What language(s) and local dialect(s) do you speak fluently? \_\_\_\_\_

G7. How many years have you been in school? \_\_\_\_\_

G8. Have you ever stopped going to school for a period of 4 months or more? (Yes or No)

\_\_\_\_\_

G9. Self-confidence is feeling good about your academic abilities, your intelligence, and yourself in general.

Please rate your level of self-confidence by checking one box.

I have very little self-confidence	I have some self-confidence	I have good self-confidence	I have excellent self-confidence

G10. Please fill out this table.

	Never	Sometimes	Often	Very Often
a) I read for fun outside of school				
b) I read aloud to someone at home				
c) I listen to someone outside of school read aloud to me				
d) I talk with my friends or family about what I am reading				
e) I borrow books from my teachers, school, or library				
f) I use a computer				

G11. What kind of things do you like to read?

G12. How do you feel about reading? Do you like it or dislike it? Why?

**G13. About how many books do you have in your home right now? \_\_\_\_\_**

**G14. Please list all of the course subjects you read under the column titled “Subject Name.”  
Then, please fill the table below.**

Subject Name (Please list all of the course subjects you read)	For this subject, do you have your own copy of required books to use in the classroom? Yes=Y, No=N	For this subject, do you share copies of required book in the classroom? Yes=Y, No=N	For this subject, are you able to take classroom books home? Yes=Y, No=N

**G15. Last year, did you or your family pay for books, photocopies, or reading materials related to your schooling? (Please answer Yes, No, or I don’t know). If yes, and if you remember, please list the total amount you or your family paid.**

**G16. This year, did you or your family pay for books, photocopies, or reading materials related to your schooling? (Please answer Yes, No, or I don’t know). If yes, please list the total amount you or your family paid.**

**G17. What are your parents’ highest levels of education? (Please check one column for each parent.)**

	No schooling	Primary	Junior High School	Senior High School	Higher than Senior High School
a) My mother’s highest level of education is...					
b) My father’s highest level of education is...					

**G18. What is your mother or female guardian’s occupation? \_\_\_\_\_**

**G19. What is your father or male guardian’s occupation? \_\_\_\_\_**

**G20. How many brothers and sisters do you have? \_\_\_\_\_**

## Appendix 3.0 – Data Collection Form: Teacher Key Informant Interview Guide

**Interviewer Name:**

**Date:**

**Time Start:**

**Time End:**

**Teacher Name:**

**School Name:**

**Teacher Phone Number:**

ET1. Male/Female?

ET2. What subject(s) do you teach?

ET3. What subject(s) did you teach last year?

ET4. How many years have you been teaching in total?

ET5. What are the classroom reading materials that you are supposed to use for your subject(s)? Please explain. (For example, if you are a science teacher, which books have you been told to use for curriculum for the year?)

ET6. When did the books listed in ET5 arrive in your classroom this year? When did they arrive last year?

ET7. Did each student in the classroom get his or her own copy of the books listed in ET5 this year? Last year? Explain.

ET8. This year, how much of your own money did you spend to give students access to reading materials? How about last year? Please explain.

ET9. Do students spend their own money for classroom reading materials, such as book and photocopies? If yes, how much do you estimate that students in your class spent on classroom reading materials this year? How about last year?

ET10. If you have received an e-reader, how do you plan to use it in your classroom for your subject?

ET11. What is the greatest challenge that affects your ability to deliver quality teaching?

ET12. What do you like to read?

**Request for Documents:**

ET13. How could we gain access to a copy of your syllabus?

ET14. How could we gain access to test scores or grades from the last marking period for the stream of students that have e-readers?

## Appendix 4.0 – Data Collection Form: Administrator Key Informant Interview Guide

**Interviewer Name:**

**Date:**

**Time Start:**

**Time End:**

**Administrator Name:**

**School Name:**

**Administrator Phone Number:**

ET15. Male/Female?

ET16. What is your position?

ET17. How many years have you been an administrator?

ET18. Approximately how many books or reading materials does the school own in total? How many are required books/text books and how many are non-required fiction books?

ET19. Please describe the process for getting a book to the classroom. Where does the order start and how does it move through the system?

ET20. Who is responsible for paying for the books? How does the financial process happen, from start to finish?

ET21. This year, how much total money was spent on all classroom reading materials? How about last year? "Classroom reading materials" includes both required reading and supplementary reading materials, and includes textbooks, pamphlets, newspapers, and other materials.

### **Request for Documents:**

ET22. How can we gain access to a school calendar that includes major dates, such as vacation and exam dates?

ET23. How can we gain access to a timetable or document that details how many hours each student spends in various courses?

ET24. How can we gain information on the subjects taught at this school?

ET25. How can we gain access to past test scores and grades for students in the stream that has e-readers?

### Appendix 5.0 – Data Collection Form: Focus Group Discussion Guide

<b>Date:</b>	<b>Moderator:</b>
<b>Site:</b>	<b>Note-Taker:</b>
<b>School Level:</b>	<b>Time-Starting:</b>
<b>Focus Group Category:</b>	<b>Time Ending:</b>

#### SIGN IN SHEET

No.	Name	School	School Subject Taught or Administrative Position
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

**Seating Chart: Make a seating chart indicating the participants and their number or identifier. Use this chart to identify speakers as you take notes.**

F 1. Why is reading important for students?

F 2. At the beginning of the year, are you given a list of books to use?

F 3. Do you have access to all of the books on the list?

F 4. Supplementary reading materials are materials that are recommended for students to read, but are not necessarily on an exam. Do you have supplementary reading materials to give to students?

F 5. Does every student in your class have required books to use in class? Does every student in your class have required books to take home? (Count show of hands.)

F 6. If no, the how do you distribute information from the required books? Do you make photocopies? Do you copy text onto the board? Etc.

F 7. How do you use supplementary books in the classroom?

F 8. What do you think students need in order to improve reading and literacy?

F 9. Do you think students should choose the supplementary books that they want to read? Or should teachers and administrators choose these books for them?

F 10. Do you know what an electronic reader is?

F 11. Have you heard of any of these products: Kindle? iPad?

F 12. How do you think e-readers could affect the classroom?

F 13. What are some challenges that you think might come up with the e-reader? In the classroom? At home?

F 14. If each student had an e-reader in your class, how would you supervise students in using the e-reader?

F 15. If you had an e-reader right now, how would you incorporate the e-reader into your current lesson plans?

F 16. What impacts do you think the e-reader might have on a student? In academic life? In family life? All around?

## **Moderator Observations**

**Note-Taker Observations**