PRINCETON UNIVERSITY

2009 Project Implementation Overview

# Ghana School Library Initiative

http://ghanainitiative.wordpress.com

Engineers Without Borders—Princeton University Chapter

## Introduction

The Ghana School Library Initiative (GSLI) is a student-initiated project coordinated by the Engineers Without Borders–Princeton University chapter. GSLI is composed of 16 students at Princeton University and is assisted by two professional mentors. Between July 6 and September 4, 2009, various Princeton students and mentors traveled to Ghana in order to:

1. Construct the reinforced-concrete frame of a new school and community library structure;
2. Set up a temporary library with 1000 books shipped from Princeton. These books had been collected through a book drive and various donations during the spring semester;
3. Evaluate availability and cost of internet access and determine the necessary computer infrastructure to be installed on a later trip; and
4. Evaluate literacy games and programs to be run at the library by working daily with a group of 3-6$^{th}$ grade students.

## Ashaiman, Ghana

Essentially a squatter settlement, Ashaiman was first settled in 1952 as construction started on the port in nearby Tema. Migrant workers who came for work in Tema set up shacks and makeshift homes in Ashaiman. However, there was no infrastructure plan in place for Ashaiman, and thus the city grew in an unchecked manner, with its population increasing from 2,624 in 1960 to 150,312 (according to the Ghana census report) or 217,717 (according to the Ashaiman Municipal Assembly – ASHMA) in 2000. In other words, in forty years, the population of Ashaiman grew 60 to 80-fold. Today, Ashaiman is still one of the fastest growing cities in Ghana. It is as diverse as it is large, with approximately 50 different ethnic groups from across Ghana and the rest of Africa taking residence in the city located 4km away from Tema and 30km away from Accra.

Unfortunately, with a lack of urban planning and infrastructure, education, health, and safety issues abound. Only one public high school, and only three private high schools, serve the city: there are fewer than 2,000 high school students in total in Ashaiman. This statistic highlights the shocking lack of access to education in Ashaiman and the city's refusal to build more capacity in education. In terms of health care, extremely unsanitary conditions (e.g., liquid and solid human waste being disposed anywhere possible due to a lack of toilets in homes) cause high rates of malaria, yellow fever, diarrhea, etc. The proliferation of animals, from chickens and goats to cows—roaming the city's muddy and unpaved streets—leave behind their own forms of waste.

Ashaiman's condition has earned it a reputation in Ghana. The city was once known as the "City of Nonsense." Many Ghanaians have never stepped foot into the area, for fear of being assaulted by armed robbers. The youth of Ashaiman are highlighted as especially volatile, rioting in the streets in an attempt to effect change and draw attention to their state of living, their unhappiness with politics in Ashaiman, and more. However, in the past five years, change has slowly swept across the ignored city. Police are cracking down on criminals. Local banks and microfinance organizations have set up shop in Ashaiman, bringing many of Ashaiman's residents into the modern financial world for the first time. Still, there is so much to do to elevate the status of Ashaiman and improve the living conditions of its residents.

Princeton University's Engineers Without Borders (EWB –PU) Chapter recognized Ashaiman as a community in need when they visited the area in 2007. Though the bustling commercial town in no way conforms to the typical rural, isolated EWB partner community, EWB–PU pursued a relationship with educational institutions to take on a project of ambitious proportions: building the only community library available to this city of thousands. In a place where even the most affluent homes in neighboring cities lack books, EWB–PU spent two months in the summer of 2009 partnering with the Evangelical Presbyterian (EP)

*Princeton student Jane Yang being welcomed to the E.P. Basic School.*

Basic School to complete the first phase of what is now known as the *Achieving Greater Heights Community Library*.

## Library Structure

The goal for the 2009 summer trip was to construct the reinforced concrete frame of the library structure over a five-week period in August and September. During the first week of August, the library site was surveyed and markers were set around the site to indicate wall and column positions. Because of delays in gaining EWB–USA approval and in finalizing design documents, digging onsite did not start until August 8th, five days behind schedule. EWB–PU was able to make up this lost time, however, by working through weekends and motivating our construction crew to work more efficiently. As a result, excavation was completed in three days instead of the budgeted five. As construction continued, other tasks—from pouring the mat to setting the columns—took far less time than anticipated, ultimately allowing the EWB–PU team to finish construction two days ahead of schedule.

Despite reaching this exciting point, EWB–PU faced no shortage of challenges while onsite. Material acquisition undoubtedly presented the greatest difficulties. While rebar was available locally, the construction project required large amounts of cement and pozzolana ash, and thus these materials had to be purchased directly from the manufacturers. Project leader Mohit Agrawal and team member Nizette Edwards, along with an EP Basic graduate Sefa Awaworyi, traveled to Kumasi to obtain pozzolana ash, an environmentally-friendly cement additive. Awaworyi was also instrumental in the purchase of cement, contacting a friend who arranged a shipment from Aflao. Whilst these arrangements were made, team members Jane Yang and Kwesi Adarkwa, along with professional mentor and site engineer Jennifer Pazdon, continued to push forward the construction progress, supervising rebar bending and the formwork carpentry work, and seeing to the purchase of lumber, sand, and aggregate. Once all materials were in place, concrete work commenced.

The first step was to erect the footings and piers, the supporting portions of the columns that lie below-grade. Here, the EWB–PU team discovered that, despite the information given in a geotechnical report commissioned by EP Basic, the piers could not be made as deep as originally planned due to a high water table. Fortunately, the soil report was also mistaken about the type of soil found onsite. Since hard, load-bearing clay was uncovered, EWB–PU's site engineers Pazdon and Pat Arnett approved of carrying on with the original design with modified, shallower piers.

*Construction after 10 days; completion of Phase I.*

Getting out of the ground proved to be full of trials for the EWB–PU team. This was in part due to the foreman first posted at the site by HydraCon, the chapter's contractor. The first foreman made the unauthorized decision to send in an unqualified friend as his stand-in on several occasions. As a result, the footings and piers were placed incorrectly. By working late into the night, however, the EWB–PU chapter was able to remove the hardening concrete, reposition the pier rebar, and repour the concrete. Further challenges were encountered with the steelbenders; the pier rebars were bent to incorrect sizes and quantities, despite the fact that a standard rebar schedule was provided and thoroughly explained. This incident caused



*Students enjoying books in the temporary library.*

both delays and cost overruns as new rebar had to be ordered and bent. Nevertheless, the piers were complete by the end of the week and the schedule was still largely intact.

After the piers were poured, a new foreman was posted at the site and work commenced on the gutter around the building foundation. Unfortunately, the carpenter subcontracted by HydraCon for making the wooden concrete formwork was unreliable and often missed deadlines. He caused delays in pouring concrete because his formwork was behind schedule. Nevertheless, the gutter was poured. The next step was to fill sand in the foundation up to the height of the slab—this was done by hand, and everyone from to community members to EP students to the EWB–PU team helped out.

At the midpoint of the construction phase, the EWB–PU professional mentors swapped. Pazdon returned to the United States and Arnett came on the ground. With the new foreman and HydraCon dedicated to make up for their previous egregious mistakes, construction work progressed at full speed. In two days, the sub-ground slab terrain was layered with aggregate and a waterproofing membrane. The entire 8" slab and surrounding apron was poured in two days. Following that momentous achievement, the construction crew and EWB–PU worked relentlessly to finish the project. With the structure finally out of the ground, the columns were erected and the ring beam poured in a record four days. Due to close supervision by EWB–PU, further mistakes and delays were largely minimized. In the end, construction was roughly $3300 over budget, largely because we needed more quantities of materials than originally estimated.

## Temporary Library

A library is not merely the shell of a building. More importantly, it is a haven of books. Recognizing this fact and desiring for the Ashaiman community to begin frequenting a library as soon as possible, EWB–PU decided to set up a temporary library for a year-long period between phases I and II of the construction project. EWB–PU contracted with Empire Shippers to ship roughly 1000 books from Princeton to Ghana. The books had been collected throughout the spring semester in conjunction with the Princeton Public Library. Forty boxes of picture books, textbooks, encyclopedias and more arrived in Ghana in late July. After waiting eight days for the ship to be unloaded after arriving in port, the EWB–PU team went to pick up the shipment with the EP Basic school bus. At the port, agents of the Sadeytex clearing firm were able to have our books cleared through customs without any duty. This development was a pleasant surprise, because although printed matter is officially non-dutiable in Ghana, the fickleness of the customs inspector is always a question mark.

While the ship was docked in port, the EP Basic administration helped the EWB–PU team hire a local carpenter to make shelves for the temporary library. These shelves will later be moved to the library structure once construction is complete. A total of nine shelves were made out of high-quality wood and the EP Basic School has pledged to treat the bookshelves to prevent any insect infestation. Following the unloading of the books, the process of stamping and sorting began. The books are sorted by reading level into seven groupings: Early Readers, Lower Primary, Upper Primary, Young Adult, Adult, Non-Fiction, and Refer-

ence. Each book was stamped and sorted onto the appropriate shelf. A group of dedicated EP Basic students came to the school even after term ended to help with the process. The EP Basic administration also hired a carpenter to outfit one of their office reception areas with a temporary wooden barrier and door. This area will serve as the temporary library.

Throughout the coming school-year, the temporary library will be run by the school. The EP Basic administration has agreed to hire a librarian. PTA teachers and parents have also pledged their support and even during the short time the EWB–PU team spent setting up the temporary library, two parents came out to donate a few hours out of their busy days. While the school has decided that for the time being, no one will be able to check out library resources, students, teachers, and community members are all welcome to come and use the books in the school compound. In the coming phase of the project, more community members, students, and parents will be registered in the library patron database to facilitate the check-out of library books, games, etc.

## Computer Infrastructure

The EP Basic School has a computer lab, funded through donations from the PTA. Out of roughly 20 computers, only six are working properly. The school is not yet connected to the Internet, through Internet connectivity is available through Vodafone, a local telecom operator. Vodafone offers a school package of 1 MB/s downstream speed for 89 GHc/month, or roughly $65/month. Vodafone representatives claimed that 20 computers could easily share this one connection.

EP Basic has the capability to repair common computer hardware problems. However, software problems can be debilitating. Low awareness and lack of antivirus and anti-spyware software means that computers, both at EP Basic and in Internet cafes across Ghana, are choking on viruses. Moreover, viruses are spread through ubiquitous USB flash drives, so even computers that are not online become infected. The EWB–PU team took three HP Mini netbooks with them to Ghana to pilot an eGranary resource and create a miniature network to assess the feasibility of a larger 50-netbook network. Though these three machines were equipped with Princeton-approved McAfee's anti-virus software and team members were diligent in carefully cleaning their flash drives, the netbooks nevertheless became hopelessly infested with viruses. The difficulties presented by this virus situation means that Linux distributions may be better suited for the EWB–PU and Ashaiman needs rather than Windows.

After resolving the computer software problem, EWB–PU plans to address the disastrous government-produced computer curriculum currently in practice at EP Basic. EWB

*Students learning how to throw a Frisbee.*

–PU team members firmly believe that the current curriculum is detrimental to students' growth in a vastly technological world. For example, the curriculum requires first grade students to learn how to single click and third grade students to learn how to double click. [What, then, do these students learn in second grade?] Consequentially, deployment of a computer lab in the Achieving Greater Heights Community Library will be supplemented with a new curriculum, developed in partnership with the local Johnson Park Elementary staff.

## Literacy Programming

As with all EWB projects, the GSLI encompasses a large anthropological component. One part of this component was in the development of effective educational programming and activities that will be facilitated in the Achieving Greater Heights Community Library. Over the course of the 2008-2009 academic year, EWB–PU team members worked to create a set of activities and potential programs to be implemented in the library. In order to pilot these resources, the EP Basic administration selected fifteen students from grades three through six to work with the EWB–PU team members. A summer workshop was held with these students for four weeks, past the end of the school term. Each meeting of the workshop lasted for three hours. The daily schedule included an hour of reading in the temporary library. Though the students initially were all drawn to the simple picture books, by the end of the four weeks, they were delving into the world of chapter books and more. After reading hour, EWB–PU members took turns holding various activities from playing soccer and Frisbee to making presentations on countries the students researched through encyclopedias. Throughout the process, each student was taken aside to individually

be assessed on reading fluency and comprehension. The EWB–PU team used Reading A-Z leveled books for the assessment. It was found that while reading levels varied quite widely (from levels *I* through *P*) and were generally below grade level, all of the students were eager to read. EWB–PU team members also discovered that students tended to not be familiar with descriptive creative writing. In school, they often only wrote academically. In order to show them another realm of writing, then, the summer workshop took on the challenge of putting on a series of play productions. Each class of students worked together to write their own script for a five-minute skit. The students learned how to do character sketches, describe settings, and format scripts. They found props, added a song and a dance, and on the day after construction ended, performed for an audience of over 40 parents, teachers, and friends. Working with the students was great fun for all of the EWB–PU team members. It was also highly productive in terms of assessing the educational programming that will accompany the completed library.

## Community Building

This summer's implementation trip marked the first time an entire team of EWB–PU members came to the Ashaiman community. Accordingly, EWB–PU team members made it a point to take the time to network with important individuals in the Ashaiman and EP communities, in order to ensure the success of the library project. Through the church, EWB–PU came to gain the support of the Member of Parliament for Ashaiman and the Ghana Education Service Director for Tema. The EWB–PU team also met with the leader of one of Ashaiman's major mosques, so as to connect with the area's large Muslim community. Through private leadership meetings and a PTA meeting, the EWB–PU team was able to set up a large support base. The team is confident that in future years, the time spent this summer on community building activities will pay off ten-fold.

## Lessons Learned

The implementation trip was a learning experience for all team members. Whether it was one's first construction project or one's twentieth, the unique conditions and experiences in Ghana meant that we all learned some valuable lessons to take forward.

1. On the construction site, have a single person in control. All team members should communicate with this single person, and only this person—not other team members—should give orders to workers;
2. The budget should anticipate a 25% excess in materials from calculated amounts;
3. Business cards and phone numbers shouldn't be handed out too freely;
4. Bring gifts in excess because there will always be someone that you forgot;
5. Set up meetings early, because things will take longer to get done than anticipated;
6. Bring and use a receipt book. Make sure to have carbon paper;
7. Get a head start on the final accounting by using the official spreadsheet and categorizing expenses for the appropriate person's cash advance or reimbursement;
8. Keep blogs up-to-date, and post lots of pictures;
9. Meet with workers before construction to go over safety and logistical procedures;
10. Supervise skilled workers carefully, because mistakes cost time and money.

## Contact Information


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