

By Christine Murakami

Girls Save the World through Computer Science



A dozen girls from Ohio delivered laptops to youngsters in the Caribbean and taught kids how to use them. In doing so, they learned something about themselves and discovered that computer science offers meaningful and fulfilling career choices.



It's no secret that fewer and fewer women are entering computer science fields. Attracting high school girls to computer science is only part of the solution. Retaining them while they are in higher education or the workforce is also a challenge. To solve this, we need to show girls that computer science is a wide-open field that offers many interesting career choices.

That's why I decided to take a group of high school sophomores and juniors from Columbus School for Girls (CSG) in Ohio on a service trip to the Caribbean, where we delivered 60 laptops to three classrooms of third through fifth grade students and taught them how to use the computers.

My intent was to expose my students to computer science through a service trip and show them that this field has many fulfilling pathways. The outcome of the project was that I tapped into a reservoir of enthusiasm that I have never seen in girls, and I found a way to attract more than the usual tiny group that has an affinity for computer science. I believe I have found a powerful way to show girls that computer science has facets beyond gaming and programming, and that the field attracts wonderful people focused on changing the world.

This project can easily be carried out in other private or public schools, either as an elective, after-school ac-

tivity, or club. What works for girls will also work for boys and minorities, both of which have declining numbers in computer science in the United States. Our country needs more computer scientists, and this is a great way to engage students who otherwise wouldn't consider it an option.

One Laptop Per Child

Almost since I began teaching, I have been paying attention to Nicholas Negroponte and his dream for the \$100 laptop. After the little green XO computer produced by Negroponte's One Laptop Per Child (OLPC) project became a reality in 2007, I've wanted to take a group of high school girls to deliver XO computers to a classroom somewhere and have the girls teach the students how to use them. The girls would have to understand hardware, software, maintenance, troubleshooting, and networking as well as have a working knowledge of the variety of "activities," including four different scripting languages, that come with the XO. It was a perfect way to entice girls to learn a lot about computer science.

I acquired my first XO during the Give One Get One (G1G1) event at the end of 2008. G1G1 allowed consumers to buy one \$400 computer for themselves and have a second one sent to a developing nation.

A short time later, I presented my idea to our school administration, and I offered a yearlong course during the 2009–10 school year. I made



innovation is

“Breaking free of the shackles of mediocrity because you have the foresight, the courage, and the conviction to believe that what you are doing will make a difference.”

—Kel Hathaway, USA



The CSG students said later that the relationships they made with the kids was the most fulfilling part of their entire year.



the course a requirement for anyone who wanted to go on a laptop delivery and teaching trip at the end of the school year. No one could travel if they weren't prepared to teach. I knew I was onto something special when more than 30 girls showed up for an initial interest meeting, and this was before I had chosen a recipient community for the laptops. The service was what attracted them.

I limited the class to 15 girls, with two alternates who audited the class in hopes that they might be able to travel if others decided they couldn't. (When have you *ever* had a teenager take a class voluntarily without the promise of a grade to keep them motivated?) The class started in September 2009, with plans to travel the following May.

The Course

The independent study course met approximately once a week for the entire school year. If I had offered a course on hardware and software troubleshooting, networking, and programming, not a single student would have shown up. Yet that is exactly the content that the course covered. By keeping the goal on the service, the students learned the computer science to reach that goal. And, in creating this course, without really thinking about it, I had created our school's first service-learning course. At CSG, we have a two-week period in May between the end of exams and commencement when we offer experiential learning to our students. It was the perfect time to fit in the trip.

The XO

The XO was designed for children in developing countries. It is durable, built for small hands, and has an operating system (Sugar) designed specifically for kids. It is also lightweight, inexpensive, and powerful. The XO uses open source software, so a gift of the hardware includes a large supply of free updated software.

Because the XO was so different from every system we'd learned before, we all started at the same place. There could be no perception of who was “good at computers” and who wasn't, because we were all beginners. Lack of self-confidence with computers is one of the things that prevents girls from pursuing computer science in the first place. They believe they don't know enough, and they feel unqualified, even before a class begins. With the XO, no one was behind.



Laptop Acquisition

Acquiring the laptops was going to be a challenge. OLPC sells them only in bundles of 100, and \$20,000+ was far too much money for us to raise. When I began this project, the economy had just begun to have a serious impact on private schools, so we were asked to refrain from fundraising. We had to get creative.

We acquired a handful of computers through eBay at the beginning of the project to allow the girls to start learning about the XO, but we needed a lot more units to donate to the recipients. Fortunately, we learned that many people around the world who participated in the G1G1 program were not using their personal XO computers. OLPC created a wiki for people to find projects to donate their unwanted XOs to. I listed our project

on the website and was able to acquire nearly 40 donated XO laptops over the course of the year!

The fact that we couldn't purchase new XOs was a bit of dumb luck. Close to 25% of the donated laptops needed some sort of hardware repair, which provided my students with real-life, hands-on experience taking apart the computers, locating replacement parts, pilfering working parts from broken computers to replace broken parts in another computer, upgrading them, and preparing them for donation. In this endeavor, the OLPC community was invaluable. The XO computer is the best-supported computer on the planet. All the information we needed to fix the units was either on the various wikis that OLPC supports or was graciously provided in e-mails and phone calls.

I have never experienced so many people who were so willing to help in so many ways.

The Recipient Community

One of the most difficult aspects of the project was finding a recipient community that would be able to continue to learn with and use the donated computers after we delivered them and departed. I also had to consider the safety risks of traveling with teenage girls, the language barrier, and the cost of travel during the recession because the girls would have to pay their own way. Because the folks at OLPC don't operate on such a small scale, I was left trying to find another organization to partner with.

I contacted many people who had projects listed on Donate Your Get One wiki with an offer something like

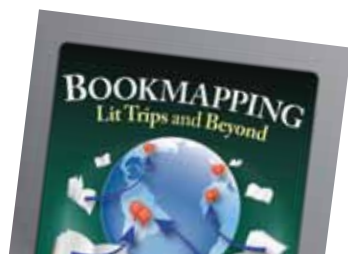
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this: “I have a donation for you, but there’s a catch: I would like to bring a group of teenage girls with me to deliver the computers and teach about them for two weeks.” The Waveplace Foundation was interested in supporting us. Waveplace raises money to purchase laptops for Caribbean children, creates training materials for teaching digital media skills, and inspires teachers to use computers in new ways. This met all of my criteria: The organization had the structure in place to support the teachers and students even after our departure, the location (St. John in the U.S. Virgin Islands) is English speaking, and it felt safe for first-time travelers.

Waveplace focuses almost exclusively on teaching Etoys, a wonderful drag-and-drop programming language that was designed for young children (ages 8–12) but is powerful enough to be used for college courses and complicated modeling. This gave my students the added benefit of spending more time programming than I’d originally intended.

The Trip

Ultimately 12 students made the trip. We traveled to St. John in May 2010, met up with a group of Waveplace volunteers, and worked at the three schools on the island for 10 days. Each school had recruited 20 students in grades 3–5 to take the 10-day class. Two Waveplace board members who live on St. John helped liaise with the schools even after we left.

Our experience at the three schools was unforgettable. My girls made immediate connections with the St. John kids. Every day there were hugs and shrieks of “They’re here!” whenever our safari cab drove up to the schools. The CSG students said later that the relationships they made with the kids was the most fulfilling part of their entire year.

We taught mostly Etoys, with a little bit of Sugar (the XO operating system)

so that the students would understand how to access the other programs on their computers. Each student progressed through 10 lessons and began writing a living, moving “storybook” of their own. Students continued to work on their storybooks after the course ended and my CSG crew returned home.

What Happened Next

Almost every one of the students in my course has plans to continue their work with OLPC or computer science.

- Some sought summer opportunities overseas on other OLPC projects.
- Some focused their senior internships on OLPC.
- Some took more programming classes.
- Some started an OLPC club at our school.

After the trip, several students asked, “Do you think I should go into computer science?” This is when I knew the trip had been a success. The girls were energized by what they experienced, and they wanted to do more. I even heard one girl say, “I love programming,” which may not sound like much, except that for months this same girl had been saying she just didn’t understand why she was being asked to do what she was doing. Now she gets it.

Extending the Project

After school began this past August, three things happened. First, a new group of students wanted to participate in the same type of project, so I began the process all over again. If you are reading this in May, we are in St. John delivering a second supply of laptops and working with youngsters. Second, many of last year’s students wanted to continue their participation. They wrote curricula for Waveplace, learning Python so they could write Sugar activities or acting as teaching aides for the newer students.

Third, a new group of students who wanted to help but couldn't travel also are writing curricula for Waveplace—using Etoys—including units on malaria, sanitation, geography, music, the environment, and a variety of other subjects that are useful to the global community. In all three cases, the students are motivated by *real* work that serves a *real* purpose in the world.

What more could you ask for?

Lessons Learned

This is the most engaged and involved I have ever seen girls in computer science. I hit an important nerve with this project. The education literature tells us that relationships are important to our female students. It tells us to focus on real-world issues. It tells us that girls would rather use computers as a tool to reach other goals, not as something to tinker with because it's cool. In this project, the students

had to learn computer science to reach their real goal: teaching kids. The project wrapped relationships together with social change and used computer science as the vehicle to get there. The combination was powerful. They learned that computer science can play a role in changing the world.

Resources

CSG student-created blog, first year: <http://csgolpc2010.weebly.com>
 CSG student-created blog, second year: <http://csgolpc2011.weebly.com>
 Donate Your Get One wiki: http://wiki.laptop.org/go/Donate_Your_Get_One
 Etoys: <http://squeakland.org>
 One Laptop Per Child: <http://laptop.org>
 The Waveplace Foundation: <http://waveplace.com>



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 Hanalani Schools, Hawaii

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