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INSTRUCTOR’S FOREWORD

Whereas some remarkable student papers arise from extensive consultation and conversation (see my previous introduction), others arise, as if by magic, almost fully formed, with little instructor intervention. Tonya is one of those students who started with a research topic that immediately achieved exactly the right level of specificity. Her focus on the MIT Media Lab’s One Laptop Per Child (OLCP) Project allowed her to anchor her inquiry into a broad range of questions related to technology, education, and international aid, without veering off into airy abstractions or ungrounded generalities. What Tonya’s paper reveals is that there is reason to be skeptical of OLPC’s claim to be “an education project” and not just “a laptop project.”

The problems OLPC seeks to confront—whether described as a “digital divide” or a “knowledge divide”—are real enough. But, as Tonya powerfully demonstrates, however important technology is, and however tempting it is to focus on the dazzling specifics of OLPC’s amazing hardware, one cannot simply airdrop XO laptops into an impoverished mountain region and expect miracles to occur. A vast human infrastructure must precede and enable such new technologies, if those devices—and the students they are meant to serve—are to achieve their full potential. As we discussed frequently in our PWR 1 class, “Rhetoric, Social Media, and Virtual Worlds,” technology is not only about microprocessors, flash memory, and open-source code but also about cultural codes, social memory, political-economic processes. If this perspective is correct, one must focus as much on curriculum as on code if one hopes to improve educational outcomes. Tonya’s affecting account of Diego, and the mystery of what he’s doing now, underscores the need to match technological development with human and social development.

—Lee Konstantinou
One Laptop per Child: A Need to Help Teachers Help Students

Tonya Yu

Diego is a seven year-old Peruvian boy who lives in the small mountain village of Arahuay. He lives on the charity of neighbors because his father left the family long ago, and his mother works in the capital, Lima, about a hundred kilometers away. Nobody tells Diego to go to school, so he stopped going when his mother left. But one day, his former teacher paid him a visit to make a bargain: If he came back to school, he would receive a free laptop. Diego didn’t know what a laptop was, but he figured he could sell it for some money, so he returned to school, collected his laptop, and… discovered that he had a natural aptitude for it. Like a blind boy suddenly discovering sight, he became entranced by the magical fountain of knowledge and entertainment. He wanted to keep the laptop so much that he decided to stay in school. Soon he began teaching his classmates—each with their own laptop—some new features that he had figured out himself. He is now learning about possibilities of a life for himself outside of his village. Maybe when he grows up, he will be able to become an educated worker and earn enough money to help children like him in his village.

This is the kind of true story that fuels the ambitions of One Laptop per Child (OLPC), the project that supplied the laptops. OLPC is a global project spearheaded by Nicholas Negroponte “to empower the children of developing countries to learn by providing one connected laptop to every school-age child” (One Laptop Per Child “Mission”). The organization sells their specially designed “$100 laptops,” officially named the XO laptop, directly to national governments, which purchase and distribute the laptops to schools with their own resources. As of August 2010, OLPC has deployed
1.85 million XO laptops to over thirty countries around the world, most of them developing countries like Uruguay, Rwanda, Haiti, Mongolia, and Afghanistan (One Laptop Per Child “Deployments”). The children keep the laptops and are allowed to take them home. OLPC hopes that by furnishing these laptops to underprivileged children, the children will be able to gain the skillset needed to survive in the global economy and finally break out of the cycle of poverty.

Negroponte’s announcement in January 2005 of his organization’s plan to produce a $100 laptop initially generated much skepticism in the tech world. Prior to the XO laptop, computer manufacturers had focused on creating high-performance machines and had never even considered marketing to developing countries. OLPC essentially opened up a new education market for cheap computers and paved the way for the salability of netbooks in 2008 (Kraemer, Dedrick, and Sharma). This means that developing countries now have several options to choose from if they decide to implement one-to-one computing in their schools, and they do not have to become dependent on one particular system. Cheaper computers also make computing more affordable to many more families in general, democratizing information by bringing access to knowledge to a greater portion of the world.

But for all it has achieved, simply shipping laptops to disadvantaged areas will not solve any problems on its own. It is only the first step in enabling children to receive a better education. In order to ensure that children are actually learning how to take full advantage of their laptops for the right purposes, many other factors must still be taken into account in the education system, such as teacher training, curriculum integration, and systemized evaluation. In light of popular criticism that OLPC does not “recognize that technology is just a tool, and … that you need not only the tool, but the connectivity, the content, the teacher training to make it all work” (Barrett), the remainder of this paper will analyze how much focus OLPC actually puts on education rather than on just the laptops, and whether that focus is enough. First I will identify the problem that children in developing countries face, and why information and communication technology (ICT) is considered crucial to raising their education to modern standards. I will analyze how OLPC proposes to help solve that problem and how it currently carries out its intentions. Then I will consider other case studies of using laptops in the classroom and in third-world countries to suggest how OLPC could improve its strategy to better fulfill its mission as “an education project” and “not a laptop project” (One Laptop Per Child “Mission”). OLPC should be admired for its ambitious goals and recognized for prompting other companies and non-profits to take action regarding universal education, but it assumes that pure technology will solve more
problems than it is capable of doing, so it should concentrate more efforts towards training teachers and helping them develop curricula that fully integrate the XO laptop.

The Digital Divide

Diego’s hometown, Arahuay, is an agricultural and farming village of 700 people nestled in the Andes mountains of Peru on the slope of a valley. With only two buses that stop there each day and almost no mobile phone signal, Arahuay is not particularly connected with the rest of Peru, let alone the rest of the world. Many of the 2.1 million children who live in extreme poverty in Peru live in isolated mountain villages like Arahuay where they have “very few resources for a modern education” (One Laptop Per Child “Children > Countries > Peru”). Photos of Arahuay’s only school on the OLPC website depict spare, dusty classrooms furnished with old and clunky desks and chairs and chipped blackboards. The plumbing and scaffolding are completely exposed, and each room is supplied with only enough electricity to power a single light bulb. Students have generally never used computers before, and even teachers have had very little experience with them. Additionally, the schoolrooms lack any reading materials or reference books like dictionaries because they are too expensive (Monroy, et al.). Without computers and dictionaries, basic learning tools that are often taken for granted in developed countries, the children of Arahuay will probably not be able to gain an education beyond the elementary school level. Even the schools in Lima at least have full electricity and limited computer access, which is enough to put their students at a slight advantage to those in Arahuay (Talbot). Students without such resources are wholly dependent on the capabilities of their teachers, who may have been formally trained but probably went through the same education system, and thus lack the competencies of teachers from the developed world (Krstić, “Astounded in Arahuay”; Negroponte, “Can the $100 Laptop Change the World?”).

Politicians call these discrepancies in access to technology and the ability to use it the “digital divide”. To have access to technology is to have more than just the ability to surf the Internet. It means that technology has been allowed to penetrate the society’s culture—its news media, commercial industry, and education system, for example—all while forming a new burgeoning IT sector that creates many high-skill jobs. As all industries move to incorporate information and communications technology (ICT) and become increasingly knowledge-based, developing countries without ICT fall farther behind, and their economies suffer even more for it. Without sufficient funds to build infrastructure for ICT, it follows that their education
systems will also lag more and more behind those of developed countries. As Marshall, Kinuthia, and Taylor remark in the introduction to the book Bridging the Knowledge Divide, “Unless ICT becomes an integral part of the development, delivery, and content of education, the disadvantages will deepen” (xxvii). Eventually, the digital divide deepens into a greater social issue known as the “knowledge divide”—where countries on the wrong side of the divide not only lack access to information, but also have not learned or are incapable of processing and managing that information (Marshall, Kinuthia, and Taylor xxvii).

But even with the support of world superpowers, it will take decades to build and implement the infrastructure to support ICT in developing countries, not to mention train all the workers and teachers to use the new technology (Negroponte, “Can the $100 Laptop Change the World?”). That’s why initiatives like OLPC believe the most worthwhile solution is to enable the children of developing countries—their “most precious natural resource”—to make use of ICT to expand their minds and enhance their educations in the meantime (“Nicholas Negroponte on One Laptop per Child”). Education is the fountain of all possible solutions to cure the many other socioeconomic problems that third-world countries face, and technology can be a powerful enabler of that education. In a 2009 report published in the Harvard International Review, Gallup researchers found that, when comparing countries with similar per capita GDPs, “students in countries where more people own computers performed better” academically¹ (Pelham, Crabtree, and Nyiri 75). Thus, computer ownership can be uniquely correlated to academic success. What children in developing countries lack is not the capability to use technology or to learn, but the opportunity and resources, and OLPC aims to fill that void.

“An Education Project, Not a Laptop Project”

The ambitions of the OLPC project actually grew from decades of experiences with other educational pilot projects. OLPC’s basic philosophy is founded on a learning theory proposed by Seymour Papert, Negroponte’s colleague, that he calls “constructionism,” which is strongly rooted in the “learning by doing” school of thought, combined with the belief that computers can help children “learn learning” (Tabb 339). Papert and Negroponte, along with computer scientist Alan Kay, ran a pilot project sponsored by the French government in 1982 in which they distributed Apple II microcomputers

¹ Measured by PISA scores, “based on reading, mathematics, and science, with emphasis on both abstract knowledge and real-world application”; see Pelham, Crabtree, and Nyiri 74.
to school children in a suburb of Dakar, Senegal. Negroponte reported in his popular TED talk in February 2006 that the children “could just swim like fish; they could play these [computers] like pianos,” proving that “children in remote, rural, and poor regions of the world take to computers as easily and naturally as children anywhere” (One Laptop Per Child “Project”). According to Negroponte, the only problem was that the project did not scale (“Nicholas Negroponte on One Laptop per Child”).

However, others have been more skeptical about the real impact of the Dakar pilot project. According to former OLPC employee Ivan Krstić, the project was “a spectacular flop” that “demonstrated nothing about anything” (“Sic Transit Gloria Laptopi”). Krstić maintains that Papert’s constructionism theory is still but a theory, a concept that appears sound but that has yet to be proven on a moderate to large scale with one-to-one computing. The results that Negroponte saw in Senegal were likely only the immediate effects of introducing computers to that environment, and were not indicative of any long-term benefits. Since “clashes of management style, personality, and political conviction” caused the French government to quickly shut down the project, a follow-up to evaluate the results was never executed (qtd. in Krstić, “Sic Transit Gloria Laptopi”).

But Negroponte and Papert were nevertheless emboldened by the early success they saw in the Dakar pilot project and went on to found the MIT Media Lab in 1985 with a mission to “invent and creatively exploit new media for human well-being without regard for present-day constraints” (One Laptop Per Child “Project”). The Media Lab has since supported several constructionist projects in Boston, Costa Rica, and Cambodia (Krstić, “Sic Transit Gloria Laptopi”; “OLPC: Project”), though all on extremely small scales (limited to one school or involving twenty or fewer people). OLPC was Negroponte’s final and most ambitious project with the Media Lab before he left as its director to fully dedicate his time to the now-separate initiative.

In order to produce the laptops at such a low cost, OLPC had to first convince a computer manufacturer to produce a low-end computer, and then to order them in mass quantities—Negroponte put initial estimates at 100 million units a year (“Negroponte on One Laptop per Child”). A completely new type of machine was envisioned so that it would be able to withstand the harsh physical conditions of many of the rural areas it would be deployed to, as well as the extra wear-and-tear handling of children. Not only is its hardware slimmed down from the specifications of traditional laptops (i.e. it uses a flash drive instead of a hard drive, and it does not have a cooling fan), but the laptop is rugged and moisture- and dirt-resistant (Tabb). The XO laptop is also unique for its constructionist under-
pinnings, specially designed for children aged six through twelve. The laptops automatically form a mesh network with each other, so only one computer needs to be connected to the Internet, and it can propagate that connection to the other computers in the network (Silverman 2). They feature a distinctive childlike aesthetic, with bright green antenna ears and a shrunken keyboard to suit small hands (Tabb), partly to appeal to children, but also partly to deter theft by creating a product too specialized to sell on the gray market (Negroponte, “Nicholas Negroponte on One Laptop per Child”). The screen swivels around and lies flat to transform into an e-reader (Silverman 2). In addition, the Linux-based operating system, called Sugar, was also developed entirely in-house. It sports a pictorial GUI to be accessible to children of all languages and literacy levels (Zittrain 236), and its “zoom” paradigm shows nearby laptops to emphasize different levels of collaboration, from the greater community down to the individual “activity” that the child is currently working on. Such activities include a graphical music composition application, an “acoustic ruler” that measures the distance between two laptops, a “paint” program, and several graphical programming applications. Thus, Sugar places its emphasis on creativity and collaborative projects, rather than rote consumption of data (One Laptop Per Child “Laptop Interface”).

Figure 1. The XO laptop, displaying the Sugar interface (http://laptop.org/en/laptop/hardware/index.shtml).

According to Negroponte during his TED talk in February 2006, about a year after launching the project, the organization had raised $20 million so far to develop the hardware and software of the XO
laptops. The huge investment of time and money spent on the laptops has aroused much scrutiny about the organization’s true goals, and whether it is more interested in the technology or in education. Even OLPC employees expressed disapproval at the excessive attention spent on the software. As Krstić wrote in an internal memo during his employment at OLPC, “Choosing to reinvent the desktop UI paradigm means we are spending our extremely overconstrained resources fighting graphical interfaces, not developing better tools for learning” ("Sic Transit Gloria Laptopi"). Notably, India’s Ministry of Education initially declined to participate in the program because it said its country needed “classrooms and teachers more urgently than fancy tools” (Oates), suggesting that OLPC’s efforts may be less appreciated than it had expected.

Other computer manufacturers have capitalized on this criticism by initiating production of their own low-end laptops using existing operating systems and software, such as Windows and Microsoft Office. In 2006, Intel unveiled the classmate PC, and the next year Asustek released the EeePC notebook, both designed for students in developing countries. Several other manufacturers began selling similar laptops or netbooks for just a couple of hundred dollars, spurring adoption of netbooks and helping lower the economic barrier of access to computers in developing countries—which will also aid in integrating ICTs in their economies and education systems in the long run (Kraemer, Dedrick, and Sharma).

However, these computer manufacturers have relegated educational goals in favor of focusing on increasing their market shares. OLPC’s ultimate mission as a non-profit, on the other hand, is to help solve a pressing global social issue. The Sugar operating system is arguably more child-friendly and better geared to encourage individual exploration, even outside of the classroom. OLPC justifies creating totally new software by claiming that it wants not only to promote computer literacy, but also to equip children with the means to use computers as tools in all learning pursuits, school-related or personal, while inspiring them to become invested in their own education (One Laptop Per Child “Laptop Software”).

Educating the Education Project

Unfortunately, OLPC’s current deployment strategy does not reflect the same careful attention to educational benefits that was paid to the development of the XO laptop. A prominent New York Times exposé in 2007 described how a one-to-one laptop program in Liverpool, New York failed to produce better test scores because teachers were not properly engaged and the goals of the program were not clearly explained (Johnson 73). Thus, it is critical that OLPC devote
more energy to what happens after the laptops are deployed, because introducing laptops means catalyzing an entire paradigm shift in those education systems—and no matter how intuitive it is to use the laptops, it will take a full support system to ease that transition.

It is especially paramount to thoroughly train teachers on how to integrate the laptops into their classrooms because there may be some resistance to full adoption of the laptops. Encouraging students to take charge of their own learning implies that teachers, traditionally in an authoritarian role, should suddenly take the back seat, which flattens the long-established pyramid of power. As an example of how some teachers feel about the laptops, one teacher in Arahuaay told her students, “You won’t take your laptops home today because yesterday, instead of doing your homework, you were playing with your laptops,” even though students had not completed their homework due to other reasons (Monroy, et. al.).

Although the strategy of learning through exploration follows the constructionist theory, it does not adequately teach teachers and students how to take full advantage of the laptops in practice. Students can discover many new things on their own, but they need a wise teacher to guide them on the right path. Jason Johnson, who manages a one-to-one laptop program for fourth to sixth graders in the United States, says that he “depended upon having talented educators to capitalize on that energy and interest and redirect it toward more productive pursuits... Teachers and librarians pulled back the curtain to show students that their newly developed skills had value beyond the limited scope of the student’s immediate interests.” Currently, OLPC only offers limited computer literacy training to teachers through brief on-site workshops in the few weeks after the laptops are received (Monroy, et. al.). There are just “a handful of trainers to cover the thousands of schools that will serve as distribution points, and the training function is more to ensure installation and functioning of the servers rather than true mastery of the machines,” leaving the rest to be learned through mostly trial-and-error (Zittrain 236). In a pamphlet-sized “OLPC Learning Guide” which devotes only two pages to glossed-over curriculum suggestions, OLPC says they are “not defining what children should learn with the XO because [they] believe that those decisions need to be made at the local level.” Yet using the XO laptops is so markedly different from traditional teaching methods that teachers who work with the OLPC program will need to create new lesson plans that focus less on meeting standards and more on fostering personal progress, a demanding task that may prove near impossible without supporting materials from OLPC (Canuel).

Meanwhile, other educators have recognized this void and have integrated the XO laptops within their own specially structured cur-
ricula. Maureen Orth, for example, is a journalist who founded the Marina Orth Foundation to teach English, ICT, and leadership to children in Colombia. In an interview with a TechCrunch subsidiary, she said, “we really find that especially teacher training is the most neglected [in the OLPC project].” Her foundation works closely with the teachers every day and aids them in developing curricula which properly exploits the potential of the XO laptops (“Marina Orth Foundation”). This approach clearly defines the role of the laptop as a rich resource and tool to be tapped for learning, but not the end of the entire solution. If OLPC wishes to truly label itself as an education project, then perhaps it should take a similar approach and aim not only to educate students but also their teachers.

**Ambition ≠ Success**

Another factor which the OLPC project could improve on is that, despite its grand scale of the OLPC project, it has yet to address the failing points of the Dakar pilot project in the 1980’s: namely, it does not have a strategy to prove that constructionism produces long-term results on a global scale. During Krstić’s employment from 2006 to 2008, the organization did not even have a deployment team “helping to plan [deployment], working with our target countries to learn what works and what doesn’t” (“Sic Transit Gloria Laptopi”), calling into question how serious OLPC is about really improving education.

The first step to rectify this issue would be to listen to feedback from laptop recipients after they have had extensive experience with them. Recipients report now that “the desire to hear from ‘others’ is not well appreciated” at OLPC (Canuel). Negroponte himself has claimed that “this is not something you have to test” and “to criticize it is a little bit stupid” (“Nicholas Negroponte on One Laptop per Child”). This self-righteous attitude has been highly disparaged by education experts and developing countries’ governments alike. Without a willingness to reflect upon and improve its strategies, OLPC risks locking itself into the outdated, inflexible mindset of the very type of education it is trying to revolutionize.

The second step should be to perform systematic evaluations of the educational impact of integrating the XO laptops into third world classrooms. The OLPC website proudly states that “an early evaluation of progress in Peru released in May 2009 showed a 50% improvement in reading comprehension among students and of almost 60% for textual and mathematical analysis. The study also noted the texts produced by children and teachers demonstrate more creativity and improvement in writing and spelling” (emphasis added). In fact, experts have identified four phases of one-to-one laptop deployment, beginning with “euphoria” in the first eight to twelve
months, then digressing to a “dip” phase in the next twelve months where users become disillusioned with the technology (Canuel). Thus, an early evaluation should never be taken as a predictor of continued success or duplicability in other regions. With teachers already somewhat reluctant to accept the laptops as immersive teaching tools, it would be easy for them to give up on the laptops during the “dip” phase. OLPC loses integrity as a charitable organization with ambitious goals by not implementing a system to hold itself—and teachers—accountable.

Conclusion

The OLPC project has generated a multitude of both praise and criticism since its inception in 2005. Indeed, it is easy to esteem such a noble cause, but a project on this grandiose scale is bound to have many shortcomings as well. There are several points which would help establish OLPC as a credible education-focused organization. For one thing, teacher training should not be an afterthought but a priority. This would take considerable shifts in management and require much more manpower, because teacher training does not scale as quickly as laptop distribution. OLPC could also expand its Learning Guide and offer more materials for teachers to use as they begin to develop their own, suited for their unique environments. Also, while positive immediate feedback is crucial because it keeps up momentum and fuels publicity, long-term evaluation is necessary to ensure that the millions of dollars donated to OLPC are being used as effectively as possible. Diego’s story was written up in a report in 2007; we don’t know how he or his classmates are doing today. Have they fallen into the same trap of using their laptops excessively for entertainment, as students are wont to do?

Another issue to explore is the sustainability of a program like OLPC. What will happen when the children outgrow the XO laptops? After all, they are designed for children up to age twelve and are expected to have a five-year lifespan (Tabb 339). To dote on younger children and neglect them after they mature seems like fighting only half the battle. Developing countries risk becoming too dependent on OLPC, which could potentially snare them into a contract to purchase even more laptops for older children. And in the end, that would not really break the cycle of dependency that the XO laptops are supposed to eradicate.

Perhaps the best measurement of OLPC’s success that we have today is the effect it has made on the netbook market. There is no doubt that the introduction of the concept of a sub-performance laptop contributed to the sales of 10 million netbooks in 2008 (Kraemer, Dedrick, and Sharma). In the long run, this will make comput-
ers more accessible for people of all ages worldwide—that would help reach the greater social goal of uplifting countries of poverty, which OLPC is trying to do through education.

Works Cited


---. “Nicholas Negroponte on One Laptop per Child.” TED2006. TED.
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