

**Imagine Every Child:
One Laptop Per Child's Distance Education Program
Reaches Students in Developing Countries**



Photographer: Ana Cecilia Gonzales-Vigil (2008).

Three students in Arahuary, Peru play with their new One Laptop Per Child XO computers after school.

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In 2003, over 103 million elementary school aged children were not attending any sort of school institution. About seventy-five percent of these children (over seventy-seven million potential students) were living in Sub-Saharan Africa and parts of Asia – areas of the world notoriously known for having sub-standard living conditions (The World Bank, 2009). Yates (2000) predicts that most illiterate individuals will be clustered in about twenty Sub-Saharan African countries by 2015. While sending textbooks to these poorer communities is one way to combat the sizable shortage of educational opportunities given to these students, a potentially more effective strategy is to use distance education. Education in these countries is important and a case study of the non-profit One Laptop Per Child will examine how this organization attempts to make distance education possible.

Students in African and Asian developing countries often receive at least five years less education than their American or European counterparts. These children, on top of dealing with many other issues that are commonly present in third world countries (such as disease, human rights violations, malnutrition, and violence), are seriously lacking in access to knowledge. Studies have shown that increasing the years a child is in school can have major impacts on many facets of his or her life. Some of these impacts include a decrease of malnutrition, an increase in life expectancy age, and an increase in personal income. For his or her community, it could mean an increase in immunizations and increase in economic growth and productivity (The World Bank, 2009). In addition, according to author Chimombo (2005), increased education often leads to a decrease in human rights injustices and political strife.

Few could disagree that education has indisputable benefits for developing societies. However, increased education overseas can be advantageous to even developed countries like the United States. Greg Mortensen (2007) argues that education improvements can drastically reduce

violence. He contends that if girls receive up to a fifth grade level of education they are much less likely to allow their future children – and especially their sons – to lead lives of violence. In a world that is often bombarded by thoughts and fear of terrorism, this could be a welcome change. In addition, the reduction of the spreading of infectious diseases can be a reward for any country. Finally, Chimombo (2005) suggests that increases in economic wealth can lead to increases in inventions and technology advances; the subsequent increase of trade and idea exchanges could be a huge benefit to other countries.

On a different yet equally important note, many argue that because the United States is economically privileged, Americans are morally obligated to help those less fortunate. Ethicist Peter Singer (1999) comments that, on average, Americans spend about one third of their personal income on non-necessities (whether that means going to Disneyland, buying Gucci handbags, or spending spring break in Cabo), and he argues that this is unethical. One way that Americans can repay this moral debt and improve the state of education in developing countries is to support organizations that participate in distance education programs.

Distance education, also known as cyber-education or e-learning, is an effort to use technology to connect and teach students who are physically separated from the professor or teacher. Williams (1999) argues that there are a variety of levels of distance education based on differences in the degree of interactions the students have with the instructor. Programs can vary from websites that supplement class time with online assignments (like GauchoSpace and Moodle) to colleges that offer degrees through virtual classes. A study conducted by Zhang (2005) found that students were more successful in school and were more pleased with their education when they were in classrooms that used distance learning (as opposed to more “traditional” classrooms) (cited in Killedar, 2008, p. 110). In 2008, Killedar concluded that the

results of his study generally supported the effectiveness of distance education, virtual classrooms, and interactive e-learning environments. In terms of developing countries, distance education may be even more important for students' learning. Former United Nations Educational, Scientific, and Cultural Organization director Victor Ordonez argues that “[c]onventional education systems are often not only unaffordable and irrelevant but also alienating to many of those they are intending to serve” (cited in Yates, 2000, p. 22).

There are a variety of forms of these unconventional education systems in developing countries. Larson (2007) discusses the organizations that have established “Community Learning Centers” – small huts that can house four to ten computers with Internet connection capability – in rural Mexico and China; teachers and students alike can go to these centers to access information. In some countries, a national television network that contains programs with health and agricultural information has been employed while others use Short Message Service technology, simple cell phones to increase communication between teachers and their students, who may reside miles away from the schoolhouse (Islam, 2006; Kenneth, 2008). Yet another form of distance education is the implementation of personal computers to students in developing countries. The organization One Laptop Per Child (OLPC) aims to do just that – to provide every child with his or her own laptop.

Founded by Massachusetts Institute of Technology graduate and professor Nicholas Negroponte in 2005, One Laptop Per Child's “educational initiative” has brought about the creation of a computer product known as the “XO” that is marketed for children aged six to twelve (Johnson, 2008, p. 72; Hatch, 2009). At the end of 2008, OLPC began an ad campaign with deceased musician and singer John Lennon urging the public (through a digitally created voice) to “Imagine every child, no matter where in the world they [are], access[ing] a universe of

knowledge”(Bloom, 2008, p. 2). OLPC asserts that the organization is focused on “imagining every child” and not selling technological products. Johnson (2008) supports this claim.

However, because students in developing countries often live in remote areas that are frequently exposed to harsh conditions, OLPC did make it a priority to create a durable and long-lasting computer design.

After reviewing all the design features, Rapoza (2007, “Insight”) concludes that OLPC has “ma[de] the XO one of the most efficient computing systems ever built,” which is an unarguably positive achievement for a computer that is expected to run under unforgiving circumstances (p. 56). The laptop, which is “lighter than a lunchbox” and is expected to operate for at least five years, has been tested to work after falls of up to fifteen feet and has a layer of flexible rubber all around to close off its interior hardware to outside water and dirt (OLPC, 2009; Pierce 2008). Former OLPC CEO and design innovator Mary Lou Jepsen formulated many aspects of the computer, but perhaps one of her most fruitful developments is the two-mode screen. While the color-backlight mode is similar to what most computers have, Jepsen created another option – a high-resolution, black and white setting that allows children to read the screen when they are using the computer outside in bright sunlight (McDonald, 2009). In terms of the battery, OLPC designers made it so that outlets, solar panels, or a personal hand-crank charger can power the laptop, which needs to be recharged only once every eight hours (OLPC, 2009, Features; Pierce, 2008). OLPC’s personal computers use about two watts of power (as opposed to other laptops, which can consume anywhere from ten to fifty watts). This energy saving capability is due to another of Jepsen’s unprecedented achievements: a console in the computer shuts off the central processing unit that runs programs when students are viewing pages of unmoving text and images (McDonald, 2009). Jepsen and others have created a device

that can feasibly work and last for students in developing countries who do not have access to a local Best Buy or customer service phone support.

In addition to considering the environment in which the computers will be used, the OLPC designers have kept in mind the demographic they are appealing to. Children can capture events with pictures and movies with a built-in camera, talk to other XO owners with the microphone and speakers, and play games such as Sudoku or Tetris (OLPC, 2009, Features; Talbot 2008). Students can also pick from different colored labels and can take advantage of hundreds of downloaded books and poems, typing programs, and art and music activities (Talbot, 2008). The screen has the capacity to rotate 360 degrees (depending on what students are using the computer for) and the touchpad can be used with their finger or a stylus (OLPC, 2009). Additionally, the laptops have a “meshing network” through Wi-Fi that allows them to connect with other laptops (Jepsen, 2006, p.2). The entertainment value and flexibility make for a product that school aged children will be eager to use for learning.

Originally promised to be the “one hundred dollar laptop,” the OLPC XOs cost \$188 dollars when they first hit the market (Butler, 2007, p. 6). Hatch (2009) says that with production costs and the fluctuating value of the dollar in other countries, the computers cost anywhere from \$180 to \$200. However, computer designer Jepsen comments that laptops have the ability to drop price significantly (sometimes up to half), depending on the quantity of computers being produced (Miyoko, 2008). So what does the future hold for the XO? Negroponte still believes the XO’s price will eventually drop down to one hundred dollars. Despite the failure to reach the objective asking price, the cost of an order of laptops can be remarkably lower than that of buying hundreds of books per student. Oscar Becerra, member of the Education Ministry in Peru, claims that purchasing the resources provided on the computers could cost at least five times

more than the laptop itself (Talbot, 2008). A price tag of \$188 looks pretty appealing when the alternative is doling out close to a grand.

Although not at as low cost as planned, OLPC has been able to deliver laptops to students all over the world. The computers are sent to warehouses near the schools that will receive them, batteries and software are installed, and then they are sent off in their “digitally locked” configuration to prevent theft (Levy, 2007; Talbot, 2008, p. 66). States such as California, New York, and North Dakota have begun to use the OLPC XOs (OLPC, 2009, Children). And, besides being implemented in many school districts in the United States, the OLPC laptops have been delivered to over thirty countries, including Peru, Mexico, Mongolia, and Haiti (Talbot, 2008). Negroponte reports that, since its inception in 2005, OLPC has sold over one and half million computers and 850,000 of those have already been delivered and are in the hands of students (McDonald, 2009).

While these numbers are significantly less than Negroponte's original goal of 100 million laptops distributed by 2008, OLPC has made a great deal of progress in its education efforts (Talbot, 2008). With this efficient delivery system and wide-reaching results and with the XO's ability to survive in a variety of climates, kid-friendly programs, flexibility, and low cost, OLPC seems to have developed a good system. But how effective is a computer as a tool for a student's learning? Glennan argues in his 1996 report that computer technology can help teachers adjust lessons to each student's ability and potential, improve the effectiveness and efficiency of classroom learning, and can prolong the amount of time students want to spend accessing information. He says that, if executed properly, educational technology “can contribute significantly to improved educational outcomes”(2008, p. xvi). Pflaum (2004) agrees with Glennan, concluding that students do not spend enough time working with technology.

Additionally, Killedar's (2008) research shows that computers are a good way of reaching students – especially those in more disconnected and less well off areas – and OLPC seems to have created a laptop that can work for them. However, since its conception, OLPC, coined “the \$100 headache” by Feldman (2008), has faced a myriad of problems and obstacles (p. 31).

Negroponete and his staff have had difficulties, primarily with funding and money. Originally, OLPC's plan was to sell several shipments of at least 250,000 laptops to various foreign governments (Butler, 2007). However, governments expected to have a large market demand (for example, China) have not placed orders and some (for example, India) have rejected OLPC's mission outright (Talbot, 2008; Feldman 2008). Without the governments' interest, OLPC did not have the means to produce more computers and therefore could not jumpstart its project as quickly as it had hoped. Additionally, Diodato (2007) has commented on the opportunity cost of selling the laptops. Poorer families, when given the choice of a device with books and games or over one hundred dollars to buy food, may choose to use the XO for monetary gain. Former director of the Indian Institute of Technology in India Ashok Jhurijhunjwala agrees, saying, “This toy will just be sold or stolen”(cited in Butler, 2007, p. 7).

Critics have commented that many of OLPC's problems stem from the company's lack of business and economics knowledge. Feldman (2008) says issues such as OLPC's lawsuit with a Nigerian keyboard company, dramatic public split from its Intel partnership, inability to lock in deals with China and India, and “rel[iance] on pro-bono distributions” all could be due to poor experience and leadership (p. 32). After screen-designer Jepsen left in 2008 to start her own company, OLPC was left without a CEO (McDonald, 2009). Negroponete himself has admitted his own shortcomings, saying, “I am not a CEO. Management, administration, and details are my weaknesses”(Hamm, 2008, p. 6). With administration issues such as these, it is no wonder OLPC

is making mistakes. Negroponte believes that these mishaps have led OLPC to relinquish its “Mother Teresa status”(cited in Hamm, 2008, p. 6).

Additionally, critics have questioned the whole premise of OLPC. Indian Secretary of Education Sudeep Banerjee argued, “We need classrooms and teachers more urgently than fancy tools”(cited in Talbot, 2008, p. 62). While the research of Glennan (1996) and Pflaum (2004) suggests that computers are successful in furthering the learning of students in developed countries, many agree with Banerjee, and believe that children in less developed countries have no need for such advanced technology. Also, dedicated teachers are essential. Both Glennan and Pflaum stress the importance of teachers in classrooms with computers. Glennan (1996) contends that to significantly benefit students’ learning teachers must be motivated and openly excited about the computers. Pflaum (2004) argues that not all teachers are computer-savvy enough to appropriately incorporate them into the curriculum. He recommends that schools employ a full-time technology coordinator. However, schools in developing countries often struggle to find enough teachers. Kochendorfer-Lucius (2008) reports that educational systems in these areas are hit especially hard by disease; in many countries, almost half the teachers in training programs die of HIV/AIDS each year. How are these countries expected to hire tech coordinators and technology-smitten teachers?

In addition to unsatisfactory numbers of teachers available, students in developing countries face a variety of other obstacles to their educations. Many children live miles away from a school (and the path to get there can be dangerous or unmarked), families may need their children to be at home to help with housework and field work, and some schools do not conduct instruction in the specific language of indigenous children (O’Neil, 2008). Also, gender inequalities and biases are often heightened in poorer countries; for example, up to two thirds of

girls are not in school (Yates, 2000). This may be due to a range of reasons, including early marriages, lowered family and teacher expectations, and lack of present female role models. In addition, in Sub-Saharan African, about seventy five percent of girls have children before they are nineteen years old (Kochendorfer-Lucius, 2008). While it may be difficult for Negroponte to address many of these basic obstacles to education in developing countries, internal changes have been made and some problems still can be addressed to improve his education project at OLPC.

In terms of money related issues, OLPC quickly altered the plan to sell solely giant orders and as a result has begun smaller “pilot programs” of anywhere from one hundred to one thousand laptops in various countries, including Cambodia, Ethiopia, Pakistan, and Argentina (Talbot, 2008, p. 64). Also, because many overseas powers were not interested in paying for the laptops, Negroponte turned to the American public for financial support, a move he initially was against. According to Butler (2007), in May of 2007 Negroponte admitted to considering the idea, and by that November had created the “Give One, Get One” program, where, for \$399, purchasers could buy two XO laptops – one that they could keep and one that would be donated to a student in a foreign country. Because of the popularity of this program, it continued until the end of December 2007 (Rapoza, 2007, “Commentary”). As of May 2009 this buying option was no longer available. Based on its previous success, OLPC should consider re-instating this deal to raise money for the organization.

In addition, the organization should encourage local chapters of OLPC to participate in advertising, recruitment, and fundraising. Currently, local chapters have been established at universities from University of Arizona in the United States to Punjab University in India (University Program, 2009). The University of California at Santa Barbara has an OLPC chapter

– OLPCsb – but, in the past school year, the group has attempted to reach the larger UCSB community only once through email, gathered less than fifteen members, and has organized no fundraisers (for more information on OLPCsb see: <http://www.uweb.ucsb.edu/~apm01/>). Even a monthly newsletter of OLPC’s progress and a few words of encouragement from the main OLPC organization could push OLPCsb (and other local chapters) to further their efforts. Recently, OLPC has made remarks about providing university chapters with fundraising kits (University Program, 2009). These kits could drastically increase the productivity of groups like OLPCsb.

To address the problem of families selling the laptops, Diodato (2007) has suggested that OLPC’s mission should instead be to give a laptop to every family. He argues that if parents have partial ownership of the computers, and if there are programs and resources specifically directed at them, they will be less likely to take the computers from their children and sell them (2007). In addition, this could be a money saving technique for OLPC; currently, the youth demographic in developing countries is the highest it has ever been, and many families in developing countries have numerous children (Kochendorfer-Lucius, 2005). While it seems extreme to change OLPC’s name to “One Laptop Per Family (OLPF)”, OLPC could certainly encourage teachers to have their students explore information such as farming techniques and health concerns with their parents and teach their mothers and fathers about the XO’s email and chatting capabilities so that they too could connect with other community members.

To combat the issues related to business management, OLPC has recently undergone a major restructuring of its administration. Four separate departments have been created – technology, deployment, market development and fundraising, and administration – which should increase productivity and organization (Hamm, 2008). Additionally, the company has delegated the tasks of various system developments to other tech companies so that OLPC can

focus on the educational aspect of its project (Shah, 2008). These changes are most likely due to OLPC's newest staff member. Charles Kane, the new president and Chief Operating Officer of OLPC, has been at work for almost a year now and, unlike Jepsen, plans to stick around. Kane brings a wealth of previous experience to the table, including a Master's Degree in Business Administration and experience as Chief Financial Officer at a variety of technology companies (Williams, 2008).

And while some, like India's Secretary of Education Sudeep Banerjee, may believe that a technological device is not the way to improve education in poorer areas, recent findings have proven them wrong. The research by Glennan (1996) and Pflaum (2004) has found that computers can be beneficial learning tools for children. Also, Pflaum contends that computers may be the most helpful to disadvantaged students. In other words, children in developing countries, students who have been repeatedly denied quality educational opportunities, may be the ones who can benefit most from a schooling that makes use of technology. Glennan (1996) and Pflaum (2004) concur that computers can provide students with a wealth of resources and information. It is these resources that Marcia Koth de Paredes, former executive director of the Peruvian Fulbright Scholars, believes students in developing countries should have access to. "Schools [in developing countries] urgently need something that can bring information from outside, and it's not likely to be a library of books," she says (cited in Talbot, 2008, p. 66).

Also, Killedar (2008) argues that computers have a "flexibility...such that teaching and learning can take place at any time and place" (p. 109). This flexibility may prove beneficial to children in developing countries. These children are often confronted with weather conditions not permitting them to make the long trek to school, parents needing extra labor and help around the house, and poor schoolhouse conditions. Students can increase their education because the

classroom and teacher are not the sole source of education. Additionally, the XOs, with their access to downloaded materials and the Internet, have the ability to provide extremely valuable information to students and their families. O'Neil (2008) notes that families in developing countries place a high emphasis on gaining life skills by beginning to work at an early age. With computers, students can obtain information about building construction and food preparation.

These qualities are both made possible because of the instructional approach that OLPC encourages – constructivism. Talbot (2008) has commented on this methodology and explains that it requires “kids [to] learn largely by exploring, discovering, and collaborating”(p. 63). Developed by psychologist Lev Vygotsky, the constructivist theory has become very popular with educators in the United States of late and may be especially successful in developing countries (Cushner, 2009). The idea behind it is that if students take charge of their education they become more involved and invested in the learning process. Cushner (2009) says that, with this approach, learning “is an individual affair” and that a child of any age can access knowledge (p. 378).

Gibson (2008) says that the National Council of Teachers of Mathematics is one of many groups recommending this learner-centered approach. The organization argues that this type of education particularly supports “the needs of the twenty-first century student.” Her study indicates that student-based constructivist learning “allow[s] [children] to utilize their dominant intelligence(s)”(2008, p. 3076). Implementing this model is particularly important in developing countries. Constructivism has the ability to spark the interest of children who may not have had the means or encouragement to satisfy cravings for knowledge in the past; it also goes hand in hand with the XO's features. Access to the Internet and downloaded digital books gives students full control over their education.

To fully take advantage of the constructivist approach to teaching, OLPC needs to provide extensive teacher training upon delivery of the laptops. Johnson (2008) concedes that, currently, OLPC makes sure that the teachers in developing countries are taught how to use the computers and introduced to the basics of “educational principles that encourage exploration and experimentation”(p. 72). However, a more lasting solution may be to send in trained volunteers with the laptops who stay in the area for one to two months after delivery. These volunteers could help teachers understand how to promote constructivist learning, respond to any technical issues, and make sure everything is running smoothly. They could also provide helpful feedback to OLPC on what to improve on. Currently, there is a “Support Gang” in place that meets once a week to answer any questions that students and teachers ask through email and chat rooms (OLPC Support Gang, 2009). However, anyone can join this gang and there is little training involved. To encourage constructivism, it would be beneficial for OLPC to instruct their volunteers about how teachers can implement this teaching approach in the classroom.

McDonald (2009) claims that the “XO is the cheapest, least power hungry notebook computer ever produced, a device that may eventually prove [to be] one of the most important educational tools of its time”(p.36). Even given the variety of complications with the laptop, few could argue that the project is not a worthwhile effort. With computer learning research overwhelmingly proving the benefits of incorporating technology into children’s education and with the inspiring and developmentally appropriate student-centered constructivism approach the laptops support, Negroponte’s laptops have the capacity to inspire children worldwide. In other words, his project has allowed the American public and individuals worldwide to “imagine every child” with a laptop, and therefore an opportunity for education.

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