Technology

**One Laptop Per Child launched in 2005 as a high-minded effort to bring cheap, durable computers to kids in poor countries. The program has had some notable successes, but its founder has discovered how hard it is to do good.**

# Have Laptop, Will

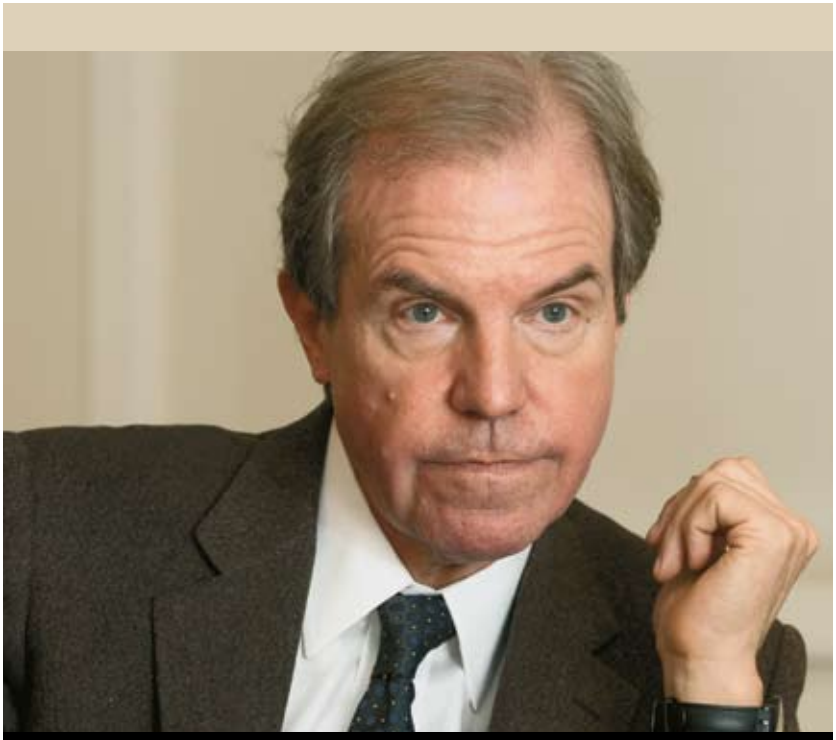
By David Hatch

# Travel

**FULL CLASSROOM:** One Laptop Per Child is aiming to distribute 1 million computers in each of six poor nations, including here in Nigeria.

Nicholas Negroponte, the renowned MIT professor who founded the One Laptop Per Child Foundation, has a curious way of demonstrating the durability of the pint-sized computers that the nonprofit distributes to the world's most impoverished children. Halfway into an interview, he suddenly and forcefully pushes one of the machines off a table. Although such a crash might leave other laptops with mangled screens and missing keys, if not damaged beyond repair, the XO, as these devices are called, survives with nary a scratch.

**FOUNDER:** Nicholas Negroponte has flown all over the world since the One Laptop Foundation's inception in 2005. He has distributed about 800,000 computers, configured in 19 different languages, to 31 nations so far.



RICHARD A. BLOOM

"The most heartwarming use is where kids teach their parents" to read and write. "That happens quite a bit."

Showcasing the ruggedness of the trademark green-and-white laptops is easy, but persuading the world's largest poverty-stricken nations to widely distribute them to tens of millions of schoolchildren has proven tougher. With vast populations of underprivileged youngsters and deep chasms between rich and poor, Brazil, China, and India seem like perfect candidates for Negroponte's program. He has worked tirelessly to reach agreements with those countries, yet four years after One Laptop's debut, it has only a tiny presence in each.

"When India backed off, Thailand got nervous," Negroponte conceded during a January interview in Washington. "But if a country backs off and does something else that results in kids getting connected to computers—that's good. It doesn't have to be us."

The setbacks underscore the steep hurdles the initiative has faced, particularly in bigger nations where bureaucracy, pride, limited financial resources, and concerns about unfettered Internet access have made the computers a surprisingly hard sell, despite the best intentions. "As soon as you start working with governments," said Bill Rust, research director for the technology consulting firm Gartner and himself a specialist in the intersection of technology and education, "you will have those folks who are invested in other programs" or want to spend money on other priorities.

The difficulties also raise a deeper question: Is Negroponte's dream of outfitting hundreds of millions of poor children ages 6 to 12 with portable, Internet-enabled computers attainable? "In order to really get this started—to get people enthusiastic about doing this—he had to sell it as a big idea," said Walter Bender, who resigned a year ago as One Laptop Per Child's president of software and content development. "To achieve those goals in such a short time is really impossible, for anybody."

Bender, who took a sabbatical from his job as executive director of the MIT Media Lab to help start One Laptop, now heads an effort to promote wider use of "Sugar," the free and

easily upgradeable software he designed for the XO, by loading it onto tiny flash drives that children can use on all computers, even outdated ones.

Negroponte launched One Laptop with considerable fanfare and bold projections in 2005, predicting that the foundation would produce up to 15 million computers—which he expected to price at $100 apiece—within the first year, and up to 150 million during the second year, according to press reports at the time. The ambitious goal met with considerable skepticism, including questions about the feasibility of such a low price, Internet access costs, and even the underlying technology. Microsoft Chairman Bill Gates and other top executives at the software giant openly criticized Negroponte's approach and championed an alternative: turning cellphones into low-cost computers.

Thanks to rising costs and the falling U.S. dollar, Negroponte's $100 laptops now cost $181 to $204—double his hoped-for price point. Support and administration typically range from $50 to $70 per student during the implementation phase, One Laptop officials say. Critics contend that ancillary expenses often run higher and that governments in poor countries could better spend the money on essentials.

"If there's a lack of electricity, basic health care, [acceptable] facilities, and especially teachers, it's not such a good idea to begin with laptops," said Larry Cuban, professor emeritus of education at Stanford University. Dismissing the contention that laptops can replace teachers, he said, "Effective teaching is based on a relationship between an adult and children, and machines don't create those kinds of relationships."

Competition from copycat efforts, including one spearheaded by Intel *(see sidebar, p. 26)* after it broke with One Laptop over philosophical differences, and the emergence of low-cost and lightweight commercial "netbook" computers have thrown up new hurdles. India, meanwhile, is developing its own handheld educational gadgets for students, though recent news accounts indicate that the devices are not laptops and appear to have limited capabilities.

The economic downturn has taken a toll as well. On January 7, One Laptop slashed its workforce in half, leaving just 32 employees. "The future brings with it some uncertainty and difficulty, but also the excitement that comes with the rededication to a cause," Negroponte, who doesn't draw a salary from the foundation, wrote in a staff memo.

For Negroponte and his remaining crew, the disappointments have been offset by successes in Peru, Rwanda, and Uruguay, which have all agreed to large-scale distributions of XOs. One Laptop has distributed computers in batches ranging from a few dozen to 50,000 in other countries that include Cambodia, Ethiopia, Ghana, Haiti, Mexico, Mongolia, Nepal, the Palestinian territories, Papua New Guinea, and the Solomon Islands.

The venture has attracted financial support and guidance from Silicon Valley's marquee names, including AMD, eBay, Google, Red Hat, and News Corp. For the second year in a row, Amazon sold the XO during the holiday season through its "give one, get one" campaign, allowing domestic purchasers to pay $399 to buy one for their own use and another for a student in a faraway land. The offer has expired, but Amazon is still taking donations to send the devices to needy children. Amazon sold more than 200,000 XOs during the two campaigns, according to One Laptop.

Since its inception in late 2005, the One Laptop Foundation, based in Cambridge, Mass., has distributed about 800,000 XOs, configured in 19 languages, to 31 nations, with the total expected to reach 1.5 million by year's end. Interest among Americans continues to grow, even though the U.S. has little in common with the target audience—the 50 least-developed nations, where children have limited or no access to education. Negroponte said he still hopes to land deals in countries that earlier rejected his overtures.

" 'Discouraged' is not a word I know," he said. " 'Disappointed' is perhaps a better one. Usually my disappointment comes from the humanitarian mission being occluded by commercial interests. Any disappointment, however, is more than compensated by Uruguay, Peru, and Rwanda."

## Computers for Childhood

- The big targets—China and India—have proven to be tough nuts to crack, but One Laptop has **done well in smaller countries** such as Peru, Rwanda, and Uruguay.
- The nonprofit's model faces competition aplenty from new for-profit, **low-priced netbooks** that approach the $200 price point.
- One Laptop wants to send its XO computers to **war-torn areas of Afghanistan and Pakistan** as an example of U.S. soft power.

Despite the setbacks, One Laptop is now aiming at another seemingly impossible goal: distributing the machines to war-torn countries where anti-Western sentiment runs high. Negroponte says that the computers can exemplify America's "soft power," and he wants Washington's help to get them into the hands of children in these regions.

### New Tone in Washington

Since taking a leave of absence four years ago as co-founder and director of the MIT Media Lab to pursue this endeavor, Negroponte has kept a whirlwind travel schedule. Already this year he has been to Iraq, at the invitation of Deputy Prime Minister Barham Salih, and to Brussels. Other foundation colleagues have visited Afghanistan, Peru, and Taiwan, and additional trips are planned.

But it is Negroponte's short jaunts to the nation's capital that could be the most worthwhile. With President Obama placing a premium on improving education, adding more computers to classrooms, and expanding access to high-speed Internet service, One Laptop wasted no time in appealing to Washington's new tone.

Negroponte and Matt Keller, the foundation's director for Europe, Middle East, and Africa, made the rounds here on January 5, the day before the new Congress convened. They met with members of Obama's transition team to discuss a broader government role in One Laptop's efforts, and they expect further talks with the administration.

"Here, in the country that invented the Internet, every child should have the chance to get online, and they'll get that

## A Chip on Intel's Shoulder

**Divorce is always toughest on the children, but that's not how Intel views its split in January 2008 from One Laptop Per Child and the chipmaker's rival venture, the Classmate PC.** "Although we share the same objectives, our approach is very different," Intel spokeswoman Agnes Kwan explained. The decision to break with One Laptop founder Nicholas Negroponte over "philosophical differences" has the upside of providing nations with more choices for outfitting students with low-cost laptops, Kwan contended.

But in reality, the appeal of directly tapping into a global market of more than 1 billion school children without being constricted by someone else's agenda was simply irresistible to the world's largest manufacturer of microprocessors. "It is a viable business. We are not just giving away PCs," Kwan said, adding that Intel is also committed to improving educational opportunities worldwide.

Intel partners with foreign manufacturers to produce Classmate PCs, which are then distributed locally under the partners' own brands. Portugal has ordered 500,000 Classmate PCs for all of its elementary school students—about half of the total number sold around the world so far in 30 countries, including Malaysia, Nigeria, and Vietnam.

The marriage between Intel and One Laptop didn't last long—about six months—and the two parted on bitter terms. Although news reports attributed the split to One Laptop's use of rival chipmaker AMD's processors for its XO laptop, Intel officials insist that wasn't a factor; One Laptop, they say, had committed to using both companies' chips. A bigger consideration was Negroponte's demand that Intel drop its Classmate PC effort, which was already under way when Intel joined One Laptop in mid-2007, a source familiar with the split said.

Negroponte struck a diplomatic tone when *National Journal* asked about the effect of the competition, but he has accused Intel of sabotaging his efforts by trying to market similar cheap, sturdy computers to the countries he targets. He has also claimed that Intel is dumping Classmate PCs below cost. Matt Keller, director of One Laptop for Europe, the Middle East, and Africa, said, "Intel had a strong desire, it seems to me and I think to Nicholas, to drive One Laptop Per Child out of the market." He added that OLPC is a purely humanitarian mission: "We're not in it to make money."

GETTY IMAGES/JUSTIN SULLIVAN

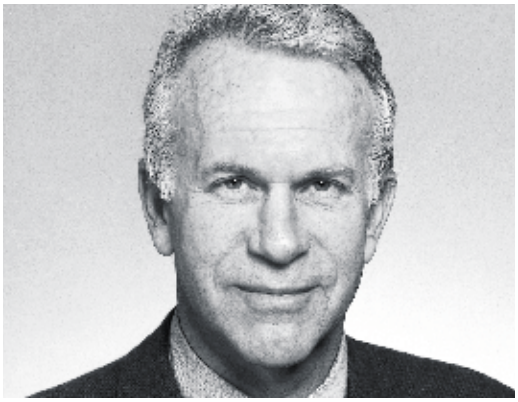
The Classmate PC, geared toward ages 5 to 14, has much in common with the XO while living up to the chipmaker's motto, "Intel Inside." "It is rugged, durable, and lightweight for children's day-to-day use," reads an Intel ad that could have been written by Negroponte's marketing team.

But there are key differences that hint at Intel's ambitions: Classmate PC operates as a for-profit business; its computers can be purchased online in the United States, and they run Windows to appeal to mainstream tastes. Intel also offers more configurations over a wider range of prices, from $200 to $500, and places a greater emphasis on teacher training.

"In the U.S., there's a lot more buzz about Classmate than about OLPC," noted Bill Rust, the research director for Gartner, an information-technology research firm based in Stamford, Conn. One Laptop's Keller counters, "For primary-school kids living in remote areas, [the Classmate] is not really an option," but an XO is because its battery has a longer life and there are more ways to charge it without electricity.

The competition between for-profit and nonprofit will continue. **—D.H.**

> "If we had a world in which everybody had a laptop, I think it would make **the job of soft power** a whole lot easier."
>
> —Ambassador James Glassman



chance when I'm president," Obama said in a December 6 address, words that are music to Negroponte's ears.

Reaching out to Washington wasn't always a priority. Initially, One Laptop tried to distinguish itself from U.S. foreign policy and aid programs. Over the past year, however, with his original strategy faltering, Negroponte began to explore partnerships with Congress, the Pentagon, the U.S. Agency for International Development, and the State Department. The stepped-up overtures come at a time when the XO, designed for the international market, is catching on stateside. *(See sidebar p. 28.)*

One Laptop generated some interest within the Bush administration but not much collaboration. Bush officials did help to arrange small-scale distributions of XOs in Iraq after provincial reconstruction teams asked for them. In e-mails to One Laptop at the time, high-ranking Pentagon brass showed tremendous enthusiasm for the laptops and their potential to contribute to rebuilding a peaceful environment. "Iraq's an example of where they have their own money in the bank," Negroponte said. He wants the Iraqi government to buy more of his computers.

He is also angling to expand those inroads by persuading Pentagon officials to help distribute the laptops throughout Afghanistan and the bordering northwest frontier of Pakistan—areas where anti-Western sentiment runs high. Internet access would be provided by satellite. "We figure that's about a $2 billion appropriation to do that. That's a relatively large appropriation, but we think it's the right thing to do," he said, emphasizing that the XO is designed for extreme conditions.

Ambassador James Glassman, who was undersecretary of State for public diplomacy and public affairs during President Bush's second term, said, "If we had a world in which everybody had a laptop, I think it would make the job of soft power a whole lot easier." The kind of computer network that Negroponte envisions would help the United States deliver messages about nonviolence and tolerance, he said.

"I recognized this was something we would like to be able to promote, but we just didn't have the funding to do it. It's expensive, when you get right down to it," Glassman said. He wants to explore teaming with One Laptop in his new role as president of World Growth Institute, a nonprofit organization that helps developing countries generate economic prosperity.

In addition to thinking big, One Laptop is also joining with third parties to distribute XOs on a small scale. The World Bank is funding a pilot project in Sri Lanka under an effort to assist children in conflict zones, and the United Nations World Food Program is helping to send 5,000 XOs to remote Himalayan villages in Nepal.

The foundation's effort has stirred interest on Capitol Hill but as yet has no champions. Rep. Howard Berman, D-Calif., chairman of the House Foreign Affairs Committee, met with One Laptop officials in January and remains intrigued, spokeswoman Lynne Weil said. Although Democrats appear more philosophically aligned with Negroponte's goals than do Republicans, she cautioned that budgetary constraints, the XO's price tag, and quibbles with its software, among other considerations, could limit Congress's role.

"One has to be realistic about looking at One Laptop Per Child against other programs that also would offer opportunities for children," she said, referring not only to Intel's competing initiative but also to the demands on foreign aid for necessities such as health care.

## Stamp of Approval

"The country I'm most proud of," Negroponte told *National Journal*, "is Rwanda," the East African nation that was wracked by genocide a decade and a half ago. Last year, One Laptop gave Rwanda 10,000 computers with the understanding that President Paul Kagame would purchase 10,000 more; instead, he ordered another 100,000. The foundation is working with the Rwandan government to make Kigali, the capital, a center for learning about the XO in sub-Saharan Africa.

"A kid is opened to the world," said Romain Murenzi, Rwanda's minister of science and technology, speaking of the difference that XOs have made in the lives of youngsters there. Travelers arriving at Kigali's main airport often see children using the machines in the terminal to take advantage of the free Internet connection, he said. "What happened in Rwanda before is because of that lack of openness—that lack of critical thinking."

There is similar enthusiasm in Uruguay, a small nation tucked between Argentina and Brazil. President Tabaré Vázquez overcame initial resistance from teachers to pursue his mission of providing every public school student from ages 6 to 12 and each of their instructors with an XO—400,000 in all—by year's end. The price tag for the effort, including administration and tech support, will be $100 million, with the government planning additional purchases for incoming classes of 6-year-olds.

"It's absolutely impossible if you

don't have a political leader that is committed fully to this," said Miguel Brechner, president of Laboratorio Tecnológico del Uruguay, which is overseeing the deployment, adding that it is "very complicated" for a minister of education to address all of the complexities that can arise. The laptops are so popular that the country has immortalized the cuddly anthropomorphic machines, whose antennae resemble rabbit ears, by placing their image on a postage stamp.

One Laptop operates under two program models. Some nations, including Peru and Uruguay, purchase computers and distribute them; in others, such as Afghanistan, Ethiopia, Haiti, Iraq, Mongolia, and Rwanda, One Laptop has donated the first machines. To buy more laptops, Haiti later turned to the Inter-American Development Bank, while Rwanda mustered its own resources.

The machines, weighing less than 3.5 pounds, are engineered specifically with elementary students in mind, right down to the 7.5-inch screen that can be read in direct sunlight and the smallish keypad that is resistant to dirt and spills. Most parts are easy and inexpensive to replace. The computers access the Internet using Wi-Fi technology and can be linked in a single classroom through a "mesh network." They run on software that has a key advantage over Windows—it is less susceptible to computer viruses. There is a cumbersome way to run Windows on the machines, and Negroponte is negotiating with Microsoft about offering the more prevalent operating system as an option.

Children use the machines to do their homework, download books, browse the Internet, chat online, and even create videos. "The most heartwarming use is where kids teach their parents" to read and write, Negroponte said. "That happens quite a bit."

Another advantage of the XO over other computers, Negroponte said, is that "it doesn't need a power grid. You can hand-crank them. You can use a solar panel that's smaller than a sheet of paper" to charge the laptops. When they are plugged into an outlet, the machines use minimal electrical power.

Critics challenge these claims as overblown. It turns out that One Laptop is still perfecting the hand cranks and that the solar panels cost an extra $20 or so per machine. Users can also pump a foot pedal to recharge the battery, although doing so is time-consuming.

Negroponte downplays ancillary costs, insisting, for example, that Internet access ranges from 20 cents to $1 per child per month. Interviews with a variety of sources, however, suggest that administrative expenses, infrastructure costs, teacher training, and tech support can run substantially higher. In Uruguay, these extra costs consumed 25 percent—$25 million—of the initial expenditure, and will total $10 million to $12 million per year once the program is fully operational.

## Birmingham's Net Gain

**Larry Langford, the mayor of Birmingham, Ala., doesn't need focus groups and flow charts to confirm that he made the right decision in purchasing 15,000 XO laptops for all of his city's students in the first through fifth grades.** He receives feedback another way. "I get stopped on the streets by children daily," the mayor told *National Journal*, and they say, "Thank you for the computer," which they received for free and may keep. "It is hard for me to contain my emotions about this computer system."

It was a bold move for the mayor of a city whose public schools have a 50 percent dropout rate, but Langford sees the project as part of Birmingham's long march toward civil rights. In the Jim Crow era, "it was against the law to teach us to read," the African-American mayor said. "We have almost a century to make up for," he added, noting that it is "cheaper to educate than to incarcerate."

Birmingham, which boasts the nation's most ambitious XO program, will order another 3,000 computers for this year's incoming first-graders and continually receives calls from other school districts inquiring about its experience. The laptops, at $200 each, cost the city $3 million; training and infrastructure added another $500,000 to the tab. Langford raised money for the program by upping the sales tax a penny and doubling the cost of city business licenses.

Birmingham's improbable journey began before Langford became mayor when he saw a *60 Minutes* profile on CBS about One Laptop's founder, Nicholas Negroponte. After his 2007 election, Langford implemented his dream, but it drew resistance from the city's political establishment, school board, and even teachers.

By using the XOs for classwork and experimenting with their features, children learn basic computing skills, the mayor said. "What I want is the child to get a general grasp of a computer—what it can do and will not do," he said, noting that kids learn through fun activities, too, such as online chats with friends. Sparking their interest will encourage them to use more-sophisticated computers later on in their lives, he continued.

The program has experienced a few hiccups. The city underestimated the level of instructor training it needed and began distributing the machines before most schools had wireless Internet connections.

Some students have been too rough on the devices, and others get disappointed when the computers are slow, sources familiar with the program said.

In February 2008, following allegations of ethical improprieties, Langford was forced to dissolve the board of a charity that helped fund the program, according to the *Birmingham News*. The mayor acted after city officials learned of a lawsuit alleging that one of the board members, a close friend of Langford, had been involved with a similar charity that had paid the mayor, financed casino trips, and gave donated computers to friends and politicians.

School board members raised a host of worries, according to coverage last year in the *News*. "I'm not sure we want to stigmatize our children as being poor," complained board member Dannetta K. Thornton Owens, noting that the computers are designed for the developing world. "If we can get real computers for $100 more than these, then why can't we go that

## Tough Sell

Before One Laptop debuted, Negroponte made an all-out effort to persuade Chinese government officials to participate on a huge scale. Everything was to take place in China—the design and construction of the computers, and even the program's launch. "That was the original plan," he said. When that plan did not materialize, Negroponte pursued the same sort of shuttle diplomacy with high-level bureaucrats in Brazil and India.

Given these countries' sheer size, the participation of all three is essential to ultimately fulfilling the nonprofit's mission. China and India together account for more than a third of all humanity. India alone is home to about a quarter of the world's children; Brazil is the fifth-most-populous nation.

Officials in those countries carefully considered Negroponte's proposals for large-scale distribution but have not adopted them. "These big, top-down decisions in government bureaucracies are difficult," said Bender, the former One Laptop president. Because of the politics and competing constituencies involved, reaching a deal boils down to knowing how to work the system. "It's like trying to sell F-16s or something."

Stanford's Larry Cuban cautioned, "There are political and economic realities that exceed the wishes of someone who desires to do well. I do not question Mr. Negroponte's motives," he said, but added, "I do question the resiliency of the idea."

Negroponte recalls that Chinese officials balked at the cost of outfitting 220 million students with the devices, but they worried even more that distributing the laptops might somehow compromise the country's teacher-centric educational system. Other sources suggested that concerns about unfettered Internet access—always a threat to China's strict governmental control—were a factor. Officials didn't raise that issue overtly, Negroponte said, though "maybe it was in the background." Another hurdle, Negroponte noted, is the concept of charity. In China, as in some other countries, "the idea of a philanthropic approach is unfathomable."

Still, the XO is poised for a breakthrough in China that could breathe new life into efforts to attain wide distribution. Donors in Hong Kong are funding a project to provide at least 1,000 laptops to earthquake victims in Sichuan province in late April or early May, complete with teacher training and free wireless Internet access. "Access to the Internet is, as you pointed out, a sensitive issue," wrote Anthony Wong, the Hong Kong-based president of One Laptop China, in an e-mail. Sidestepping the political issues, he noted that inappropriate content always is a concern when children, including those in the U.S., surf the Internet.

China's reluctance to participate on a larger scale is ironic, given that the XO is manufactured outside of Shanghai by Quanta, the world's largest assembler of laptops for name-brand companies. Design is handled in Taiwan, where Quanta is based.

route?" asked Virginia Volker, another critic on the board.

A few states have conducted small pilot projects for One Laptop, and dozens of user groups have sprouted from Washington, D.C., to San Francisco to share ideas and swap software for the XO. Domestic interest spurred chatter about a One Laptop Per Child program for America that was supposed to debut last year. It never materialized, although the program may launch this year. Matt Keller of One Laptop said that the group feared it would be stretched too thin if it expanded domestically but is now convinced that U.S. deployments won't drain staff time.

Yet impediments to wider domestic distribution remain. The U.S. has a decentralized educational system, which creates a minefield of jurisdictional and political issues to navigate, especially in comparison with other nations, where centralized ministries of education can mandate national participation.

**Larry Langford**

LANDOV/NEWHOUSE NEWS SERVICE/HAL YEAGER

**"I get stopped on the streets by children daily," and they say, "Thank you for the computer."**

A research paper published last year by economics assistant professors Ofer Malamud of the University of Chicago and Cristian Pop-Eleches of Columbia University reported that computer use among children can result in increased proficiency with technology and useful career skills. The negatives include a higher risk of repetitive injuries and eyestrain, social isolation, and exposure to adult content.

"It's actually very difficult to do a major laptop initiative here in the U.S.," conceded One Laptop spokeswoman Jackie Lustig, noting that discussions with some rural school districts have faltered. "One of the fundamental principles of One Laptop Per Child is saturation"—the idea of flooding a school, community, region, or nation with enough laptops to encourage learning among all children—which is tough to achieve domestically, she said.

Mayor Langford sees another hurdle: U.S. cities must overcome the stigma of embracing technology designed for poor nations. "In many sections throughout the United States of America, if you're low-to-middle income, you are in the Third World," he said, but those communities are reluctant to acknowledge it. **—D.H.**

## School Tool

AFP/GETTY IMAGES/MIGUEL ROJO

**A boy takes measurements with his laptop in the greenhouse of a rural school in Uruguay, which has bought 400,000 XO laptops.**

India, plagued by rampant poverty and an antiquated infrastructure, seemed like another perfect fit for One Laptop, but government officials there were bluntly critical. Education Secretary Sudeep Banerjee called Negroponte's plan "pedagogically suspect" and asserted that the nation needed "classrooms and teachers more urgently than fancy tools," according to a 2007 BBC report.

As a result, One Laptop's only beachheads in India are seven small pilot projects that the foundation is funding to distribute 1,000 computers, said Satish Jha, president of One Laptop India. Overseeing a staff of just four full-time employees and about eight volunteers, he acknowledged, "We do not have all the ground forces in India to do all the things necessary to get [a nationwide] account." Sources said, however, that One Laptop hopes to cut significant deals with a few individual Indian states in the near future.

After the setbacks in China and India, Negroponte retooled, setting a goal of distributing 1 million laptops each in Argentina, Brazil, Libya, Nigeria, Pakistan, and Thailand. He said he received high-level assurances in each case, yet all six balked, citing reasons that ranged from a desire to devote resources to more-critical needs, to interest in entertaining competing offers.

Brazil has been a particular frustration because Negroponte knows President Luiz Inácio Lula da Silva, who initially expressed support. The Brazilian government opened the process up to other bidders, however, and imposed specifications that prompted One Laptop not to compete. In the end, Brazil awarded a contract for 150,000 laptops to an Indian-based company, handing Negroponte one of his biggest defeats.

As Negroponte has learned, sometimes it's hard to do good.

### Ahead of the Curve

The XO was a marvel of innovation when it was introduced in 2007, but today the marketplace is awash with netbooks, a class of inexpensive and feather-light computers inspired by the XO that threatens to make it irrelevant. Models such as the Acer Aspire One and the Eee PC, built by Taiwan-based Asus and boasting battery life up to 9.5 hours, are closing in—not just on features but on price.

These mini-laptops have the added advantage of being available in stores and over the Internet without government strings attached. The fast-changing world of technology makes it increasingly difficult for the XO to outpace the competition and justify its existence, said analyst Bill Rust. The competitors "do make it harder" for One Laptop to maintain its niche. "They're not as high-cost as they used to be," he noted, adding that sophisticated devices such as iPhones are also beginning to compete in this space. But MIT's Bender said that the XO maintains an edge with a battery that can last up to 24 hours under certain conditions and can be recharged 2,000 times. "Most of these netbooks aren't quite there yet."

NComputing offers technology that enables several students to work off one powerful computer simultaneously, using terminals at their desks. The approach is less expensive than outfitting each child with a laptop and purchasing additional units each year for newly enrolled students. NComputing, based in Redwood City, Calif., says it has captured 7 percent of the domestic public education market and boasts that its technology is being used in 100 countries, including the Republic of Macedonia, South Africa, and Turkey. Last year, the company signed a deal with the Indian state of Andhra Pradesh to provide computing access to 1.8 million children. But Keller of One Laptop counters that using a computer terminal is not the same experience as "when kids own something" and can bring it home to share with family and friends.

One Laptop has made incremental improvements to the XO, but now it is fighting back against the competition with a top-to-bottom redesign that could once again put the machine in the vanguard. The revamped version, slated for a 2010 debut, is expected to drop the distinctive antennae and add several new bells and whistles, including touch-screen technology and capabilities that mimic the experience of reading a book.

Once again, Negroponte is pushing the envelope on price, with a target of $75 per machine, and on features, including half the power consumption of today's version, less weight, and a smaller size. The result, experts say, could be a machine that is even more attractive to the developing world—if he can deliver on his promises.

"I knew it would be hard. But, yes, it proved even harder," Negroponte said, lamenting that One Laptop constantly finds itself in the center of "proxy wars," such as the battle between Intel and AMD over which microchip he should install in the XOs, or in the middle of disagreements between foreign government officials and their political opponents. "And yet being a nonprofit is the best decision we ever made," he said. "If nothing else, we have total clarity of purpose. It is about children and learning, not shareholders." ■

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