



# Una Laptop por Niño

THE PHILANTHROPIC PROJECT FIRST KNOWN AS THE "\$100 LAPTOP" HAS FALLEN FAR SHORT OF GRAND INITIAL GOALS. BUT IN PERU, 486,500 MACHINES ARE HEADED FOR SOME OF THE WORLD'S POOREST AND WORST-EDUCATED CHILDREN.

By DAVID TALBOT

A fleeting roadside scene in Lima, Peru, sticks in my mind. A very little girl, perhaps four, stood on a narrow traffic island bisecting a congested thoroughfare amid choking dust, soot, and fumes. With the girl was a woman I took to be her mother. The mother, a street peddler, was unpacking a crate full of something. (I couldn't see what, but other peddlers offered avocados, toilet paper, and toy rats.) Around them roared 1970s-era buses and battered vehicles, passing below concrete habitations creeping up dismal, denuded hillsides in one of the city's vast slums. The child was energetically scooping up plastic bags for her mother, her shaggy brown hair flopping forward. Not far away, an old woman picked through a pile of smoldering refuse. Against the squalid tableau, the girl was tidying her little corner of Lima as she spent her morning helping Mom at work.



I thought of her as I passed through steel gates manned by armed guards at Peru's Ministry of Education to talk to Oscar Becerra, general director for educational technologies. Peru is poised to deliver 486,500 laptops to its poorest children under the One Laptop per Child program—a figure that could swell to 676,500 if the Cuzco region buys in. It is the largest such OLPC purchase in the world (see “OLPC Scales Back,” p. 64). I asked Becerra whether children in Lima's slums would receive the green-and-white machines. “No,” he said. “They are not poor enough.” At first I thought he was making a hard-hearted joke. But he went on to explain that Lima residents generally have electricity and (in theory) access to city services, even Internet cafés. The laptops are headed to 9,000 tiny schools in remote regions such as Huancavelica, in the Andes, an arduous 12-hour bus ride over rocky roads southeast of Lima, and

**EARLY ADOPTERS** Children carry XOs at the Institución Educativa Apóstol Santiago in Arahua, Peru, where almost 50 kids have been using prototype laptops since last summer. They are at the vanguard of the world's largest deployment of OLPC computers—to Peru's most remote primary schools.

villages such as Tutumberos, in the Amazon region, days away. By the standards of children in those areas, the girl on the traffic island enjoyed enviable opportunity.

What Becerra told me drove home the true scope of what OLPC is trying to do in a country that, according to a survey by the World Economic Forum, ranks 130th out of 131 countries in math and science education, and 131st in the quality of its primary schools. “There is a long-term social cleavage in Peru that has been around forever,” says Henry Dietz, a political scientist and expert on Peru at



With the laptops, says a government official, “we are reaching the poorest schools in Peru for the first time.” The effort is also “critical to the future of OLPC,” says the organization’s founder.

the University of Texas at Austin, describing the country’s income inequality and rural poverty. “You get out of those provincial capitals, a half-hour in any direction, and you are in rural Peru, and things are pretty primitive. Electricity is a sometimes thing, and the quality of education—the school is four walls and a roof and some benches, and that is about it. There is very little there to work with.” In some cases, the laptop deployment will tie in to an existing program to bring Internet access to certain schools. But for the most part, the machines are entering an educational vacuum.

And they’re bringing with them a whole new pedagogy. The computers come loaded with 115 books—literature such as *Mi Vaquita*, about a rare porpoise, but also classics, like some of Aesop’s fables, novels (at least one by the Peruvian writer Mario Vargas Llosa), and poetry (including verse by the early-20th-century Peruvian poet César Vallejo). The laptops’ flash drives also store introductions for teachers, reading-comprehension programs and other educational software, a word processor, art and music programs, and games, including chess, Sudoku, and Tetris. The rugged, low-power hardware includes a camera that can capture video or still images. The computers are Internet ready and can wirelessly relay data to one another.

These tools will land in the hands of first through sixth graders who in many cases never even had books—at home or elsewhere—and whose teachers themselves had little education. They will not come cheap; Peru is spending about \$80 million on the laptops—nearly a third of the education budget normally available for capital expenditures—plus about \$2 million for teacher training. Becerra characterized the sum as a special appropriation meant to bring schools up to date. “To distribute all these books would cost five times the cost of the machines,” he estimates. “We are reaching the poorest schools in Peru for the first time in history.” The

hope is that more children will make lives for themselves beyond subsistence farming or menial labor.

Peru’s move comes at a critical time for OLPC, because the non-profit has failed to achieve the manufacturing scale and low prices it initially sought (see “Philanthropy’s New Prototype,” *November/December 2006* and at *TechnologyReview.com*). One Laptop per Child was unveiled in early 2005 at the World Economic Forum in Davos, Switzerland, by Nicholas Negroponte, the cofounder and chairman emeritus of MIT’s Media Lab. “We will not launch this without five to ten million units in the first run,” Negroponte said at the Technology, Entertainment, Design (TED) conference in February 2006. He set goals of building seven million to ten million machines in 2007 and 100 million to 200 million in 2008, listing seven major countries as potential early customers: China, India, Thailand, Egypt, Nigeria, Brazil, and Argentina. “If it comes out at \$138, so what?” he said at TED, predicting that mass production would drive the price down. “If it comes out six months late, so what? That’s a pretty soft landing.”

OLPC’s actual landing was far bumpier. Yes, the production computer, called the XO, is cheaper, sturdier, and less power hungry than any laptop previously made: it uses just two to five watts, peaking at nine watts, about a 10th the power consumption of a typical laptop. Its battery is long lasting, cheap to replace, and relatively easy on the environment. But the laptops wound up costing not \$100, or \$138, but \$188 each. Large countries have been slow to buy; the harshest reaction came in 2006 from the Indian education secretary, Sudeep Banerjee, who dismissed the program as “pedagogically suspect” and declared, “We need classrooms and teachers more urgently than fancy tools.” Competitors arose; Intel’s Classmate PC, while not as rugged, did tempt some potential customers. A partnership between OLPC and Intel, forged in 2007 to



**LIFE WITH LAPTOP** Nine-year-old Nilton Quispicóndor (standing, far left) uses his computer at school in Arahua, Peru. Later he totes it up the village stairs (center) before setting up shop in his house (right), as his father, Huber, a farmer, looks on.

find collaborations between their existing educational and technological efforts, ended bitterly six months later. The first OLPC customers have turned out to be Peru and Uruguay, with smaller initiatives in Mongolia and—in a surprise nobody imagined—Birmingham, AL. (And rather than being paid for by governments, some of these efforts were funded by donations made through OLPC's Give One, Get One program.) Altogether, the first group of customers has ordered only about 500,000 machines, a figure that includes some, but not all, of Peru's planned acquisition.

If Peru's effort succeeds, however, it will become a model for other nations. Peru launched its teacher education program in late winter, and curricula are being designed that can be delivered to the laptops and updated over the Internet. By providing low-cost access to books, lessons, games, and activities, the machines are meant to help realize a so-called constructionist model of education, in which kids learn largely by exploring, discovering, and collaborating. "It is so important, because [Peru] is doing everything right," Negroponte told me in his small office near the MIT campus, with a view of the Boston skyline. "They are doing remote schools, they are doing it with constructionism, they are doing it at scale. The only thing they have going against them, if you will, is that they are first, and we will be debugging things as we go. But it is absolutely critical to the future of OLPC." When I visited Peru in mid-March, distribution of the laptops had not yet begun. But a clue to how the effort might fare can be found in a Peruvian mountain farming village where, last year, prototypes were handed out to kids in a trial run.

#### A GOAT CALLED PALOMA

The first hour of the drive from central Lima is a tour of sprawl and poverty. Then comes 90 minutes in which the traffic thins and the scenery gives way to vegetable farms in the valleys of the Andean foothills. The air clears and cools as the elevation passes 1,000 meters and you traverse the small town of Santa Rosa de Quives. You turn off onto a desolate, rocky dirt road and continue for another hour. The road switches and jogs its way to 2,600 meters, skirting perilous precipices. Finally, rounding a bend, you glimpse

the corrugated-steel roofs of Arahua, an agricultural village of 742 residents. The steep surrounding hills contain pre-Inca archaeological sites and sparkling cold ponds. In the town's colonial-era church is a Virgin Mary statue festooned with plastic flowers.

Arahua is poor, but as Becerra explained later, it is also "not poor enough" to warrant laptops under the national rollout. Nevertheless, it was here that the Ministry of Education decided to test a preproduction model of the OLPC machines. Arahua is relatively handy to Lima (battered buses make two trips daily), and it has a preexisting Internet connection (a satellite dish was installed as part of the earlier Peruvian initiative). The laptops arrived in June 2007 and were delivered to the first building you encounter in Arahua: the Institución Educativa Apóstol Santiago, a clean-swept, U-shaped concrete-block school with a concrete yard and corrugated-steel roofing, open at the eaves. The primary school has 46 students: 8 in the first and second grades, 21 in the third and fourth grades, and 17 in the fifth and sixth grades. (The town also has a secondary school, but many children drop out by then.) Some of Arahua's students come from smaller hamlets in the region that lack schools of their own. These children travel (often by foot) to Arahua on Sunday night and leave on Friday; during the week they sleep in a bunkhouse owned by the town and run by a Catholic charity, where they are fed hearty meals, such as a spicy (and tasty) potato-based stew ladled out by a cheerful house mother.

The teachers knew we were coming. The children were at their desks, pecking away at their now-battered laptops. The machines were clearly well worn, with names written in marker to distinguish them (OLPC has since added color coding on the logo's X and O, with 400 combinations, so kids can tell them apart). It was Monday, March 10, which happened to be the first day of school in Arahua after the Peruvian summer. Kevin Gabino, 11, was following a teacher's instructions to type a statement of the school's values into a text file (*Llegar temprano al colegio*—Be early to school—topped the list). Several other kids were playing Tetris. Rosario Carrillo, 10, was performing a Google search for "*elemento de la comunicación*," but the town's Internet connection was so slow that the wait dragged into minutes. Rosario said she uses the laptop to

Significant purchases  
Rejections  
Pilot projects with between  
100 and 1,000 laptops

## OLPC SCALES BACK

One Laptop per Child initially hoped to manufacture millions of machines for a few large countries. But most of the orders that have come in so far are relatively small. Here is where OLPC's efforts stand, according to its founder, Nicholas Negroponte.

play games, take pictures, draw, perform calculations, write documents, and send e-mails to her 25-year-old sister, who works in Lima "washing clothes and looking after babies."

Cecilia Aquino, also 10, clutched hands with Rosario. She chimed in that she has used her laptop's video camera to make grainy movies of her father's goat, which she named Paloma. Becerra told me that such pursuits were part of the plan. "One of the problems with education worldwide is that children don't understand why they should learn what they are supposed to learn," he says. "When you have a computer, and students own the computer, they begin finding 'why.' They realize they can actually do something that is meaningful to them. For example, if they want to make a movie about their crops or their animals, they need to learn all the related aspects—not only technology, but expression, articulation, artistic representation."

Of course, the kids use the computers for more standard educational pursuits as well. The school's principal, Patricia Peña Cornejo, said that assignments often require students to search the Web for basic information, such as facts about local flora and fauna. "I am happy because I see how the children learn," she said. "The communication between the students is better. They talk to each other about things they saw on the Internet." Students are directed to educational Web pages; some other sites have been blocked by the ministry, Cornejo said. But one of the biggest benefits she sees is the possibility of access to instructional materials and digital books. (The Arahua computers didn't come loaded with books, but some were apparently downloaded later.) "The people are very poor here

### MEXICO

Mexico has ordered 50,000 laptops, underwritten by Mexican telecom billionaire Carlos Slim Helú.

BIRMINGHAM, AL

NEW YORK CITY

### HAITI

Haiti has ordered 13,500 laptops, partly underwritten by the Inter-American Development Bank.

### PERU

Peru's Ministry of Education has already taken delivery of the first 25,000 of an expected 486,500 machines for poor villages.

BRAZIL

### URUGUAY

Uruguay has received at least 30,000 of 110,000 ordered laptops, the first installment of what may be a total order of 350,000.

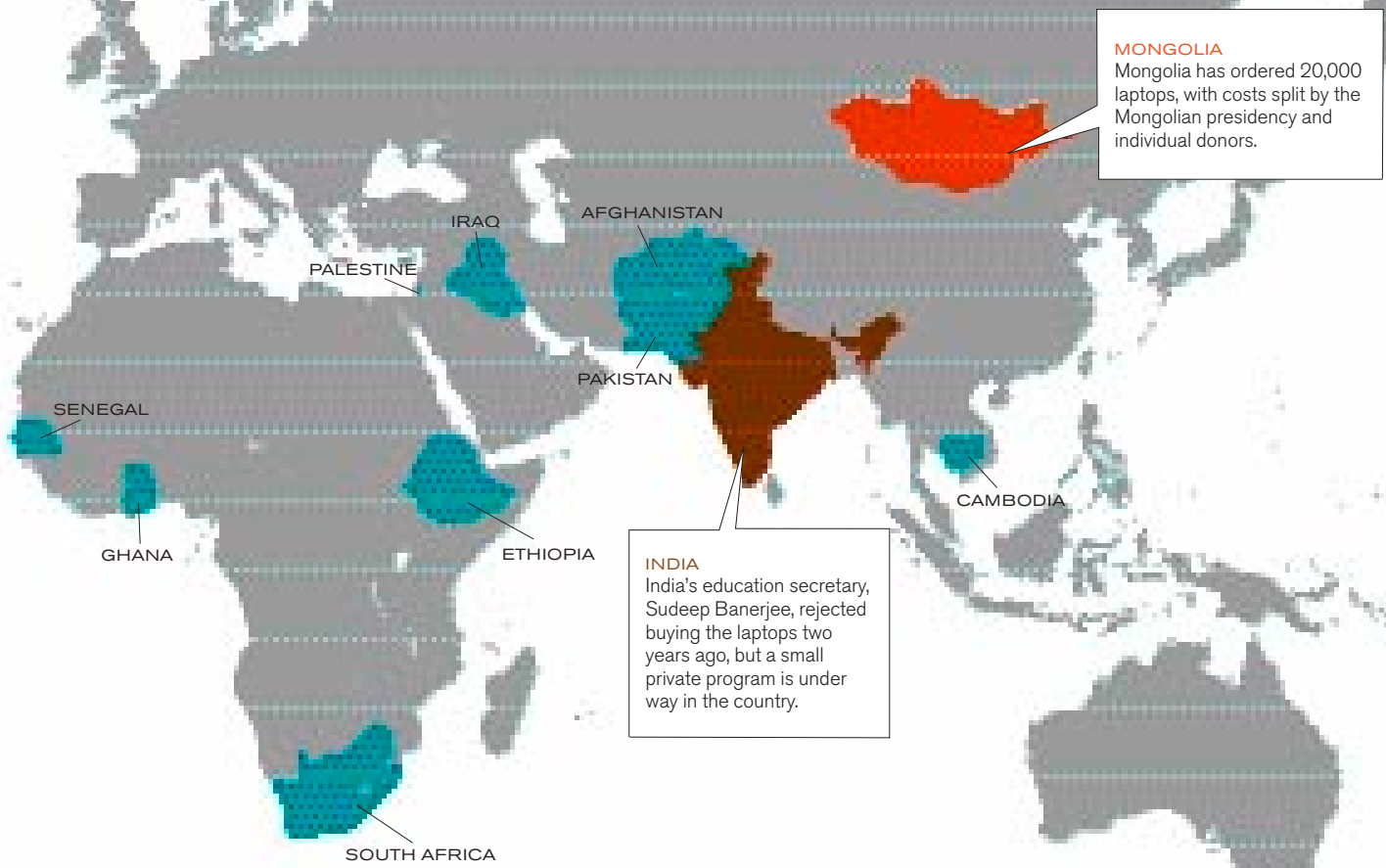
ARGENTINA

and don't have many books," added one teacher, Judith Inocente Olórtequi. "Not all kids can buy books."

I asked nine-year-old Nilton Quispicóndor whether he liked his laptop. "Sí!" he replied enthusiastically, as he toted the computer home from school. The concrete house he lives in is dark and roofed with corrugated steel; it has no electricity, but the laptops can be charged at school, and a charge lasts four to eight hours. Sacks of potatoes sat in the cluttered kitchen. Asked about his typical after-school routine, Nilton replied, "First I have lunch, then I change my clothes, then I play with my laptop." He opened up Tetris and played a round. Then he opened the drawing program and drew a picture of a house with a pitched roof, a door, and win-

www

TR's chief correspondent, David Talbot, visits Arahua, Peru, site of an early OLPC deployment: [technologyreview.com/olpc](http://technologyreview.com/olpc).



dows. Last, he opened a digital copy of “*Las Habichuelas Mágicas*,” the Spanish-language version of “Jack and the Beanstalk”—a story that Becerra later said must have been downloaded by a teacher. The boy’s father, Huber Quispicóndor, a 48-year-old who tends a *chacra* (small farm) of potatoes and corn, watched with pride. “He knows how to use the computer—he knows how to use every part of it,” Huber said in uneven Spanish (he speaks Quechua, an indigenous language). “Above all, it is more knowledge for him.”

I asked whether the machines had broken down or been misused, but I heard no horror stories. True, teachers and administrators may have been wary of criticizing a ministry effort, and for my part, I faced a language barrier. But my impressions were of a proud and supportive father, effusive teachers, and kids making creative use of their laptops. I asked Becerra what Peru wanted for children like Nilton. “Our hope for him is that he will have hope,” he said. “So we are giving them the chance to look for a different future—or the same, but by choice, not by force. These children who didn’t have any expectation about life, other than to become farmers, now can think about being engineers, designing computers, being teachers—as any other child should, worldwide.”

The challenge, Becerra said, “is how to transmit a technology and a knowledge that people in the poor areas never saw, and never heard of.”

**OPPORTUNITIES AND DISASTERS**

And by all accounts, that challenge dwarfs those associated with designing the laptop in the first place. Fernando Reimers, director of global education at the Harvard Graduate School of Education, recalls a scene he witnessed in Peru during an earlier effort to put PCs in certain schools. Visiting a school in the town of Trujillo, Reimers found that the computers were kept in one room. The teachers were so concerned about dust, which they understood could damage the machines, that they kept the windows closed and the door locked, and frequently polished the floor with a petroleum-based cleaner. The result: a suffocating, smelly shrine to unused technology. “I am very positive on the potential of innovation to make things happen,” Reimers says. “I also know that in education, when it comes to large-scale reform, the devil is in the implementation. Sometimes implementations can take great opportunities and turn them into disasters.”



**LAPTOP LAUNCH** In a Lima warehouse, 25,000 OLPC machines are inventoried and loaded with updated software. Boxes containing five laptops apiece are stacked on individual pallets, labeled by village and school.

Reimers pointed out that Peru faces no small challenge in ensuring that the machines get where they're supposed to go (and aren't stolen once there), and in seeing that thousands of teachers learn how to use them, keep them maintained, and share successful experiences with each other. But while Reimers and other educators were apprehensive about Peru's capacity to sustain the program in far-flung locations, they also saw undeniable potential. "The schools really urgently need something that can bring information from outside, and it's not likely to be a library of books," says Marcia Koth de Paredes, who spent 26 years as executive director of the Fulbright Scholar Program in Peru. If the children tap the laptops' content, she says, the machines can only be a positive force.

In Lima, I visited an olive-green warehouse, a 25-minute drive from the education ministry. Boxes containing five XO's apiece—25,000 in all—were stacked in neat columns. Young men were unpacking the boxes, installing batteries in the laptops, and affixing bar-code stickers to them. At another table, a worker used a thumb drive to load updated software onto the machines, five at a time, before sheathing them in plastic and returning them to the boxes. The finished boxes were organized on pallets labeled by region, village, and school. To protect against theft, the computers leave the factory digitally locked; only when they arrive at their destinations (or as close as is practically possible) will teachers receive USB drives containing the codes to unlock them.


Delivery might be easy compared with the monumental task of turning ill-educated teachers, generally unfamiliar with computers, into OLPC experts in 9,000 schools. There will be much to learn: how to operate, maintain, and recharge the laptops, and how to take advantage of all the digitized texts and software. Most of the villages have intermittent electricity, and those without it will get generators or photovoltaic recharging systems. But 90 percent of the villages also lack Internet connections; the nearest access points are at regional education offices. Teachers will be shown how to upload updated content to the laptops; in theory, when they make their monthly trips to the regional offices to pick up their paychecks, they will be able to download new material onto thumb drives, then install it on the laptops. "Peru is being very ambitious

in reaching out to the most-needy kids right from the get-go, but it introduces some logistical challenges," says Walter Bender, OLPC's director of deployment (*see Q&A, March/April 2008 and at TechnologyReview.com*), who traveled to Peru in February and March. When I interviewed him in late March, he was writing a deployment manual that can be generalized to later-adopting countries. They "didn't have such a document" for Peru, he said, "so there was a lot more hand-holding and discovery that had to happen."

It's not hard to imagine glitches and misunderstandings emerging from all this. But in the end, the verdict on OLPC in Peru will come from the children. Until now, many of them have had a limited sense of their own potential, says Lawrence E. Harrison, a Latin America expert and director of the Cultural Change Institute at Tufts University's Fletcher School of Law and Diplomacy. "You have to put yourself in the shoes of the kid, and the eyes of the kid, and it's not easy to do," Harrison says. "The vast majority of these kids grow up with images of programs from TV but are convinced that this goes on in another part of the world that doesn't affect them. They have a fatalistic worldview, often reinforced by religion. They do not connect education with their own progress. They see it as something that has to be done. So really, the success of this should not be measured in terms of their ability to manipulate the instrument, but in changing the way they see their prospects."

That's why Harrison and Reimers think that programs to evaluate children before and after they work with the computers—something Becerra says is planned—must measure values and attitudes as well as math skills and literacy. Are the kids focused on the future? Do they believe that knowledge matters? Do they associate work with the possibility of getting ahead, or just with survival? "Based on all the panaceas that we have experienced since the 1950s, I start with a little bit of skepticism" about the OLPC deployment in Peru, Harrison says. "But certainly, if I had been in the position of deciding whether to do it or not, I would have tried it."

The success of OLPC can no longer be judged against Negroponte's early predictions and plans, nor by the technical merits of the laptop itself. Peru is what matters now. When I was in Lima, OLPC's former chief technology officer, Mary Lou Jepsen (she has formed Pixel Qi, a startup dedicated to making even lower-cost displays for OLPC's computers and others), visited the education ministry to offer help and show staffers how to repair the machines. But she acknowledged that OLPC's future doesn't revolve around the hardware she helped bring about. "Laptops are easy; education is hard to transform," she said. "I don't even speak Spanish. How can I even start to transform primary education in Peru?"

In truth, she can't. But Peru now has a chance to help Rosario, Cecilia, Nilton, and 486,497 other kids—and, maybe, someday, the little girl on the traffic island in Lima. 

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