White Paper

Intel powered classmate PC

Malinalco, Mexico: Using Innovative Technologies to Improve Learning in a Rural Community

Combining innovative learning devices, WiMAX networks, teacher training, and hands-on collaboration, a program spearheaded by the Intel World Ahead Program provides a practical model for improving education and opportunity around the world.

Overview: Holistic Approaches for Education

"We are investing in our teachers and students. By providing students with access to trained teachers, computers, Internet connectivity, and localized software, we can develop the next generation of Mexico's leaders."

Francisco Delgado
Principal
Secondary School 156—
Ignacio García Téllez

Innovative laptop computers such as those featuring Intel powered classmate PC designs provide a powerful vehicle for governments and school systems in developing nations to improve education and introduce children to opportunities afforded by technology. But to deliver a sustainable impact and a meaningful return on investment (ROI), these devices must be complemented by wireless Internet access, locally relevant content, and teachers skilled at using mobile computing to enhance learning. In rural and semirural communities, these can be hard to come by or challenging to implement.

The Intel World Ahead Program is spearheading a holistic, year-long project to overcome these obstacles at four public schools in the semirural municipality of Malinalco, Mexico. The collaborative project unites educational and government leaders, nongovernmental organizations (NGOs), and businesses. It combines Intel powered classmate PCs and high-speed WiMAX networking with teacher training provided through the Intel® Teach Program.**

Children and teachers are excited by changes that are occurring, and the project is yielding best practices that can help Mexico and other nations use a new generation of learning devices to improve education and expand social and economic opportunities.

Intel World Ahead Program

The Intel World Ahead Program is Intel's collaborative global initiative to introduce the digital world to the next billion people. Taking a comprehensive, long-term approach, Intel collaborates with local and worldwide leaders to improve citizens' lives through:

- Access to highly capable PCs
- High-speed connectivity
- Effective teaching and learning
- Locally relevant content

Focused on developing communities, these efforts integrate technology to help people improve their lives, societies, and economies.

Situation: Rural Pressures in a Global Economy

"If education makes progress, the country will make progress. This is the most important aspect of this project."

Francisco Delgado
Principal
Secondary School 156—
Ignacio García Téllez

With more than 107 million people, Mexico is the world's most populous Spanish-speaking nation. It is also the 12th-largest economy in the world and Latin America's wealthiest country. But nearly half of Mexico's people live in poverty and 15 percent live in extreme poverty, according to the Organization for Economic Cooperation and Development.[1] A disproportionate number of impoverished Mexicans are located in rural and semirural areas of southern Mexico, and while globalization is allowing northern cities to expand their manufacturing base, the traditional economies of many southern rural communities are declining.[2]

Many of these factors are at play in Malinalco, the capital city of the municipality of Malinalco, which has 24,000 people in an area of 186 square kilometers. Located 125 kilometers southwest of Mexico City in the State of Mexico, this mountainous, semirural area is a picturesque place where Aztec sites and cobblestone streets coexist with an award-winning golf course. But job opportunities are limited, and traditional subsistence farms are less able to succeed under the pressure of the global economy. Many adults have moved away to seek work, often leaving children in the care of extended family members and further weakening the community.

Education is a way out of a potential downward spiral. Mexico's government views investments in education as crucial to fending off competition from less-developed nations and expanding economic opportunities for Mexico's youthful population. (More than 43 percent of Mexicans are younger than 18.[3]) Yet while education levels in Mexico are rising, many children in rural areas do not complete secondary school, and few go on to college or university. In Mexico as a whole, about 20 percent of children ages 12 to 15 have dropped out of school.[4]

Challenge: Limited Access to Technology

Technology is an important part of a high-quality education. Malinalcan students had taken an important first step, thanks to leadership efforts by Malinalco educators and the Union of Entrepreneurs for Educational Technology (UNETE), a Mexican nonprofit organization that works across the country to bring technology into the schools. All 45 schools in the province of Malinalco had traditional desktop PC labs, but only a few had Internet access, and without opportunities for in-depth training, many teachers' computer skills were limited. As a result, these PCs were used primarily for teaching basic PC literacy rather than for enhancing teaching and learning across the curriculum.

While PC literacy is indispensable in the 21st century, the real power of technology comes when it is used throughout the day in all areas of the curriculum. In an ideal classroom scenario, each student has a wirelessly connected mobile computer well suited for children's use and available to them throughout the day. Teachers are supported with professional development to become comfortable and competent using technology in the classroom to foster critical thinking, collaborative learning, and other skills that help individuals and societies thrive in an increasingly demanding world.

Malinalco's educational leaders want to move toward this vision of one-to-one mobile computing. They have undertaken a one-year project with the Intel World Ahead Program and other organizations to see how new, child-friendly learning devices from Intel—backed by wireless networking, teacher training, and effective content—could enhance education in Malinalco.

1 Stephanie Guichard, "The Education Challenge in Mexico: Delivering Good Quality Education to All," working paper no. 447, OECD Economics Department, Sept. 2005.
2 OECD Rural Policy Reviews: Mexico.
3 UNICEF, "At a Glance: Mexico."
4 Guichard, "The Education Challenge."

Program Description: Malinalco Project

"We don't want children to only consume information. We want them to generate it, to produce ideas and knowledge and put them to the service of the community, as well as produce their own means to survive in the future."

Guadalupe González
Academic Advisor
Malinalco Project

The Intel World Ahead Program is Intel's collaborative global initiative to connect the next billion people to technology that helps them learn, succeed economically, and improve their lives. Working with Mexican educational leaders, NGOs, and businesses, the Intel World Ahead Program provided resources, expertise and leadership to:

- Equip students at four rural and semirural public schools with low cost, highly capable, Intel powered classmate PC learning devices
- Connect the four schools to the Internet via high-speed, cost-effective WiMAX technology
- Train teachers to use in-classroom technologies across the curriculum
- Promote the development of relevant educational content

Collaboration

Broad resources are required to address complex challenges. Intel collaborates with local, national, regional, and multinational experts to provide robust solutions to these challenges while expanding local economies. In addition to UNETE, which has had a longstanding relationship with Malinalco schools, the Malinalco Project includes a variety of public and private collaborators:

- Latin American Educational Communications Institute (ILCE) is an international nonprofit organization created by 13 countries in Latin America and headquartered in Mexico. ILCE develops and delivers educational models, content, and training related to technology. It delivered the Intel Teach training for Malinalco's teachers.
- AXTEL is Mexico's nationwide telecommunications carrier providing integrated local and long-distance Internet connectivity and value-added services. AXTEL offered logistics, implementation services, and the 3.5 spectrum required for the project.
- Redline Communications is the leading Mexican provider of advanced broadband wireless access and backhaul solutions. Redline's RedMAX* system delivers reliable, economical broadband connectivity.
- Edutech is the Mexican PC distributor that is importing and distributing classmate PCs in Mexico.
- ASEC is a consulting company that provides ongoing training to help Malinalco's teachers incorporate technology into their lessons.

Learning Devices

Children in emerging nations deserve access to technologies that are well-suited to their needs and can help them achieve their potential. Intel has developed the Intel powered classmate PC learning device specifically to meet the needs of young students in communities such as Malinalco. Designed at Intel's regional Platform Definition Centers, these highly capable PCs reflect the findings of global studies conducted by Intel's social science and market research teams.

Intel powered classmate PCs are child-friendly systems—small and lightweight, colorful, fun, and inviting. They're also practical—rugged enough for daily use in rural environments, and equipped with a built-in handle for easy carrying.

"The rich part that Intel has provided is not only training the teachers, not only putting the machines in their hands, but emphasizing the development of high-level thinking skills in the children and, of course, in the teachers."

Guadalupe González
Academic Advisor
Malinalco Project

Malinalco Project at a Glance

Goal

- Explore the challenges and benefits of using Intel powered classmate PCs and comprehensive approaches to enhance teaching and learning in developing communities

Program actions

- Four schools equipped with 105 classmate PCs and WiMAX connectivity
- 25 teachers empowered through the Intel® Teach Program** and provided with ongoing coaching
- 400 students experiencing a one-to-one mobile computing environment
- Content development activities initiated

Results

- Teachers are learning effective ways to use technology for student-centered learning.
- Students are broadening their horizons, becoming more independent learners, and learning skills to enhance their success in the global economy.
- Educational leaders and collaborators are deepening their understanding of how to effectively use innovative technologies to enhance education and expand opportunities for young children in developing nations.

Key collaborators

- Intel World Ahead Program
- UNETE
- ILCE
- AXTEL
- Redline Communications
- Edutech
- ASEC

Top best practice

- Extensive teacher training—both formal coursework and ongoing coaching

Intel contributions

- Leadership, resources, and expertise for classmate PCs, Intel Teach training, and program development and management

Intel powered classmate PCs are designed to support children's learning needs. Classmate PCs can run video and educational software and other mainstream applications, and they come with special educational features that help teachers manage the classroom and present effective lessons.

The mobility and built-in wireless capability of the Intel-powered classmate PCs allow students to carry them wherever they go at the school. Unlike desktop computers in the labs, the Intel powered classmate PCs follow students through different classrooms and groups. These PCs serve as tools that allow children to search, process, and share information on any of the signatures the national standards offer.

Intel provided 105 classmate PCs to allow 400 students from four schools to experience one-to-one mobile computing. The program involves two elementary schools (grades 1 to 6) and two junior highs (grades 7 to 9). The smallest school had fewer than three dozen students clustered into two classrooms, while others had 100 to 120

"It is not easy to leave behind our ideas and methodology and adapt to the learning style of the children. It is a challenge. But it is also beautiful and interesting to see that our students are capable of doing many things that sometimes we can't even imagine."

Abigail Ugalde
First Grade Teacher
Secondary School 156—
Ignacio García Téllez

students each. Intel also provided teachers with Intel® Core™2 Duo-based laptop PCs, which they use to develop and present lessons and work interactively with students. The laptop provides software that enables teachers to control students' usage of the classmate PCs, including the ability to block access to the Internet or specific sites as needed.

Connections

Internet connectivity gives students access to learning resources and communication that can help them be part of today's world. Malinalco's relatively remote location meant the area had limited Internet access. Cable infrastructure had not reached many of the villages dispersed throughout the municipality, and Malinalco's high elevation and location—in a valley surrounded by dense forests and high mountains and with limited visibility—created significant connectivity challenges.

Intel collaborated with AXTEL and Redline Communications to create a full WiMAX-certified network that connects the four project schools to the Internet. WiMAX is an industry standards-based broadband technology that can link Wi-Fi wireless hotspots into a metropolitan area network.

The companies combined Redline's high-performance RedMAX AN-100U base station and SU-O outdoor broadband wireless subscriber unit to deliver the reliability connectivity needed for this challenging project. The network uses AXTEL's 3.5 spectrum. The first phase of the project uses partial-sight and non-line of sight operation with links as far as 4 kilometers away from the base station.

Teacher Training

Successful one-to-one mobile computing is a result of teachers feeling empowered to make technology an integral part of teaching and learning. Effective 21st century learning models emphasize student-centered teaching and promotion of critical thinking skills. This requires teachers to evolve from their traditional role as knowledge givers and become more of knowledge facilitators. Teachers must also become skilled at applying teaching strategies that incorporate computers and the Internet into their lesson plans.

To support Malinalco's teachers in making this transition, Intel invited them to attend a 60-hour Intel Teach course presented in collaboration with ILCE. More than 4 million teachers in over 40 countries have used the Intel Teach Program to improve their expertise in using technology to support 21st century learning models.

Approximately 25 Malinalco teachers at the four schools attended the training, which introduced pedagogic strategies such as project-based classes and the use of questions to drive students to think for themselves and develop a deeper understanding of the subject they are studying. The training also showed how teachers can use computers to help students communicate and collaborate more effectively—abilities that will be important to success regardless of what career path they follow. ASEC has provided ongoing support to teachers, sharing suggestions on teaching strategies and curriculum resources.

Educational Content to Enhance Teaching and Learning

The best technology is only as good as what you can do with it, so Intel works with public and private leaders to promote development of locally relevant content that can enhance education. We also develop specific content, including our award-winning skoool™ Learning and Teaching Technology. Skoool provides free online resources for math and science education and is available in multiple countries and languages. We support local content developers by sharing tools, technologies, and expertise, and are working on the localization of the portal for Mexico.

"We use the computers in classes like math, geography, and Spanish. If we don't understand something, we can get on the Internet and look up the information and do everything possible to understand. We have come a long way with these computers."

Brenda Cárdenas
Second Grade Student
Secondary School 156—
Ignacio García Téllez

Results

Formal program evaluation will be conducted when responsibility for program management transfers to the local government in early 2008, but those involved in the Malinalco Project say changes began to occur almost immediately.

Students were immediately attracted to the Intel powered classmate PCs and quickly felt comfortable with them, to the surprise of their teachers. "We had thought the children would have difficulties because they had not had previous contact with computers," recalled Guadalupe González, academic advisor for the Malinalco Project. "But it was wonderful, extraordinary. The discovery of the teachers and students, as they realized that what they thought would be so difficult was actually easy—it has been incredible."

That initial success, reinforced with the ongoing excitement of using the Intel powered classmate PCs and working in a one-to-one mobile environment, is building needed self-confidence, González said. "What we need, and what we have seen in this process, is the self-confidence that teachers and students have been gaining. When they have the classmate PCs in front of them, they don't even wonder if it's hard or not. They simply begin to use them."

Students are beginning to see themselves differently as a result, according to González. "The contact with the world through these technological resources will give the children the opportunity to see themselves with greater achievements in their horizons, with attainable dreams, that they, due to the environment of poverty they live in, haven't felt they could achieve," she said. "They feel encouraged by seeing themselves as the main characters of a project where technology plays an important part. I'm sure that they have generated a sense of pride for the process they have achieved."

Key Learnings

The Malinalco Project confirms that highly capable, Intel-powered classmate PCs—designed to meet the needs and aspirations of children and to support effective teaching and learning—can play a positive role in improving education and opportunity for children in the developing world. The project also emphasizes that even the most exciting learning devices must be supported by affordable wireless connectivity, effective teacher training, and compelling content if they are to truly enhance education and opportunity.

"What makes the magic is the combination of the different elements," said Fernando Martinez, education manager for Intel Mexico. "It's not the hardware, connectivity, content, or training alone—it's all of them together. When you think about technology, you have to take a holistic approach."

Other specific learnings from the Malinalco Project:

- WiMAX provides an outstanding solution for affordable high-speed wireless connectivity for rural and semi rural areas.
- Transformation takes time. Teacher training should combine formal instruction with ongoing individualized consulting.
- Build champions—start by offering technology to the most fearless teachers. Their enthusiasm can inspire other teachers who may be more reluctant.
- Infrastructure matters. Evaluate power capacity before deploying equipment to avoid damage caused by power fluctuations.
- NGO and private-sector collaboration can be effective at seeding proof-of-concept projects. Ultimately educational authorities and government agencies must commit the resources to carry them forward and achieve long-term, sustainable results.

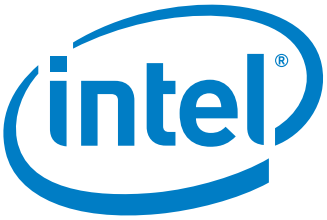
Moving Forward

"This project started as a kind of utopian dream. It then became a reality."

Maruca Ruiz
Board of Directors
Union of Entrepreneurs for Educational Technology

With this successful project, Malinalco's education leaders are taking steps to improve teaching and learning and to enhance student achievement and aspiration. Project participants and education officials are developing experience-based best practices that can enhance the success of future efforts to improve education in emerging nations and particularly in rural and semi rural areas.

González believes the Malinalco Project, with sustained support, will benefit Malinalco for years to come. "In this town, the maximum level of education was elementary school, and many children saw this as the most they could aspire to," she said. "Now many aspire to a career, to go further in their studies, and we see that this aspiration is something that technology can provide them with through online learning. This gives them great hope, because many towns like this one don't have many job opportunities. If the community gives them the opportunity, through technology, to have bigger dreams and to aspire to other ways of developing in society, they will be repaying Malinalco."



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