



## Case Study

Intel-powered  
classmate PC

Non-governmental  
organization  
Education



“Before the coming of Maendeleo Foundation to our school, all our students and teachers were computer illiterate. But Maendeleo has enriched us with computer knowledge and skills. At least now we have an idea of what a computer is and how to use it.”

Immaculate

P7 Student

Seeta C/U Primary  
School

# Solar-powered e-learning in Africa

## Maendeleo Foundation uses Intel-powered classmate PCs to give Ugandan children their first taste of computers and the Internet

In a country of 30 million where only 3% of the population can afford electricity, computer training was non-existent – or was, until one US programmer used his vision, skills and Intel-powered Classmate PCs to start a small learning revolution.

### Challenge

- **Opportunities for rural children in ICT (Information and Communication Technology).** Lack of infrastructure and resources means computers, like the electricity to run them, are rare in Ugandan schools. Programmer Eric Morrow's vision was to find a way to overcome this challenge to give Ugandan children their first taste of computers and the Internet.
- **Maximize use of scarce resources.** In a country where IT support is scarce and electricity even scarcer, portable, rugged, reliable and efficient computers are essential to ensure continuity of service.
- **Foster a skills-based economy.** In the long term, Morrow hopes to model the success of India's IT outsourcing sector by stimulating development of IT skills and helping Ugandans create a viable IT services industry.

### Solution

- **Classmate PCs to go.** A specially-equipped vehicle provides solar power to run ten Intel-powered Classmate PCs from a portable Mobile Solar Computer Classroom that is used by hundreds of students.
- **Start with the basics.** Students use a standalone training application and cached Web content to learn progressively more advanced skills.
- **Follow up for the long term.** Because the Maendeleo Foundation's classrooms are mobile, teachers can regularly visit a number of schools, allowing students to build upon earlier lessons and build long-term interest in the technology.

### Assessing the Situation

Computers are out of reach for most citizens of land-locked Uganda, which is one of the world's poorest countries. Although its median population age of just 15 years suggests a large student population, few Ugandan students have access to anything but basic learning resources. And while education is highly valued, parents making an average of \$US2 per day struggle to manage school fees that typically reach US\$300 per year.

Uganda is a focus for many non-governmental organizations (NGOs), who deliver aid, teaching, and business mentorship in outreach with local communities across the country. Family affiliations with an NGO operating in Uganda led Eric Morrow, a professional computer programmer who on an earlier trip to India had been overwhelmed with the desire to help, to consider how his skills might be used to aid the children of Uganda.



Consultations with other NGOs led Morrow to consider how he might bring computers to Ugandan schools – most of which are boarding schools with few technology-skilled teachers and practically no money to spend on technology of any kind.

Working with Ugandan development economist Asia Kamukama and experienced relief worker Richard Happy, Morrow sketched out a plan of action for the Maendeleo Foundation, a NGO he established to bring computers to Ugandan schools in a cost-effective, sustainable manner.

One of the first challenges identified was the near total lack of infrastructure: only 5% of Ugandans have access to electricity and just 3% can afford it. This meant that the technology solution put in place had to be self-powering and self-contained – a need that was met by mounting three 65-watt solar panels on top of an old four-wheel drive. The vehicle was also used to transport a custom-made tent and related equipment, which when assembled at a site became the Mobile Solar Computer Classroom (MSCC).

Local schools were receptive to the idea and welcomed the team to bring the MSCC and teach basic computer classes to their students. Initially

lacking any other viable options, they used low-cost, low-specification desktop PCs that promised low power usage but proved unfit for the extremes of temperature, dust, and durability they faced every day. Maendeleo staff lost time and money servicing them, and unpredictable availability also limited the number of children its staff could teach.

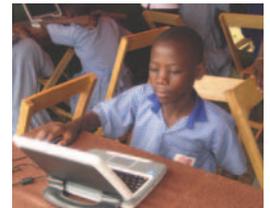
“Some days we would have five working computers, but on most days only four,” said Morrow. “Inevitably, one would either overheat or fail to start, which limited the number of students we could teach. A 2GB flash drive was the only provision made for difficult environments, and with consumption of 20W each, they were pushing the power generation limits of our mobile solar system. The MSCC was proving its value, but we simply couldn’t meet our objectives without more reliable computers.”

### Delivering the Solution

The first few months of operation in Uganda confirmed that the Maendeleo Foundation had the right idea: training was warmly received by teachers, parents and especially children.

“I thank Maendeleo Foundation for the computer training lessons,” said Aidah Biyinzika, an English teacher at Mukono Boarding School. “Some of the children didn’t have any computer experience, and the period Maendeleo spent with us helped them to acquire various skills and become computer literate.”

As Internet access is unreliable in Uganda, Morrow could not rely on teaching skills with a live Web connection. Instead, he wrote a Microsoft\* Windows\*-based e-learning application that tracks each student’s progress through a graduated series of training exercises. Cached Web content works around the lack of Internet service by providing a limited selection of information. This approach enabled continuity in lessons even though the MSCC might only visit a given school once a month.



**“Our old systems were pushing the power generation limits of our mobile solar system, and on most days we only had four PCs running. The same solar panels can power 10 Intel-powered classmate PCs for six hours without topping up the power or using the laptops’ batteries – which means we can train a whole grade in a day, then give the same students a chance to play with the computers every month.”**

Eric Morrow  
Director  
Maendeleo  
Foundation

### Spotlight: Maendeleo Foundation

- Non-government organization based in Seattle, USA
- Operates in Uganda’s capital of Kampala and other areas nationwide
- Projects include medical aid, educational support, and technology education
- Custom-built training software engages students at an appropriate level
- Regular visits to schools ensures students can develop their skills
- Web site: [www.progressafrica.org](http://www.progressafrica.org)

**“Some of the children didn’t have any computer experience, and the period Maendeleo spent with us helped them to acquire various skills and become computer literate.”**

Aidah Biyinzika

English teacher

Mukono Boarding School

Morrow had heard about the development of Intel-powered classmate PCs, and believed they might offer a better solution than the PCs used at first. After failing to find a local distributor, he purchased several of the units from an online store in the US and had them delivered to Uganda. As soon as he began experimenting with the classmate PCs, he realized they offered a more rugged, reliable design that ran much faster than the previous units – and delivered a standard Microsoft Windows XP desktop experience.

The classmate PCs were far more energy efficient: in one test, the units were run from the solar-charged battery with the solar panels covered to prevent recharging. All ten classmate PCs ran for over six hours without a problem – and this life could be extended further by using each unit’s individual battery. This meant the Maendeleo Foundation workers could teach an entire class of students at once, allowing them to reach significantly more students at no additional cost.

“I have been very impressed with everything about the Intel-powered classmate PC,” Morrow explained. “They have all caused us absolutely no trouble. After having desktops that would break down just about every day, I’m so happy to have these computers that work – and work well.”

After establishing a relationship with South African Intel partner Mecer\*, Maendeleo was able to source more classmate PCs, eventually bringing the total number of installed systems to ten.



Now that they have a reliable laptop technology solution, Maendeleo Foundation workers have been able to achieve their goal of delivering computer training to more students than ever before – while remaining mindful of the massively constrained budget typical of all NGOs.

Having more-reliable laptops means Maendeleo Foundation staff spend less time fixing broken PCs, and more time improving the purpose-built software that continues to give Ugandan school children their first exposure to potentially life-changing technologies. Staff taught more than 1,300 students in a year, rotating through schools so each student got around five hands-on sessions. The team also trained 46 teachers to teach computer classes, giving them skills they can use to reinforce and extend their students’ computer knowledge throughout the rest of their education.

In the longer term, Morrow hopes steady and repeated exposure to computer technologies will encourage students to consider careers that might have seemed out of reach – including Web design and roles within a potential services outsourcing industry that could eventually expand across Eastern Africa.

### Key Technologies

- Three 65W solar panels recharge a battery that provides power for all of the equipment in Maendeleo’s Mobile Solar Computer Classroom.
- Students use Intel-powered classmate PCs to run Microsoft\* Windows\* XP and Maendeleo’s proprietary training software, which provides graduated skills training and access to a small, self-contained array of Web sites.

### Integral Answers

- South African reseller Mecer\* supplies the Intel-powered classmate PCs to Maendeleo Foundation.
- Microsoft Unlimited Potential has donated five Intel-powered classmate PCs to help Maendeleo’s teachers reach more children.



## Achieve Your Vision

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## Benefits

- Because they use less energy than alternatives, switching to Intel-powered classmate PCs has allowed Maendeleo Foundation to power more than twice as many PCs at once with the same amount of power.
- With technical support difficult to come by, the reliability and durability of the Intel-powered classmate PCs means Maendeleo workers don't waste time, resources, and gasoline driving to a major city to fix problematic computers.
- Because they can now teach more students, more regularly, Maendeleo Foundation teachers' core goal – to open up students' minds to the possibilities that computers provide – can now be met at lower cost, and with higher effectiveness.

## Solution provided by:



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