

Lab News: PK
Slug: RENEAL:
Target issue: Oct. 18, 2013
Reviewed by: Rene Bierbaum, Tim Shepodd
Approving director: Tim Shepodd (per Russ Miller)
DC: pending

Words: 1,045
Photos: yes

Connecting kids with the world, one computer at a time

By Patti Koning

Computers and internet connectivity are something we take for granted. Between work and home, many of us have more computers than we can count on one hand and we've come to expect internet access to be as reliable as electricity. But in developing countries, computers and internet access remain elusive.

Rene Bierbaum (8225) and her husband Neal are working to change that, one school at a time, through their nonprofit organization Reneal International Education Outreach, appropriately named by combining their first names. Rene will retire in early November to dedicate herself fully to Reneal work—traveling to developing countries to install robust computer labs and train teachers on using computer resources.

The seeds for Reneal were planted back in 2006, when Rene and Neal served as Peace Corps Volunteers in the Philippines (see the Aug. 14, 2009 issue of *Sandia Lab News*). They were assigned to Compostela National High School, where they developed a low-cost campus-wide computer infrastructure based on Open Source software and used computer hardware from the World Computer Exchange.

"The experience was so incredibly fun and rewarding, we knew this was something we wanted to continue," says Rene.

She returned to Sandia in 2009 following their Peace Corps service. Neal retired and devoted himself to refining the low-cost computer infrastructure and continuing to work with Compostela National High School. The low-cost computer system is based on a client-server architecture with a server, the powerful computer on which all programs reside, and lower-tech client computers that run off the server. Another key element is Linux-based Open Source software.

"It's free, legal, and is not affected by viruses," says Rene. "A lot of schools get nice IT labs that would be shut down within a matter of months because the computers became so virus-infested they simply stopped running."

Neal has customized the low-cost computer system for school environments. Features include centralized file storage, personalized teacher accounts, shared teacher space, and student accounts. He's also spent a lot of time developing a simple and accessible user interface.

He loads the server with standard applications, like picture editing, spreadsheets, and word processing, that can be run on any client computer. For the most recent Tanzania installations, he downloaded over 4,000 Khan Academy videos, about 400 of which have been translated into Swahili by the Oakland-based non-profit Asante Africa.

Neal made his first trip to Tanzania in 2010, after connecting with a nonprofit doing similar work in that country. He's since been three more times, most recently in August. Rene joined Neal on that trip, her second to Tanzania. They installed computer labs in three high schools.

“It’s pretty exciting. As a result of that trip, 3,100 students and 85 teachers now have access to 51 computers in their schools,” says Rene. “Most of the kids have never touched a computer before. Giving them the chance to use a computer prepares them so much for life after high school and for college. Computers and an internet connection open up so many worlds.”

She was quite moved at the official turn-over ceremony for the computer system at Mukulat Secondary School. “It was thrilling to hear the school board president speak of the opportunities that computers could offer to the students at Mukulat, which is exactly the reason why Reneal IEO exists,” she says. “But then he went on to talk about how amazing it was to have a woman engineer (me) standing before them, something that the girls may not have even known they could aspire to.”

Moving Forward

Reneal IEO incorporated in April of 2012, becoming a 501(c)(3) tax exempt public charity in August of 2012. Along the way, there have been plenty of lessons learned. One is to visit candidate schools to evaluate first-hand if they meet Reneal’s requirements: a dedicated computer room with tables and chairs, security, electricity, and an IT teacher and headmaster who will fully support the computer system. On his first trip to Tanzania, Neal went to an orphanage he thought was ready for a lab installation, only to find the site had no electricity.

One challenge for Reneal is acquiring the computer hardware. The server costs about \$500 with all of the components; other necessary items such as the network switch, Ethernet cable, surge protection, UPS, and server monitor add another \$600. Ideally the client computers are older, donated machines. “Discarded hardware in the United States tends to be really nice and Reneal can transform it into opportunity for kids in developing countries,” says Rene.

A Bay Area company recently donated about 50 surplus laptops to Reneal with more expected to come, allowing Rene and Neal to plan nine installations in the Philippines and Tanzania in 2014. Early next year they will take a long trip to the Philippines to do six lab installations, follow up at sites of previous installations, scout potential new sites, and spend time with the friends they made living in the country as Peace Corps Volunteers. They plan to travel to Tanzania to do the other three installations late in the year.

Looking towards the future, Rene and Neal plan to split their time between traveling abroad to do lab installations and scout potential school sites and, at home, working on strategy and vision at Reneal. Neal continues to refine a system administrator’s manual, written by a Reneal board member, to share his expertise with others.

“We need to think about what we want to do with the non-profit moving forward,” says Rene. “If we can get more hardware, it then becomes a logistical issue of getting hardware from here in the US to the schools. Expansion—if we pursue it, how it would happen—will be an important topic at our board meeting in January.”

Rene will officially retire from Sandia in early November. She has mixed emotions about this. “I hate to leave Sandia because I really enjoy my work and colleagues. Sandia has been very good to me. But we may not be able to travel like this and work on lab installations forever, so we want to keep at it while we are physically able,” she says.

Learn more about Reneal at <http://reneal.org/>. Rene has a blog on the site that details previous lab installation trips and other Reneal mission areas.

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A student at Mukulat Secondary School in Tanzania helps assemble one of the computers.



With a smile on her face, a student at Mukulat Secondary School uses one of the new computers.



Rene and Neal help students use the new computer lab at Mlangarini Secondary School in Tanzania.



The school board president of Mukulat Secondary School in Tanzania accepts a keyboard, symbolizing the turn-over of the computer lab from Reneal IEO to the school. It was then passed to the headmistress, at right. At the ceremony, the school board president noted how amazing it was for his students to see a female engineer.



Students begin using donated laptops in the newly installed lab at Paroma Secondary School in Tanzania.