Three Hundred Libraries Later: Evaluating the eGranary Digital Library and Off-line Information Delivery in Education

Cliff Missen
Director, WiderNet Project
University of Iowa
Iowa City, Iowa

Thank you very much for having me back this year. I am delighted to be here to share the ongoing adventures of the digital library and the WiderNet Project. One of the things I enjoy about coming here is hearing all the other adventures that people are having in your work.

The American philosopher Thoreau said, "It is not enough to be simply good. You must be good for something." The eGranary Digital Library, which I'll be presenting in a minute, is good, but the 'good for something' is the work that you're doing in the field. I enjoy this collaboration in terms of learning what you're doing, and what we can be doing with our technology, to improve the work you're doing. I'm saying that partially because I changed my presentation to answer questions raised earlier.

The WiderNet Project has been around since 2000. This grew out of a year I spent teaching as a Senior Fulbrighter at the University of Jos in Nigeria back in 1999. It grew out of visiting people trying to do education with technology and being frustrated with that technology. We founded the WiderNet Project as a way to support our colleagues who were doing work in developing countries. Our biggest focus is training people.

When talking about the total cost of ownership of computer systems over a five year perspective, the computers are about 25%, training people is about 30%, and staffing is about 30%. So we focus on those two big pieces: training and staffing. We've had over 4,000 people go through our training programs since 2000.

At the same time, we work with mostly American corporations and individuals to get donations of hardware and software that we ship off to our partners. We've had volunteers at The University of Iowa refurbish and ship over 1,200 computers so far. Whenever we ship a cargo container of computers, we pad the computers with thousands of books. So, we get a lot of value out of that.

Our focus is on practical, cost-effective solutions. There are a lot of people who like to talk about a digital divide. I think the term 'digital divide' is a luxury afforded to people who have digital technology. When I go around the world, I see refrigerator divides. I see antibiotic divides. I see healthcare divides. I see good governance divides. I see it, really, as a large economic divide. Hence, a lot of the work that we do at the WiderNet Project focuses on coming up with cost-effective solutions for using IT.

Out of this has come this device called the eGranary Digital Library. I have one hooked up right here. This started with me sending CDROMs to the universities we partnered with in Nigeria, full of Web sites that we'd copied. They said, "That's really cool. Can you send us more?" No good deed goes unpunished. So we started sending more CDs and people started asking for more content. Pretty soon, it was, "Can we have the entire Wikipedia?" Whoa, that's kind of big.

Let me grab the pointer here. This is a chart that shows Internet uptake from 1990 and 2005. We see regular Internet use going up to 60, now 60-plus percent of the population in the wealthy countries of the world. Then middle income countries. And then finally, the poor countries of the world, with Africa at the bottom, in the blue line.

This is one of those glass half full/half empty sorts of things. I'm interested in the 30% of American families who don't have the Internet and the 98% of the population of Africa who don't have the Internet. Everybody has information needs and there are solutions if we think creatively about this.

The reality of the cost across Africa is that it's expensive. I just visited a university that spent $150,000 last year, for their one-megabit Internet connection. That's an insane amount of money considering all the needs that the university has. I have a friend in Nigeria who has a hole in his head, delivered during a student riot because he wasn't able to pay salaries on his campus. He had spent a ton of money on networks and computers the previous year. That put him in a position of not being able to pay salaries. These are real choices that people are making about using the technology.

I have a term: "bandwidth blackmail". It bothers me a great deal when I hear experts from afar tell people in poor countries, "Everything's free. You just have to get on the Internet." Advising someone who doesn't have books, or access to information, that they should be on the Internet is like advising somebody who doesn't have water that they should drink Perrier. In many situations, it's the most expensive option. We have to be careful about that.

I call it the 800-pound gorilla effect. Do you know the joke about the 800-pound gorilla? It's an American joke. Where does an 800-pound gorilla sleep? The answer is: anywhere he wants. I see foundations; I see corporations who are serving the bottom of the pyramid. I see individuals, like myself, who show up in suits and ties as experts, wandering all around developing countries telling people, "You just need to get the Internet." And they don't understand what that means.

The reality of Internet connectivity across most of the developing world is that even if it exists, it's not reliable. It's rarely there 24 by 7. We've done some testing to show that in Africa, many institutions are hard-pressed to come up with six hours a day of connectivity. That's because the power goes out, or the satellite dish goes down, or any number of other problems. In my teaching, when I teach from Iowa to Africa, my students will disappear from the radar for weeks at a time because of one failure or another.

With the eGranary Digital Library, we replace bandwidth with "storewidth". We get millions of resources, put them on a hard drive, and put them inside the organization. These are all educational documents. We don't do popular culture. We don't do pornography or anything like that. No sports scores (sorry), just good educational materials, curated and collected by volunteers from around the world. We put it inside the institution's local area network, where their local area network is very fast. They might have a tiny Internet connection outside, but inside, they've got fast connectivity, which means that video, audio, and multimedia can be employed.

Right now, we've got the eGranary Digital Library in 300 locations across the world. It's growing, which prompted us to stop and ask the question, "How are we doing?" I maintain a list of about 150 features that we want to add to the eGranary, because every time I travel, I meet people who have not just content, but features that they want to add. So, we're constantly growing this thing. Thanks to the folks of the Rockefeller Foundation, we had a chance this last year to ask people this question and get some good feedback.

This is the model: the eGranary is hooked up to a local area network. Everybody has free and fast access, even when there's no Internet connection. I did a focus group at the Dalai Lama school in Dharamsala, India. They had been working for years on setting up a wireless network around the valley there. They had experts come with inexpensive wireless equipment and hook it up. It was amazing that on good days, with good weather, they were able to get a signal from one part of the valley to the other. It was impressive, but not useful. The teachers were beating themselves up because the outside experts had come in and said, "Get the Internet and everything will change." Well, they did get the Internet. It took a lot of time and money, and little changed. It was frustrating for them.

When the eGranary was hooked up, the educators in the room instantly said, "This is it. This is change. This is real information access." We have people taking this connection, adding wireless access points around their community to it, and turning it into what we call a knowledgesphere. It's turning into a free public wireless library. Anybody with any Internet-enabled device like a cell phone or laptop can hook up and use this free library.

This is the interface of the eGranary. This is what the eGranary looks like to somebody who's hooked up. I'm not connected to the Internet here. There are plenty of wires, but none of them are connected to the Internet and there's no wireless. I'm just using this hard drive right here. We've written an interface so that it looks and acts much like the Internet. So I'll click on—say, books. It comes up and says there are 30,000 books in here.

Scroll down a little. Say I'm interested in children's literature. I click through the books here and find *The Adventures of Ulysses*. It opens right up. Click on a chapter. As you see, it opens instantly, because, again, we're using the speed of the local area network.

I'll do a search on the catalog and look from my favorite project, Mutopia. Here we go. These Mutopia folks have gathered almost 1,300 pieces of music. Let's say that this morning, I'm in a Mozart mood. Click on Mozart. Here are the works of Mozart. If I want to hear it, I'll click on the midi file. It will open up and play. Terrific. Let's go onto the PDF file. And there's sheet music, opening instantly.

In Africa, there's something I call PDF paranoia. When somebody has downloaded a Web site, it takes five minutes to get the Web site. The next click is five more minutes of their life. If they click on a PDF file, what happens? It could take five hours…or five days. You never know. You can't hit the back button, so you have to quit. My job as a trainer is to walk around behind people, and nudge their elbow so they click, because in this model, you can open PDFs without worry.

I'll do one more demo. I'll go to a video. Here's one I'm familiar with, a 126-megabyte video. How long would this take to open at your home? A few minutes? A few days? Click on that. It opens instantaneously. As instructors, this is our dream. Right? An instructor, turning to her 50 students in her human anatomy class says, "I want the 50 of you to go online, watch a video, and take a tutorial. We'll talk about it tomorrow." That's doable now, even in the furthest reaches of the world.

We have permission from over 1,200 authors and publishers so far: MIT Open Courseware (thank you very much), Wikipedia, and the World Health Organization. We have librarians working around the clock to identify good content and bring it in. This collection is over 14 million documents so far. It has tens of thousands of books, and people opening these documents 5,000 times faster than if they were hooked up to their Internet.

This slide here shows individual Internet connectivity speeds across the world. We measure what the user experiences, not what the institution has purchased. This speed here is a typical connection at a university in the US. About 17 megabits per second is what the individual experiences at their desk. The typical corporate desktop is experiencing 2.5 megabits per second; they're not so liberal with Internet connectivity there. eGranary users are experiencing 65 megabits per second, almost five times faster for everybody. We have fast computers. We have fast networks. The weakest link is our Internet. We take out the Internet and everything is fast.

We've done an evaluation program, a series of online surveys and paper surveys delivered to some institutions that didn't have the Internet. There was also a series of onsite focus groups and a couple of focus groups over Elluminate, people connecting and talking online. Then we also grabbed logs from servers so we could assess how much the materials had been used.

There are a number of stark things that stood out for us. One, it's really hard to carry on a survey in Africa where people don't have this kind of connectivity. We have a database of about 5,000 emails. When we sent out our first request, about 4,000 came back as

undeliverable. So we had two students spend several months phone-calling and emailing, trying to find other people's email addresses, because they change so much.

What we found is that about 70% of the sites that reported said their eGranary was working fine, thank you very much. But we found that implementation usually depended on one person who had the enthusiasm to make it happen. There are a number of cases where somebody said, "Yeah, my eGranary is working." And I asked, "How many people are using it?" And they said, "Nobody right now, because I keep it in the desk drawer so that it doesn't get stolen." In all the cases we looked at, it's about one individual who gets on fire about it, usually a young person who takes this technology and spreads it around.

Many of our subscribers do not expect or use technical support. I knew this from wandering around Africa visiting server rooms that had brand new servers in boxes, in corners, unopened and unused, because something was missing, something hadn't arrived yet or no one had figured out how to open it. In the American corporate world, we call that FUD: fear, uncertainty, and doubt. There was a lot of FUD in the way. There were many times when we'd work with somebody after learning that their eGranary wasn't working and the fix was less than five minutes. It was, "You need to push this button or switch that switch." But when we asked people, "Why didn't you contact us?" We got a lot of different responses.

From that, we've learned to have local people do the installations and the training. We've started implementing this in Nigeria, and will in Uganda soon. Then it's not something coming from Iowa. We have a young woman in Nigeria making about five times this year what she made last year, and last year, she made twice what she made the year before, wandering around installing eGranaries and, most importantly, teaching people how to use it.

The other complaint that we received was that there were not enough access points. Once they have this up and running, if an instructor wants to use it in their course with 50 students, they need 50 workstations. A couple of people have talked about that already this morning; the challenge of getting enough of what I call "face time." Sitting in front of the computer and learning from that computer is rough.

We did an installation at the University of Liberia last year at the medical school. With volunteers, we went over with 12 donated computers and set up a lab. We trained the second year medical students how to do all this. At the end of the week of training, I pulled out a wireless access point, plugged it in, and hung it on the wall. I said, "There, now you have wireless." And the students said, "No way." I said, "Yeah." The next day, five students came into the library with laptops, and the dean was sitting there shaking his head. He said, "I had no idea these kids had laptops." The next day, the dean brings in his own laptop. So we'd grown from a 12- to a 17-computer lab overnight, without having to buy a single piece of technology.

But the number one conundrum that most people face is information literacy. Those of us here in the US who have been on the Internet for the last 5 or 10 years have lots of experience under our belts doing searches and working our way through the wealth of information that's out there.

One librarian put it to me clearly. She said, "This is what happens every year. 7,000 new students come to my university. I go into a lecture hall with no electricity. I've got students piled up to the walls, hanging out the windows, and I'm telling them that the best resources on campus are in the eGranary Digital Library." Most of these kids have never seen a computer before. That goes right over their head. It's the same with the Internet; right over their head. That's what I have to start with: not enough access points, not enough computers, and students who have never used this technology before."
We were asked constantly, across the board, for more training material, more resources, and more training for libraries and instructors, so they can master these technologies faster.

Across the board, everybody had more content that they'd like to see, too, but no one agreed. That's to be expected. They wanted more veterinary science, more agriculture, more whatever. That's our day-to-day job: finding more content.

There are a couple things we've done with the recent eGranary that address these. We were doing evaluation programs and building the Community Information Platform at the same time. The Community Information Platform or CIP is sponsored by Intel, which is a great gift. One of their Vice Presidents heard us giving a presentation at a conference, and came up and said, "We spend $2.5 million a year caching the Internet inside our company. That saves us $7 million dollars in connection fees." They understood immediately why we'd do something like this. And they came out with a gift. They said, "What do you need to do next?"

We've added Web 2.0 capabilities to this drive. Now it has LDAP security. One can log into the drive. It's easy to upload and share locally-made content. We put information into silos so people can have their own silos and add their own information. We've made a dynamic with MySQL and PHP, which means we can run programs like Moodle, Drupal, and Word Press, which are all in there and ready to go. In terms of scaling this, asking an institution to install the server and run these services is almost a commitment to two or three full-time IT staff. Most of them couldn't afford that; these small schools and small clinics weren't going to be able to do that.

We're trying to aggregate that and put the best practices into the box so that someone can plug this into their network and start making Web pages. The built-in Web tools are my favorite part. It's got a browser so you can log in. You can move, upload and download files. It's got a building Web editor. You simply click on a page. It opens up in a Web editor and you can edit and save it. I beta-tested this on my own students at The University of Iowa where I was teaching some teachers and librarians. When they went back to their schools around Iowa, they had their students using my server. They set up individual Web sites for all the students and had them making their own pages. It's an

easy tool. It makes it easy for someone to click a button, upload a PowerPoint, make a link, and share it.

We've also been working on improving the interface. Again, most of the people using the eGranary haven't used the Internet before. If they have, they haven't spent as much time as we'd like on it so, we've been doing a lot of work with librarians to catalogue the items in the eGranary, making them easier to find. As you saw earlier, I went to the Mutopia site. It was simply a matter of typing in a quick search, and boom, it poppped up. We have a catalog of items that a librarian has marked and viewed. We have a word search, which is 14 million documents worth of words. We have something we call portals. All this is making a user-centered view of information on the eGranary.

When we asked users out in the field the best ways to find information in the eGranary, the number one use was portals. There was a university in Ethiopia that, through the magic of a technician hitting the wrong switch at the wrong time, was serving up the eGranary interface, but when you clicked on the item, it went out to the Internet instead of to the eGranary. But the professors at the university, who had lived with this for a month, said it was actually better than the Internet alone, because they could usually interface to find what they want, and get directly to the item.

I'm going to pop back over to the eGranary for a second here and show you. I'll click on portals. Here, for example, we're working with the University of Alabama and the University of Zambia to put together a portal for training healthcare workers there. They've gone out and identified over 500 resources that fit with the curriculum they're teaching. If we click on 'Browse by Category' here, we see a list of topics. I go into Public Health Nursing and click on Environmental Health, and there's a list of links that take you directly to…MIT Open Courseware. Yeah! That was not planned or rehearsed.

The idea of portals is that we ask the users, "What do you need to know and what do you need to get access to?" so now everybody doesn't have to reinvent the wheel. This is the time-honored tradition of professors making syllabi. We take our students into the forest of information and we pick out the pieces that we think that they should use.

The other thing we're doing now is building training tutorials in the eGranary itself. We're making modules in Moodle and one of our objectives is to be lazy. First, we found and copied lots of resources other people had put together for doing basic Internet training, and the like. We brought them into the eGranary and now we're making Moodle courses that link to these modules people have created, and we're creating complimentary modules.

Our aim over the next year is to develop this so that that librarian who has 7,000 new students walking in the door can set up an incentive system for them to spend time with the computer, go through the module, get their Internet driver's license, and understand better how to use these technologies.

That's what we've been up to: spreading information. We now even have eGranaries in some prisons here in America. We're finding many populations where people need access to information.

I have an eGranary on my cell phone. I have a chip in here that's about the size of my fingernail that has 36,000 documents on practicing medicine. We're making little eGranaries like this one here, a USB key. I think this one has 25,000 documents on it. This is offline information delivery. There's a large amount of potential here. We're finding that the great challenge is making it presentable, and making the information findable when people get their information store. Thank you very much.