



NCTI 2010 Innovators Conference

Underserved Populations: How Innovative Technology Can Make a Difference

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Summary: Presenters shared ongoing projects and lessons learned using technology in underserved locations and populations. Project-based learning and the potential to engage students' interests and curiosity was a recurring theme.

Discussion

Celia Kang

- Set the stage for where the U.S. stands in its approach to technology. A lot of buzz in DC and within the administration to use mobile technology and broadband technology as a cure-all for the economy and for boosting education. Also a great desire to show how “the rubber is meeting road” in how the ideas come into play. The panel can talk about what they do on the ground.
- Idea that expanding broadband across country will increase applications for education, improve rural access to healthcare, etc. About \$6 billion has been allocated to bring broadband to many locations in U.S. Also several programs that haven't worked—sometimes technology moves faster than regulation and government mandates; this has always been a struggle. E-rate program is federal program that allocates money for computer centers, broadband connections, etc. in schools and libraries. You may have a lot of computers in rural area libraries with no broadband connection; that doesn't serve children well. It's a complicated picture.

Yong Zhao

- Technology is both good and evil (think about yin and yang). Technology can be liberating, but it can be repressive. Technology can be used to enable a lot of people in education but can also be used to control the education process. Can be used to impose a national agenda. Need reorientation of education approach and how we view tech in our lives.
 - Technology has expanded our space. Now we have an expanded living space in terms of the people we interact with. We have expanded the primary space and people close in proximity don't matter that much. Some



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people say now you don't have an argument with anyone anymore because you hang out with only people you like on the Internet.

- Technology redefines the value of talents. What wasn't valuable becomes valuable. What is not valuable locally may be valuable somewhere else. eBay redefines this because of the distance, and brings you in touch with people you may not have access to—small niche patterns in a broader market.
- Technology redefines what's possible. Improving test scores does not necessarily focus on the right things. Test scores deny people who have special talents and strengths to take charge of their own learning. Don't try to impose a set of standards and judge them as deficient because they don't meet our standards.

Paul Kim

- Trends in domestic and international use of technology: cell phone technology has become one of the biggest disruptors.
- Mobile technology for the underprivileged: recent report notes that within five years, mobile technology will surpass desktop technology. Students use mobile devices to access more and more educational content.
- **The Programmable Open Mobile Internet (POMI) 2020 Project** at Stanford is developing different applications and data.
 - Project description: Students without computer/Internet at home were given a mobile device and were asked to create mobile videos to get help. Other students viewed their videos and helped with video replies. We learned that students really help each other. Did not find kids abusing the privilege of mobile technology.
- **Design-based learning in science education.** Gave Android phones to students and asked them how to measure velocity with phone. Next goal is to make car move faster. These are examples of design-based learning in education (DBL).
 - Unexpected outcomes of technology: using Facebook to upload photos from class, Googling, typing notes on phone, etc.
 - Another example: asked kids to design earthquake-proof buildings. All the science classes didn't have a textbook or script but were given a problem and then had to design it.
 - Innovation in science is not influenced by standard stuff like test-taking, etc.



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- Told students to come up with homework based on most meaningful things they have learned that day. Then, the students rated each other's homework. Developed a homework management system. All open source.
- There is an increase in number of students going to online schools. One problem is that they don't get to do real science experiments at home. Is there a way for them to do them remotely? Examples: tracking weather with your phone (read wind speed, humidity, light, water spray, etc.), growing a plant remotely.
- **PocketSchool** is an initiative to help underrepresented children and mitigate digital, educational, and economic divides. This appears in different languages and for different subjects.
 - Low cost, self-sustainable model to target grass roots approaches.
 - It is self-discovery for the kids.
 - Has a storytelling app and has collected over 8,000 stories from around the world - put all stories on Google Maps so anyone anywhere can find it wherever they are.
- Plug-and-play school: put open source education content into a computer, plug into solar panel or battery, and use in the school.
- Developing a project in Zambia to equip a bicycle with a charger and mobile technology attached to bike to use mobile technology.
- Mobile and audio games for the blind. Doing experiments with mobile technology in different environments.
- Need to contextualize content for technology to have an impact. Need to have the right pedagogy and value that is right for everyone involved in learning ecosystem (teachers, etc.) to see the value of it - need to include them.

Sean DeWitt

- Focus on what's going on with technology on the ground.
- If you're successful, ensure you can meet demand.
- Building a two-way communication is almost more important. Getting valuable information from people allows us to understand where the gaps are—can we close the gap on both sides?
- Information needs to be actionable. When demand increases, capacity at all levels must be considered.
- Target all stakeholders on the issue. In a program on disseminating information on the value of prenatal care, we had to target the "pregnant family" (include the spouses, not just the expectant mothers).



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- Technology can be a powerful magnifier of human intent and capacity. Need to see more multi-stakeholder projects to solve multi-dimensional problems to achieve impact, sustainability, and scale.

Discussion and Q & A

Question from Michella Maiorana (doctoral candidate, Michigan State University): Interested in using technology to provide language models for deaf and hard of hearing students in rural areas. I have heard a lot about using mobiles and written technology, but what about video technology?

- **Paul Kim:** I would love to use HD project imaging in different countries, but you have to think about what's available. new need to study what's available there as infrastructure, what's coming down the road, who can afford it, etc. You have to study the context as much as possible.
- **Yong Zhao:** Look for foreign language acquisition models because they use a lot of speech models that can be adapted through phones—modeled after speech patterns in various ways. Early research around speech recognition and synthesizers.
- **Sean DeWitt:** Need to think about impact, sustainability, and scale—sustainability is the big challenge (can people afford the phones?). One way to reach scale is in Rwanda we are engaging with farmers, thinking about intermediaries who can reach others in their network.

Question from Cindy Cai (American Institutes for Research): With respect to the importance of pedagogy in using technology—how is pedagogy emphasized in your projects?

- **Paul Kim:** Often I pretend I don't know anything and ask students to tell me what they find. Most projects start with the learners and trying to get the most out of them instead of trying to give them something. When you unlock their curiosity it works well. Sometimes we think telling is teaching and listening is learning but it's not—you have to unlock curiosity and start the engine somehow. You have to find a way to get kids to be engaged and motivated to learn, otherwise you can talk about things for hours and they aren't motivated to learn so don't remember it. Teaching less is teaching more.

Question from Mark Horney (University of Oregon): I get troubled when hearing about project-based learning approaches because they always seem to be spotty—deep learning here and there, but not everywhere. We have to do something to fill in the gaps in a more reliable way. I don't know what that is but maybe you have thoughts about it.

- **Paul Kim:** Not every curriculum will be project based, but it is often a good jump-start. You can't worry too much about gaps because there will always be gaps.



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Students will learn what they want to learn and are motivated to learn—it's hard to find the granular level for every student but in the future. Example: homework assignment is to make your own homework on what you believe is most relevant. Teachers can review questions, students review their peers. Getting students engaged in project-based learning to jump start curiosity and come up with solutions. I think they will be filling their own gaps.

Follow up from Mark Horney (University of Oregon): There needs to be a secondary part to the project. We need a curriculum that helps students follow up on their curiosity and where they might see a path to what they know now to that next bit they're highly motivated about.

- **Yong Zhao:** I'm not sure, I think we need to take a step back [from the assumption] that there is the perfect curriculum. My vision is not a fake project but somewhere to start from their interests and that gets them motivated. With an interest it expands the knowledge bit. Learning starts from passion and then you expand your learning.

Question from Celia Kang: Should there be someone to create the connective tissue and who should that be? Should there be a universal curriculum design?

- **Sean DeWitt:** I think there are multi-stakeholder issues that need to happen but with people in different industries. If we can leverage that there's a lot of money out there then people can think about building some platforms to deliver a lot of stuff.