How well does technology solve social problems?

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Credit: George Hodan/Public Domain

University of Michigan professor Kentaro Toyama was in India leading a team studying how to make computers work better in the classroom when he noticed that students far outnumbered computers at the underfunded government schools.

So, Toyama and colleagues devised a potential solution: software that

allowed multiple children to use a single computer at the same time. Multiple mice could be plugged into one PC, and each had its own cursor on the screen.

The researchers discovered that five children at one computer could each learn as much as one child with a computer all to herself. But when the experiment was replicated in surrounding schools, it was a failure.

The lesson Toyama learned was that technology alone can't solve problems—it's most effective when it's paired with capable underlying human forces.

"At the school where (the software) worked, we had the support of the principal, and the teacher was engaged in learning. But in other schools, that support system was missing. As a result, the technology didn't work," said Toyama, an associate professor at the U-M School of Information, who explores the limits of technology in a new book, "Geek Heresy: Rescuing Social Change from the Cult of Technology."

When he was doing the research in Indian schools in 2004, Toyama was the co-founder at Microsoft Research India in Bangalore. He was involved in more than 50 projects focused on finding technological solutions to poverty, illiteracy, poor health and unemployment. Near the end of his stint in Bangalore, he concluded that technology was not the answer.

Toyama argues that to help people with technology, it's far better to teach them to become technology producers—engineers, entrepreneurs and corporate professionals—than to treat them as consumers.

"When you buy an iPhone, you may get some pleasure, but it's Apple employees and shareholders who get rich," he said.

People need computers to learn things like programming, Toyama said, but that's very different from believing that every child should have a laptop.

"Anyone can be a Facebook user, but to be an engineer at Facebook takes a lot more. To be a good computer scientist, it's essential to have a good math education, and that hardly requires a computer to teach," he said.

Technology has to be applied within a broader context that works to improve the communities' ability to make the best use of it, he said. In poor communities, people are often overlooked in favor of technology to bring about social change, when in fact, it is the human forces that are the key to causing real social change.

Toyama said that when technology does work, it has a big impact. Digital Green was one of the projects that came out of his work at Microsoft. It's an innovative platform that lets farmers learn new agricultural methods through videos. Digital Green is now a nonprofit organization with a $5 million annual budget that works in more than 5,000 villages in eight Indian states and several African countries, such as Ethiopia, Ghana and Tanzania.

"What makes Digital Green work is that a person who has the farmers' trust mediates their interaction with the video," he said. "It's the combination of trusted human agents and digital video that has the impact. Without its partners, there would be no Digital Green."

After returning to the U.S., Toyama spent time tutoring kids at Lakeside School in Seattle, which counts Bill Gates as an alum. The school has ample technology and educates the children of many tech industry executives. Yet, they know that it's not technology but adult supervision that's critical for kids' learning, he said.

"These students had round-the-clock Internet access and could watch as many Khan Academy videos as they wanted. Yet, when they needed a boost, their parents insisted on paying for extra human supervision," he said. "Nothing beats knowledgeable, caring adult guidance for a good education. Technology can augment pedagogical strengths, but it exacerbates weaknesses."

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