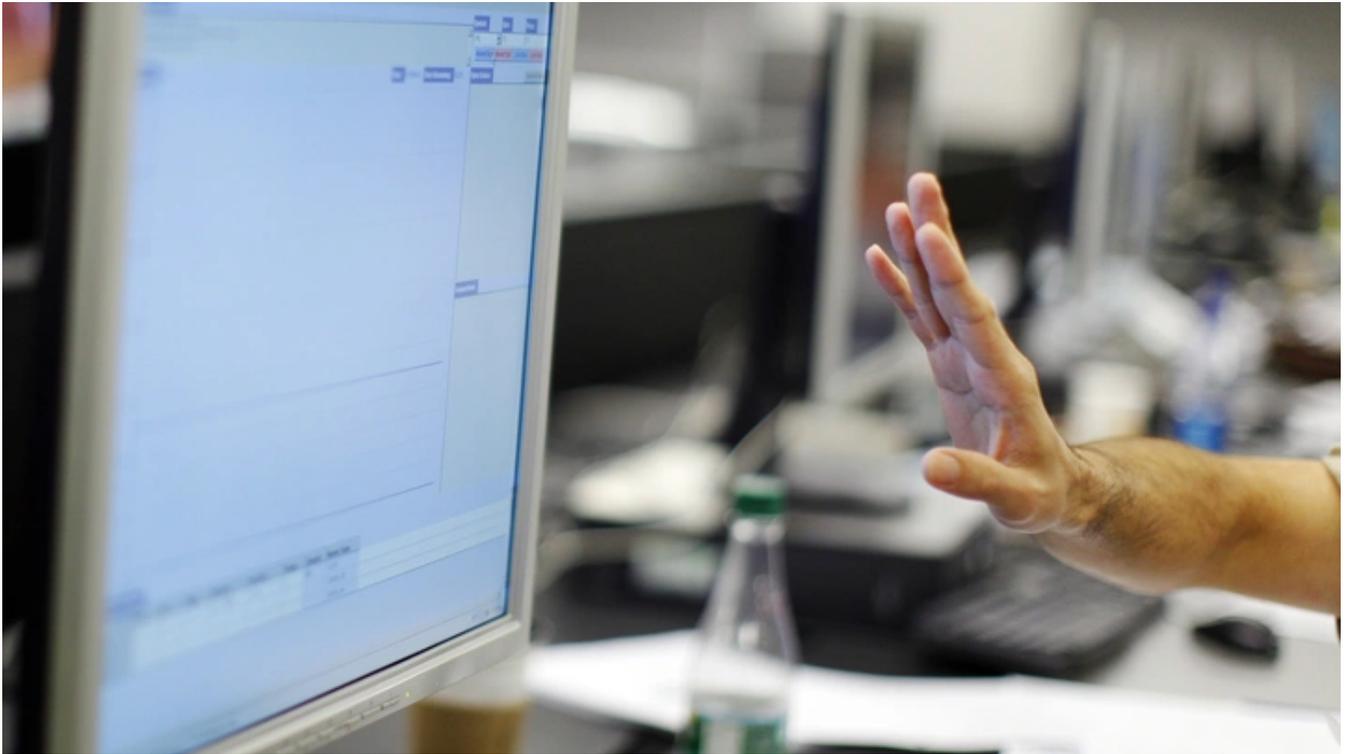


Why Technology Alone Won't Fix Schools

To wonder what ails American education is to open a Pandora's box of wicked problems ... but the problem is definitely not a lack of computers.

KENTARO TOYAMA JUNE 3, 2015



BRIAN SNYDER / REUTERS

For about a month in the spring of 2013, I spent my mornings at Lakeside School, a private school in Seattle whose students are the scions of the Pacific Northwest elite. The beautiful red-brick campus looks like an Ivy League college and costs almost as much to attend. The school boasts Bill Gates among its alumni, and its students come from the families of Amazon and Microsoft executives.

Unsurprisingly, there is no dearth of technology: Teachers post assignments on the school's intranet; classes communicate by email; and every student carries a laptop (required) and a smartphone (not).

In this context, what do parents do when they think their children need an extra boost? I was there as a substitute tutor for students spanning the academic spectrum. A few of them were taking honors calculus. They were diligent but

wanted a sounding board as they worked on tough problems. Others, weighed down by intensive extracurricular activities, struggled in geometry and algebra. I would review material with them and offer pointers as they did assignments. Yet another group required no substantive help at all. They just needed some prodding to finish their homework on time. Despite their differences, the students had one thing in common: What their parents were paying for was extra adult supervision.

All of the content I tutored is available on math websites and in free Khan Academy videos, and every student had round-the-clock Internet access. But even with all that technology, and even at a school with a luxurious 9:1 student-teacher ratio, what their parents wanted for their kids was more adult guidance.

Lakeside parents are not unusual in their valuing of quality time with adults over technology. Other well-educated professionals agree. Silicon Valley executives send their children to Waldorf schools, where electronics are banned until the eighth grade. Steve Jobs once admitted that he didn't give his children iPads: "We limit how much technology our kids use at home."

These parents aren't anti-technology—at work, they tend to be exuberant digital evangelists—but they apparently don't believe that more machines in and of themselves contribute to education. What is it that they know?

* * *

Over the last decade, I've designed, studied, and taught educational technology in different parts of the world. In Bangalore, India, I experimented with multiple mice plugged into a single personal computer to increase student interaction. In rural Uganda, I cringed as students played a typing game with their index fingers, hunt-and-peck style. In Seattle, Washington, I wrestled with the distraction posed by technology in an after-school computer literacy class for pre-teens. Across all of those projects, a single, simple pattern held in every case. I call it technology's "Law of Amplification": Technology's primary effect is to amplify human forces, so in education, technologies amplify whatever pedagogical capacity is already there.

Amplification seems like an obvious idea—all it says is that technology is a tool that augments human power. But, if it's obvious, it nevertheless has profound consequences that are routinely overlooked. For example, amplification explains why large-scale roll-outs of educational technology rarely result in positive

outcomes. In any representative set of schools, some are doing well and others poorly. Introducing computers may result in benefit for some (the ones highlighted in pilot studies), but it distracts the weaker schools from their core mission. On average, the outcome is a wash.

An even bigger problem is that administrators rarely allocate enough resources to adapt curricula or train teachers. Where teachers don't know how to incorporate digital tools appropriately, there is little capacity for the technology to amplify.

If a private company is failing to make a profit, no one expects that state-of-the-art data centers, better productivity software, and new laptops for all of the employees will turn things around. Yet, that is exactly the logic of so many attempts to fix education with technology.

And what about computers outside of school? What happens when children are left to learn on their own with digital gadgets, as so many tech advocates insist we should do? Here technology amplifies the children's propensities. To be sure, children have a natural desire to learn and play and grow. But they also have a natural desire to distract themselves with Angry Birds. Digital technology amplifies both of these appetites. The balance between them differs from child to child, but on the whole, distraction seems to win out when there's no adult guidance. And this is exactly what economists Robert Fairlie and Jonathan Robinson found in a randomized controlled trial of laptops distributed to some California students but not others: Those with laptops saw no improvement "on a host of educational outcomes, including grades, standardized test scores, credits earned, attendance, and disciplinary actions," though they did use the laptops for social media and video games. That is, if you provide an all-purpose technology that can be used for learning and entertainment, children choose entertainment. Technology by itself doesn't undo that inclination—it amplifies it.

* * *

To wonder what ails American education is to open a Pandora's box of wicked problems. It could be poverty in early childhood or school districts funded by inadequate property taxes. Maybe it's poorly designed incentives for teachers or elite flight into the private school system. The truth likely lies in some combination of these factors and more, but the problem is definitely not a lack of computers. Even

tech proponents don't argue that U.S. educational decline was caused by a decline of technology.

In America, much of our collective handwringing about education comes from comparisons with other countries. In the 2012 Program for International Student Assessment (PISA), American students ranked twenty-seventh in math and seventeenth in reading. But while the United States as a whole may be losing its competitive edge, stronger students aren't sliding. At the annual International Math Olympiads, for example, where countries send their six best precollege mathematicians to solve problems that make SAT questions seem like 1+1, the United States regularly places in the top three.

But as data from PISA show, high-scoring countries emphasize high-quality education for everyone, not just the elite. America, unfortunately, does poorly here when compared against thirty-three of the world's wealthiest countries. We have the third-lowest school enrollment rate for fifteen-year-olds (nearly 20 percent of our kids are not in school!), and we're ninth worst in educational disparity—scores vary particularly widely between well-off students and low-income ones. We all know that our schools are unequal. Less acknowledged is that this inequality is responsible for our lack of global competitiveness.

If educational inequality is the main issue, then no amount of digital technology will turn things around. This is perhaps the least-understood corollary of technological amplification. At a talk Secretary of Education Arne Duncan gave at the South by Southwest conference, he pressed the case for more technology in education (mentioning “technology” forty-three times, and “teachers” only twenty-five). He claimed, “Technology can level the playing field instead of tilting it against low-income, minority and rural students—who may not have laptops and iPhones at home.” But this is wishful thinking; it's misleading and misguided. Technology amplifies preexisting differences in wealth and achievement. Children with greater vocabularies get more out of Wikipedia. Students with behavioral challenges are more distracted by video games. Rich parents will pay for tutors so that their children can learn to program the devices that others merely learn to use. Technology at school may level the playing field of access, but a level field does nothing to improve the skill of the players, which is the whole point of education. Mark Warschauer, a professor at University of California, Irvine, and one of the foremost scholars in the field of educational technology finds that “the introduction

of information and communication technologies in ... schools serves to amplify existing forms of inequality.”

If tech-industry parents are right about their children, then what the U.S. education system needs above all isn't more technology, but a deliberate allocation of high-quality adult supervision focused on those who need it most. The specifics are daunting and complex, but inequity in educational opportunity isn't a problem that technology can fix. Without addressing the underlying socio-economic chasm, technology by itself doesn't bridge the gap, it only jacks it further apart.

This article has been excerpted from Kentaro Toyama's book, Geek Heresy: Rescuing Social Change from the Cult of Technology.