

TEACHING FOR THE NEW MILLENNIUM

Digital technology offers a better alternative to the traditional classroom—especially in parts of the world where schools and classrooms barely exist.

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The way we teach and learn is at a once-in-a-millennium turning point.

The old classroom model simply doesn't fit our changing needs. It's a fundamentally passive way of learning, while the world requires more and more active processing of information. The old model is based on pushing students together in age-group batches with one-pace-fits-all curricula and hoping they pick up something along the way. It isn't clear that this was the best model 100 years ago; it certainly isn't anymore. When and where do people concentrate best? The answer, of course, is that it all depends on the individual. Some people are at their sharpest first thing in the morning. Some are more receptive late at night. One person requires a silent house to optimize his focus; another seems to think more clearly with music playing or against the white noise of a coffee shop. Given all these variations, why do we still insist that the heaviest lifting in teaching and learning takes place in the confines of a classroom and to the impersonal rhythm of bells and buzzers?

Technology has the power to free us from those limitations, to make education far more portable, flexible, and personal; to foster initiative and individual responsibility; to restore the treasure-hunt excitement to the process of learning. Technology offers another potential benefit as well: the Internet can make education far, far more accessible, so knowledge and opportunity can be more broadly and equitably shared.

In 2004—somewhat by accident—I started experimenting, and the experiment that took on a life of its own was my posting of math lessons on YouTube. My basic philosophy of teaching was straightforward and deeply personal. I hoped to convey the sheer joy of learning, the thrill of understanding things about the universe. Furthermore, I wanted to do this in a way that would be equally helpful to kids studying a subject for the first time and for adults who wanted to refresh

their knowledge. Can watching video lessons or using interactive software make people smart? No. But I would argue that it can do something even better: create a context in which people can give free rein to their curiosity and natural love of learning, so that they realize they're already smart.

By the middle of 2012, the new entity I ended up starting, Khan Academy, had grown well beyond me. We were helping to educate more than six million unique students a month—more than ten times the number of people who have gone to Harvard since its inception in 1636—and this number was growing by 400 percent per year. Our videos had been viewed over 140 million times and students had done nearly half a billion exercises through our software.

The mission statement that has guided Khan Academy since day one is this: to provide a free, world-class education for anyone, anywhere. Admittedly, this is a rather grandiose ambition. It probably springs in part from the fact that I myself am the child of immigrants and have seen with my own eyes places like Bangladesh, India, and Pakistan, where the inadequacy and unfair distribution of educational opportunity is a scandal and a tragedy (and pre-Katrina New Orleans, where I was born, wasn't much better). But if my internationalist perspective is partly a function of personal history and emotion, it is also a matter of simple practicality.

Lack of education and the poverty, hopelessness, and unrest that tend to go with it are not local issues but global ones. The world needs all the trained minds and bright futures it can get, and it needs them everywhere. Contrary to many people's assumptions, I believe that computer-based, self-paced learning can be delivered very cheaply. It can be deployed in thousands of communities where tens of millions of kids currently have no educational access at all. Consider an analogy with cell phones.

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Cell phones have changed life everywhere, but they have positively revolutionized it in the developing world. Why? Because the developing world had so few landlines. For most people there, cell phones aren't just an add-on, they are it. As with telephones, so with education—the more egregiously that people were underserved before, the more revolutionary an improvement they will experience.

Let's start with cost. If school districts in poor countries can't even afford secondhand textbooks, pencils, and blackboard erasers, how can they possibly afford up-to-the-minute video lessons? The answer is that the lessons, in their most basic form, could be delivered virtually for free.

India loves its Bollywood movies, and even in the most remote rural villages, there is almost always someone with a first-generation DVD player and a television set. Thanks to grant money that Khan Academy has received, we already have video lessons translated into Bengali, Hindi, and Urdu (as well as Portuguese, Spanish, and several other languages) and copied onto DVDs, to be distributed free of charge.

Admittedly, just having students *watch* the videos is not ideal; with DVDs alone, they would not be able to do self-paced exercises or have access to a great deal of feedback. Even so, video lessons on DVDs would ameliorate the teacher shortage and give kids in the world's poorest areas a cheap approximation of what the wealthy have.

But say we aim higher. Say we aim *ridiculously* high. Say we aim to give kids in poor rural villages around the world virtually the



GOODBYE,
MR. CHIPS?
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same experience as kids in Silicon Valley. This is preposterous, right? Well, I believe it can be done.

Consider: inexpensive tablet computers are coming onto the market in India for under \$100. If such a computer can be expected to run for around five years, the annual cost of owning this device is \$20. Now the Khan Academy curriculum is designed so students can get what they need in one to two hours a day of following lessons and working out problems; this means that a single tablet could be used by four to ten students a day. Even taking the more conservative number, the cost is \$5 per student per year. Now let's give our students some downtime and some sick days, and posit the computer is used

300 days a year. The cost is thus less than *two cents per student per day*. Can anyone tell me in good conscience that this is more than the world can afford? Even more, the technology will only get better and cheaper from here on out.

Realistically, cheap tablet devices alone do not suffice to re-create a Silicon Valley—style virtual education experience. There remain the questions of Internet connectivity and the gathering and use of data regarding students' progress. These are logistical challenges that will vary in different locations, but the general point I want to make is that with some imagination and technological savvy, the challenges can be met far more cheaply than is usually acknowledged.

Bandwidth-hogging videos can be preloaded on devices and user data could be transmitted over cellular networks. If there is no cellular connectivity, information regarding students' work and progress could be downloaded from individual computers, copied onto flash drives, and carried in a truck to central servers. They could be carried on a donkey! Not everything in high-tech education has to be high tech. There are hybrid solutions right in front of us—if we are open to them.

Coming back to cost, cellular Internet connectivity can be had in India for as little as \$2 per month. So our per-student expense has now increased to \$11 per year (\$44 per year per device with Internet that can be shared by four students). Let's further suggest a worst-case scenario in which not even this meager amount can be procured from public or philanthropic funds. What then?

Certainly in a place like India, the price of educating the poor could be covered by the middle class and the well-to-do—not by taxation, charity, or under any sort of compulsion, but by giving prosperous families themselves a much better deal on education. Let me explain. In much of the developing world, especially in both South and East Asia,

school is regarded not primarily as a place to learn—the rigid conditions don’t allow for much of that—but rather as a place to show off what you know. The actual learning happens before or after school, through the use of private tutors. Even middle-class families tend to see tutors as a necessary expense, and private tutoring is in fact the way many teachers end up making something approaching a middle-class income. As teachers of advanced subjects are in short supply, tutoring in calculus or chemistry gets pretty pricey.

What if families were offered an alternative that was far less expensive, far more comprehensive, and designed in accordance with a proven international standard? In other words, what if they were offered low-cost access to computer centers that offered Internet-based, self-paced learning? This might be bad news for the private tutors, but it would be good news for everybody else. Middle-class families would spend far less for quality education; kids would have the benefit of a complete, tested curriculum rather than the hit-or-miss teaching of tutors whose own understanding might be less than world-class.

Supported by the fees of those who could afford them, the centers would be free to the poor and the currently unschooled. The beauty is that the middle-class kids, still attending conventional classes, would use the center in the early morning or the evening. The kids (and the adults, for that matter) without access to other education could use the facilities during the day.

Now, as a sworn enemy of one-size-fits-all approaches, I’m not suggesting that this scheme would work everywhere or that it couldn’t be improved upon. But I am convinced that the basic model—providing high-quality, low-cost education to the affluent and middle class and using the revenues to make the same services free to the poor—has a place in how we finance our educational future. In a perfect world, such schemes would not be necessary; governments and societies would see to it that everyone had access to quality education. In the real world, however, with its blatant inequities and tragic shortfalls of both money and ideas, new approaches are needed to prop up and refresh a tired system that works for some but fails too many. The cost of wasting millions of minds is simply unacceptable. ■

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