

"Flipped Classroom" Time Magazine: Reboot The School:

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By Kayla Webley

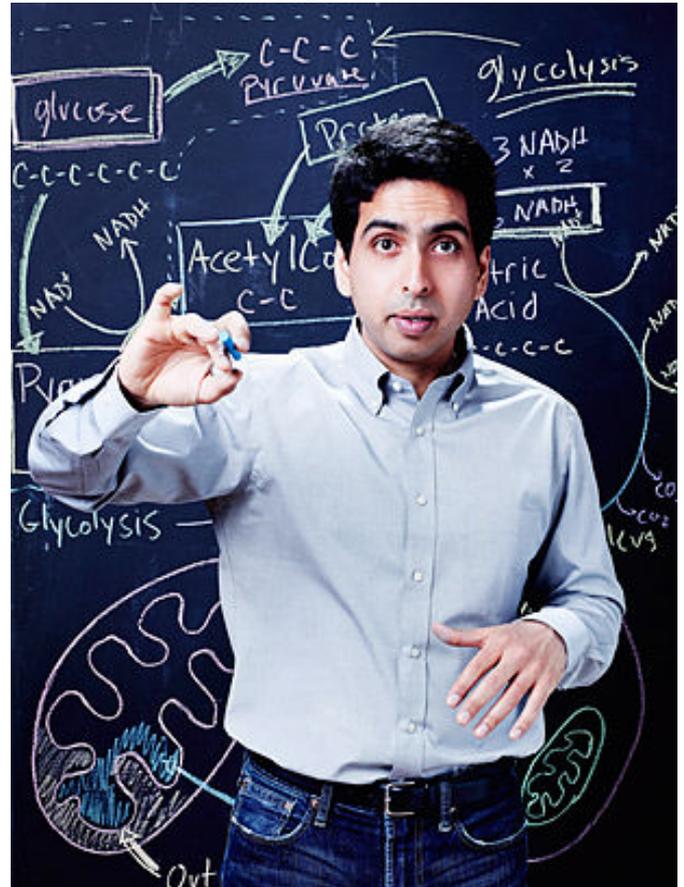
Fifth-graders at eastside College Preparatory School in East Palo Alto, Calif., sit at their desks with netbooks. They're in the middle of a math lesson, listening as a teacher explains how to convert percentages to decimals. "If we get rid of the percent sign, we just have to move the decimal sign two places to the left," the instructor says. Pens scribble across notebooks.

Seven thousand miles away in Accra, Ghana, students at the African School for Excellence are studying logarithms. Their teacher is the same one firing off math tips in California--both groups of kids are learning by watching online videos. While the screen shows a march of equations and diagrams, the students never actually see the face of the lecturer. There's just a voice, deep, patient and unrehearsed--think NPR host crossed with Mister Rogers. His inflection rises at times to underscore a point or when he gets really excited. "Math is not just random things to memorize and regurgitate on a test next week," he says. "It's the purest way of describing the universe!"

The voice belongs to Salman Khan, a 35-year-old hedge-fund manager turned YouTube professor to millions around the world. Thanks to his Khan Academy, an online repository of some 3,250 digital lectures, he has become a celebrity to techies, educators and uncounted high schoolers cramming for the AP biology test. His 18-minute discourse on the Krebs cycle and cell metabolism has been viewed more than 675,000 times.

But Khan isn't satisfied with being the most famous teacher ever to appear on a Web browser. He believes he has stumbled onto a solution to some of education's most intractable problems, with his video-driven teaching method at its heart. He wants to fundamentally change the role of teachers in the classroom--and redefine the concept of homework along the way. And he has persuaded Bill Gates, Google's Eric Schmidt and a minor constellation of other tech billionaires to back this quest.

Education reform is notoriously difficult. K-12 schools are debating everything from teacher evaluations to standardized tests, with no consensus in sight. Universities, meanwhile, are confronting massive budget cuts and new kinds of competition--as



dramatized by the recent turmoil at the University of Virginia. Its board fired the president amid worries that UVa wasn't keeping up with change and embracing online education fast enough, then rehired her 16 days later after a backlash from students and faculty.

At all levels, there's plenty of skepticism about any tech-centric approach to teaching. An estimated \$65.7 billion was spent in the U.S. last year on education technology, according to research firm Gartner. But many educators say there is little concrete proof of its benefits.

Khan is already butting up against veteran teachers nervous about their roles in his brave new classroom. But the biggest obstacle of all may be Khan himself. For all his grassroots fandom and Silicon Valley cred, he's not an educator, and he's never worked with children. Are parents and teachers ready to upend hundreds of years of precedent about how basic subjects are taught on the word of a guy who has spent more time analyzing financial statements than standing before a blackboard?

It's 8:30 a.m. in an office above a tea shop in downtown Mountain View, Calif., and Khan is about to create a new lesson for his online audience. His classroom is an office dominated by a large bookcase full of textbooks and sci-fi novels he has collected over the years. His chalkboard is a black Wacom computer tablet parked on a desk made from old telephone poles. On the tablet he sketches the colorful diagrams and equations that are hallmarks of Khan Academy videos. Today's first lesson is a new entry in his series on macroeconomics: a discussion of how human emotions transition from optimism to denial, then panic and fear, and finally hope and relief, as a market fluctuates from a growth period to a depression and back again. Khan begins by doing two minutes' worth of research on Google, looking for graphs that affirm what he remembers from his econ class in college, then flips through a few pages in a 4-in.-thick economics textbook sitting on his desk and clicks a button to start recording. Dragging a stylus across the tablet, he sketches the business cycle on the screen, leaning into a microphone that captures his narration. After two minutes, he stops and deletes the recording. He never goes back and edits out mistakes but starts over from the beginning if he is "bumbling around" or loses his flow. "If my own thinking isn't clear, that's not helpful to the person listening," he says. He doesn't use a script. In fact, he admits, "I don't know what I'm going to say half the time." But the low production values of Khan's videos are part of what makes them so effective. A student can hear Khan thinking things through aloud, using intuition and solving the problem with his viewers rather than for them. The unscripted nature of the videos makes him more relatable--it's as if he's sitting right next to you explaining the concepts as your own private tutor. After the 11-min. video is uploaded, Khan pauses, checks his e-mail and runs through his mental to-do list. There won't be a meal break; Khan skips breakfast and lunch, preferring to subsist only on hot water during the day and to eat a day's worth of food at night. "A lion runs the fastest when he is hungry," he says.

This morning's macroeconomics video is aimed primarily at college-level students; other lessons range from basic addition to calculus. There's also everything from astronomy and chemistry to computer science and SAT prep. Once online, Khan's lectures become available to anyone, for free, at any time and any place. Many will call up one of his videos at home as they struggle through an assignment or review for an exam, getting a better understanding of material their teachers have already explained with their own classroom chalk talks. That's fine with Khan. "That's how we got popular," he says.

But Khan believes he's onto something much bigger--a buzzy concept educators call the "flipped classroom." In Khan's view, there is no need for students to be divided into grades by age. Instead, they should learn at their own pace, moving on to the next lesson only when they have mastered the concept before it. Students would watch videos that introduce the concepts as homework and then go to class to demonstrate their learning. And there would be no need for a teacher to stand in front of the class and give a lecture ever again.

Flipping 800 Years of Teaching

You may not have thought about it much back in seventh-grade history as you struggled to keep your eyes open during a review of key Revolutionary War battles, but the concept of a classroom in which a teacher stands at the front to deliver a lesson goes back a long way. All the way, in fact, to medieval universities of the 14th century. Gutenberg and the printing press were still 100 years in the future, and teachers were human textbooks. Even after it became possible to reproduce teaching materials, the lecture remained entrenched in the classroom setup.

Eventually new technologies arrived to help teachers present information to students. In the beginning of the 20th century, early forms of the projector prompted Thomas Edison to predict, "Books will soon be obsolete in schools. Scholars will be instructed through the eye." In the 1920s, radios became prevalent in classrooms, allowing "schools of the air" to broadcast lessons to millions of American students.

During the dotcom boom of the late 1990s, classroom computers began to take off. In 1984, U.S. public schools had one computer for every 92 students; by 2008 the ratio was 1 to 3.1. Also by 2008, nearly 100% of public schools had Internet access.

Lots of technology--and little proof of results. There have been few major long-term studies on the effectiveness of technology in education. A 2007 report commissioned by Congress found that test scores in classrooms that were randomly assigned to use reading and math software were not significantly higher than those in classrooms that did not use the software. Some studies have found technology to be moderately effective in improving student performance in reading but not math, while other studies have found the exact opposite.

Khan says the issue isn't the computers; it's how we're using them. The traditional classroom model essentially forces educators to teach to the middle. High-achieving students aren't challenged, and low-achieving students are made to move on to the next concept before they've mastered the previous one. In the flipped classroom, proponents are fond of saying, the teacher shifts from being the sage on the stage to being the guide on the side. With lecture material covered at home as kids watch those online videos, elements traditionally associated with homework--math-problem sets, history essays, science projects and so on--can become the focus in the classroom. All that lecture time is converted to personalized attention. Everyone's work is tracked and measured in real time, so teachers know where to direct their attention. There's no more teaching to the middle: from bottom to top, all students work at their own pace.

Khan's vision faces its biggest test yet in a pilot project at Eastside Prep, a charter school where all the students are economically disadvantaged and, if they make it, will be the first in their families to go to college. In the classroom of teacher Suney Park, when it's time for math, the kids get out their netbooks to work on what Park calls the "Khaniculum."

Today the class is moving from a unit on fractions to one on percentages. Park introduces the new unit even though about half the kids aren't ready for it. She tells her class it's "totally fine" that they are all in different places. Some work ahead, watching Khan videos to explore new material; others review with Park.

One student, Joshua Walker-Ford, is already learning how to convert percentages to decimals. He says no one has taught him how to do this yet, but rather than watch one of Khan's videos, he guesses how it might be done and gets it right. In no time, he completes 10 questions and advances to the next topic. "At my old school, I would understand something in one day, but the teacher would still go over it for two or three days for the kids who didn't get it," he says. "Here I can just get it and move on."

Khan understands kids like Walker-Ford. He was one of them. Growing up in Metairie, La., he chafed at the pace set by the school curriculum. He was raised by a single mom, an immigrant from Kolkata; his father, a pediatrician from Bangladesh, separated from his mom when he was young, moved away and died when Khan was 14. In high school, while his mother was busy starting a convenience store, Khan began participating in math competitions. That's when he met Shantanu Sinha, considered the kid to beat from another area high school. Sinha told Khan how his school allowed him to skip ahead in math. Khan asked to do the same at his own school--and was told no. He says he was so frustrated, he called around to local universities and ended up taking precalculus at Loyola University that summer. (Sinha became a lifelong friend and now works with Khan as president and chief operating officer of Khan Academy.)

Khan's self-directed curriculum helped him get accepted to the Massachusetts Institute of Technology and then Harvard Business School. M.B.A. in hand, he landed an analyst position at a relatively small hedge fund. There, he happily spent his days researching the financial conditions of publicly traded companies--until his cousin Nadia needed help with her algebra homework.

Hello, Mr. Gates

Khan was in Boston; Nadia was in New Orleans. So he offered to tutor her online. They would both sign on to the Yahoo! Messenger chat service, and Khan would use a tool called Doodle to draw lessons. One day a friend suggested that he record the lessons as videos and upload them to YouTube. "I was immediately dismissive," Khan says. "YouTube is for cats playing pianos, not serious mathematicians." But he tried it anyway. He started getting feedback like "I've learned more in the past three hours on YouTube than I have in three years of math class." "People don't expect to get something of value for free online, so when they do, it's like, Thank you," Khan says.

Eventually he decided his hobby was more than just a side project. In the fall of 2009, he quit his job and devoted his full attention to Khan Academy from a makeshift office in a converted closet in his home. The real breakthrough came in May 2010, when Ann Doerr, wife of Silicon Valley venture capitalist John Doerr, dropped \$10,000 into his PayPal account. He was overjoyed at the donation--his largest to that point--and immediately wrote to thank her. When Doerr found out it was his largest donation, she insisted that they meet. Khan spent an hour with Doerr over coffee, explaining his vision of how the way we think about learning could be fundamentally altered. On his drive home, his phone beeped with an incoming text message: Doerr said she planned to deposit an additional \$100,000 into his account. "I almost crashed the car," Khan says.

Word spread quickly. A month and a half later, Khan's phone lit up with text messages and e-mails informing him that Bill Gates had just mentioned Khan Academy in a

speech at the Aspen Ideas Festival. Then Gates flew Khan to Seattle for a meeting and gave him a \$1.5 million grant. (He would eventually throw in \$4 million more.) "I'd been, frankly, frustrated at how little creative work was being done to use the Web as a core component of instruction," Gates wrote in an e-mail to TIME. "And when I saw this, I thought--yes, he's got it." Soon Khan had a \$2 million donation from Google, followed by grants of \$3 million from Netflix CEO Reed Hastings and \$5 million from Irish entrepreneur Sean O'Sullivan. Khan is using the money to transform the academy from his own personal YouTube channel into an educational nonprofit with Silicon Valley start-up DNA. The goal: to create a complete educational approach--with video lectures, online exercises, badges to reward student progress, an analytics dashboard for teachers to track that progress and more--that can be integrated into existing classrooms or serve as a stand-alone virtual school for anyone wanting to learn something new.

Now Khan Academy has 32 employees and is being used in nine schools in the Los Altos school district and 16 other schools in California. The organization estimates that Khan lessons are also used unofficially at nearly 2,000 schools around the U.S., effectively making Khan Academy the largest blended-learning experiment in the nation.

Winning Teachers Over

While it seems like an inherently good thing to allow every student to work at his or her own pace, educators are far from unanimous regarding the benefits of it. Some see a risk that two students will reach graduation with very different skill sets. One may have mastered everything from calculus on down while the other made it only as far as algebra. In the worst-case scenario, high-achieving students race ahead while low performers languish. It's a particular concern in low-income districts where students may not have access to a computer at home.

Khan says the goal is to help kids at the back of the pack catch up more quickly. But some experts are unconvinced. "I've seen a lot of things come and go," says Jeff Mirel, a professor of education and history at the University of Michigan. "The idea that new technology can quote-unquote save schools or dramatically improve student performance--well, the road is littered with a lot of, if not train wrecks, then certainly a lot of new technology left by the side of the road."

Probably the biggest challenge is to increase teacher buy-in. Some worry that Khan's methods are too untested. Others are more blunt, saying he wants to replace teachers with computers. Khan responds that while his program could end the need for teachers to stand at the front of the class and pontificate, it makes their role no less important. "In the ideal classroom, the teacher is either spending all of their time doing deep interventions with students on a one-on-one basis or facilitating true interactivity--labs, simulations, projects," he says.

He's also well aware that many educators dismiss him because he is not a trained teacher. "It'd piss me off too if I had been teaching for 30 years and suddenly this ex-hedge-fund guy is hailed as the world's teacher," he says. "But that's silly. It's like telling Bill Gates, 'Look, you don't have an M.B.A., so don't do business.' I think there's an advantage to being an outsider--I'm not colored by the dogma of the Establishment."

At the office, Khan plots out a few more economics videos for the day. The lesson he uploaded this morning is already drawing comments. He says he's a "sucker for positive feedback" and admits he'll sometimes wait until he gets a compliment before making another video. Writes one commenter: "I wish they had this when I went to school. LOL." Time to make another video.

Sources:

<http://www.schoolleadership20.com/profiles/blogs/flipped-classroom-time-magazine-reboot-the-school>

<http://www.time.com/time/magazine/article/0,9171,2118298,00.html>