5 Ways That edX Could Change Education

By Marc Parry
Cambridge, Mass.

Marcello Pagano (left), a biostatistician, and E. Francis Cook Jr., an epidemiologist, will teach a course in their disciplines this fall, one of Harvard's first on edX. "We draw people into this program who want to improve the health of the world," says Mr. Cook.

Since MIT and Harvard started edX, their joint experiment with free online courses, the venture has attracted enormous attention for opening the ivory tower to the world.

But in the process, the world will become part of an expensive and ambitious experiment testing some of the most interesting—and difficult—questions in digital education.

Can community-college students benefit from a new form of hybrid learning, based on a mix of local instruction and edX content? Can colleges tap alumni as teaching volunteers? Can labs be reinvented in the style of online video games?

EdX and its collaborators are developing tools and teaching models to answer those questions. And they view the project as a means to study even deeper problems, like understanding how people forget—and creating strategies to prevent it.

"It's a live laboratory for studying how people learn, how the mind works, and how to improve education, both residential and online," says Piotr Mitros, edX's chief scientist.

That laboratory remains a work in progress. When a Chronicle reporter visited edX's offices here, in a low-slung brick building on the edge of the Massachusetts Institute of Technology campus, the
Engaging Alumni in New Ways

Robert C. Miller had a problem.

His students were writing so much code that the teaching staff lacked time to read it all and give fast feedback. So Mr. Miller, an MIT associate professor who teaches software engineering and human-computer interaction, decided to try a new tactic: crowdsourcing. His work may help solve a challenge facing massive online courses: how to provide human feedback to thousands of students.

Under Mr. Miller's model, Web-based software called Caesar breaks homework submissions into chunks. A mix of teaching staff, fellow students, and alumni volunteers evaluates the code, which is also automatically tested by a computer. Students then revise and resubmit their work. The human review is essential, Mr. Miller explains, because people can detect things that computers can't, like hidden bugs or poor design.

"The future of online grading is going to be a mix of automated approaches ... and human eyeballs," says Mr. Miller. The class that has deployed Caesar is expected to go on edX as it expands.

His project is one of several that highlight how technology can tap the altruism—and self-interest—of graduates. MIT alumni "are strongly motivated to find great programming talent," Mr. Miller says. By helping to review code, they could both spot that talent and expose students to their companies. Caesar, used on the campus for the past year, has attracted MIT graduates working at companies like Facebook and Google.

Across the Charles River, at Harvard’s School of Public Health, E. Francis Cook Jr. and Marcello Pagano are working on a similar idea. The veteran professors will teach a class on epidemiology and biostatistics this fall, one of Harvard's first on edX. Details are still being worked out, but they hope to entice alumni to participate, possibly by moderating online forums or, for those based abroad, leading discussions for local students. Mr. Cook sees those graduates as an "untapped resource."

"We draw people into this program who want to improve the health of the world," he says. "I'm hoping we'll get a huge buy-in from our alums."

Reinventing Hybrid Teaching

In March, Tony Hyun Kim moved to the Mongolian capital of Ulan Bator, where he spent three months teaching high-school students a spinoff of the first edX course. The adventure made the young MIT graduate one of the first to blend edX's content with face-to-face teaching. His hybrid model is one that many American students may experience as edX presses one of its toughest goals: to reimagine campus learning.

On his own initiative, Mr. Kim brought over lab gear and mentored
about 20 teenagers through the circuits-and-electronics class, which is based on a course normally taken by MIT sophomores. The edX version features video snippets and interactive exercises, and Mr. Kim used the free online content to teach in a style known as the "flipped classroom." Students watched edX content at home. At school, Mr. Kim spent hours each day reviewing material and apprenticing them through labs and problems.

The results were remarkable. Roughly 12 students earned certificates of completion. One 15-year-old, Battushig, aced the course, one of 320 students worldwide to do so. EdX ended up hiring Mr. Kim, who hopes to start a related project at the university level in Mongolia.

EdX is now preparing a bigger experiment that is expected to test the flipped-classroom model at a community college, combining MOOC content with campus instruction. Two-year colleges have struggled with insufficient funds and large demand; they also have "trouble attracting top talent and teachers," says Anant Agarwal, who taught the circuits class and is president of edX. The question is how MOOC's might help community colleges, and how the courses would have to change to work for their students.

"MOOC's have yet to prove their value from an educational perspective," says Josh Jarrett, of the Bill & Melinda Gates Foundation, which backs the community-college project. "We currently know very little about how much learning is happening within MOOC's, particularly for novice learners."

Gamifying Labs

As edX tries fresh teaching models, it's also engaging the math muscle of MIT to push the boundaries of simulations.

When MIT students take the circuits class, they sit at a lab workbench and build with tools. Lab equipment can cost a fortune: An oscilloscope may run $20,000.

Offering a comparable experience online is an engineering challenge. It must be fast, sufficiently open-ended, and simple enough to use without consulting "telephone-book-size manuals," as Mr. Agarwal puts it. Mr. Agarwal, a former director of MIT's Computer Science and Artificial Intelligence Laboratory, has worked on this problem for years. "To me, the big hurdle to online learning was, How do we mimic the lab experience?"

EdX's first crack at answering that question can be heard in the violins that filled Mr. Agarwal's office one recent morning. The music came from his computer, where he input it through a circuit. It's one part of a simulated lab environment that lets students rotate components and build circuits as if they were "assembling virtual Legos on a desktop," Mr. Agarwal says.

More Legos are coming. Eventually, edX students won't just build circuits. They'll assemble computers, cellphones, and perhaps even bridges, all from digital parts. EdX points to video games as one model for its lab design.

"You see a lot of immersive experiences in the online gaming world, where people really get caught up in the mission," says Christopher J. Terman, a senior lecturer who helped build edX's lab and who is known as the "education czar" of MIT's department of computer science and electrical engineering. He adds, "When you think about what an immersive engineering experience is, we've really just
Scratched that surface."

Studying the Human Mind

Over time, enrollment in edX is expected to climb into the millions. That has major implications for research—an area that Mr. Mitros, the chief scientist, has been discussing with faculty members.

"Basically, everything that a student does is logged and can be mined by researchers," Mr. Mitros says. And the platform is rigged so researchers can show content to one group of students and not to another, and then test the results.

So who might study edX? Anthropologists interested in online social interactions, for one. And psychometricians who work on test problems.

But to Mr. Mitros, most exciting is the chance for once-impossible cognitive-science research. If you’re like many people, you’ve forgotten much of your formal education. But studies show that if you repeat things—you take a freshman physics class, say, but continue to use those concepts throughout college—you retain them. Researchers might show refreshers to students at different points in time after a course has been completed, Mr. Mitros says, tracking what they recall.

"You can build a mathematical model of how memory works, based on data from a large number of students," he says. The results of such research could be applied directly to improving education.

Changing MIT

One question is how edX might improve elite universities, which are late to the e-learning game. In the spring, MIT tested the edX circuits class with about 20 on-campus students. It was a hit: A majority said they would take another Web class.

Bethany LaPenta, a junior majoring in electrical engineering and computer science, enjoyed earning credit while studying on her own schedule. She found Web tests less stressful than in-class ones, and took the midterm in her dorm room. Another benefit: Students could rewind or fast-forward their professor. Data showed MIT students tended to watch the videos at 1.5 speed, which makes voices sound almost like chipmunks but delivers information more rapidly. "I do want MIT to offer more online education," Ms. LaPenta says.

To Mr. Agarwal, many aspects of e-learning are better than campus lectures, where attendance often plummets by semester’s end. Future MIT students will experience a blended education, he says, with videos and auto-graded exercises online, and in-person time spent on labs and research and group problem solving. His prediction: "Ten years from now most of our classes will be using blended learning."
The new education is here.

When asked his opinion of the French Revolution, Zhou En Lai is alleged to have said, "Too soon to tell."

Myth. Zhou En Lai was referring to the student protests in France in 1968.

For the middle of the pack, the future is precarious. WWW.GetPositionBetweenMilliona...

I suggest colleges to adapt edx courses in their degree program and accept the certificates of edx as transferred credits toward their degree programs. This way if a college gets 5 courses from edx out of 10 courses per year they would save 50 % of the cost of education at the college. Then they can increase their capacity 100 % still making the same income but twice as much students. Plus it is nice to see in my transcript suchand such courses were taken at MITx and Harvardx. As an employer I would hire those more than withouts.
Still the credential and not the knowledge, eh?

Colleagues: The future of #highered is global content (Harvard, MIT, Stanford) & local coaching (at community colleges). For the middle of the pack, the future is precarious.

For the middle of the pack it is selling pencils and apples on street corners. Perhaps this is not so bad -- provided one has not had to borrow heavily to get that doctorate (knowledge for its own sake as we idiots used to say). As it is now, the middle of the pack is there just to support the curve and define an upper 10% worthy of employment. I will add, however, that my experience with community colleges recommends they not adopt this model just yet, at risk of loosing their one real strength: sound teaching.

Nobody addresses a significant problem in these offerings: every single one of them relies on people working for free. In a Republican-stalled economy that is purposely, systematically strangling public education, droves of people are signing on as virtual slaves in response to our generating too much work for too few employed people. My English classes are stuffed and there is no way I can respond to students' writing in timely, meaningful ways. Shall I crowd source their work and invite anyone and everyone to comment and assign grades? Just look at the responses to this article. The writing is awful, ridden with errors. I would never hire such inarticulate people no matter what their massively open course transcript suggests they know. People have become suckers for the latest technology, no matter how damaging it is to educational integrity. It's equivalent to allowing the energy companies to frack up the entire nation in every person's backyard. That is, if they still have backyards. "Everybody's doing it" doesn't make it smart. I do not deny the incredible resource that crowd sourcing offers to solve problems; that merit has been proven repeatedly. I do not oppose making more information available to more people. However, to undermine the quality of public education, to make its mission to become more like video games, is to give away the farm with nary a meal in return. It's great for the few who get paid to generate the programs. It's a job killer for everyone else, those who value face time over screen time.

"In a Republican-stalled economy that is purposely, systematically strangling public education"

Please spare us the partisan politics, especially dishonest comments like this one. The two parties have different views on how to address education challenges, but neither is intent on "purposely, systematically strangling public education."
...Never mind the ridiculous idea that the economy has been stalled by the GOP.

You must be borrowing money from your parents to attend college. Nearly every attempt by the President to reign in irresponsible economic practices by big lenders on Wall Street, to keep cash flowing to public services, including schools from Head Start to university research, has been stalled in Congress unless it allows blank checks to the biggest players. The only dishonesty lies in your not acknowledging this.

1 person liked this.

1. The web funnels money upward -- plain and simple. 2. You are a worker, not an employer. 3. Give your students multiple choice exams and yourself a rest. 4. You can't give away any farm you don't possess. 5. None of us have a crystal ball.

2 people liked this.

I am more hopeful about this effort than I am about MITx, Coursera, and Udacity because of the preconception that edX is not a finished product, but rather a vehicle for learning as much as for teaching. In an age of rapid technological change, beginning from the point of knowing that you will need to learn from your efforts is a very sound way to begin a project of this ambition. Bravo!

For us in the developing world like India, problems in higher education are multifaceted and huge. There are millions of students who are still not able to go to college, there are still not enough higher education institutes to teach them effectively, qualified and good teachers are just not available, gap in the demand of teachers and supply is huge, teaching and learning resources are mostly out dated and will require huge investments --- list may go on.

edX like initiative fills many gaps for us. Blended learning with quality online courses can fill the gap of non availability of good and qualified teachers to quite an extent. The quality of education in engineering, from student point of view is good only where they have peer learning. Most of the students in Tier 2 institutions are able to do reasonably well because of peer learning. And that's where edX like initiative can do wonders. The core learning with the help of edX and enhanced by peer learning among students will nonlinearly catapult the quality of learning outcomes in India. At this point absence of labs etc. does not bother me much. Once online learning picks up, there may spring up instead of private tuition centres private lab centres, filling the gap.

In the usual mode of class room teaching with student to teacher ration of 25 or so, we will never make it in higher education. We just do not have time and resources to educate the young population fast and effectively. Every college and university will have to adapt to quality online learning like edX, increase the number of students say ten times, use the resources at hand - less number of class rooms, less number of teachers to facilitate blended learning and come out at the top.

Our research and development coming out of the top institutes like IITs and others will also pick up. These institutes will be able to have a look at the promising students- picked up from the student activity while learning online - from the millions studying for their courses online in a
blended learning mode. Given the best of the young minds, we can expect to have best of
the research happening in our 100 or so top institutes and rest of them producing good quality work
force at every level.