LAPTOP U

Has the future of college moved online?

BY NATHAN HELLER

Gregory Nagy, a professor of classical Greek literature at Harvard, is a gentle academic of the sort who, asked about the future, will begin speaking of Homer and the battles of the distant past. At seventy, he has owlish eyes, a flared Hungarian nose, and a tendency to gesture broadly with the flat palms of his hands. He wears the crisp white shirts and dark blazers that have replaced tweed as the raiment of the academic caste. His hair, also white, often looks manhandled by the Boston wind. Where some scholars are gnomic in style, Nagy piles his sentences high with thin-sliced exposition. ("There are about ten passages—and by passages I simply mean a selected text, and these passages are meant for close reading, and sometimes I'll be referring to these passages as texts, or focus passages, but you'll know I mean the same thing—and each one of these requires close reading!") When he speaks outside the lecture hall, he smothers friends and students with a stew of blandishment and praise. "Thank you, Wonderful Kevin!" he might say. Or: "The Great Claudia put it *so* well." Seen in the wild, he could be taken for an antique-shop proprietor: a man both brimming with solicitous enthusiasm and fretting that the customers are getting, maybe, just a bit too close to his prized Louis XVI chair.

Nagy has published no best-sellers. He is not a regular face on TV. Since 1978, though, he has taught a class called "Concepts of the Hero in Classical Greek Civilization," and the course, a survey of poetry, tragedy, and Platonic dialogues, has made him a campus fixture. Because Nagy's zest for Homeric texts is boundless, because his lectures reflect decades of refinement, and because the course is thought to offer a soft grading curve (its nickname on campus is Heroes for Zeroes), it has traditionally filled Room 105, in Emerson Hall, one of Harvard's largest classroom spaces. Its enrollment has regularly climbed into the hundreds.

This spring, however, enrollment in Nagy's course exceeds thirty-one thousand. "Concepts of the Hero," redubbed "CB22x: The Ancient Greek Hero," is one of Harvard's first massive open online courses, or MOOCs—a new type of college class based on Internet lecture videos. A MOOC is "massive" because it's designed to enroll tens of thousands of students. It's "open" because, in theory, anybody with an Internet connection can sign up. "Online" refers not just to the delivery mode but to the style of communication: much, if not all, of it is on the Web. And "course," of course, means that assessment is involved—assignments, tests, an ultimate credential. When you take MOOCs, you're expected to keep pace. Your work gets regular evaluation. In the end, you'll pass or fail or, like the vast majority of enrollees, just stop showing up.

Many people think that MOOCs are the future of higher education in America. In the past two years, Harvard, M.I.T., Caltech, and the University of Texas have together pledged tens of millions of dollars to MOOC development. Many other élite schools, from U.C. Berkeley to Princeton, have similarly climbed aboard. Their stated goal is democratic reach. "I expect that there will be lots of free, or nearly free, offerings available," John L. Hennessy, the president of Stanford, explained in a recent editorial. "While the gold standard of small in-person classes led by great instructors will remain, online courses will be shown to be an effective learning environment, especially in comparison with large lecture-style courses."

Some lawmakers, meanwhile, see MOOCs as a solution to overcrowding; in California, a senate bill, introduced this winter, would require the state's public colleges to give credit for approved online courses. (Eighty-five per cent of the state's community colleges currently have course waiting lists.) Following a trial run at San José State University which yielded higher-than-usual pass rates, eleven schools in the California State University system moved to incorporate MOOCs into their curricula. In addition to having their own professors teach, say, electrical engineering, these colleges may use videos by teachers at schools such as M.I.T.

But MOOCs are controversial, and debate has grown louder in recent weeks. In mid-April, the faculty at Amherst voted against joining a MOOC program. Two weeks ago, the philosophy department at San José State wrote an open letter of protest to Michael J. Sandel, a Harvard professor whose flagship college course, Justice, became JusticeX, a MOOC, this spring. "There is no pedagogical problem in our department that JusticeX solves," the letter said. The philosophers worried that the course would make the San José State professor at the head of the classroom nothing more than "a glorified teaching assistant." They wrote, "The thought of the exact same social justice course being taught in various philosophy departments across the country is downright scary."

Nagy has been experimenting with online add-ons to his course for years. When he began planning his MOOC, his idea was to break down his lectures into twenty-four lessons of less than an hour each. He subdivided every lesson into smaller segments, because people don't watch an hour-long discussion on their screens as they might sit through an hour of lecture. (They get distracted.) He

Élite educators used to be obsessed with "faculty-to-student ratio"; now schools like Harvard aim to be broadcast networks.

ILLUS

ILLUSTRATION BY LEO ESPINOSA

"You should just feel a tiny prick, and then a lifetime of morphine addiction."

• •

thought about each segment as a short film, and tried to figure out how to dramatize the instruction. He says that crumbling up the course like this forced him to study his own teaching more than he had at the lectern.

"I had this real revelation—I'm not saying 'epiphany,' because people use that word wrong, because an epiphany should be when a really miraculous superhuman personality appears, so this is just a revelation, not an epiphany—and I thought, My God, Greg, you've been spoiled by the system!" he says. At Harvard, big lecture courses are generally taught with help from graduate students, who lead discussion sessions and grade papers. None of that is possible at massive scales. Instead, participants in CB22x enroll in online discussion forums (like message boards). They annotate the assigned material with responses (as if in Google Docs). Rather than writing papers, they take a series of multiple-choice quizzes. Readings for the course are available online, but students old-school enough to want a paper copy can buy a seven-hundred-and-twenty-seven-page textbook that Nagy is about to publish, "The Ancient Greek Hero in 24 Hours."

Lecturing can seem a rote endeavor even at its best—so much so that one wonders why the system has survived so long. Actors, musicians, and even standup comedians record their best performances for broadcast and posterity. Why shouldn't college teachers do the same? Vladimir Nabokov, a man as uncomfortable with extemporaneity as he was enamored of the public record, once suggested that his lessons at Cornell be recorded and played each term, freeing him for other activities. The basis of a reliable education, it would seem, is quality control, not circumstance; it certainly is not a new thought that effective teaching transcends time and place. Correspondence courses cropped up in the nineteenth century. Educational radio appeared in the twenties and the thirties. The U.K.'s Open University, which used television to transmit lessons to students, enrolled its first students in 1971.

The Internet was the natural next step. The University of Phoenix, for years the strongest force in for-profit online education, added a modem-dial-up support to its distance-learning program in 1989, and plans for Internet-based higher education took hold more broadly in the nineteen-nineties. At that point, the technology was shaky, and the audience was, too. Early efforts, like Western Governors University—an online school founded in 1996—saw the World Wide Web the way that many New Yorkers see Roosevelt Island: as an unexplored, accessible place with great potential of some sort, if only people understood it slightly better. In the new millennium, Harvard ran a program called Harvard@Home, initially available only to alumni. Few people watched it, though, and Harvard killed the program in 2008.

Supporters of MOOCs say that they are a different and heartier species. Rather than broadcasting a professor's lectures out into the ether, to be watched or not, MOOCs are designed to insure that students are keeping up, by peppering them with comprehension and discussion tasks. And the online courses are expected to have decent production values, more "Nova" than "NewsHour." Alan Garber, the provost of Harvard and a strong advocate of online education, told me, "Long run, I see the online courses or online components becoming pervasive. Instructors in a seminar or small course might obtain modular materials from multiple sources and reassemble them in order to put together an entire course."

MOOCs are also thought to offer enticing business opportunities. Last year, two major MOOC producers, Coursera and Udacity, launched as for-profit companies. Today, amid a growing constellation of online-education providers, they act as go-betweens, packaging university courses and offering them to students and other schools. Coursera, a Stanford spinoff that is currently the largest MOOC producer, serves classes from Brown, Caltech, Princeton, Stanford, and sixty-five other schools; Udacity, also the progeny of Palo Alto, focusses on tech and science. Last May, with twin pledges of thirty million dollars, Harvard and M.I.T. jointly founded edX, a nonprofit MOOC company that works with a

dozen colleges and universities, including U.C. Berkeley and Rice. EdX is organized as a confederation, with each member institution maintaining sovereignty over its MOOC production; Harvard's line is called HarvardX. "This is our chance to really *own* it," Rob Lue, a molecular- and cellular-biology professor who leads the program, told me.

For decades, élite educators were preoccupied with "faculty-to-student ratio": the best classroom was the one where everybody knew your name. Now top schools are broadcast networks. New problems result. How do you foster meaningful discussion in a class containing tens of thousands? How do you grade *work*? Nagy's answer—multiple-choice tests, discussion boards, annotation—is something like the standard reply, although there's lots of debate. At one extreme, edX has been developing a software tool to computer-grade essays, so that students can immediately revise their work, for use at schools that want it. Harvard may not be one of those schools. "I'm concerned about electronic approaches to grading writing," Drew Gilpin Faust, the president of the university and a former history professor, recently told me. "I think they are ill-equipped to consider irony, elegance, and . . . I don't know how you get a computer to decide if there's something there it hasn't been programmed to see."

She explained, "Part of what we need to figure out as teachers and as learners is, Where does the intimacy of the face-to-face have its most powerful impact?" She talked about a MOOC to be released next academic year, called "Science & Cooking." It teaches chemistry and physics through the kitchen. "I just have this vision in my mind of people cooking all over the globe together," she said. "It's kind of nice."

On campuses now, the pedagogic ideal is the "flipped classroom"—a model in which teachers preassign whatever lecture-type material is needed, as homework, and use the classroom time for peer and interactive learning. "Students, if all you're going to do is lecture at them, no longer see any reason to show up to be lectured at," Harry R. Lewis, a former dean of Harvard College, who teaches computer science, told me. "Most of our classes are video-recorded, so they'll watch the recording if your class is taught before eleven o'clock."

One morning in March, I visited a meeting of what Nagy calls his "skunk works" MOOC-production team. The agenda was pressing: the next morning, CB22x was going to go live, and the videos for the first lesson were not yet finished. Natasha Bershadsky, the course's main video editor, kept checking the clock. She is not, by vocation, a Web editor: she recently defended her dissertation in Greek history, at the University of Chicago. For CB22x, she was trained in editing technique by Marlon Kuzmick, a teacher of "digital storytelling" who serves as Harvard's MOOC video guru. Nagy refers to Kuzmick as "our German director," although Kuzmick is Canadian. Nagy likes to imagine him as Fritz Lang in "Contempt," shooting a film of the Odyssey.

"Marlon has authorized one of his camera people to come to Greece with me over break," Nagy told the group that morning, shifting his eyes merrily around the table. "This is a new idea."

"It was *very* difficult to persuade her to do it," Kuzmick said dryly.

"It's five days of contact time," Nagy went on. "Can you imagine Delphi, where you almost always have *just* the right kind of mist—and you think of that scene when Patroklos dies, where

Apollo appears in a cloud of mist, and then swats the hero with the back of his hand from behind, and it's the scene that my old professor at Harvard, Cedric Whitman, said was the moment of ultimate terror, *holy* terror, in all of literature—and at Delphi you can see a mist like that!"

Kuzmick said, "I think that we're just trying to capture moments that seem real, that seem authentic."

Bershadsky showed a video segment that she had been up late cutting the previous night—a part of the online class's first lesson, setting up a concept that Nagy would use through the course. The segment started with a head shot of Nagy talking about the 1982 movie "Blade Runner." His lecture was intercut with a muted clip showing the rain-drenched death soliloquy of Roy Batty, the movie's replicant antagonist.

"I've seen things you people wouldn't believe," Roy says in the movie. "Attack ships on fire off the shoulder of Orion. I watched C-beams glitter in the dark near the Tannhäuser Gate. All those moments will be lost in time, like tears in rain. *Time to die.*"

Nagy spoke the crucial words and started teasing them apart. "The tears in rain are a way of comparing the microcosm of the self and the macrocosm of the rain that is enveloping the whole scene," he explained. "'Time to die'—and, for me, a good point of comparison is the word *hôrâ*, which means the right time, the right place, the seasonal time, the beautiful time. Where everything comes together."

The word *hôrâ* appeared floating in the air beside Nagy.

"There's the subtitle!" he cried delightedly from across the table.

In the Web lecture, Nagy talks about the scene from the Iliad in which Achilles is told of his forked destiny: "You have two choices, Achilles. Either you stay at Troy and fight, and then die young, and then get a glory that is imperishable. Or you go home. And then you don't die young. You live to a ripe old age, presumably, and you could even be happy. But you're not going to get the glory. And this glory—I use the word 'glory' to translate *kleos*—is not just glory. It's the glory that comes from being featured in the medium of Homeric poetry."

The lesson was one of ten short ones composing the first hour of Nagy's course. Following standard MOOC wisdom, each bite-sized chunk of lecture addressed a single topic and was filmed with as much visual variety as possible: Nagy said he wanted to avoid "The Greg Show," in which students saw only his talking head. When presenting Achilles' *kleos* quandary, for example, he was sitting at a table with two members of his skunk-works team, Claudia Filos and Jeff Emanuel, both posing as students. They

nodded as he talked. Then Filos spoke up:

FILOS: So this one small passage, actually, has a lot to teach us about the whole epic tradition.

NAGY: In a way, it's a micro-narrative of the whole Iliad, Claudia. I couldn't agree more.

A little later, Nagy read me some questions that the team had devised for CB22x's first multiple-choice test: "'What is the will of Zeus?' It says, 'a) To send the souls of heroes to Hades'"—Nagy rippled into laughter—"'b) To cause the Iliad,' and 'c) To cause the Trojan War.' I love this. The best answer is 'b) To cause the Iliad'—Zeus' will encompasses the whole of the poem through to its end, or *telos*."

He went on, "And then—this is where people really read into the text!—'Why will Achilles sit the war out in his shelter?' Because 'a) He has hurt feelings,' 'b) He is angry at Agamemnon,' and 'c) A goddess advised him to do so.' *No one* will get this."

The answer is c). In Nagy's "brick-and-mortar" class, students write essays. But multiple-choice questions are almost as good as essays, Nagy said, because they spot-check participants' deeper comprehension of the text. The online testing mechanism explains the right response when students miss an answer. And it lets them see the reasoning behind the correct choice when they're right. "Even in a multiple-choice or a yes-and-no situation, you can actually induce learners to read out of the text, not into the text," Nagy explained. Thinking about that process helped him to redesign his classroom course. He added, "Our ambition is actually to make the Harvard experience now closer to the MOOC experience."

When people refer to "higher education" in this country, they are talking about two systems. One is élite. It's made up of selective schools that people can apply to—schools like Harvard, and also like U.C. Santa Cruz, Northeastern, Penn State, and Kenyon. All these institutions turn most applicants away, and all pursue a common, if vague, notion of what universities are meant to strive for. When colleges appear in movies, they are verdant, tree-draped quadrangles set amid Georgian or Gothic (or Georgian-Gothic) buildings. When brochures from these schools arrive in the mail, they often look the same. Chances are, you'll find a Byronic young man reading "Cartesian Meditations" on a bench beneath an elm tree, or perhaps his romantic cousin, the New England boy of fall, a tousle-haired chap with a knapsack slung back on one shoulder. He is walking with a lovely, earnest young woman who apparently likes scarves, and probably Shelley. They are smiling. Everyone is smiling. The professors, who are wearing friendly, Rick Moranis-style glasses, smile, though they're hard at work at a large table with an eager student, sharing a splayed book and gesturing as if weighing two big, wholesome orbs of fruit. Universities are special places, we believe: gardens where chosen people escape their normal lives to cultivate the Life of the Mind.

But that is not the kind of higher education most Americans know. The vast majority of people who get education beyond high school do so at community colleges and other regional and nonselective schools. Most who apply are accepted. The teachers there, not all of whom have doctorates or get research support, may seem restless and harried. Students may, too. Some attend school part time, juggling their academic work with family or full-time jobs, and so the dropout rate, and time-to-degree, runs higher than at élite institutions. Many campuses are funded on fumes, or are on thin ice with accreditation boards; there are few quadrangles involved. The coursework often prepares students for specific professions or required skills. If you want to be trained as a medical assistant, there is a track for that. If you want to learn to operate an infrared spectrometer, there is a course to show you how. This is the populist arm of higher education. It accounts for about eighty per cent of colleges in the United States.

It is also under extreme strain. In the mid-nineteen-sixties, two economists, William J. Baumol and William G. Bowen, diagnosed a "cost disease" in industries like education, and the theory continues to inform thinking about pressure in the system. Usually, as wages rise within an industry, productivity does, too. But a Harvard lecture hall still holds about the same number of students it held a century ago, and the usual means of increasing efficiency—implementing advances in technology, speeding the process up, doing more at once—haven't seemed to apply when the goal is turning callow eighteen-year-olds into educated men and women. Although educators' salaries have risen (more or less) in measure with the general economy over the past hundred years, their productivity hasn't. The cost disease is thought to help explain why the price of education is on a rocket course, with no levelling in sight.

Bowen spent much of the seventies and eighties as the president of Princeton, after which he joined the Mellon Foundation. In a lecture series at Stanford last year, he argued that online education may provide a cure for the disease he diagnosed almost half a century ago. If overloaded institutions diverted their students to online education, it would reduce faculty, and associated expenses. Courses would become less jammed. Best of all, the élite and populist systems of higher education would finally begin to interlock gears and run as one: the best-endowed schools in the country could give something back to their nonexclusive cousins, streamlining their own teaching in the process. Struggling schools could use the online courses in their own programs, as San José State has, giving their students the benefit of a first-rate education. Everybody wins. At Harvard, I was told, repeatedly, "A rising tide lifts all boats."

Does it, though? On the one hand, if schools like Harvard and Stanford become the Starbucks and Peet's of higher education, offering sophisticated branded courses at the campus nearest you, bright students at all levels will have access. But very few of these students will ever have a chance to touch these distant shores. And touch, historically, has been a crucial part of élite education. At twenty, at Dartmouth, maybe, you're sitting in a dormitory room at 1 A.M. sharing Chinese food with two kids wearing flip-flops and Target jeans; twenty-five years later, one of those kids is running a multibillion-dollar tech company and the other is chairing a Senate subcommittee. Access to "élite education" may be more about access to the élites than about access to the classroom teaching. Bill Clinton, a lower-middle-class kid out of Arkansas, might have received an equally distinguished education if he hadn't gone to Georgetown, Oxford, and Yale, but he wouldn't have been President.

Meanwhile, smaller institutions could

be eclipsed, or reduced to dependencies of the standing powers. "As a country we are simply trying to support too many universities that are trying to be research institutions," Stanford's John Hennessy has argued. "Nationally we may not be able to afford as many research institutions going forward." If élite universities were to carry the research burden of the whole system, less well-funded schools could be stripped down and streamlined. Instead of having to fuel a fleet of ships, you'd fuel the strongest ones, and let them tug the other boats along.

One day in February, 2012, a social scientist named Gary King visited a gray stone administrative building in Harvard Yard to give a presentation to the Board of Overseers and Harvard administrators. King, though only in his fifties, is a "university professor"—Harvard's highest academic ranking, letting him work in any school across the university. He directs the university's Institute for Quantitative Social Science, and he spoke that day about his specialty, which is gathering and analyzing data.

"What's Harvard's biggest threat?" King began. He was wearing a black suit with a diagonally striped tie, and he stood a little gawkily, in a room trimmed with oil paintings and the busts of great men. "I think the biggest threat to Harvard by far is the rise of for-profit universities." The University of Phoenix, he explained, spent a hundred million dollars on research and development for teaching. Meanwhile, seventy per cent of Americans don't get a college degree. "You might say, 'Oh, that's really bad.' Or you might say, 'Oh, that's a different clientele.' But what it really is is a revenue source. It's an enormous revenue source for these private corporations."

King rattled off three premises that were crucial to understanding the future of education: "social connections motivate," "teaching teaches the teacher," and "instant feedback improves learning." He'd been trying to "flip" his own classroom. He took the entire archive of the course Listserv and had it converted into a searchable database, so that students could see whether what they thought was only their "dumb question" had been asked before, and by whom.

With compilation tools like this, online education turns from a dissemination method to a precious data-gathering resource. Traditionally, it has been hard to assess and compare how well different teaching approaches work. King explained that this could change online through "large-scale measurement and analysis," often known as big data. He said, "We could do this at Harvard. We could not only innovate in our own classes—which is what we're doing—but we could instrument every student, every classroom, every administrative office, every house, every recreational activity, every security officer, everything. We could basically get the information about everything that goes on here, and we could use it for the students."

A giant, detailed data pool of all activity on the campus of a school like Harvard, he said, might help students resolve a lot of ambiguities in college life. "Right now, if a student wants to learn What should I do if I want to become an M.D.?—well, what do they do?" he asked. "They talk to their adviser. They talk to some previous students. They get some advice. But, instead of talking to some previous students, how about they talk to *ten thousand* previous students?" With enough data over a long enough period, you could crunch inputs and probabilities and tell students, with a high degree of accuracy, exactly which choices and turns to make to get where they wanted to go in life. He went on, "Every time you go to Amazon.com, you are the subject of a randomized experiment. Every time you search on Google, you are the subject of an experiment. Why not every time a student here does something?"

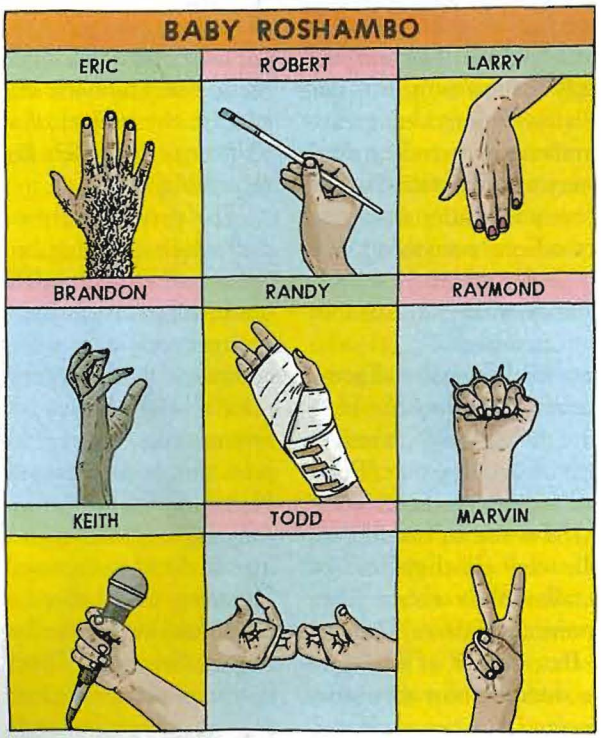
The promise of proprietary data-gathering is appealing, because, with digital life wearing down the gates of élite universities, schools are no longer competing solely with one another; their command of the educational marketplace is being challenged by industry. A few months earlier, Faust, Harvard's president, had happened to speak with Hennessy, Stanford's president, during a congressional lobbying session in Washington. At that meeting, Faust told me, Hennessy talked about an early MOOC on artificial intelligence by one of his professors, Sebastian Thrun. The course had exploded—it ultimately gained more than a hundred and sixty thousand

"From now on, don't bring any newspapers with my breakfast!"

IMAGINED INVENTIONS

VISION QUEST

BY KAREN RUSSELL



My last invention was for the seventh-grade science fair. I poured sunscreen onto a deodorant stick and called it Roller Solar Cream. On the bus to school, my best friend, Alexis Vgeros, taped Wite-Out to a Bic pen. Both of these technologies left bird-shit-white streaks all over the judges, our teachers. It was as if we were two rival inventors, each attempting, in her own half-baked way, to erase the authorities. Our suppurating gizmos got C-plusses. John Almond, whose father worked for NASA, invented a remote control that moved the moon with "lunar receptor cells." Or something like that: it was impossible to understand, and it won.

Today, the dream machines that I'd most like to see are in league with that moon remote—I don't pretend to understand the science that would permit their creation or govern their function. But I do think that we could use new ways to refine our vision. Here are some fantasy technologies to extend its range into the past and the future; to remove the cataracts of painful memories; and to correct our social myopia.

1. In 2010, a mobile app called Trapster appeared on the market. It alerts motorists to speed traps, surveillance cameras, and "other roadway hazards." Surely, we have the capabilities to create a similar tool for social situations. Social Trapster can be worn as a phony ruby or sewn into your checked-shirt collar. It analyzes subtle changes in your interlocutor's vocal pitch, body language, and temperature. If you are blithely blabbing away, barrelling toward a danger zone, Social Trapster prompts you to adjust your speed or topic accordingly. It keeps you safe during blind dates and bus trips. It guides you through monologuic small talk with poker-faced Midwesterners, minty-breathed sociopaths, inscrutably smiling mothers-in-law, and fourteen-year-old girls. Are you about to get busted for a zero-to-sixty presumption of intimacy? Biffed by a stranger's unaccountable rage? Anytime you are approaching an ambush point, Social Trapster will flare red, and suggest an alternate route: "Ixnay on the oopid-stay, this person was involved in the making of that film!"

2. Last Wishes Glasses eliminate the weird, sad arguments that erupt in families over a phantom legacy. Often, the dead person lives on through the warm mouths of the living, generating fresh desires and opinions: "Pop-Pop would have shot the horse before he let Davey have her!"; "Pop-Pop would have razed that house himself before he let the cousins paint it puke green!"; "Pop-Pop would have loved 'Spring Breakers'!"

Last Wishes Glasses are handed out in a sombre wooden box—a miniature casket that holds the relic of a perspective. Put them on and you can see the world through the eyes of whomever you've lost. The glasses are crafted in China by a team from Google that is led by E. T. A. Hoffmann's youngest descendant. Each lens is cross-hatched with infinitesimal scratches that stand in for all the scarring events of the person's life. Tiny beads of condensation continually form on the glasses' oval windows, blurring the hard living light. It's your loved one's take on reality, warped to spec.

3. I know that people argue that it's genes we should be looking at to predict a young person's future, but I have a hunch that names are very, very important. You think that the hard part is

making babies—wrenching a somebody out of the void—but matching the right name to your newborn is a chance to pull the bowstring back, and let the arrow fly true. Baby Roshambo is a computer-modelling program that shows parents how the baby's life might turn out with a different name: Ashley, Bubbles, La'Dynasty, Gertrude. Using a special algorithm, the computer program projects a hologram of your adult daughter in fuchsia office wear, or planting a little tree, or making cheese sandwiches for the homeless, or stabbing a man through the heart with a fence post. Parents can run through the alphabet, do a thousand different simulations: same baby, radically different life story.

4. Isn't there some old stuff you'd really like to use again? Stuff that history ruined? I have a music box from my father that has become so smudged with sentiment that I can't touch it. Maybe you have a paisley apron from your dead aunt or an awesome T-shirt from an ex-boyfriend, but the ache that these things provoke has made it impossible to wear them. It's mnemonic, but it's also somehow material, deep in the weave of the fabric. You'd like to drive Pop-Pop's Cadillac through the LeJeune intersection without sobbing. You loved Waffles, God rest him, but that doggie bed he died on is in fine condition.

The Anonymizer peels away layers of significance from objects. A TV commercial for the Anonymizer shows a mist of old emotion lifting off a wedding dress, and mildewed nostalgia disappearing from a child's duckie. Is it a special detergent? A chemical agent that swabs putrescent Time from your household items? I leave the how to science. ♦

MR. BINGO

participants—and Thrun was not blind to the opportunity involved: he later took the MOOC from Stanford and used it to co-found Udacity with venture-capital money. When Faust returned to Boston and met with a subcommittee of deans she'd previously assembled to think about the future of education, she told me, it was with a fresh sense of urgency about needing to make online education work at Harvard. King was invited to speak at the February meeting; the Overseers asked follow-up questions that continued by e-mail and by phone during the next few weeks. Less than three months later, it was announced that Harvard and M.I.T. would launch their nonprofit MOOC-making start-up, edX.

In his office that afternoon, overlooking a small quadrangle and the back of the Swedenborg Chapel, King told me that he didn't think MOOCs were quite ready to replace the classroom. "At the moment, there's a very big difference between an online experience and an in-person experience," he said.

Just how much is lost has lately been a subject of debate. At Harvard, as elsewhere, MOOC designers acknowledge that the humanities pose special difficulties. When David J. Malan, who teaches Harvard's popular and demanding introduction to programming, "Computer Science 50," turned the course into a MOOC, student assessment wasn't especially difficult: the assignments are programs, and their success can be graded automatically. Not so in courses like Nagy's, which traditionally turned on essay-writing and discussion. Nagy and Michael Sandel are deploying online discussion boards to simulate classroom conversation, yet the results aren't always encouraging. "You have a group who are—they talk about Christ," Kevin McGrath, one of the coördinators of CB22x, told me soon after the discussions started up. "Or about pride. They haven't really engaged with what's going on."

"Humanities have always been cheap and sciences expensive," Ian M. Miller, a graduate student who's in charge of technical production for a history MOOC intended to go live in the fall, explained. "You give humanists a little cubbyhole to put their books in, and that's basically what they need. Scientists need labs, equipment, and computers. For MOOCs, I don't want to say it's the opposite, but science courses are relatively easier to design and implement. From a computational perspective, the types of question we are asking in the humanities are orders of magnitude more complex." When three great scholars teach a poem in three ways, it isn't inefficiency. It is the premise on which all humanistic inquiry is based.

Speaking with King that afternoon, I mentioned that it was especially difficult to turn humanities courses into MOOCs. King wrinkled his brow.

"Why?" he asked. "Why should it be?"

Evaluating student performance on massive scales can be harder when you're teaching qualitative material, I said.

King disagreed: "I think assessment is probably harder in those fields to *begin* with—not because it's harder to assess but because it's harder to define what you wish to evaluate." Big data might help resolve this. The real potential of MOOCs, he went on, is to randomize input within a single virtual "classroom" in the way one can't in a traditional setting. "It would be possible to randomly assign different teaching methods, and different approaches, and different ways of seeing the screen, and all kinds of things," he told me. "And since the numbers are large and the potential for running many experiments is great, what you could do is completely solve, at least in an online setting, this huge problem in educational research."

For the moment, data about how well MOOCs work are diffuse and scant. A cornerstone of the case for them is a randomized study that Bowen helped plan, through the Ithaka organization, a Mellon Foundation spinoff. It showed no significant difference in educational outcomes between online learning and traditional classroom learning. The MOOC in question was a statistics course, however, and a "hybrid" one: its students had a weekly in-classroom Q. & A. session. When MOOCs are a purely online experience, dropout rates are typically more than ninety per cent.

"I feel as if we're very much in the experimental stage," Kathleen McCartney, a developmental psychologist and the dean of Harvard's Graduate School of Education, told me one afternoon in her offices on the edge of the old Radcliffe Yard. This summer, she'll leave Harvard to become the president of Smith. In

May, 2012, when edX was announced, Alan Garber, the provost, asked her to serve on its board. "It really is a value-added question," she said. "What is the value added that a college or a university, and professional schools within the university, can offer?" Later, she got up to look for a paper that had impressed her. "This guy is a really good thinker," she said, handing me a printout of a report by Michael Barber, an adviser to the publishing and education conglomerate Pearson, with two co-authors. The paper, titled "An Avalanche Is Coming," was released this past March by the Institute for Public Policy Research, a British think tank. The avalanche in question, according to the report, is the upheaval that digital culture will bring to universities. Its authors write, "The one certainty for anyone in the path of an avalanche is that standing still is not an option." For instance, it says, Brezhnev's Soviet Union was in the path of an avalanche and didn't prepare—look what happened. Also, Lehman Brothers. The foreword was by the economist and former Harvard president Larry Summers.

Written in a portentous tone and drawing heavily from the literature of tech-business strategy, "An Avalanche Is Coming" cites Richard Florida and Clayton Christensen to propose that schools take advantage of an "unbundling" in their educational responsibilities in order to remain competitive—a popular idea among MOOC supporters. "Some of the leading entrepreneurs of our times, including Mark Zuckerberg and Steve Jobs, dropped out of college to move to Silicon Valley," the report says. "Driven by the purpose of city prosperity, technology hubs could be the universities of the future." The idea is increasingly popular among a certain sector of the higher-education community. (The Minerva Project, an online-based liberal-arts university being developed with a twenty-five-million-dollar seed investment from Benchmark Capital, will have its students travel among as many as seven campuses globally, doing online-based work at each; Larry Summers chairs its board.) McCartney said, "I think it's a good paper. I got it three times yesterday."

One sunny afternoon in March, the president of edX, Anant Agarwal, a fifty-three-year-old professor of electrical engineering and computer science at M.I.T., showed me around the company's new offices. EdX is two blocks from Google's Boston offices, near M.I.T.: an area of Cambridge that, in contrast to the undulating brick sidewalks and noodle-shaped streets surrounding Harvard, comes across as sleek and angular and most efficiently traversed by car. "Welcome to our start-up," Agarwal said when we shook hands. "It is very start-up-y." He gestured across the open-floorplan office, filled with ferns and stylish blond-wood furniture. Flat-screen TVs hung from the ceiling. Employees strode between workstations. "As you can see, this is what a start-up looks like," he offered one more time.

Agarwal has started up a lot of start-ups, most recently one that made multi-core processors. He told me that he drinks coffee, nonstop, all day. That isn't hard to believe; he walks as if in fast-forward, and when he's sitting he fidgets. In December, 2011, he launched something called MITx, under the aegis of the university, ostensibly to put his spring-semester circuits-and-electronics course online. "When we started, a sweet-spot number of students I was looking for was about ten times as many students as the M.I.T. class," he said—about fifteen hundred. "In the first few hours of posting the course, we had ten thousand students sign up, from all over the world." The course ultimately enrolled a hundred and fifty-five thousand students.

Agarwal realized that he was onto something big. When the M.I.T. and Harvard brass approached him about running a MOOC partnership, he drew up a budget of sixty million dollars. At current rates, he estimates, the investment will cover edX's needs for "approximately a couple of years." He said, "As the business builds, we will see how it goes, and what we really do, what we don't do, and shuck and jive as we go along, as you might imagine in any start-up company—this is a start-up company."

How edX will make money remains a little murky. Courses in the HarvardX program are now free. That will change this fall, as Harvard starts conducting what it calls "revenue experiments." MOOCs are costly to produce—Rob Lue, the HarvardX leader, told me that some courses require "in the hundreds of thousands" of dollars to get up and running—and so far there are no significant returns. The university regards its thirty-million-dollar pledge as a "venture capital" type of investment, and hopes to get its money back.

One idea for generating revenue is licensing: when the California State Uni-

versity system, for instance, used HarvardX courses, it would pay a fee to Harvard, through edX. Another idea, geared toward the individual home user, is a basic per-course fee: you'd pay to enroll in a course you liked. There's an existing market for tuition-based online courses—the University of Phoenix, for one—and, to compete in that field, edX will have to choose its per-course price points carefully. A model often mentioned is iTunes.

For the professors involved, too, the financial details remain vague. Should you get paid extra for conducting online classes? (Michael D. Smith, the dean of Harvard's Faculty of Arts and Sciences, told me that Harvard plans to start paying MOOC teachers when revenue begins flowing.) There are gnarly intellectual-property issues: if a professor launches a MOOC class at Harvard (an edX property) and then takes a job at Princeton (Coursera), who keeps the online course? Will untenured professors, who may have to find jobs elsewhere, be discouraged from MOOC-making? While nonselective institutions winnow staffs and pay licensing tithes to the élite powers, MOOCs offer substantial opportunities to academic stars, who might aspire to have their work reach a huge international audience. When Nagy decided to turn his popular class into a MOOC, he was thinking not only of its global reach—he's already working to secure CB22x inroads into Greece, India, China, and elsewhere—but of the long half-life that the course would have once it's circulating on the Web.

"I could easily see a great institution like Harvard having a dynamic archive where, even after I'm gone—not just retired but let's say really gone, I mean *dead*—aspects of the course could interlock with later generations of teachers and researchers," Nagy told me. "Achilles himself says it in Rhapsody 9, Line 413: 'I'm going to die, but this story will be like a beautiful flower that will never wilt.'"

In Cambridge, when the weather starts to warm up, fragrances return: first, there's a soft, faint scent of earth and fog; the grass comes back; and trees begin to blossom in the courtyard of the old-books library at Harvard. Groundskeepers set down mulch. On one of the first warm days of the year, I met Peter J. Burgard, a professor of German at Harvard, at the back entrance of Widener Library, where he keeps a research study separate from his office.

Burgard is a tall man with a crown of wavy silver hair. That afternoon, he wore a green-and-bright-blue striped shirt, bluejeans, and lime-green socks. For all his claims to scholarly immurement, he reads a fair amount online, and speaks with a young standup comic's restless, patter-and-punch-line lilt. Unlike most tenured professors, Burgard teaches advanced German-language courses by choice, and, each summer, leads an intensive immersion program, in Munich. His other teaching is varied: his subjects include the German Enlightenment; baroque literature and art; twentieth-century art; and Goethe, Nietzsche, and Freud.

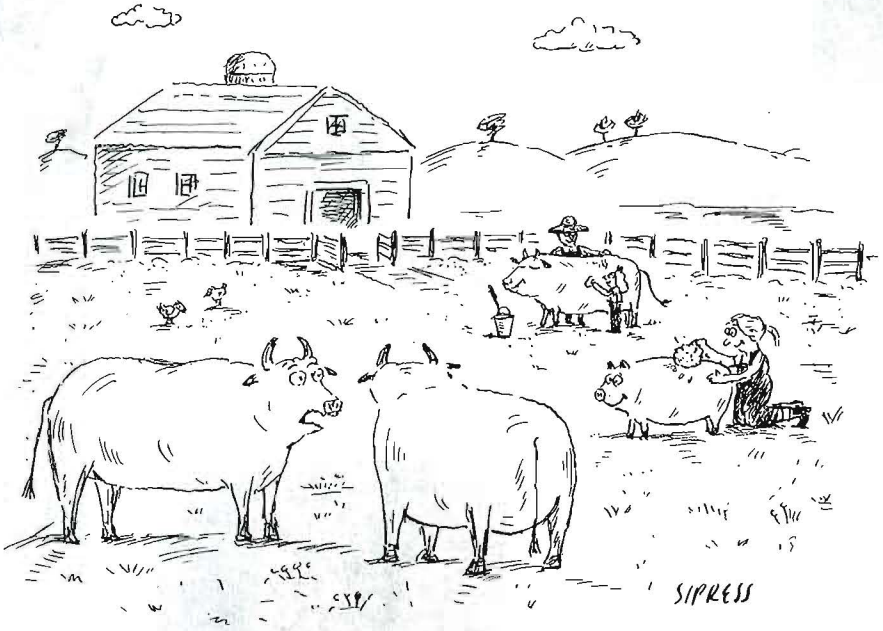
Burgard is a highly regarded teacher. Since edX was announced at Harvard, though, he's been a persistent and outspoken critic of it. "I made the decision that I will not teach in HarvardX," he told me, swivelling in his chair before a large iMac. Behind it, propped on one wall, was a huge black-and-white reproduction of Gustav Klimt's "Jurisprudence," left over from a 2005 exhibition that Burgard co-curated; it depicts a man being ensnared by an octopus in front of three nude women. "To me, college education in general is sitting in a classroom with students, and preferably with few enough students that you can have real interaction, and really digging into and exploring a *knotty* topic—a difficult image, a fascinating text, whatever. That's what's exciting. There's a chemistry to it that simply cannot be replicated online." Burgard also worries that MOOCs may slowly smother higher education as a system.

"Imagine you're at South Dakota State," he said, "and they're cash-strapped, and they say, 'Oh! There are these HarvardX courses. We'll hire an adjunct for three thousand dollars a semester, and we'll have the students watch this TV show.' Their faculty is going to dwindle very quickly. Eventually, that dwindling is going to make it to larger and less poverty-stricken universities and colleges. The fewer positions are out there, the fewer Ph.D.s get hired. The fewer Ph.D.s that get hired—well, you can see where it goes. It will probably hurt less prestigious graduate schools first, but eventually it will make it to the top graduate schools. . . . If you have a smaller graduate program, you can be assured the deans will say, 'First of all, half of our undergraduates are taking MOOCs. Second, you don't have as many graduate students. You don't need as many professors in your department of English, or your department of history, or your department of anthropology, or whatever.' And every time the faculty shrinks, of course, there are fewer fields and subfields taught. And, when fewer fields and subfields are taught, bodies of knowledge are neglected and die. You can see how everything devolves from there."

I asked Michael Smith, the Harvard dean, whether he worried about the effects of MOOCs on the academic job market. "I think oftentimes this question is oversimplified," he said. "We're working very closely with our graduate school and our graduate students to think about how they can be involved in this process." Job offers today, he said, will necessarily "be different from the ones I saw when I finished up graduate school." Some Ph.D. students are being trained in MOOC production as "HarvardX fellows."

Yet Burgard is not alone in his concerns. Last month, when Amherst College turned down an invitation to join edX, it was by a faculty vote of more than sixty per cent. A lot of teachers, some of whom had been browsing Harvard MOOCs, worried that they threatened to centralize higher education to an uncomfortable degree, and that their giant scale clashed with Amherst's small-class style. A single MOOC could exceed the number of alumni, dead and living, that Amherst has seen in two centuries.

"I was surprised at the outcome," David W. Wills, a professor of religious history at Amherst, told me. "It seemed to come down the road as something that was going to happen." Wills started out being open to MOOCs, he said. But



"Do you ever ask yourself 'humanely raised' for what?"

• •

the more he heard the more his concerns grew, and none of edX's representatives seemed able to address them. "One of the edX people said, 'This is being sponsored by Harvard and M.I.T. They wouldn't do anything to harm higher education!' What came to my mind was some cautious financial analysts saying, about some of the financial instruments that were being rolled out in the late nineties or early two-thousands, 'This is risky stuff, isn't it?' And being told, 'Goldman Sachs is doing it; Lehman Brothers is doing it.'" The language he heard from edX, he said, was the rhetoric of tech innovation—seemingly to the exclusion of anything else—and he worried about academia falling under hierarchical thrall to a few star professors. "It's like higher education has discovered the megachurch," he told me.

He and others worried about what this might do to smaller preachers. "I have to say, it turned my stomach to think that we were going to be making decisions about other people's jobs in a discussion to which they were not party," Adam Sitze, a member of the department of law, jurisprudence, and social thought at Amherst, told me. "Some very brilliant people are at institutions that are not wealthy." In a meeting, one of Sitze's colleagues, the political theorist Thomas L. Dumm, described the conveyance of MOOCs to weaker universities as "eating our seed corn."

I was curious whether graduate students at Harvard, the élite professors of the future, shared any of these concerns. Most I spoke with seemed fairly sanguine about the future of a MOOC-sustained academy or, at least, upbeat in their disenchantment. "I have a hard time seeing how this makes an already dire situation for the humanities worse," Stephen Squibb, a graduate student in English, said.

Might it make some things better? Peter K. Bol, a Chinese intellectual historian, started depending on computers as a graduate student at Princeton, in the late nineteen-seventies, because he was a sloppy typist. Today, as the director of Harvard's Center for Geographic Analysis, he's a leading exponent of the use of geographic-information-system technology in historical study—like Google Maps, except with a historical record's worth of information in it.

To him, MOOCs look like a victory for open-access scholarship. "The question for us here was: How do you take what you're teaching to a very small group and make it accessible to a large group?" Bol told me late one morning in his office, a kind of paper jungle piled with journals, manuscripts, and books. "Unless I'm writing popular books, I'm not reaching those people. I'm not telling them stuff that I've worked hard to try to understand."

Now he thinks he can. This fall, Bol will launch ChinaX, a survey of Chinese cultural history from the neolithic period to the present day. He has also launched a course to let students get involved in preparing that program. Those in "Chinese History 185: Creating ChinaX"—a campus class offered only to Harvard students—have spent this term building Bol's online course, module by module, in small groups under his direction. Teaching takes place in both a classroom and a computer lab. I sat in on one of the class meetings.

Bol is a gifted teacher. When he takes the head of the classroom, his weary, slightly stiff manner falls away, as the years melt from a veteran stage actor when the curtain rises. He speaks energetically and clearly, gesturing briskly with both hands, as if making two marionettes dance. His jokes get full-classroom laughs. It was the first time I had been in an active university class since my time in college, and I fell back into old habits and a long-forgotten rhythm. I found myself taking lots of notes, college-type notes, notes more nervously dutiful and conceptual than I often take today. Once, when Bol was speaking, I glanced at my phone to see whether an important e-mail had come through. When I looked up, I found Bol's eyes on me, and flinched. I had adopted again the double consciousness of classroom students: the strange transaction of watching someone who watches back, the eagerness to emanate support. Something magical and fragile was happening here, in the room. I didn't want to be the guy to break the spell.

Near the end of the two-hour session, a student raised her hand and asked Bol what he meant by a phrase he'd used, "the historian's mind-set." There were a few minutes of class left. Bol nodded and perched on the edge of a table with his legs dangling below him. A colleague and collaborator had slipped into the room, the historian Mark C. Elliott, and Bol asked him to come up to the front. The two sat side by side. Bol said, "How

do I know the historian's mind-set when I see it? I know it because it's somebody interested in how things change over time, but not just that. They're also interested in the *problem* of how things change over time. And how to account for change over time."

"I would answer it a little bit differently," Elliott said. "I would say the historian's mind-set is the person who sees what's going on, today, and assumes that whatever's happening is not happening for the first time. And that whatever we're seeing must have happened in some iteration, at some point, sometime in the past somewhere. And that those versions of the kinds of change that we see around us in various scales are just the latest installment of a very long series of similar such changes."

Bol cocked his head. "So it sounds to me that you're saying—"

"Here it comes!"

"—that history is sort of *repeating* in some ways. But isn't history also cumulative—that when we see it happening a second time it's somehow different from the first time?"

"Yeah, I certainly don't mean to say that it's repeating. There's a great Shirley Bassey song, actually, 'History Repeating'—"

"If you could sing a bar or two—"

"I'll send you the MP3. It doesn't repeat, but it *rhymes*."

Their discussion left an energetic silence in the room, a feeling of wet paint being laid on canvas. Sitting there, I thought of similarly fragile, unexpected moments that together helped define my college education. Once, during a bout of warm midwinter weather, a teacher of Baroque chorale harmony pranced into the room and spent half of class analyzing a song lingering in his mind; the song was "June in January," and today it puts me in mind of open windows and warm Fridays. I can still see the faculty office—small, dimly lighted, chilly—where I sat as a freshman, having come with a question, as the professor, a charcoal-gray scarf looped around her neck, mentioned a document trove that became the basis for my senior thesis. I recall being in a survey-course lecture so slick and wrong-headed that, at one point, the woman sitting next to me reached over and wrote ugh-get-me-out-of-here comments in the margin of my notebook. And that she used a blue-ink Uni-ball Vision. And that the seconds while she wrote each note were bliss. I remember those moments, and I remember more. I've seen things you people wouldn't believe.

Education is a curiously alchemic process. Its vicissitudes are hard to isolate. Why do some students retain what they learned in a course for years, while others lose it through the other ear over their summer breaks? Is the fact that Bill Gates and Mark Zuckerberg dropped out of Harvard to revolutionize the tech industry a sign that their Harvard educations worked, or that they failed? The answer matters, because the mechanism by which conveyed knowledge blooms into an education is the standard by which MOOCs will either enrich teaching in this country or deplete it.

William W. Fisher III, a professor at Harvard Law School, has been experimenting with ways to split the difference. This spring, Fisher is teaching his first online course, CopyrightX, through edX. But he's also a casual student of the medium. Fisher's field is intellectual-property law—he was among those to represent Shepard Fairey and his "Hope" poster—and he works a lot on rights in the digital age. I met him one morning in his office, which had a standing desk and an ergonomic keyboard in one corner. At one point, Fisher's Portuguese water dog, Nica, wandered in. He explained to me that he has reservations about MOOCs.

"Two features that can be found in most of this recent wave of online courses are: first, what could be described variously as the 'guru on the mountaintop,' or the 'broadcast model,' or the 'one-to-many model,' or the 'TV model,'" he said. Fisher has a shock of strawberry-blond hair. He was wearing a pinstriped suit and, incongruously, tan hiking boots. "The basic idea here is that an expert in the field speaks to the masses, who absorb his or her wisdom. The second feature is that, to the extent that learning requires some degree of interactivity, that interactivity is channelled into formats that require automated or right-and-wrong answers.

"I think this fails to capitalize on many of the most important advantages of new technologies vis-à-vis education," Fisher said. "It's possible that it's optimal for math, computer science, and the hard natural sciences. I don't teach those things, so I'm not sure. But I'm pretty sure it's not optimal for social sciences, humanities, and law. So I wanted to try a different technique."

Fisher's idea is to constrain his online course as much as possible. Online enrollment in CopyrightX was capped at five hundred students. In picking students, he looked partly for a range of ages and professions: his goal is to seed knowledge of digital-age copyright law among people who will apply it creatively in their own circles and work. Unlike most MOOCs, CopyrightX runs simultaneously with the version of the course that Fisher teaches at the law school. This lets him link the two communities. Students in his law-school course, and alumni of it, volunteered to serve as "teaching assistants" for the online students. He divided the five hundred online students among these volunteers.

Each week, the law-school class has two Socratic sessions on campus. The online students, meanwhile, have "sections" on the Web, taught by the teaching assistants. Every other week, the whole group convenes, in person or remotely, for an evening session at the law school. Artists, writers, and other copyright holders visit and speak about their legal concerns. The teaching assistants are in the room, but also online with their Web students, who are watching the event through a Webcast. "The teaching fellow is monitoring this discussion, participating in it, and then forwarding questions into the room," Fisher said. "So in the room there are two screens: one screening questions from the Harvard Law School students, and the other featuring the questions that are curated by the teaching fellows. And we oscillate the discussion between them."

As the wheels of CopyrightX begin to turn, the course tries to deliver on all promises of online education: it proliferates useful knowledge beyond Harvard, it lets students learn by teaching, and it enriches the classroom environment by giving more time to discussion of hard problems. It also is not massive, open, or entirely online. "This is an old idea—it's basically the way seminars have been run for centuries," Fisher said. "But it remains a good one." ♦