Classes for the Masses: The Evolving Efforts of Three Institutions to Create High-quality, Large-scale, Low-cost Online Courses

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In the years he spent as a professor of political philosophy, Greg von Lehmen’s interests centered on such questions as how careful readers should understand the concept of *phronesis*, a Greek word often translated as “practical wisdom.” This academic pedigree—von Lehmen’s Ph.D. advisor at the University of Georgia was a student of the noted political philosopher Leo Strauss—might at first glance seem incongruous for a senior leader of the University of Maryland University College (UMUC). After all, UMUC is among the world’s largest open access universities, delivering most of its classes online to nontraditional students, many of them members of the U.S. Armed Forces. A profile like this might not seem to augur well for an institution’s quality and intellectual seriousness. Von Lehmen, who spent several years as provost before recently being named head of external relations and initiatives, admits that he was a little dubious himself. Despite his leadership position at the university, he wondered whether an asynchronous online course could really be, he says, “as rich as a face-to-face class.”

Von Lehmen decided that the best way to answer the question to his satisfaction was to personally teach an online class. After teaching Introduction to Political Science three years ago, he was persuaded. To be sure, he doesn’t dispute that online courses sometimes lack the energy of the best discussions in the best brick-and-mortar classrooms. But he is convinced that student learning doesn’t have to suffer: “My conclusion is that I think you can teach a demanding online course that produces learning outcomes that are as good as you could have for a face-to-face class.”

At a university where students badly want to acquire the kind of practical wisdom that von Lehmen studied in his own scholarly work, his assessment of the quality possible in online classes is encouraging. But what does it really mean to develop a high-quality online course, particularly one that can be delivered at scale and at modest cost?
The question is important for both pedagogical and practical reasons; it underlies much of today’s discussion about improving productivity, and thus lowering costs, in postsecondary education. Traditional models of developing and delivering courses—each stage of which typically runs through an individual professor—are expensive to offer, requiring faculty time, physical space, and a fixed daily and yearly schedule in which classes can be offered. Colleges recoup those costs by charging a relatively modest number of students—those who are physically enrolled—relatively high tuition (extremely high in the case of many private institutions) to attend and receive credit.

This slow-to-change cost structure represents an enormous opportunity for UMUC and other technology-driven providers during an era of growing demand for affordable access to postsecondary degree programs. Placing instruction, content, and assessment online allows colleges to realize significant economies of scale by attracting tens of thousands, or even hundreds of thousands, of students. Such numbers let providers recoup the cost of course development and delivery while driving down the cost of courses—and typically their price to students.

There is, of course, no single model of online course delivery. Course design and methods of instruction can vary considerably. So does the context in which online classes are offered, as well as the cost model on which edu-entrepreneurs build their efforts. At the same time, thoughtful online educators seem to have several things in common in their efforts to harness technology in the service of effective pedagogy: they pick curriculum carefully, often on a uniform basis; they pay close attention to methods of keeping large numbers of students engaged; they train instructors thoroughly; and they use data systematically to track student learning and to monitor student participation. This chapter, aimed at lay readers as well as policy
experts, profiles three online course providers: UMUC, the University of California’s “UC Online” initiative, and the much-discussed Silicon Valley start-up Udacity. Drawing largely on site visits and interviews with academic leaders and administrators at those institutions, it aims to shed light at the micro level on several noteworthy efforts to provide high-quality, low-cost classes without regard to barriers of time and space.

University of Maryland University College

While much is made of the brand-new institutions that populate the landscape of online higher education, UMUC has a relatively lengthy pedigree. It grew out of the University of Maryland’s night school for adults in the 1920s and was formally established in 1947 as an independent institution called the College of Special and Continuation Studies. It became University College in 1959, then UMUC in 1970. Along the way, it was a major provider of classroom education to U.S. military personnel in Europe, then in Asia, and eventually in Iraq and Afghanistan. As of the late 1990s, when the university first began offering online courses such as Accounting 220, a large majority of its enrollment continued to be overseas. But the balance has now shifted to the United States, where about 59,000 of the institution’s 92,000 students are enrolled.

Along the way, the internet revolution transformed the core teaching activities of UMUC. While there are still some brick-and-mortar classes, particularly overseas, 75 percent of the university’s enrollments are now online. Little wonder, then, that a visitor to one of the university’s central administration buildings encounters no students. Instead, the polished office complex just inside the Washington Beltway—a few minutes from FedEx Field, home of the Washington Redskins—is filled with deans, assistant deans, academic advisors, librarians, curriculum designers, technology specialists, student services staff, student recruiters, and more. Any university’s back office and governance operations might be found in such a structure, but
this businesslike edifice is where much of the academic substance of UMUC’s 120 academic programs gets hammered out (in consultation with a variety of advisory boards).

Given its relative longevity, UMUC could be viewed as the Establishment of American public online education, akin to Great Britain’s hugely influential Open University. Its enrollment is high and it has proven staying power (although the mysterious resignation of its president in the spring of 2012 provided a bout of unwelcome publicity). It enthusiastically embraces its mission of serving nontraditional students—von Lehmen boasts that UMUC graduates more African Americans each year than all of Maryland’s historically black colleges and universities combined—while staying attentive to maintaining academic standards. It has thrived by pioneering methods that remain too rare in traditional American higher education but which have become increasingly common in fast-growing online institutions, both public and for-profit.

Compared to many conventional U.S. universities, UMUC takes an unusually systematic and centralized approach to what is taught and how it should be taught. The process is lengthy. For a just-completed curriculum redesign, the university worked with an employer and alumni advisory group to decide what program outcomes were needed. Next, it reverse-engineered to meet its goals: it mapped ideal programs, developed program and course outcome guides, then designed courses and created teaching guides for each class. Worksheet-like program and “Outcomes Guide[s]” provide a concrete way to track of what students know and can do. They ask what core concepts and skills learners need to acquire to demonstrate proficiency in program and course outcomes, what key assessments will be used to provide evidence of student proficiency, and what students should be able to do as a result of each course and program.
Cynthia Davis, longtime head of academic affairs for UMUC and now acting dean of the undergraduate school, says this kind of practical, systematic mapping of content, assessment, and outcomes is particularly helpful for nontraditional students. Members of the military, for example, often proceed slowly through degree programs because of deployments and other responsibilities. This means that a predictable sequence of courses with standardized content is crucial. “We want a student who takes a course in Heidelberg to have essentially the same course as one in the United States, because it may be a prerequisite for a course they take here,” Davis says.

Once curriculum has been designed, how should it be taught? As an early adopter of online teaching, UMUC quickly learned what is now conventional wisdom—that simply videotaping classroom lectures is ineffective. The challenge was to harness technology in service of content and effective pedagogy. Thus, from the beginning of its online efforts, UMUC needed to find a balance between academic experts and course development specialists (the latter are now known as instructional designers and have becoming a thriving sub-specialty in the online higher education industry). On the academic side, subject matter experts included the course creator, peer reviewers, and curriculum specialists. They work closely with a team, led by an instructional designer, that includes an editor, a web specialist, a graphics expert, and often a programmer. It was this combination that contributed to the explosion of online course offerings in UMUC’s early days, says Sharon Biederman, who heads the university’s Office of Instructional Support Services. “What distinguished UMUC was our understanding that while we had faculty who were experts in their subject matter, they were not necessarily experts in converting that from a lecture to something that was not only full of content, but something that was interactive.”
This quest for interaction—for engaging students in their online classes—is a preoccupation throughout the sector, and has certainly been thought about long and hard by UMUC administrators. They aim to ensure that students become engaged in three principal ways—by interacting with course content, by interacting with faculty members, and by interacting with one another.

Typically, course designers try to engage students in course content through a process known as “scaffolding.” A student first reads class material; next observes a chart, table, or video (often called a “learning object”); then participates or interacts in some way with the course content; and finally is quizzed on the material either through a self-assessment exercise or a graded assessment. In a criminal justice class, for instance, a forensics lab unit begins with students viewing a slide show showing examples of different powders, both licit and illicit. To help students understand how a narcotics task force tests substances for drug content, they are next shown a variety of screen objects, including a scale, lab instruments, and powder in plastic baggies. Using virtual tools, they are able to drag each bag of powder onto the scale, clip off its top using scissors, dump the contents into a bowl, and weigh the sample. Students then watch a video showing a lab technician applying different chemicals to each sample in order to see the chemical reaction that occurs and determine what the substance is.

When students’ exposure to academic content comes in the form of watching videos, UMUC course designers endeavor to keep learners connected by breaking up professors’ lectures into bite-size chunks. Again, this is an area where instructional designers say their understanding of cyber-pedagogy can help make classes more effective. “The faculty always say, ‘Let’s put this 30-minute video in,’ and the instructional designer will say, ‘No, we have about a 10-minute
attention span here, and maybe even five minutes,’” observes Biederman. “If you just have a
talking head there’s a limit to how much people can stand it.”

Instead, a 30- or 45-minute lecture might be broken into segments of three to five
minutes, with questions from the professor interspersed for students to keep in mind as they
continue watching. Students would then move to the “conference” section of the course—an
asynchronous discussion forum that is accessed through the LMS, or learning management
system. The professor might throw out a question that brings together some of the video clips the
students have watched, then moderate the discussion with students that ensues. UMUC class
sizes are relatively small—the maximum number of students is around thirty-two—and the
university makes clear to instructors that they are expected to interact about academic content
with students on a weekly basis.

This isn’t always easy to accomplish, according to Richard Schumaker, UMUC’s director
of Faculty Professional Development and Training: “Often instructors who are from more
traditional environment where they lecture, they may be used to coming in and doing office
hours, but they may not be so comfortable [with such regular, direct interaction].” The role of an
online instructor is really about facilitating rather than teaching in a traditional sense, he adds. To
ensure that instructors are meeting their obligation to maintain a regular classroom presence,
UMUC keeps tabs on how often faculty are participating in class discussions. The LMS tracks
instructors’ interactions and sends a report automatically to program directors each week. “There
may be legitimate reasons [for extended classroom absences], but it’s sort of a tripwire for us,”
says Alan Carswell, who runs a popular, two-year old master’s program in cyber security as
chair of the UMUC graduate school’s Cybersecurity & Information Assurance Department.
The requirement for active participants extends to students as well—indeed, at UMUC and other online providers the role of student-to-student learning is significant. This makes pedagogical sense, course designers say. “If you think of a face-to-face classroom, you’re not only learning from the faculty member—you’re learning from the person next to you,” says Emily Medina, an instructional designer in UMUC’s course development unit. Just as instructors are required to interact regularly with students, students are required not just to monitor conference discussion but to participate. They typically have to respond to comments by other students several times a week, and their interactions are expected to be more than perfunctory; instructors use a grading rubric that grades students not only on the quantity of their comments but on their quality—whether they advance discussion in a useful way. Placing a priority on students’ interactions with one another is an important learning tool, Biederman notes: “There’s lots of research showing that students retain information better if they get it from another student than if they read it.” Sometimes that information may be about class logistics as much as course content: some UMUC classrooms have a section called “the Corner Café” in which students can ask one another questions about practical topics such as how to use the plagiarism detection website Turnitin.com.

A frequent theme in conversations with UMUC administrators is the importance of obtaining, and making thoughtful use of, data on student engagement, academic success, and degree attainment. The university knows, for example, that students who have completed a college writing class before enrolling at UMUC are much more likely to persist in their studies. It knows that showing frequency in the online classroom—just as in its brick and mortar counterpart—correlates with higher grades. It also knows that if a student isn’t actively involved in the online classroom within the first week, von Lehmen says, “that’s a real danger sign.”
But academic leaders would like more sophisticated capabilities that would allow them to track students’ online activity even more closely. UMUC is in the midst of choosing a new LMS that will allow it to do simple but important things like email a student if he or she hasn’t signed on for the first few days of class. More significantly, an improved LMC should allow the university to make use of “learner analytics” to see how often students look at individual assignments, what they do in response to each assignment, and how much they learn as a result of these actions. UMUC is also working on a predictive analytics project, funded by the Gates Foundation, that will use data mining to try to understand which factors are most closely associated with success in college. In addition, it is working with Carnegie Mellon University’s Open Learning Initiative to develop adaptive learning techniques. These generate immediate data on students’ progress and tailor lessons to their particular strengths and weaknesses in subjects like biology, statistics, and computer literacy.

Faculty training at UMUC is elaborate, beginning with a mandatory orientation program lasting one month, which covers both theory and practice. New instructors have to set up a class of their own, with guidance from seasoned facilitators, and also observe a couple of other classes to see the kinds of exercises and techniques other faculty members use to engage students. Once they begin teaching, all undergraduate instructors have faculty mentors who are charged with observing their classes, providing support and guidance, answering questions, and so forth. Those who struggle are assigned coaches.

Despite the attention that university leaders pay to making the most of an online educational environment, a surprising amount of administrators’ conversation about effective instruction is not about technology at all. Instead, in keeping with the middle prong of UMUC’s threefold strategy of making sure students engage with the material, with faculty, and with one
another, they emphasize the need to connect with students and to pay particularly close attention
to whether they are staying engaged and understanding the material they need to learn. Over and
over, faculty who have taught in traditional settings say that teaching online, contrary to
stereotypes, is significantly harder than teaching in a brick and mortar classroom. “People think
teaching online is a non-time-intensive process,” says Kim Stott, executive director of UMUC’s
Center for Teaching and Learning. “If you’re doing it well it takes more time for a faculty
member than if it’s face-to-face or in a blended environment. For students to feel satisfied that
they’re really learning and being connected to the faculty, you need to be present.”

In addition to keeping up a back and forth stream of questions and answers with students,
and dipping into online discussions to keep them on track, faculty need to be very accessible to
students—they’re expended to respond to messages within twenty-four hours, for example. Stott
also shows up to answer questions in an online forum called Ask Dr. Stott.

During their training, they’re taught about the importance of bringing themselves to life
in the online classroom. “If you don’t do that, your classroom is flat,” Stott says. Concrete steps
for an instructor to establish a personalized identity might include not just posting a photo and
capsule biography, but also communicating to students exactly why he or she is drawn to the
subject of the class. When these kinds of efforts are paired with regularly engaging students
about coursework, instructors can achieve a pleasant paradox of the online classroom: greater
personal attention than is sometimes possible in a regular course. “The bright spot is that a face-
to-face class can be dominated by someone and the shy people can hide in the back. Online I can
make everybody talk,” Davis says.

She and others also note that online students—particularly the nontraditional students
who predominate at institutions like UMUC—respond particularly well to being given a
roadmap telling them exactly what they need to do to learn material and then demonstrate
mastery. This can mean avoiding free-form class discussion. In the case of Davis’s Modern
British Literature classes (in which, incidentally, she had the novel experience of teaching a unit
on World War I war poets to a class that included many military veterans), she finds that she has
to moderate discussions carefully. “You have to be much more explicit with students. You can’t
just say, ‘What do you think about this poem?’ You have to give them more directive
questions…. [but] you can get them to the same places.”

To those who believe that getting students to those places online will yield quick and
easy cost savings, Greg von Lehmen is quick to offer a number of contrary observations. For one
thing, UMUC faces the significant expense of building and maintaining an information
technology infrastructure good enough to create a rich online experience. There is the need to
maintain in online form many of the student services found on a conventional campus: advising,
a library, a helpdesk, and so forth. Training and providing ongoing support to faculty who teach
online is also considerable: the university’s Center for Teaching and Learning trains over 600
adjunct faculty each year, offering faculty development workshops of a week or more on a range
of subjects. Fiscal planning entails setting aside money for future capital investments. In
addition, the university must factor in future uncertainty over how many active duty troops will
be serving in Europe and Asia, where it operates under contract with the U.S. Department of
Defense to offer degree programs on military installation. Its classes operate on approximately a
break-even basis, and would be difficult to downsize immediately. And, of course, there is the
usual spending on data warehousing and administrative and finance overhead.

All this said, von Lehmen is convinced that the online model is compelling financially for
the reason usually cited: scale. UMUC was able to expand by 7,000 students over the past five
years with an increase in operating costs of just $92 million, plus some modest capital investment. This is “remarkable,” von Lehmen observed at a recent conference, noting that the enrollment growth is the equivalent of creating a reasonably sized traditional campus—but at much lower cost. Buying computer servers and hiring additional staff costs a lot less than erecting new buildings, he points out. What’s more, the adjunct instructors who are often hired by large online providers—particularly when they are expanding quickly—cost much less than traditional faculty.” While online education is not inexpensive,” von Lehmen says, “it’s less expensive than brick and mortar education - the costs at the margins are lower.”

Von Lehmen notes that UMUC receives very little support from that state and is able to charge tuition that is highly competitive with that of other Maryland institutions (each of which sets its own tuition). Price and cost aren’t the same, of course, and in a subsidized state university system—or across different state systems—it can be hard to make apples-to-apples comparisons of cost-effectiveness between institutions. Nevertheless, at $250 per credit hour, UMUC’s tuition, with fees, is the second lowest in the Maryland system, after Coppin State University. “Our cost structure is such that we are able to operate at scale and at a lower comparable tuition rate,” he says. “More people should be doing what we’re doing because there are lower costs per margin. There’s no near-term end to this fiscal exigency for higher education in the United States—the model’s got to change.”

There are certainly plenty of reasons for online institutions to charge higher tuition. They are by no means immune from the tendency of many universities to seek tuition increases in order to secure funds for everything from better technology to higher salaries. But another model, along the lines of Amazon’s success at offering low prices while making money on high
volume, can allow online universities to bring in significant new revenues while keeping prices low.

At UMUC, as at many other universities, the growing popularity and visibility of MOOCs—massively open online courses, for which students typically pay little or nothing and receive no course credit—has led to renewed thinking about cost, price, and pedagogy. For now, UMUC is exploring how MOOCs might be used as part of a competency-based learning program, in which students are tested on and given credit for previous learning experience. This is a very different model from most online programs, including MOOCs, and UMUC is just beginning to think about how a full MOOC-driven, competency-based, degree program could be created.

Heading to the elevator after concluding a series of interviews, von Lehmen returns to the question of how well the online classroom can match the experience of face-to-face teaching and learning. Wearing his political philosopher’s hat, he muses about Aristotle’s view that the soul and the physical body cannot be separated. The implication, as few would deny, is that there are inevitably limits to the kind of learning experience students can have via the internet. “There’s something about the college experience of being together, at least for some part of the experience, that is really valuable.”

But he reiterates his view that a different qualitative experience need not mean different learning outcomes. And online classes don’t need to replace traditional courses in all cases to be used vastly more widely in blended instruction classes. This will happen, von Lehmen is confident, not only because of the need for cost-cutting in an era of budget austerity, but because technology is improving fast enough to offer compelling ways to meet the demands of new generations of digital natives.
UC Online

If UMUC’s history, size, and financial success make it something of an entrenched incumbent in the online education marketplace, the University of California’s online initiative, UC Online, is working hard to gain a toehold just within its own system. Launched with ambitious declarations in 2010, the online project has encountered numerous challenges in the ten-campus UC system, often regarded as the most prestigious public university system in the nation, but not necessarily one that is immediately hospitable to change.

The online program was given a high-visibility public introduction in 2010 by Christopher Edley, Jr., dean of the Boalt School of Law at the University of California, Berkeley. “Online education could become central to the University of California,” wrote Edley, a former Harvard Law School professor and Clinton administration official, in a San Francisco Chronicle op-ed. The university’s brick-and-mortar model is inadequate to UC’s future needs, he declared, citing the dire budget problems that then, as now, threaten the university’s excellence. Even if the budget gap could be eliminated, the university would remain unable to accommodate growing numbers of qualified students seeking educational opportunity.

Edley’s solution: an innovative pilot project creating twenty-five to forty online courses. Ensuring quality as good as that of on-campus classes would be imperative, he stressed, noting that the quality of the more than 1,000 online classes already offered by UC’s extension schools is mixed. Under the new program, the on-campus experience would be unaffected, while a whole new crop of tuition-paying UC-eligible students would have the opportunity for an academic experience from which they would otherwise be shut out, he contended. If the pilot succeeded, some might ultimately have the chance to earn a transferable associate’s degree. “Fully online undergraduate programs in selective institutions will happen,” Edley concluded. “The question is
when, and led by whom. The leadership should come from the world’s premier public university—which belongs to California.”

Two years later, UC Online is indeed moving ahead, but not exactly at a speed that suggests it will meet Edley’s goal of leading the nation, or even of improving access and lowering costs in the 222,000-student system, anytime soon. A number of factors have slowed progress. Faculty resistance, particularly professors’ anxiety about the quality of online classes that yield UC credit, has probably been the biggest stumbling block. A key personnel change didn’t help: The initiative’s champion at the university’s headquarters, Daniel Greenstein, vice provost for academic planning, programs, and coordination, recently left UC for a job running the Gates Foundation’s postsecondary success strategy.

Budget obstacles have been significant, too; leaders of the initiative initially promised to raise private funds to get the plan off the ground. When those funds didn’t materialize, they turned to Plan B—a $6.9 million interest-free loan from UC’s Office of the President. The loan, which is supposed to be repaid over seven years, comes “from a program that encourages system-wide efficiencies,” according to a university fact sheet. The publication goes on to note—as if to preempt criticism—that the university dollars being loaned to the online initiative could not otherwise be used for faculty salaries, student services, or ordinary academic programs. To bring in the dollars needed to service its loan, UC Online is resting its hopes on a plan to enroll not only UC students but also non-matriculated students. The former will pay nothing extra for online classes, but the latter will pay fees of $1,400 to $2,100 per four-unit class (each of which will bear academic credit). Any revenues beyond what is needed to cover instructional costs for non-UC students—which presumably will become lower and lower as course enrollment grows—will be used both to support the ongoing online program and to create a new revenue
stream for participating academic departments. The extra funds can be used by departments pretty much as they wish, which has huge appeal given California’s budget meltdown. Departments may want to use the revenues as reimbursement for faculty time devoted to developing and teaching the cyber-classes—presumably providing professors an additional incentive to participate in the program. The dollars might also be used to support lecturers and TAs, or to underwrite the costs of student instruction.

With its initial plan established, in the spring of 2012 UC Online offered six inaugural classes to student already enrolled at the university. They covered a range of subjects: Preparatory Calculus at UC Merced; Politics and Strategy at UCLA; Global Climate Change at UC Davis; Fresh Water Policy and Sustainable Water Engineering at UC Santa Cruz; Diversity, Disagreement, and Democracy at UCLA; and Art, Science, and Technology at UCLA. By the summer, the program began adding another nineteen classes which were set to start at different times over the following nine months, with still more courses in the development stages. The average cost for developing each course is in the mid-$50,000 range, according to Williams; some classes cost half that amount, while others are something less than double the figure. However, these numbers do not include what are presumably significant personnel costs, ranging from the time of instructional designers and administrators to builders of technology infrastructures.

The rationale behind the specific mixture of courses being offered, says Keith Williams, the new interim director of UC Online, is twofold. There will be a strong focus on offering high-enrollment “gateway” courses—the kind that appeal both to non-matriculating students as well as undergraduates already at the cash-strapped university, where students may have to wait a quarter or even a year to enroll in, say, a popular biological science class at UC Davis. “That’s
where we’re having trouble having enough slots—getting students in and not slowing their progress through the university,” says Williams, a veteran UC Davis lecturer who specializes in biomechanics. The initiative also includes some niche courses, such as dance history, to test how technology can be used creatively to teaching a range of subjects in unconventional ways.

The start-up is already facing a particularly significant barrier, however. While non-UC students will in principle be able to take online courses offered at any of the system’s campuses, the same will not be true of regularly enrolled UC students. All of the nearly 500 undergraduates who took the first six classes in 2012 were studying with instructors who teach at their home campuses. In other words, the initiative isn’t able to take advantage of one of the core characteristics of e-learning: reaching students without regard to time or location, so that a UC Santa Barbara sophomore facing a long wait for a key introductory econ class could instead take it at immediately from a professor at UC San Diego.

The problem with implementing cross-campus enrollment is threefold, Williams explains. First, there is disagreement about where the money for the expense of teaching each student should come from. Second, there are problems transferring data between UC Online and different campuses in the system; every campus registrar has a different registration system, which causes difficulties, among other things, with reporting requirements for student financial aid. Third, autonomous academic senate policies mean that a course from one campus isn’t automatically accepted toward academic major and degree requirements at another. All these bureaucratic difficulties notwithstanding, Williams says he is hopeful that the obstacles will be overcome by fall 2013. Registrars are amenable to creating more compatible data systems, he says, and campus leaders seem open to lowering credit transfer barriers. He also believes that
opening up classes to non-UC students will help create some of the infrastructure needed to ease cross-campus enrollment within the system.

For now, well-aware of the need to persuade professors that the new program has value ("the faculty is generally very skeptical," Williams says), UC is emphasizing that quality will be preserved by ensuring that each class is fully under the control of the faculty. "UC Online is faculty-driven," the UC web site’s FAQ emphasizes. "Participating faculty work hand-in-glove with instructional designers to create courses tailored exactly to what faculty members want to teach, and how they want to teach it. In other words, there will be no effort to impose a one-size-fits-all template on each course. "We’ve tried to let the faculty be the faculty," says Williams. Indeed, faculty governance at UC by definition puts the professoriate firmly in charge of admissions and curriculum. He contrasts this approach with the philosophy of most for-profits and extension programs (and, one could add, places like UMUC), which have a high degree of comfort with standardization in teaching and curriculum. Those institutions “have a box they want everybody to fit within,” Williams say. “We’re trying not to put faculty in a box.”

The result is a careful effort to create online classes in tandem with professors, deferring to their preferences while offering them technical and pedagogical assistance. Of course, not every professor passes muster in the first place. During the online project’s first phase, eighty applied to teach classes, of which thirty made the initial cut and twenty-two ultimately went forward with courses. Mary-Ellen Kreher, the recently hired director of online course design and development, observes would-be instructors with her team to assess their likelihood of succeeding in an online environment. Above all, they look for whether professors are engaging students. The most obvious example would be asking questions during lecture—“not just talk
talk talk,” says Kreher, who previously served as executive director of curriculum products at Kaplan Virtual Education.

Once faculty begin preparing a class, they’re offered the help of instructional designers. Some have declined assistance and struggled more than they expected, Williams explains, while many have found the entire process more time-consuming than they anticipated. That is little surprise given the huge number of options available to instructors. Modes of instruction include video segments (ranging from two to three minutes to as long as twenty to thirty minutes); images, animations, or text accompanied by the instructor’s narration; threaded discussion; a web tool called Piazza that lets students and instructors discuss and answer questions collaboratively; online office hours using AdobeConnect; weekly videos answering common student questions; interactive whiteboards that let students see the teacher writing and ask questions via audio and video; and in some cases videoconferencing, although UC officials have found that bandwidth limitations make it difficult to use video for more than a few students. Some classes are asynchronous, while others include real-time online office hours, large-group discussions and presentations, and small-group synchronous discussion sections. Williams is confident that this menu of options is only going to expand and improve: “Everything’s getting better. It’s better now than it was two years ago, and it will be better in two years.”

Instructional designers—the field is now growing so quickly that it’s possible to get a master’s degree in the subject—try to ensure that each professor designs a course that includes clear learning objectives, well-articulated sequences of instruction designed to meet those objectives, and assessments that cover what students have learned. Along the way, like their counterparts at UMUC, course designers at UC Online emphasize the need to engage students in three ways: with the course content, with the professor, and with other students. Cognitive
research shows that people retain 10 percent of what they hear, 20 percent of what they see, and 30 percent of what they both see and hear, Kreher says. For this reason, she believes the multimedia techniques available in UC Online courses, such as chat rooms using both audio and video, are most effective with students, particularly when they are active participants. “The highest level of learning is about the doing—the more you are engaged, that is when the most deep “ah-hahs’ come,” she says.

How will the emerging new world of MOOCs affect UC Online’s nascent efforts? Williams draws numerous contrasts between the initiative he heads and the newcomers that have attracted huge attention over the past year. New MOOC ventures include MITx and a related entity, edX, a not-for-profit Harvard-MIT collaboration recently joined by UC Berkeley; Coursera, created by a consortium initially consisting of Princeton, Stanford, Michigan, and the University of Pennsylvania, then expanded to twelve other universities; and a newly announced effort by the University of Georgia’s Center for 21st Century Universities. While all these courses are free, all involve automated delivery and testing with little or no personalized instructor feedback, Williams points out. They may work well for students who can work well independently, and they’re an importing proving ground for elite universities to demonstrate that they can deliver effective online classes. But he contends that they don’t offer the rich learning experience available through UC Online courses.

He ticks off the contrasts: UC Online courses use “innovative delivery modes” that emphasize student-instructor, student-student, and student-content interaction, both synchronous and asynchronous, with discussions, instructor assistance, and feedback on assignments. All, he says, “maximize the intellectual benefits of a course,” which makes UC classes the right fit for students who wants this kind of interaction. There is also the glaring distinction that, for now,
gives traditional online programs a decisive advantage over the MOOCs: course credit: “Credit is much more useful as an educational achievement by current standards than a certificate.” That’s hard to deny in today’s educational pecking order, but of course it remains to be seen whether MOOCs will usher in new forms of credentialing and career preparation that could require initiatives like UC Online to rethink, or augment, their current approach.

For now, assessing which teaching technologies are most effective is a priority for the UC initiative—an effort to build continuous improvement into its structure. John Yun, director of the UC Educational Evaluation Center at UC Santa Barbara, is leading the effort, which UC contends will involve “a degree of assessment unequalled in the offline environment.” To help make that happen, UC is monitoring students’ academic results and also surveying them to find out which online experience they find most appealing. It also wants to use much more information about students’ online interactions. Some current tools, such as AdobeConnect and Piazza, provide information on student participation in online discussions. But UC would like vastly more information, which will gradually become available as the modest capabilities of its learning management system, CoLE (Common Learning Environment), become increasingly sophisticated. “Eventually we hope to have the ability to track what students did when on a web page, what videos they watched and how many times, how much time they spent on different sections of a unit or activity, how well they scored on non-graded embedded quizzed, problems, activities, etc,” says Williams.

Concerted efforts to measure and improve the quality of the student learning experience are crucial to making this initiative a success. But it is striking, and somewhat dismaying, that the goal of lowering costs in order to expand educational resources in a time of financial constraints, a key motivation behind the project, no longer seems front and center. The UC
Online team is focused heavily on course development, quality of instruction, and navigating bureaucratic and political obstacles (even the idea once floated by Edley of a two-year associate’s degree is now off the table). This doesn’t mean that increasing revenues is unimportant to the project, of course—the strategy of focusing on non-UC students is designed not just to serve more students but to bring in enough money to fund the program. Thus, prospects for cost-savings may improve in the mid- to long-term. Moreover, as more students enroll both inside and outside the UC system there should be economies of scale that will free up resources for other uses. Moving beyond limits of physical classroom capacity and geographical location is a crucial factor, of course. So is faculty time. Having created an online class, a professor who no longer needs to spend three hours a week lecturing, and more time preparing, may be able to interact with students in other ways, or do research. “In that sense it’s a money-saver, because it expands what they’re able to do,” Williams says.

In the end, if the program can open up course access to many more students at modest marginal cost, it will have met one of the core purposes for which it was created. “Because we’re putting people in virtual seats, we can save money on real seats,” Williams says. Experience so far suggests that it may not be easy to expand and institutionalize even a high-quality program at a wary institution, all the more so in the age of MOOCs –several free courses are now offered at UC Berkeley and UC San Francisco. Nevertheless, UC Online offers a precious commodity—credit from an elite public university—and the initiative’s rocky start doesn’t necessarily mean its goals are out of reach.
Udacity

If scale is the key to cutting costs in higher education, the growing new world of MOOCs would seem to hold particularly great promise for bringing certain kinds of education to the masses. MOOCs, which offer class content and access to great professors, but without traditional credentialing, have been around for some time. But they have attracted intense interest in 2011 and 2012 with the launch of Coursera, edX, and similar initiatives. One of the highest profile ventures is Udacity, whose founding narrative has become emblematic of the possibilities MOOCs hold for changing how people think about college.

The story of Udacity, by now well-known, starts with two cutting-edge computer scientists, Sebastian Thrun and Peter Norvig. The duo, who hold high-profile positions with Stanford and Google, had started teaching Stanford’s introductory computer science class several years ago. In 2011, they decided to teach the class online, free, to students around the world. Despite minimal publicity, more than 160,000 students from 190 countries signed up to watch video lectures, take multiple-choice quizzes and exams, and participate in virtual office hours. There were more students from Lithuania signed up for the class, its creators like to point out, than there are students enrolled at Stanford.

Some 23,000 students made it to the final exam, with around 250 earning perfect scores. No student earned Stanford credit, and the university insisted that its name appear nowhere on the certificates of accomplishment students received for successfully completing the class. Strikingly, the class proved appealing not just to the masses of far-flung students who enrolled, but to Stanford students themselves. By the time the class was over, just thirty of the 200 who were taking the course in person were still showing up for flesh-and-blood lectures.
Not long afterwards, in early 2012, Thrun declared that he would no longer teach at Stanford (though he maintains a research affiliation). Instead, he announced that he was founding Udacity to spread the kind of learning experience he and Norvig had piloted in their intro Artificial Intelligence class. The for-profit company is an outgrowth of KnowLabs, a firm he had created the previous year with two colleagues. One is David Stavens, co-creator with Thrun and others of “Stanley,” Stanford’s driverless car, the precursor to Google’s self-driving vehicle. The other is Mike Sokolsky, a Stanford robotics researcher. In a massive show of ambition—some would say hubris—Thrun announced the new venture in an oft-quoted statement at a January 2012 conference in Germany. “Having done this, I can’t teach at Stanford again. I feel like there’s a red pill and a blue pill, and you can take the blue pill and go back to your classroom and lecture your twenty students. But I’ve taken the red pill, and I’ve seen Wonderland.”

For now, Wonderland is very much a work in progress. Udacity’s small Palo Alto offices, at the corner of El Camino Real and South California Avenue, are barely marked—the only exterior signage is for the company’s ground-floor neighbor, the Provident Credit Union. Inside, the look is classic Silicon Valley startup. There are a dozen or so 20-somethings, their bikes, an open floor plan, white boards, and many computers. With five million dollars in venture funding provided by Charles River Associates, plus $300,000 from Thrun himself (entrepreneur and author Steve Blank later put in $200,000) the company began by offering just two courses. Thrun taught a class on how to program a robotic car, while University of Virginia professor Dave Evans taught another on how to build a search engine.

Since then, nine more classes have been added, bringing the total to eleven. Most cover computer science topics, but classes in physics and statistics have also been introduced. All lend themselves to the automated (and inexpensive) computer grading that has so far been one of
Udacity’s defining characteristics. But a couple of classes on how to start a business, a topic that has the hallmarks of a bridge between the purely quantitative academic world and more mainstream offerings, will soon follow, according to Stavens, now Udacity’s president and chief operating officer. Over time, he says, a broader menu of course offerings is likely. “We aspire to innovate in education,” he says, “which means we have to teach everything eventually.”

Udacity’s classes thus far are marked by a stripped-down aesthetic inspired in part by the Khan Academy. As Steven Leckart recounts in his authoritative Wired magazine account of Udacity’s founding, course videos feature close-ups of instructors speaking to the camera, followed by shots (taken by an overhead camera) that show their hands writing out diagrams and explanations on a tablet, with an accompanying voiceover explaining the material. As with most of the new generation of online courses, videos are broken into short segments, with questions interspersed that students can answer directly via their browsers.

Despite the lack of traditional personalization, or even high-touch online instruction—MOOCs by their nature are a far cry from a 30-student UMUC class—Udacity leaders argue that there are pedagogical advantages to online instruction even in a mass format. While traditional lectures can certainly include live interaction, says Dave Evans, who has now taken a leave from UVA to become Udacity’s vice president of education, students who aren’t quick to answer a professor’s question can be marginalized. “One of the huge advantages of the online format is that every student gets the chance to answer the question. They can have as much time as they need—they can go back and watch the lecture segment if they don’t get it.” In conventional lecture settings, professors tend to overestimate how much students are able to learn by osmosis, adds Evans, rather than through actively tackling things like short programming exercises. “What students really learn from is by doing things and solving problems on their own.” In a sense,
then, even with a vastly larger class, “you’re getting a much more personalized experience,” he contends.

A related advantage, notes Stavens, is that constant small quizzes within each class unit, graded by computer, give instructors the kind of immediate feedback that is typically lacking in university classes. Where Thrun might lecture in a Stanford classroom for weeks without having a sense until the midterm of what topics students were or were not understanding, ongoing student feedback lets Udacity instructors know that 90 percent of students got a question on probability right, while just 40 percent correctly answered a question on SLAM (simultaneous localization and mapping). In the latter case, “that probably means we missed a step explaining, or the question was too difficult,” he says. Eventually, Udacity may develop adaptive learning that uses student responses to provide follow-up questions and exercises based on their individual strengths and weaknesses.

As the company begins to grow, it must not only expand course offerings but recruit faculty who can create high-quality classes. Picking new professors must be done carefully even for those with a proven track record in conventional classrooms. The advent of mass online classes, Stavens suggests, is analogous to the beginning of the movie industry in the early twentieth century. “Not all actors who are talented on the stage will be talented on the screen. Not all professors who are great lecturers in the classroom will be great online.” Candidates whose teaching seems most promising are flown to Palo Alto to be videotaped and vetted by Thrun, Stavens, and Evans to see whether they offer the right mixture of charisma and pedagogical skills. A large percentage are rejected. Those who do become Udacity instructors don’t become wealthy: professors are paid from $5,000 to $10,000 per class.
The attention paid to teaching at Udacity contrasts starkly with Evans’s experience at UVA. Like most major research universities, it hires faculty based on their research accomplishments. The closest proxy for teaching is the job talk required of all candidates. Faculty themselves often care about good teaching, “but it’s not an institutional priority,” he says, with little more than a half-day orientation for new hires. At Udacity, where recruiting and curriculum development are Evans’s main responsibilities, professors are required to prepare assiduously for their videotaped lectures. This requires putting together a script that spells out each step of a lecture, including exact quiz questions, in much more detail than the outlined lecture notes that many professors at traditional institutions use. “We find that when people try to do a recording without that, it doesn’t go very well.”

Paradoxically, the need to keep students engaged is greater in a free class than in a conventional university course, according to Evans. Professors at traditional institutions try to make their classes interesting, but many students are enrolled because the courses are required. At Udacity, nobody has to be there. “Students can leave—they have all the temptation of the internet a mouse click away,” Evans says. That means motivating students with well-designed classes is crucial. After a faculty lecture has been taped, significant time and energy are devoted to video editing in order to create a watchable finished product.

During the preparation period, and once a class is underway, professors get help with class development, grading, and interacting with students from assistant instructors, who function much like traditional university teaching assistants, although they are full-time employees and not graduate students. Students also get a considerable amount of assistance from one another: many participate in online course forums and often provide prompt, accurate
answers to each other’s questions. Eventually, Stavens suggest, Udacity may promote local meet-ups where students can study together in person.

Udacity’s financial model, like every other part of the venture, is very much a work in progress. Stavens estimates that the company spends around five dollars per student per class, a figure he believes will drop still further as course scale increases. By comparison, he calculates, Stanford charges each student approximately $3,000 per class. “Yes, we’re not accredited,” he says. But for a student taking a Udacity class from a Stanford professor, sitting for the same final exam, proctored at one of the Pearson VUE global testing centers with which Udacity recently partnered, all at a cost vastly lower than at the elite university, “it seems like there’s a value proposition there.”

Udacity will have to compete for students with other MOOCs, of course. But Stavens maintains that he doesn’t see much of a threat from the likes of Coursera, which also had its origins at Stanford. “We respect the work Coursera is doing to improve education for students around the world,” he emails, before inserting a little MOOC trash talk: “Students tell us that Udacity classes and the Udacity experience is preferable to the Coursera experience.”

The costs to Udacity for producing its classes are fairly substantial, encompassing technology infrastructure, salaries for faculty and assistant instructors, and extensive video editing. But economies of scale—especially scale of the MOOC variety—has a way of putting those costs in perspective. “Our belief is that it’s okay and it’s necessary to put a lot of resources into developing a course, and that is amortized by having a large number of students,” Evans says. Marginal costs are further lowered, of course, for that usual reason that technology can replace labor: far less professorial preparation and lecture time is required once a class has been thoroughly prepared and fine-tuned.
To become self-sustaining and even profitable—though the latter goal does not seem to be a huge preoccupation in the company’s start-up phase—Udacity will need a business model that provides a reliable stream of revenue that comes either directly or indirectly from its hundreds of thousands of students. In addition to charging students modest fees to have their classroom performance officially certified (and given greater credibility) via one of the Pearson VUE testing centers, it may charge employers for introductions to Udacity’s best students. These well-trained alumni are likely to be a valued commodity in markets where employees with excellent programming skills are much sought after. “We know some real rock stars who are as good as Stanford’s best people,” Stavens says.

In the end, this post-accreditation vision has much more far-reaching implications for lowering costs than efforts such as UMUC’s or UC Online’s. When free or low-cost online courses, particularly those offering practical skills, bypass traditional institutions and provide students with credentials that have value in the labor market, conventional notions of selectivity and credentialing will in some cases be upended. “I love Stanford,” says Stavens, who earned a Ph.D. in computer science from the university. “But the idea that you can’t get a great credential in computer science unless you’re one of the few people they admit and who can pay $60,000….Our classes show that there are talented people in Mongolia.”

MOOCs have plenty of challenges and limitations of their own, of course. Even as they begin adding a richer variety of courses, they are in many cases likely to be a supplement or alternative to traditional higher education, not a replacement. With no near-term prospects for offering full degrees, places like Udacity may find their niche in specialized certificates combining a range of high-demand courses in, say, cryptology. This isn’t what everybody wants—but initial experience has already shown that it’s appealing to huge number of people. “I
totally agree that it’s not a replacement for the traditional university experience,” says Evans. “But there are millions and millions of people who don’t have access to that—and that’s where the real opportunities are.” Particularly when the price is right.

Conclusion

Generalizations are difficult when describing today’s online education landscape. The models offered by UMUC, UC Online, and Udacity illustrate just three of many possible approaches to course creation and delivery in a fast-expanding education marketplace. UMUC offers a fully accredited online degree; UC Online is developing online classes on a piecemeal basis with no fully online credential in sight; and Udacity is breaking new ground with unaccredited, specialized classes whose ultimate shape and value are still very much to be determined. What the three have in common is earnest attention to quality—from the length and form of videotaped lectures to the importance of instructor feedback to fostering student engagement of the kind that is increasingly recognized as crucial to a successful learning experience. They are also carefully attuned to creating cost structures over time that take advantage of the economies of scale made possible by technology.

Still, finding the sweet spot at the intersection of quality, scale, and cost is not easy. These and numerous other ventures, whether within traditional colleges or as freestanding initiatives, face continuing scrutiny about the legitimacy of the educational experience they offer. They are exploring the possibilities and limitations of their own work through constant trial and error. University-based programs, MOOCs, and fast-growing for-profits are all grappling with political and regulatory headaches, the need to make tradeoffs between personal attention and scale, and the quest for respectability.
It goes without saying that it is too soon to know how today’s explosion of online initiatives will shake out. But it is noteworthy that online classes, despite the challenges they face, are rapidly losing some of the novelty and stigma once attached to them. Almost one in three college students is taking at least one online class, according to the Sloan Consortium. Whether through hybrid classes, fully online degrees, mass-access ventures, adaptive learning modules, or as-yet-invented technologies, it seems hard to believe that this phenomenon will not continue to spread. Already, there are promising signs that high-quality classes can be offered to growing numbers of students at modest cost. Such classes won’t solve every problem facing U.S. higher education. But developing more of them—many more—is a goal well-worth pursuing.