**Ubiquity Symposium**

# MOOCs and Technology to Advance Learning and Learning Research

## Can MOOCs Help Reduce College Tuition?

***by Stephen Ruth***

### Editor's Introduction

*This article will briefly describe some of the cost issues associated with MOOCs and suggest a perspective through which drastic tuition savings might someday be achieved, possibly through the assistance of MOOCs.*

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## Can MOOCs Help Reduce College Tuition?

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After several decades of continuous e-learning growth in postsecondary education, to the point where a third of all college students are now taking at least one for-credit course online, it would seem that the answer to the return on investment question—the technology/tuition link—would be at hand. But the cost of a college degree continues to rise at twice the rate of inflation annually, as it has for decades. The aggregate cost of postsecondary education is now nearly $500 billion, about a third of which is subsidized by state and federal appropriations. Student loan debt now stands at more than $1 trillion, more than total credit card debt.

At first glance MOOCs would appear to be the ideal vehicle for reducing tuition, since they can potentially increase the number of students attending the same course by several orders of magnitude. Especially since the supply of tenured faculty is decreasing—now only about one fourth of college instructors are tenure or tenure track—the cost displacement possibilities of MOOCs might seem welcome. But translating the potential savings advantages of MOOC—being able to reach tens of thousands instead of dozens of students with the same professor—has been difficult.

### Examples of MOOC Cost Models

MOOCs can be classified in many different cost and performance categories. A do-it-yourself MOOC can be relatively inexpensive yet still offer low overhead and high production values, as in the case of the popular Marginal Revolution University site at George Mason University, which offers dozens of illustrated lectures on focused bodies of knowledge [1].

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Several estimates indicate the lower end cost of a single MOOC is in the range of $50,000 plus the originating professor's expenses [2]. Most current MOOC deployments are not the home-grown variety, though. The major MOOC providers, Coursera, Udacity and edX, are migrating toward three significant revenue sources: specific college courses (initially "free" but gradually generating revenues, especially through certificate programs and tailored executive education); learning management systems (the "platform," which includes apps for enrollment, authentication, exams, reviews, interaction with instructors, etc.) ; and sharing expertise. While most of the specific courses are nominally free, except for small administrative charges, it appears that for-credit versions are gradually evolving into revenue producers. A decision by the Council on Higher Education to certify five Coursera MOOCs as eligible for college credit resulted in the establishment of modest users fees. The initial revenue stream from learning management systems and expertise is becoming clearer, too. For example, if an institution wants to prepare its own MOOC using edX—a well-funded partnership between Harvard and MIT—as an expert consultant, there is a base rate of $250,000 per course with an additional $50,000 for each time the course is offered again. The base rate includes expertise in applications, like enrollment management, test and quiz design, etc. This approach offers greater returns to the university if the course becomes very popular since 70 percent of the revenue could be retained by them, offsetting the initial costs relatively quickly. As an example, revenues to the institution could reach well over $10 million dollars for a three-credit course with 10,000 paying students, seemingly enough to make a dent in tuition costs and still cover edX's MOOC-related fees plus additional institutional overhead. Another edX cost strategy, the "university self-service model," permits an university to use the edX platform at no cost, but edX receives a part of the revenue generated from the course. For this option edX does not assist in the production process and does not place the final course in the edX catalog until it meets quality control standards. Once the course is actually placed on the edX website, the company collects the first $50,000 generated and also receives $10,000 for each recurring course [3].

**Coursera's Outreach**

Coursera, the MOOC developer with the most extensive deployment results to date, has formal agreements already signed with more than 80 universities worldwide, including many top-tier institutions. Coursera acts as a provider of individualized MOOCs, a facilitator or consultant of various learning management system improvements, or assists with integrated on line course delivery approaches by consortia of universities. Recently Coursera joined SUNY's ambitious program to add 100,000 new online students. SUNY comprises 64 campuses, 88,000 teachers

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and almost a half million students throughout the state of New York. Coursera's role would vary with each institution, from basic advising to full-scale integration of for-credit MOOCs. SUNY's is the largest state online system, and Coursera recently added additional partners with an aggregate student population of 1.2 million, including, among others, the University of Kentucky and West Virginia University, and. Also included are the statewide systems for the University of Colorado, the University of Georgia, the University of Houston, the University of Nebraska, the University of New Mexico, and the University of Tennessee.

As with the SUNY arrangement, the range of support will vary. Tennessee's initial focus, for example, would be on producing normal courses with no expected increase in student enrollment, with the option to ramp up Coursera's participation, as needed. The company would get $25 per student plus a fee of $3,000 to use the Coursera learning platform. The state would budget about $50,000 for each course's development [4]. Incidentally, these new deals with state universities are reminders that Coursera, edX, and Udacity may eventually be competing directly with Blackboard and Desire2Learn in learning management systems as well as with EMBAnetCompass, Deltek, 2U, Bisk and others, for a share of the course integration market.

**The Georgia Tech/Udacity Case**

So far, few of the announcements of new e-learning partnerships specifically promise significant tuition reductions, but a new agreement between Udacity and Georgia Tech University may represent a ground-breaking innovation that could actually lower tuition. Udacity and the Georgia Tech computer science department have been joined by AT&T in a consortium that aims to deliver a Georgia Tech master's degree in computer science for about $7000, about one third of the in-state cost for this degree when delivered in face-to–face mode. This kind of partnership may have very interesting ramifications since it is aimed at a large user base, about 10,000 students, and also requires significant modification of some of the traditional roles of various higher education actors. For example, graduate students, long the providers of relatively low unit cost teaching, would be partially replaced by specialists who are more permanent and also are more conversant with the specifics of the course material. The plan also gives entrepreneurial professors a bonus for originating a course, which could lead to considerable cash flow for Udacity and become a very substantial funding stream for the offering department as well as the institution itself. AT&T's role would be one of assisting and also gaining insights for its other business areas from this novel approach. Of course, the major beneficiaries would be 10,000 students who would be able to gain a reputable computer

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science master's degree for a fraction of its normal cost. The revenue stream is quite precarious, since it would require three years before Georgia Tech began to see any substantial black ink [5]. The program began in early 2014 and had twice the normal number of applicants.

**MOOCs and NCAT**

While the financial models for MOOCs are not yet clearly defined, the course redesign paradigm pioneered by the National Center for Academic Transformation (NCAT) has been widely reported. With broad support from groups like the Sloan Foundation, the Bill and Melinda Gates Foundation, and many others, there is a decade-long history of successful implementations.

NCAT's approach is relatively simple, and already is in use in more than 100 institutions of higher education. It involves selecting some of the most frequently taught college courses, the ones that may have a dozen or more sections, and improving them through significant redesign, including the development of a master course with significant ICT interventions. NCAT's results have been fascinating—if underpublicized—generally yielding improved learning (higher test scores), higher student satisfaction ratings, and average per-course dollar savings in the range of 20 to 30 percent over the traditionally taught version. It has been estimated that savings in the billions per year might be possible if the NCAT approach were broadly utilized, that is, increasing coverage to thousands instead of barely a hundred institutions [6]. And if MOOCs were combined with NCAT's proven redesign strategy, considerable additional savings might be attainable, for several reasons:

1. MOOC segments could be interspersed with various course redesign strategies;
2. MOOC learning management systems, one of their most significant selling points, could facilitate the course redesign system-wide, instead of being limited to the individual department or school;
3. MOOC data-gathering capabilities facilitate improvements in subsequent redesign efforts, extending the value of the improved course across other institutions.

As mentioned, NCAT's approach to reduce unit costs and improve academic performance has only been adopted by a relatively small number of institutions, possibly because its primary cost offset is reductions in teaching and administrative personnel, not a popular outcome [7].

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**Limitations of MOOCs**

Many of the MOOC visionaries, like Coursera cofounder Daphne Kohler, and Anant Agarwal, edX's president, have articulated a long-term vision of MOOCs reaching vast numbers of people. (edX in its early descriptive material suggested that it might be possible someday to reach a billion learners.) This is a noble vision and a significant public policy issue. But many of the early MOOC successes have been achieved by students with significantly higher than average entering credentials. An MIT study reported that for edX's first MOOC, "Circuits and Electronics" (6.002x), almost two-thirds of its enrolled students already had at least one college degree [8].

And a recently released study by University of Pennsylvania covering 32 Penn MOOCs offered by Coursera found the student population was characterized by already having a job and already being well-educated, Incidentally, in this study the recurring gender bias found in MOOC instructors as well as students was evident, with considerably more male than female participation. The students reported their primary motivation for taking the MOOCs was advancing in their employment and satisfying curiosity, not gaining college credit [9].

Another concern is that for many students additional instruction will probably be needed before enrolling in a MOOC. If for-credit MOOCs are to be successful with the average four-year or community college student, significant modifications may be necessary. Extensive remedial training will be appropriate for some categories of students to be MOOC-ready. Community college studies already indicate a significant expense required to raise some learners to the ability to successfully complete any course online, let alone a complex, difficult MOOC. And to extend MOOCs to developing nations would clearly involve serious problems of readiness and culture, not to mention language and technology. None of these factors suggest that MOOCs cannot be circulated widely beyond the boundaries of current university practice, but it is clear that serious additional cost is involved, with learning outcomes unpredictable.

And there is another fundamental issue, transferring credit to another institution for, say, a Sociology 101 course. Who gets the revenues? So far it appears that an import/export process would be operative. For approved for-credit courses, the exporting MOOC owner/exporter receives a fee paid by the importer [10]. But since most universities will be net importers, it's possible to visualize a serious debate about the size of that fee.

A related challenge is MOOCs currently have notoriously high dropout rates, in the range of 90 percent or more. As the co-founder of Udacity, Sebastian Thrun, commented: "A medium

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where only self-motivated, Web-savvy people sign up, and the success rate is 10 percent, doesn't strike me quite yet as a solution to the problems of higher education" [11].

Since up to now MOOCs have been mostly free, a course participant has little pressure for completion, and no penalty. This issue may eventually recede in importance since persons who are seriously pursuing college credit, and who have to pay for the online experience, will probably be far less likely to drop out.

**University Governance. Another Potential Barrier?**

Surprisingly perhaps, the ultimate financial success of MOOCs may not depend on learning management systems, technology deployment, or cost diffusion models. It could hinge on one of the most unpredictable factors in the Academy—university governance. A major player in MOOC deployment at individual institutions so far has been a group that is are not traditionally associated with headlines about technology: university boards of trustees, faculty senates, and faculty departments. For example, in the case of the Georgia Tech and Udacity deal approval from the board and the faculty senate, in addition to the computer science faculty, was required. But faculty groups at San Jose State, Amherst, American University, Harvard, and many other institutions have either succeeded in curtailing MOOC deployment or at least publicly expressing concern about proposed plans. The reasons for this skepticism on the part of instructional staff are complicated. Many MOOC opponents have criticized their low completion rates and the inability to exactly replicate the face-to-face discussions in a traditional classroom. And a looming concern for tenured and tenure-track faculty might be the possibility that MOOCs could displace some of their numbers, which have been going down for a long time. The AAUP estimates that of the 1.4 million instructional faculty at colleges and universities, 25 percent are tenure or tenure track, 42 percent are part-time, 18 percent are graduate students, and 15 percent are non-tenure-track faculty [12].

A recent case at San Jose State seems to vindicate some faculty criticism of MOOCs. Three highly touted Udacity-originated MOOC courses were set up for undergraduates and high-achieving high-school students. The results were significantly inferior when compared with the face-to-face experience. The failure of this highly touted experiment has caused several institutions of higher education to be a bit more wary of MOOCs, at least in the near term [13].

**Where the Money is Going**

With more than $100 million already in funding, the major MOOC producers seem to have a sizable advantage over individual university e-learning practitioners. But there have recently

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been some very interesting developments in state university systems. More students are now eligible to register for undergraduate credit in a wide array of online courses given at all institutions within the state system. Most of these courses are traditional online offerings using learning management systems like Blackboard, Moodle, Sakai, etc. instead of the MOOC platform. Here are two examples.

Earlier this year a bill introduced in the California legislature aimed at stimulating broader use of MOOCs failed to win support, partly because of significant opposition from faculty unions and other faculty governance groups [14]. But by contrast, California State University, with 437,000 students, was given permission to initiate a program called Intrasystem Concurrent Enrollment. The program allows online learning through dozens of for-credit courses available throughout the CSU system for full-time students at any of their 23 campuses. These classes are mostly not MOOCs, but instead locally produced hybrid distance learning offerings [15].

Similar large-scale, non-MOOC-dependent deployments are taking place in Florida and other states, and, as mentioned earlier, in New York. The Florida case is the most recent, where the state not only mandated that a broad array of online, for-credit programs be available statewide, but that students matriculating in these courses receive a discount—currently 25 percent—from the normal tuition cost. Five online programs began in January 2014— business, criminology, environmental management, health education, and sports management—and more than 20 more are planned, aiming to achieve a breakeven point in the seventh year of implementation. These recent developments represent a clear signal that many institutions will be able to fend for themselves in online learning, not necessarily depending heavily on MOOCs [16].

**Summing it Up**

The major opportunity in the technology versus tuition balance may not be related to MOOCs at all, in spite of their potential for reducing unit costs. The NCAT data suggests significant tuition savings, possibly on the order of many billions of dollars per year, might be possible if institutions were willing to trade technology (combining MOOCs and NCAT course redesign, for example) for labor expense. Unfortunately, the inevitable offsets—instructors and administrators—would be a bitter pill to swallow, possibly leading to a reevaluation of the entire concept of the university as a place, and giving rise to more competency-based curricula like the Western Governors University and their many affiliates, like WGU-Indiana and WGU-Texas.

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From this perspective, MOOCs may turn out eventually to be one of several enabling technologies that could eventually lead to significant tuition savings, if combined with a realization that higher education's tuition cost spiral can only be reduced through reduction in unit labor costs. A university of the future might have dramatically fewer buildings and would depend heavily on other institutions for shared facilities like libraries, data processing support, registrar services, and many more. For now, MOOCs will continue to be controversial and, despite their significant financial support and publicity, may be destined for the role of an enabler but not a dominant force—one of many approaches that will eventually allow the beleaguered tuition payer to see some reductions in the cost of college.

**References**

[1] Rivard, R. Tip of the Iceberg. *Inside Higher Education*. June 12, 2013.

[2] Popp, T. MOOC U. *The Pennsylvania Gazette* 111, 4 (2013). Last modified March 3, 2013.

[3] Kolowich, S. How EdX Plans to Earn, and Share, Revenue From Its Free Online Courses. *Chronicle of Higher Education.* February 21, 2013.

[4] Rivard, R. State Systems Go MOOC. *Inside Higher Ed*. May 30, 2013.

[5] Rivard, R. The Fine Print. *Inside Higher Ed.* May 28, 2013.

[6] Ruth, S. Can MOOC's and Existing E-Learning Paradigms Help Reduce College Costs? *International Journal of Technology in Teaching and Learning* 8, 1 (2012), 21-32.

[7] Twigg, C. Academic Productivity: Decisions, decisions, decisions. *NCAT The Learning Market* Space. April 2013. National Center for Academic Transformation.

[8] Breslow, L., Pritchard, D. E., DeBoer, J., Stump, G. S., Ho, A. D., and Seaton, D. T. Studying Learning in the Worldwide Classroom Research into edX's First MOOC. *Research and Practice in Assessment* 8, 19 (2013), 13-25.

[9] Christensen, G., Steinmetz, A., Alcorn, B., Bennett, A., Woods, D., and Emanuel, E. J. The MOOC Phenomenon: Who Takes Massive Open Online Courses and Why? November 6, 2013. Available at SSRN: http://ssrn.com/abstract=2350964.

[10] Ruth, S. The Import/Export Paradigm for High-Quality College Courses an Answer to Tuitions Through-the-Roof Cost Spiral? *IEEE Internet Computing* 16, 2 (2012).

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[11] Kolowich, S. The MOOC 'Revolution" May Not Be as disruptive as Some Had Imagined. *Chronicle of Higher Education* August 8, 2013.

[12] Thornton, S. and Curtis, J. *A Very Slow Recovery –The Annual Report of the Economic State of the Profession, 2011-2012. Academe* 98, 2 (March-April 2012).

[13] Lewin, T. After Setbacks, Online Courses Are Rethought. *New York Times*, December 11, 2013.

[14] Kolowich, S. California Puts MOOC Bill on Ice. *Inside Higher Ed*. August 1, 2013.

[15] CourseMatch. Cross Campus Enrollment. The California State University.

[16] Biemiller, L. U. of Florida Online Bachelor's Programs Win State Approval. *Chronicle of Higher Education*. September 29, 2013

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**DOI:** 10.1145/2591685

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