Provost's Faculty Advisory Committee on Online Learning

Report

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COLUMBIA UNIVERSITY
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Report of the Provost's Faculty Advisory Committee on Online Learning

"Improvement in post-secondary education will require converting teaching from a solo sport to a community based research activity."

- Herbert Simon, Nobel Laureate

1. Introduction

The Provost convened the Provost's Faculty Advisory Committee on Online Learning (PFACOL) in early 2013 with the expectation that it would "play a key advisory role in shaping the University's future strategy in online and digital learning," according to the Committee's charge. "Columbia has developed pioneering programs and initiatives in this field over many years, based mainly in its various departments and schools. These school-based activities have now matured to the point where each of them, and the University as a whole, would benefit from a higher level of institutional focus and coordination. In other words, what we need now is an integrating vision and a strategic plan. The committee's charge is therefore to examine where Columbia is now and what it needs to be doing over the next five to ten years to retain and enhance its leadership in teaching and learning in light of rapidly evolving new technologies and the discoveries of the learning sciences."

The Committee was appointed in early 2013 and met throughout 2013 and 2014, with the pace of work quickening in the spring of 2014. In its initial phase of collecting information and ideas, the committee invited thought leaders in online learning from throughout the country to share their insights with us in a series of public forums. The committee also made itself familiar with online and digital initiatives and programs already underway throughout the institution.[1]

In the course of our discussions, the committee came to the conviction that the University's evolving strategy in online and digital education should be guided by three strategic principles. These are:

(1) First, our primary commitment is and should continue to be to provide educational opportunities of the highest quality to students who meet our admissions standards and enroll in our degree programs. Other goals, such as fulfilling our service mission or revenue enhancement, while desirable, should not displace this strategic priority, but complement it. Moreover, the University's top priority should be to focus not just on the new digital technologies themselves, but on how they can best serve the larger goal of a continuously improving teaching and learning environment throughout the University.

(2) Second, our principal goals in developing a University-wide strategy in this field should be to increase support and recognition for innovation in online and digital teaching and learning; facilitate communication about best practices, technological developments, and new

[1] A list of committee members can be found in Appendix A.

discoveries in the learning sciences; realize economies of scale and coordination through voluntary cooperation in licensing, procurement, and shared facilities; and maintain and upgrade as needed Columbia's current flexible regulatory policies.

(3) Third, our most valuable resources in the efforts we undertake to offer education of the highest quality, whether online or in-class, are the time, talent and creativity of our faculty. To ensure that our students are the best educated in the world requires that we do all we can to empower our faculty to take full advantage not only of the most advanced technologies, but also of the insights and discoveries of the learning sciences; advances in this field should be widely and effectively disseminated to all those who teach our students.

Keeping these principles in mind, this report addresses a wide range of relevant issues and presents a series of recommendations to the Provost that suggest steps the University could take to enhance Columbia's leadership in teaching and learning. Our report begins by examining the history of distance education and its more recent online variant to assess its disruptive potential. Next, we analyze the varieties of online learning currently in use, from open, non-credit, minimally interactive MOOCs, to online degree programs and hybrid programs, to the use of "flipped classrooms" and other interactive online technologies for residential degree programs. We will suggest that the role each of these options plays in the development of an integrated University strategy should be responsive to a heretofore neglected but potentially crucial element in that strategy: the insights that can be drawn from the learning sciences to enhance the quality and effectiveness of instruction.

Then we turn to the question of institutional coordination by proposing a bold initiative – the creation of a Center for Teaching and Learning with a campus-wide mandate to improve teaching and learning throughout the University. We believe that more effective and coordinated deployment of existing infrastructure and human resources would make it possible for such a center to serve as a catalyst for innovation. We also propose the eventual creation of a related research center devoted to building capacity in the learning sciences.

Finally, we turn to the role of the faculty and the incentives, rewards, and regulatory environment – the "culture" – needed to protect the University while unleashing the creativity of its existing and future faculty.

2. Background and Context

Online learning has formed a significant part of the higher education landscape for many decades. In fall 2010, for example, 31% of US college students took at least one online course.[2] Fully online degree programs are also commonplace at both the undergraduate and graduate levels, including several masters' programs at Columbia (the scope of Columbia's current online programs is described in Section 4, as well as at the website: online.columbia.edu).

The term "online learning" covers an array of applications and approaches ranging from simple videotaped lectures to sophisticated online collaborative environments. Offerings also vary substantially in terms of instructor-student contact ranging from zero contact (e.g., Khan Academy)

[2] Bell, B.S. and Federman, J.E. (2013). E-learning in postsecondary education. *The Future of Children*, **23**, 1, 165-185. http://futureofchildren.org/futureofchildren/publications/docs/23_01_08.pdf

to extensive virtual face-face interaction (e.g. Minerva). We use the term "online learning" to refer to any activity that uses computer technology to enhance learning.

It is important to keep in mind that large-scale *distance* education has existed for many decades. In the first half of the 20th century, millions of Americans enrolled in correspondence courses as an alternative to formal study at colleges and universities.[3] Radio broadcasts of courses were commonplace in the 1920s and 1930s, followed in subsequent decades by television courses.[4] The United Kingdom's Open University has been offering fully certified college courses for credit over television since 1971.[5] From this perspective, one can view online learning as a natural progression in distance education.[6] Columbia's ill-fated experiment in distance education, called Fathom, which shuttered in 2003, was innovative in various ways but followed this pattern.

For the most part, however, distance education has used the traditional classroom as its model. Technology has served mainly to bring the classroom experience to students located too far away to attend "real" classes. What distinguishes the contemporary era, however, is the capacity of evolving technologies to enhance the classroom experience itself through more effective use of audio-visual materials, use of social media to communicate and engage, measurement of student learning in real time, and "flipped" classrooms, in which lectures are viewed by students *before class meetings* and class sessions are used for raising questions and discussion. A principal recommendation of this report is that Columbia create a new Center for Teaching and Learning (described in Section 9) to exploit these capabilities more fully.

The convergence of the digital revolution and rising costs in higher education has led to widespread speculation that the former might be a cure for the latter. Indeed, the cost of higher education in the United States has risen faster than the rate of inflation (and median income) for decades (though actual tuition costs to students who are eligible for financial aid at Columbia and many peer institutions have not increased for more than a decade due to financial aid enhancements).[7] The principal cause of rising costs is what Baumol and Bowen termed the "cost disease."[8] Universities face a highly competitive market for top talent, so wage increases are not likely to moderate.

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[3] Kett, Joseph F. (1996). Pursuit of Knowledge under Difficulties: From Self-Improvement to Adult Education in America. 1996. p. 236-238.

[4] Cuban, L. (1986). Teachers and Machines: The Classroom Use of Technology since 1920. New York: Teachers College Press.

[5] "History of the OU", http://www.open.ac.uk/about/main/the-ou-explained/history-the-ou

[6] http://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_edit_dec-2013.pdf

[7] Etchemendy, John and Wadhwa, Vivek. Five Myths about College Debt. Washington Post. Sep 24, 2013.

[8] Simply put, if technical progress elsewhere in the economy drives up wages, then a sector with little technical progress will see its price rise faster than the general rise in prices. If, in addition, the skill premium is rising, as it has been in the US, then the intense reliance of universities on skilled labor will lead the cost of education to rise all the more rapidly. See e.g. "The Cost Disease in Higher Education: Is Technology the Answer?" William G. Bowen, 2012. It is worth noting, of course, that the "cost disease" is not really a disease. Skilled labor is both the universities' input and its output, so that the same pressure raising the cost of an education simultaneously raises its value.

However, a widely held view, endorsed by many in government and the media, expresses the plausible hope that effective use of new technologies might make it possible for professors to teach larger numbers of students or students to acquire the same knowledge or skills in less time, thus slowing or even reversing the trend toward higher costs.

These hopes are not new. They can be found in abundance at the dawn of earlier technological revolutions in distance learning. Nonetheless, we cannot dismiss the hypothesis that "this time is different."

The big questions can be stated simply. Will online learning lead to an industrial revolution in higher education? Will it so dramatically reduce costs, raise quality, or both, that it will dramatically transform higher education? Under what conditions might it do so? Are those conditions likely to hold over any short or medium horizon? These are difficult questions and we don't pretend to answer them here. But the possibility of great change and the need for a thoughtful strategy in light of this possibility suggest the need for ongoing and highly focused attention to the questions.

The potentially disruptive impact of new digital technologies has caught the eye of numerous commentators. Online degree programs offered at much lower cost than residential programs could eventually challenge even the most prestigious residential programs, especially those that rely on a highly paid research faculty for teaching. The availability of online lectures offered at low cost to students at financially challenged colleges could push faculty hiring down, reducing costs and tuition charges and forcing competing institutions to mimic or close.

While institutions like Columbia, which offer residential programs of exceptional quality, would probably not suffer from this kind of competition directly, diminishing job opportunities for Ph.D. recipients could take a significant toll, reducing the number of doctoral students who play a vital role in both scientific research and teaching. We examine the potentially disruptive effects of the online revolution in greater depth in Appendix B.

3. The MOOC "Revolution"

The term Massive Open Online Course or MOOC first appeared in 2008 when a 25-person class at the University of Manitoba opened up to 1,500 online participants. The arrival of the venture-backed for-profit enterprises Coursera and Udacity and the non-profit edX two years ago dramatically accelerated the spread of MOOCs. Now hundreds of courses are available and these courses collectively enroll millions of students. Columbia faculty members have offered 14 courses on the Coursera platform that have attracted over 400,000 enrolled students, of which, over 40,000 have become active students in the courses.[9] By end of spring 2014, Columbia had given out over 12,000 statements-of-accomplishment to online students who have successfully completed one of these MOOCs.[10]

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[9] For a complete listing of Columbia's MOOCs and other online initiatives, see Appendix C and the website http://online.columbia.edu.

[10] The statistics pertain to the first 8 Columbia MOOCs. See, Michael J. Cennamo, "The First Year of MOOCs at Columbia University: 2013" (New York: Columbia Center for New Media Teaching and Learning, 2014)
http://ccnmtl.columbia.edu/dr/papers/First_Year_of_MOOCs_Columbia_University.pdf

MOOCs offer a self-paced model of instruction that allows students to advance as they learn the material. MOOC providers such as Coursera employ a mastery learning approach, offering students multiple attempts at quizzes until they pass with a perfect or close to perfect score. Students can also pause and replay video lectures, typically provided in chunks of six to ten minutes, long enough to maintain high student engagement. MOOC videos can be played more slowly or faster than normal speech.

Though millions of students have enrolled and hundreds of thousands have successfully completed MOOCs over the past three years, MOOCs do not offer the equivalent of in-class instruction. They provide minimal student-instructor interaction, so customization to individual students is usually not possible. Most MOOCs follow a traditional pedagogical model of lectures and quizzes. Few attempt to assess student understanding and adapt instruction accordingly and they typically provide no explicit concept of learning goals to guide course design. Finally, MOOC creation and delivery is resource intensive. Faculty report spending much more time on their MOOC lectures than on in-class lectures and production is costly. The University of Pennsylvania, for example, spends about $50,000 to create a basic no-frills MOOC[11].

While MOOCs have attracted considerable media attention, they represent just one dimension of a complex landscape of online learning. MOOCs generally emphasize video-recorded instructional clips coupled with basic online assessment and peer-to-peer communication. As MOOCs proliferate, however, the underlying educational technology continues to evolve and we fully expect MOOCs of the future to adopt more diverse educational strategies. We therefore see advantages to continuing to develop a modest number of MOOCs at Columbia. MOOCs provide faculty with opportunities to think deeply about pedagogy and generate much-needed attention to the University's core teaching mission. They generate unprecedented data about student learning experiences that instructors can use to improve teaching. They attract huge numbers of students, contribute to Columbia's reputation as a global university and may attract students to traditional Columbia programs.

At the same time, however, the Committee endorses the current practice of subjecting all Columbia MOOCs as well as all new for-credit online offerings to rigorous academic review by school-based Committees of Instruction -- the same process that governs all other courses offered at the University. We also recommend exploring the potential for collaboration in online initiatives with peer institutions. The economies of scale underlying online technologies do not lie at the level of the individual university. There may be benefits to exchanges and common efforts that could take the form of multi-institution working groups and conferences, joint development of materials for use in flipped classrooms, and even joint MOOC development. Our existing partnerships that provide instruction in less commonly taught languages[12] represent a potential model for such collaborations.

Finally, the committee considered whether Columbia should follow the example of some other institutions by providing Columbia course credit to students who successfully complete MOOCs offered by Columbia faculty through our MOOC partners Coursera and edX. While not wishing to foreclose a future move in this direction, the Committee believes that such a step would be

[11] http://www.mindingthecampus.com/originals/2013/09/what_do_moocs_cost.html
[12] http://www.lrc.columbia.edu/sci/

premature. Instead, we recommend that Columbia continue making MOOC "certificates of completion" available to students who successfully complete Columbia-based MOOCs. Such certificates are now commonly issued in exchange for a small fee (shared between the University and the host platform, as in the case of Coursera), but do not bear the name of the educational institution sponsoring the course.

4. Closed Online Degrees, Certificates, and Courses

Closed online courses, certificate programs, and even entire degree programs have existed at Columbia for many years. In the past two years, the number of such courses and programs has grown steadily.[13] The most ambitious of these initiatives are fully online degree and certificate programs. For example, the School of Social Work is now planning to launch an online version of its Masters in Social Work degree program, with online coursework supplemented by a one semester practicum in the New York metropolitan region. Similarly, the Mailman School of Public Health will launch two online Masters degree programs in 2015. Several departments in the Arts and Sciences, including Economics and Statistics, are preparing fully online MA programs to be launched in the near future. The School of Continuing Education already offers fully online certificate programs, soon to be supplemented by hybrid (partially online) MS degree programs. And SEAS has offered distance and fully online M.S. degree programs through its Columbia Video Network for over a decade and a half.

These initiatives share a number of characteristics, which the Committee endorses:

- Tuition and fees that mirror those charged in-residence students;
- High admission standards, comparable to in-residence programs in the graduate and professional schools;
- Rigorous course requirements, supervised by school Committees on Instruction;
- Online lectures by full-time Columbia faculty or adjunct faculty expert in the field;
- Course designs driven by learning goals;
- Interactive components that interrupt the lectures at intervals to insure comprehension via quizzes or other tools;
- Student interactions via chat groups and mutual help links;
- Online help provided by Columbia graduate students serving as teaching assistants.

The Committee believes these initiatives are valuable and should be encouraged so long as they maintain the high standards and rigor of existing Columbia degree and certificate programs. It recommends that the Provost's Office monitor and review these programs at regular intervals, as it currently does in the case of in-residence degree and certificate programs. The Committee also believes that schools should be free to offer stand alone for-credit courses that meet the criteria cited above to enable part-time students to pursue coursework that could eventually lead to certificates or degrees.

[13] For a catalog of these programs, see Appendix D.

5. Executive Education and Short Courses or Modules

A number of Columbia professional schools have modified their executive training programs to incorporate online components. In most cases, online materials such as lectures or case studies are provided in advance to students enrolled in short but intensive non-degree training programs. In some cases, however, executive training is offered entirely online. The Business School already offers a four-lecture, completely online training program on leadership, for example.

Some schools are developing short online courses or modules designed to insure that entering students arrive with a basic skill set, such as calculus or statistics. Some are also experimenting with online formats for non-degree programs of executive education, either by offering short courses entirely online or by "flipping" executive training programs, making some lectures and case study videos available online prior to classroom sessions.

The Committee believes that the University should encourage experiments with online executive programs as well as online "math camps" and similar preparatory modules. Such efforts are likely to develop as schools and even departments discover their utility even without targeted support from the University; but encouraging their development and sharing their lessons would also produce benefits to the larger community.

6. Hybrid or Blended Degree Programs

Though definitions vary, these terms generally refer to teaching strategies that "blend" online and in-class teaching. Hybrid degree programs are those that combine online instruction with short periods of in-residence instruction. Online and in-class components can be designed to optimize the learning experience offered by each format. A major advantage of hybrid degree programs is that they can be designed to reduce the in-residence time required for fulfilling degree requirements and are thus especially suitable for students in executive or part-time degree programs in which students are employed while they study. The School of Continuing Education is developing a number of hybrid MS programs, while the Business School and SIPA have developed hybrid executive degree programs.

The Committee believes such experiments, which make the benefits of Columbia professional degrees more broadly available without sacrificing standards or rigor, should be encouraged. They reach an underserved community of highly motivated and qualified professionals who would otherwise find it difficult to pursue advanced degrees due to geographic and scheduling barriers. Moreover, because of their personal motivation and the possibility of rapid reward in the workplace, this group would be ideal for testing new ideas and technologies and discovering the best ways to craft effective digital learning initiatives. This may help to explain, in part, why we see so much online educational activity and innovation in the professional schools, as with programs in Bioinformatics, Business, SEAS, SIPA, and Teachers College in addition to the School of Continuing Education.

We recommend that Columbia conduct an internal study of its existing master's programs, evaluating current and likely online competition, and exploring options for possible online and hybrid delivery formats, including possible use of the Columbia global centers.

7. Encouraging Flipped Classrooms

As we have stated above, the Committee believes that Columbia should encourage the development of online initiatives that enhance and improve the learning experience of students enrolled in Columbia's in-residence degree programs. We believe that targeted efforts to promote experimentation and innovation through flipping classrooms should be a key focus of these efforts. Flipped classrooms combine online and in-class components to complement each other and thus to enhance learning. Usually, lectures are made available online (rather than in large lecture halls) while in-class sessions are devoted to discussions, projects or exercises that explore and deepen understanding of the online content.

There is growing evidence among researchers in the learning sciences that this approach produces better learning outcomes.[14] For that reason, we recommend that the University encourage faculty to consider and evaluate opportunities to flip classrooms, especially in large-enrollment undergraduate lecture classes. To do so effectively will require serious engagement with insights drawn from the learning sciences and made available through a University-wide Center for Teaching and Learning.

8. Improving the Learning Experience at Columbia: Incorporating the Learning Sciences

The debate about the effectiveness of online learning has spawned a vast literature. The diversity of online learning approaches renders the question "does online learning work?" overly broad. Thousands of studies have evaluated a diverse array of online offerings. Such studies face considerable methodological challenges. A 2004 study by Bernard and colleagues,[15] for example, performed a meta-analysis of 232 studies, each of which attained a pre-specified level of rigor. The analysis showed no significant differences between online and classroom instruction in terms of overall achievement.

More recent meta-analyses provide similar findings,[16] although there is also a literature suggesting that online approaches may be less effective for certain student sub-populations.[17] This literature

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[14] For an overview of research, see Bishop, J. & Verleger, M. (2013). Flipped Classrooms: A Survey of the Research. Proceedings of the 120th Annual Conference of the American Society for Engineering Education.

[15] Bernard, R.M. et al. (2004). How does distance education compare with classroom instruction: a meta-analysis the empirical literature. *Review of Educational Research*, 74, 379.

[16] Traci Sitzmann et al. (2006). The Comparative Effectiveness of Web-Based and Classroom Instruction: A Meta-Analysis, Personnel Psychology 59, 623–64; Barbara Means et al. (2010). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies, report prepared for the U.S. Department of Education, Office of Planning, Evaluation, and Policy Development (Washington: U.S. Department of Education, September 2010; Figlio, D.N. et al. (2010). Is It Live or Is It Internet? Experimental Estimates of the Effects of Online Instruction on Student Learning. Working Paper 16089 (Cambridge, Mass.: National Bureau of Economic Research, June 2010).

[17] Jaggars, S. S., & Bailey, T. (2010). *Effectiveness of fully online courses for college students: Response to a Department of Education meta-analysis*. New York, NY: Teachers College, Columbia University.

does suggest, however, that well-designed combinations of online and in-class instruction are associated with improved learning and retention.[18]

Thus, the Committee believes that Columbia should be a leader in harnessing technology to improve the student learning experience by focusing on hybrid or blended programs of instruction, including flipped classrooms, along with increasingly effective use of online learning materials, student reaction and assessment measures, and social media to enhance collaborative student engagement. To move decisively in this direction will require concerted efforts to continue to promote a culture at Columbia that emphasizes student learning; values and rewards innovation and experimentation in technology-infused course design and pedagogy; emphasizes the use of technology as a learning tool, rather than a delivery mechanism; and augments student evaluations with more insightful methods, such as learning outcome-based assessment and the development of online teaching portfolios that can be deployed to maximum effect in classrooms throughout the University.

Many of the key findings from decades of research on how students learn have yet to permeate Columbia classrooms. We believe that our larger introductory classes should be able to make use of online tools to improve the student learning experience. In particular, Columbia should move as rapidly as feasible to expand active learning opportunities in the classroom. Gradual shifts in practice to include emerging pedagogical approaches could enrich the learning environment for all. Crucially, we need to use objective evidence to augment faculty intuitions about what works and what doesn't work in the classroom.

Adopting ideas from learning science can and should impact the way classes are taught, from simple re-sequencing of classroom activities to flipped classrooms, and even wholesale re-design based on empirically tested theories of learning. Experimentation should guide this activity and faculty incentives should encourage it. Teaching itself should become an object of research, ideally in collaboration with learning scientists and educational researchers more generally. In short, the Committee recommends that Columbia respond to the challenge of new online learning technologies not only to make classroom activities accessible via the internet, but also to challenge, re-assess and transform the classroom experience itself. This is the principal but not the only reason why the Committee recommends that Columbia establish a University-wide Center for Teaching and Learning.

Community College Research Center; Bell, B., & Federman, J. (2013). E-learning in postsecondary education in the United States. *The Future of Children. (23)*1,165-185.

[18] See, for example, Lovett, M., Meyer, O., & Thille, C. (2008). JIME-The open learning initiative: Measuring the effectiveness of the OLI statistics course in accelerating student learning. *Journal of Interactive Media in Education*, *2008*(1); P. S. Steif and A. Dollár. (2009). Study of Usage Patterns and Learning Gains in a Web-based Interactive Static Course. Journal of Engineering Education, 98, pp. 321-333; C. D. Schunn and M. Patchan. (2009). An evaluation of accelerated learning in the CMU Open Learning Initiative course 'Logic & Proofs'. Technical Report by Learning Research and Development Center, University of Pittsburgh; Barbara Means et al. (2010). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies, report prepared for the U.S. Department of Education, Office of Planning, Evaluation, and Policy Development (Washington: U.S. Department of Education, September 2010.

9. Creating a Center for Teaching and Learning at Columbia

It is now nearly twenty years since March 1995 when a Provost's Advisory Committee on a University Teaching Center, chaired by distinguished historian Richard Bushman (now emeritus) recommended the creation of a center at Columbia to "promote excellence in teaching, to facilitate innovation, and to enhance the synergy between the research and the teaching missions of the university." The committee labeled this "a crucial investment in the University's future," and noted that "nurturing a professional 'community of educational scholarship' is an important…aim of the teaching center."

Although that committee wrote at the dawn of the online era, it recognized even then the vital linkages between a center for teaching excellence and educational technologies: "The teaching center could play the role of monitor and advocate for classroom improvement and an agent for rational long-term planning rooted in academic rather than purely administrative or architectural thinking. Similar considerations apply to classrooms with advanced instructional technology."

Since that 1995 report, virtually all of Columbia's peer institutions have created such a center both to signal the importance of institutional commitments to excellence in teaching and learning and to back up that commitment by establishing a variety of successful programs of pedagogical support, new teacher orientation and training, outreach and mentorship, assessment and evaluation, and integration of new technologies into traditional as well as innovative curricular formats. In the absence of such a center at Columbia, various schools, departments, and administrative units have endeavored to fill in gaps, promote effective teaching, and experiment with digital technologies. (See Appendix D.) The result is a series of disconnected efforts of varying ambition and effectiveness; even when they are highly successful, their successes are not routinely communicated and adopted by others.

The lack of a University-wide center, in the words of Mark Phillipson, director of the local Teaching Center in the Graduate School of Arts and Sciences,

> has impoverished the teaching landscape at Columbia. New faculty joining the University, many of whom come with limited or idiosyncratic teaching experience, find no centralized training or support for their teaching. No program exists at Columbia that encourages instructors from across disciplines to observe and discuss peer teaching practices. Neither is there a structure in place for teaching consultations or other formative evaluations of classroom teaching practice…Teaching assistants are not required to undergo extensive training before they are entrusted with instructing Columbia students.

While some of these deficiencies have been addressed by schools and departments, often with positive results, this "decentralized model, however well it serves local needs, makes for an uneven and opaque teaching landscape across campus."

One highly-focused University-wide effort, however, does provide cutting-edge technical support for teachers throughout the University. The Columbia Center for New Media, Teaching, and Learning (CCNMTL) was created in 1999 and since that time has evolved into a significant

enterprise lodged administratively in the Libraries.[19] CCNMTL's staff is already experienced and successful at harnessing (and creating) new technological capabilities to serve pedagogical goals. CCNMTL's chief limitation is lack of campus-wide visibility and its outdated identification with "new media." Positioned within a larger enterprise whose goal is to improve teaching and learning throughout the University, CCNMTL's technical prowess would, in the view of this Committee, have a much more powerful impact. Other units within the Libraries also play significant roles in fostering digital education. The Center for Digital Research and Scholarship develops novel digital tools and publishing platforms, while the Digital Humanities Center supports scholars at the intersection of humanistic and computational approaches. At the same time, Teachers College has a rich and long-standing research history in the area of teaching and learning. Teachers College also has a number of technology-related initiatives and centers, such as the Center for Technology and School Change.

The Committee's primary recommendation therefore is that Columbia create a University-wide Center for Teaching and Learning (CTL) to provide professional development and support services for faculty at all levels, as well as teaching assistants and relevant staff. The University-wide CTL would not replace existing centers and initiatives at the school and department level, but would instead help them to share information, access unique services at the CTL, exchange information on best practices and new technologies, and coordinate software acquisition to keep costs down, among other functions. In short, it would serve as a central clearinghouse for information and training on innovative teaching, both online and in-class, for the diffusion and evaluation of new evidence-based teaching strategies.

To promote and ensure excellence in teaching and learning throughout the University, the CTL's functions would include:

- Organizing orientation and development training workshops as well as coaching and mentoring services available to all members of the University's diverse and growing teaching staff, including both part-time and full-time faculty as well as graduate student teaching assistants;
- Providing support for curriculum design and integration;
- Promoting and facilitating technological and pedagogical best practices in teaching;
- Monitoring and recommending enhancements to the University's learning management systems, student course evaluations, online data collection, and course and program assessments;
- Creating and administering awards and prizes that recognize effective teachers;
- Collaborating with the University's Diversity Initiative in recruiting, mentoring, and retaining a diverse and inclusive community of great teachers;
- Collaborating with Teachers College to build on their existing research on pedagogical approaches and the use of technology;
- Providing advice to administrators and faculty bodies on issues related to academic integrity, grading and other academic policies;
- Monitoring and advising at all levels on classroom technology needs and innovations;

[19] Information on CCNMTL's activities, and its annual report, can be found at: http://ccnmtl.columbia.edu/

- Working with schools and departments to enhance incentives already in place for faculty to engage in innovative teaching and learning.

The integration of innovative educational technologies in areas that include media production, case studies and simulation development, social media and collaborative spaces, and multimedia medical and public health interventions, among many others, requires strong support to keep Columbia at the forefront. Increasing the capacity and reach of the innovations already underway at Columbia will inspire faculty to become ever more engaged in their teaching and help build links to their research. In the coming years, developing a successful course or reinventing a current one may require the input of curriculum designers, educational technologists, media experts, interface designers, animators and more.

Moreover, the rapid turnover of technology platforms will also require nimble and effective evaluation, adoption, and release strategies. As an example, in the last 18 months Columbia has made use of four major LMS platforms with different levels of engagement: Canvas, Coursera, edX & Open edX, and Pearson's OpenClass. Thus, the Committee recommends that CCNMTL serve as a key building block of the new CTL, and that the CTL coordinates closely with the CUIT Teaching and Learning Applications Group. The Committee also recommends that CTL maintain close ties with Teachers College, with its historical roots in teaching and learning and its current research in technology and learning.

To ensure effective faculty oversight of the CTL, the Committee recommends that the Provost appoint a Faculty Advisory Committee broadly representative of the University as a whole, like the recently appointed Faculty Library Committee and other similar bodies.

The Committee also recommends that the Provost extend the mandate of this Committee to provide additional advice that includes academic as well as administrative and technical perspectives on the University's evolving online strategy. Among the issues that merit continued scrutiny are the legal and copyright issues addressed by a subcommittee whose report appears below as Appendix F. The Committee endorses the subcommittee's thoughtful review and its recommendations, in particular its recommendation that "all these issues be reviewed periodically to determine whether any further clarifications or changes to existing policies need to be made in the future.

Finally, we believe the University would benefit from a concerted effort to develop research and teaching in the learning sciences. Such an effort could take shape through the appointment of three to five learning sciences faculty, junior and senior, in the Arts and Sciences (e.g., Psychology) and the Fu Foundation School of Engineering and Applied Sciences, as well as a collaborative relationship with faculty at Teachers College. The creation of a well-funded research center linked to the CTL, with a complement of post docs and graduate students skilled in both the teaching and learning aspects of the enterprise and in the computational aspects of the field could have a major impact both on the quality of teaching and learning at Columbia and its reputation for excellence in research in the field.

10. Faculty Engagement and Faculty Governance

The diversity and rapidity of developments in online education are creating a host of new opportunities and new challenges for faculty members. Many are eager to take advantage of the

distinctive characteristics of new media and technologies, whether to reach a broader audience, to improve learning outcomes, or to bridge the gap between research and teaching. Faculty engagement will depend critically on building a supportive environment that encourages and rewards innovation. Creating and nurturing a new Center for Teaching and Learning with the goals and activities outlined above is an essential first step.

Teaching and learning lie at the heart of our mission as a world-class educational institution. We believe technology can enhance the magical interplay between inspiring faculty and brilliant students but only if used thoughtfully and with an experimental frame of mind. Effective faculty governance of educational technology is crucial in this endeavor. We believe that our Committee can play an ongoing oversight role but individual schools should also consider forming faculty-led oversight groups both to support school-specific innovation as well as to inform the larger campus-wide conversation.

11. Summary of Recommendations

To recapitulate the major recommendations and endorsements in this report, Columbia should:

- Establish a University-wide Center for Teaching and Learning to provide support for schools, departments, faculty, and graduate students in all aspects of teaching, including the use of educational technologies.

- Promote a culture that emphasizes student learning and which values and rewards innovation and experimentation in technology-infused course design and pedagogy.

- Emphasize the use of technology as a learning tool, rather than a delivery mechanism.

- Incentivize faculty efforts at technology-enabled innovation, including flipped classrooms and related approaches.

- Continue targeted development of hybrid programs, and implement monitoring system to ensure quality.

- Augment student evaluations with more insightful methods such as learning outcome-based assessment and teaching portfolios.

- Maintain MOOC engagement at a moderate scale where it serves Columbia's strategic goals.

- Evaluate existing Columbia legal and copyright policies in the face of a rapidly changing landscape.

- Maintain this Committee as a durable body to continue to evaluate online learning developments, to serve as a conduit for faculty interests and concerns, and to advise the Provost on Columbia's evolving strategy.

Appendices

Appendix A. PFACOL participants

- Melissa Begg, Public Health
- Kristine Billmeyer, Continuing Education
- Adam Cannon, Computer Science
- Michael Collins, Computer Science
- Matt Connelly, History
- Don Davis, Economics
- Pierre Force, Arts & Sciences
- Pat Grieve, Latin America Studies
- Eitan Grinspun, Computer Science
- George M. Hripcsak , Biomedical Informatics
- Garud Iyengar, Industrial Engineering and Operations Research
- Gita Johar, Business
- Soulaymane Kachani, Engineering and Applied Science
- Avery Katz, Law
- Shantanu Lal, Dental Medicine
- David Madigan, Statistics and Arts & Sciences, Committee Chair
- Ellen Meier, Teachers College
- Janet Metcalfe, Psychology
- Sharyn O'Halloran, International and Public Affairs
- Cathy Popkin, Slavic Languages
- Vincent Racaniello, Microbiology
- Mark Taylor, Arts & Sciences
- Assaf Zeevi, Business

Ex-officio:

- Beryl Abrams, General Counsel's Office
- Candace Fleming, Information Technology
- Maneesha Aggarwal, Information Technology
- Maurice Matiz, CCNMTL
- David Park, EVP office
- David Eisenberg, EVP office

Appendix B: An Industrial Revolution in Education? Assessing the Potential Impacts on Higher Education Institutions

In the body of the report, we identified several key questions about the impact of online learning on higher education institutions. These, as we stated, are: Will online learning lead to an industrial revolution in higher education? Will it so dramatically reduce costs, raise quality, or both, that it will dramatically transform the sector? Under what conditions might it do so? Are those conditions likely to hold over any short or medium horizon? These are difficult questions and we don't pretend to answer them here. But the possibility of great change and the need for a thoughtful strategy in light of the possibility of such change suggests the need for ongoing and highly focused attention to the questions.

The most basic question affecting the depth of transformation we can expect is: Do students learn in online settings? This will be an area of intense research looking forward. It is worth keeping in mind two economic ideas in this regard. The first draws on the work of Clayton Christensen, and notes that disruptive change frequently comes from competitors who start with an inferior product, produced much more cheaply, which they then go on to refine.[20] That is, online education may have a quite sizable impact if it is both inexpensive and "good enough." Certainly state legislators will be very tempted to move to low cost teaching methods if there is not a notable deterioration in learning.[21] There are myriad other questions that affect the feasibility of large expansions in online learning, many discussed elsewhere in this report. Ultimately they come down to the mechanics of keeping costs down and whether the quality will be high enough that it will win accreditation from relevant governing bodies and acceptance among firms looking to hire graduates.

The history of technical change suggests that answering these questions will be difficult. There are many cases, of course, of vaunted changes that never came to pass or had at most incremental impact on a target industry. But there are also many cases where initial breakthroughs move nonlinearly. After the breakthrough, change doesn't come, doesn't come, and doesn't come. And then it does – big time! The automobile provides a simple example. The first patent for a gasoline engine was in 1886. By 1900, only 8,000 automobiles were registered in the United States, but this surpassed 2 million by 1915 and 20 million by 1927.[22]

With respect to online education, Columbia was an early enthusiast, spent considerable resources on Fathom and earned close to a zero financial return. This is a good reason to be careful. But for disruptive technical change, the past may not be prologue – we must instead attend carefully to the substantive barriers limiting adoption.[23]

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[20] Christensen, Clayton M. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, MA: Harvard Business School Press, 1997.

[21] Indeed, many of the California state colleges and universities are undertaking considerable experimentation in this dimension.

[22] See *Highway Statistics Summary to 1995*, Federal Highway Administration, Table MV-200. https://www.fhwa.dot.gov/ohim/summary95/mv200.pdf .

[23] Mark Twain wrote, in Pudd'nhead Wilson's New Calendar, "We should be careful to get out of an experience only the wisdom that is in it – and stop there, lest we be like the cat that sits down on a hot stove-lid. She will never sit down on a hot stove-lid again – and that is well; but also she will

Even for those inclined to be skeptical regarding the more breathless claims about online education, there is reason to look more closely. The recent financial crisis has given renewed prominence to the concept of "tail risk" – the need to attend to risks judged unlikely but which, if realized, could have extreme consequences. It is often difficult to judge just how unlikely a tail event is because data and experience are, by definition, sparse. Disruptive technical change falls into this category, since it involves a constellation of conditions that have never existed previously. We must study closely whether the myriad barriers to disruptive change are likely to persist or be overcome.

There is reason to pay attention even if you believe that disruptive change, if it comes, will most directly affect non-elite institutions quite unlike Columbia. The reason is that the great research universities, such as Columbia, exist in a wider ecology. If drastic change arrives most directly elsewhere in the education pyramid, the implications for Columbia may nonetheless be quite serious. We are obliged to think about how the interconnected system will change.

What Would Disruption Look Like? The Case of Georgia Tech

The current initiative with the most disruptive potential is a partnership led by Georgia Tech's Zvi Galil (also former SEAS Dean) and Udacity's Sebastien Thrun. Georgia Tech currently offers face-to-face masters in computer science to 100 students per year that costs $45,000 in tuition. They plan to offer a high quality, high contact degree online for only $6,600 – 15 percent of the face-to-face cost. The program is supposed to begin with 600 enrollments expanding to 6,000 by year three.

The crucial thing is to ask where the quality and the contact come from. The Georgia Tech faculty will prepare the video segments of the courses and have light contact via weekly sessions. Faculty will receive additional compensation for preparing the courses and each time the same course is offered. There will also be more intense contact, but it won't be the professors. Neither will it be PhD students. Instead they are professionalizing the role of the TA so they can service the course even more cheaply than with PhD students (whose hours of work are limited by their own needs to study and do research).

Caveats are in order. Most importantly, the Georgia Tech-Udacity collaboration could fail. Second, even if it succeeds in a technical field such as computer science, this might be a difficult model to replicate for other masters level degrees. And, since masters degrees typically have a much more circumscribed curriculum than undergraduate education, lessons learned there may not be directly applicable elsewhere.

Caveats noted, if the Georgia Tech-Udacity collaboration succeeds, it could be very disruptive. To gain perspective, the 6,000 degrees they hope to award is equivalent to 80 percent of the total number of computer science masters degrees awarded in 2011-2012 by all US universities public and private.[24] Georgia Tech and Udacity aim to be very, very big players on the national and global stage.

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never sit down on a cold one anymore." We can't have Fathom be Columbia's cold stove-lid. Quote from Fred R. Shapiro, *The Yale Book of Quotations*, 2006, p. 779.

[24] See Table 7 in Zweben, Stuart, "Computing Degrees and Enrollment Trends: From the 2011-2012 CRA Taulbee Survey, Computing Research Association.

The Georgia Tech program is an immediate challenge to existing online masters programs in computer science, such as through SEAS that seek to charge face-to-face tuition for online education. This could be undermined almost overnight. It could, as well, challenge the sustainability even of face-to-face programs at the tuition levels they are accustomed to charging, with the online cost at only 15 percent of the current face-to-face cost.

If this succeeds in computer science, it cannot be long before a similar effort is made for masters programs in other technical fields. Indeed, efforts will surely be made to extend this to a wide variety of masters degrees, starting with the largest. It can't be known in advance where this may succeed and where fail. However, even if the face-to-face programs survive, they may do so with dramatically increased competition if high quality, low cost substitutes exist. Any institution relying on high tuition masters programs as a major revenue source may be at risk. Any success will likewise spur an effort to extend this model to other areas of education, including at the undergraduate level.

Online Undergraduate Education: Direct and Indirect Effects

While online teaching is likely to be incorporated into the curriculum at an increasing rate everywhere, top universities and colleges such as Columbia will almost surely maintain a high face-to-face component. If very significant change is to come to American higher education, it is likely to have more drastic immediate consequences at non-elite colleges and universities. If at these schools online education can be substantially less expensive and nearly as good (or better), then the current model that relies on relatively high levels of contact with high cost faculty will be at risk. How exactly change would be implemented is an open question. What is clear, though, is that great savings can only be attained by economizing on high cost inputs that can be replaced either with automata (the online resources) or lower cost inputs (a professionalized TA force). That is, the cost savings from online education must come primarily from reducing reliance on high-cost faculty.

If cost savings at non-elite universities come from economizing on high cost faculty, this will have an immediate impact on the research universities. Those faculty at non-elite institutions are the products of our PhD programs. If this were to proceed rapidly enough that the non-elite universities aim to reduce the size of their faculties, then the fact that tenure protects existing faculty suggests that there could be a risk of a "jobs desert," possibly lasting years, for new PhDs across all fields affected by the new technologies. Naturally, this could have severe consequences in (1) our recruitment of new PhD students, (2) the research enterprise in which they are a key element, as well as (3) our undergraduate education where they currently play a key role.

An additional, indirect, but possibly powerful effect could come through the impact of online education on market structure. Traditional economies of scale for face-to-face education appear to be modest. In 2010, there were 21 million college students in the United States, while the largest enrollment of undergraduates at a single campus is roughly 45,000, or less than 0.25% of the total.[25]

The new technologies are all about increasing returns to scale. This raises the prospect that one or a few gigantic educational firms could emerge. An interesting parallel is the market for textbooks, where increasing returns come from the very large fixed costs associated with producing and marketing textbooks. The top four textbook publishers account for nearly 90 percent of the

[25] *Digest of Education Statistics 2012*, National Center for Education Statistics, Table 221, http://nces.ed.gov/programs/digest/d12/tables/dt12_221.asp .

market.[26] The concentrating force is evident as well in the fact that the for-profit University of Phoenix, mainly through online education, has already become the single largest post-secondary educational institution in the country.[27] However, Phoenix has not become a significant competitor to the great research universities since it competes only in the non-elite segment of education. The question posed by the new entrants – Udacity, Coursera, and others – is what will happen if one or more of these for-profit companies successfully enters the high quality segment of the market (similar to the high quality, high contact program Georgia Tech and Udacity are aiming for in their masters program). We have no road map for this, but if such a high quality behemoth were to emerge, it could become a significant competitor for those members of our faculty who are both top-flight researchers *and* teachers. And if these for-profit firms were to succeed in this, we have to consider whether they might eventually also become a significant competitor for top students.

Academic Megastars?

One concern that has been voiced is that online education may produce academic megastars, to the disadvantage of the great mass of academics. To state it so does not go far enough. A central aim of online education is to replace the great mass of academics with a small set of megastars, capital (hardware and software), and a more routinized academic labor force for the segments of education that require human contact. This is not a byproduct; it is an essential element of the project. Cost reduction is premised on reducing the number of (high cost) professors for a given amount of student instruction. Of course, this is true only in the aggregate and need not be true at those universities or firms leading the online revolution.

The transition from live theater to motion pictures provides an excellent illustration of how communications technologies can promote stars. The magnitude of the shock of film on live theater can be seen in the fact that the number of legitimate theaters outside of New York fell from more than 5,000 in 1890 to 1,490 in 1910 and only 564 by 1925. These are the conditions that made it possible for megastars like Charlie Chaplin to rise from the stage, where they could entertain hundreds, to film, where they could entertain millions.[28]

Addressing Heterogeneity

While online initiatives will greatly affect all elements of the university, these effects will not be uniform. Classics and Statistics have different needs and opportunities. The Mailman School of Public Health and Columbia Law School face different markets and will need to engage the issues with considerable attentiveness to these idiosyncrasies. Thus, even as the University seeks some

[26] Eli Noam, *Media Ownership and Concentration in America*, 2009, p. 149.

[27] A broader discussion of the market concentration of Phoenix-like firms can be found in Deming, Goldin, and Katz, "The For-Profit Postsecondary School Sector: Nimble Critters or Agile Predators?", *Journal of Economic Perspectives*, 2012. They note that ". . . online institutions, typically part of national publicly traded companies, increased from almost nothing to become the largest part of the sector. Indeed, almost 90 percent of the increase in for-profit enrollments during the last decade occurred because of the expansion of for-profit chains." (p. 141)

[28] See Bernheim, Alfred L. *The Business of the Theatre: An Economic History of the American Theatre, 1750-1932*. New York: Benjamin Blom, Inc., 1964.

common elements of infrastructure and shares experience, departments and schools should be invited to contemplate closely the nature of the needs specific to their own educational mission and the market environment within which they operate.

Appendix C. Columbia Online Initiatives

On the Coursera platform, 14 MOOCs have been offered so far:

- Natural Language Processing - Michael Collins; Feb 24, 2013; 10 weeks
- Financial Engineering and Risk Management - Martin Haugh and Garud Iyengar - Feb 24, 2013; 13 weeks
- MOS Transistors - Yannis Tsividis; Mar 11, 2013; 10 weeks
- Virology I: How Viruses Work - Vincent Racaniello; Aug 1, 2013; 11 weeks
- Economics of Money and Banking Part I - Perry Mehrling, Barnard; Sep 1, 2013; 6 weeks
- Economics of Money and Banking Part II - Perry Mehrling, Barnard; Oct 13, 2013; 6 weeks
- Big Data in Education - Ryan Baker, Teacher's College; Oct 24, 2013; 8 weeks
- Financial Engineering and Risk Management Part I - Martin Haugh and Garud Iyengar; Oct 31, 2013; 7 weeks
- How Viruses Cause Disease - Vincent Racaniello; Jan 9, 2014; 12 weeks
- The Age of Sustainable Development - Jeffrey Sachs; Jan 21, 2014; 14 weeks
- Financial Engineering and Risk Management Part II - Martin Haugh and Garud Iyengar; Jan 26, 2014; 7 weeks
- Economics of Money and Banking Part I - Perry Mehrling, Barnard; May 27, 2014; 7 weeks
- Economics of Money and Banking Part II - Perry Mehrling, Barnard; July 8, 2014; 7 weeks
- The Age of Sustainable Development - Jeffrey Sachs; Sep 9, 2014; 14 weeks

The university also offers an on-demand short MOOC on Coursera: Introduction to Sustainable Development by Jeffrey Sachs.

On the edX platform, Columbia is offering a three-course sequence:

- The Civil War and Reconstruction - 1850-1861 - Eric Foner; Sep 17, 2014; 10 weeks
- The Civil War and Reconstruction - 1861-1865 – Eric Foner; Dec 1, 2014; 8 weeks
- The Civil War and Reconstruction - 1865-1890 – Eric Foner; Feb 25, 2015; 9 weeks

In addition, the Office of the Provost and CCNMTL jointly host a series of of public talks by leading experts on the future of education, specifically around online learning issues. The presentations are recorded and made available to the public. See online.columbia.edu for an overview of online initiatives at the University.

Appendix D. Online and hybrid degree and non-degree programs

The Fu Foundation School of Engineering & Applied Science, Columbia Video Network
Master of Science & Certification Programs
Columbia Video Network (CVN), the graduate distance learning program of the School of Engineering and Applied Science was founded in 1986 and went fully online in 1998. Columbia University Degrees available via CVN are fully accredited by the Commission of Higher Education, a unit of The Middle States Association of Colleges and Schools. All of CVN's Graduate Degrees are granted by Columbia University, and these degrees are identical to, and indistinguishable from those earned by students on-campus at Columbia University. CVN offers 16 Master of Science programs, 20 Certifications of Professional Achievement and 4 Professional Degree programs. CVN runs over 50 courses a semester and over 120 distinct graduate engineering courses overall.

School of Continuing Education
Master of Science & Certification Programs
Since 1995, Columbia University's School of Continuing Education has administered and developed innovative programs that fill a diversity of student needs, including online learning. The School of Continuing Education offers three blended (online and on-campus) Master of Science programs (Information Knowledge & Strategy, Technology Management, and Strategic Communications); and three online Certifications of Professional Achievement (Actuarial Science, Bioethics, and Business). The School is planning to expand its online offerings.

School of Social Work
Master's of Social Work
The Columbia School of Social Work's Online Master of Science program will feature an innovative curriculum that requires study via online classes as well as field internships. Currently, the School offers eight courses online, ranging from Social Work Research, Social Welfare Policy to Advance Clinical Practice. Classes are presented in an easy-to-understand, accessible platform and include: lectures, discussions, writing exercises, breakout groups, collaboration with classmates and instructor feedback. The School of Social Work plans on launching a full Master's online degree program in fall 2015.

Columbia Mailman School of Public Health
CUBED MS Programs
Columbia University Biostatistics and Epidemiology Digital Education (CUBED) Master's program is Mailman's first online Master's degree program, launching in fall 2015. CUBED offers two of the School's existing degrees in a distance education format: the Master of Science in Epidemiology and the Master of Science in Biostatistics. The CUBED Master of Science is designed to allow qualified trainees from anywhere in the world to acquire the conceptual, methodological, and biostatistical skills they need to engage in rigorous population health research.

Earth Institute Center for Environmental Sustainability
Certificate Program in Conservation & Environmental Sustainability

The Earth Institute (EI) launched its online courses in Spring 2014 as part of EI's Executive Education Program in Conservation and Environmental Sustainability. The online Certificate Program in Conservation and Environmental Sustainability (EICES), provides evening courses via EI's Distance Learning Program. EICES Distance Learning Program offers a variety of online courses, such as Environmental Economics and Introduction to Ecology.

Columbia University Medical Center
Certificate of Achievement in Health Information Technology (HIT)
This two-semester, competency-based Certification of Professional Achievement program offers a conceptual framework, background knowledge, and workforce skills in HIT. The format is a blend of online and in-person learning. The majority of the course materials are available online. Regular online and remote collaboration occurs between students, team members, and faculty. Self-guided materials are combined with team assignments, with teams selected to maximize professional diversity. Teams work on problem-based assignments in order to develop collaboration skills, a necessity for this multidisciplinary field. Remote interaction involves weekly meetings and group quizzes, assignments and large-scale projects.

Columbia Business School
Online Executive Education Programs
The new online programs of Columbia Business School meet the professional development needs of busy executives, encouraging focused learning and interaction with faculty members and other participants in the virtual space. Online programs include *Personal Leadership*, an online course that explores tools for tangible personal improvements and greater leadership skills through a distinctive set of video-lectures, delivered with a flexible learning schedule and self-reflection exercises; and *Driving Strategic Impact*, an online course where participants use video-lectures, exercises, and online engagement to learn tools used by top-tier consulting firms for more effective analysis and resolution of strategic problems.

Appendix E. School-Based Teaching and Learning Centers

Samberg Institute for Teaching Excellence, Columbia Business School
http://www8.gsb.columbia.edu/samberg/

The Arthur J. Samberg Institute for Teaching Excellence seeks to improve the teaching and learning experience at Columbia Business School through programs, resources, and information for faculty members and students.

Teaching Center, Graduate School of Arts & Sciences
http://teachingcenter.wikischolars.columbia.edu/

The GSAS Teaching Center offers to graduate students a variety of workshops and activities that promote best practices in teaching and communication within a fast-changing academic landscape.Language Resource Center, Arts & Sciences (http://www.lrc.columbia.edu/). Established in 1998 with support from the Andrew W. Mellon Foundation, the Language Resource Center serves both as a hub for new language instruction and as a catalyst to promote the widespread adoption of technology to enhance language teaching and learning.

Center for Education Research & Evaluation, College of Physicians and Surgeons
http://ps.columbia.edu/education/resources-support/advising-and-academic-support/center-education-research-evaluation-cere

The Center for Education Research & Evaluation supports and empowers learners, educators, and scholars through collaboration, consultation, and advising in study strategies and test preparation, program evaluation, learner assessment, educational research and scholarship, instructional design, and educator development.

In addition, as the oldest and largest graduate school of education in the United States, **Teachers College** prepares educators who not only serve students directly but also coordinate the educational, psychological, behavioral, technological, and health initiatives to remove barriers to learning at all ages.

Appendix F. Legal and Copyright Issues in Online Learning

The legal and copyright issues subcommittee focused on copyright ownership, teaching and other uses of courses and course material prepared for delivery online, both within the University and outside. The University's existing Copyright Policy, adopted in 2000, provided a starting point for this exercise, along with its policies on conflict of interest and conflict of commitment, and statements in the 2008 Faculty Handbook on Outside Interests and Employment all have applicability to faculty teaching of online courses and the creation and development of such courses.

Background

Columbia is not alone in examining its existing policies on these issues. With the advent of MOOCs, many universities are undergoing the same process. Some universities, including Columbia, start with the basic premise that faculty own the copyright in course material and courseware they develop for teaching at their respective institutions. Others, like Stanford, have policies providing that the institution owns courses and courseware developed by faculty while employed by the university. However, the policies are not that dissimilar on issues of use and distribution rights of faculty and institution. Most policies, including Columbia, irrespective of course ownership, allow faculty to make broad academic and other noncommercial use of the courses they develop and teach at Columbia, subject however to institutional policies on conflict of interest and commitment that say that faculty's primary duty is to the institution where they are employed.

Under current University policies and principles, faculty owe their primary professional obligations to Columbia. Outside activities may not absorb an undue amount of time and thereby interfere with the performance of their duties as officers of Columbia. A conflict of interest or conflict of commitment may exist even when a faculty member observes the time limitations on outside activities prescribed by University policy. As stated in the Faculty Handbook, this has become increasingly relevant as new information technologies have greatly expanded the opportunities for faculty and other members of the University community to create and disseminate their works to new audiences in new ways.[29] Faculty may also not engage in outside activities that directly compete with the mission and interests of the University or are in conflict with their University responsibilities.

Below is a description of how Columbia's current policies would apply to ownership and outside teaching and use of online courses, and identification of open questions and issues that need to be addressed. While copyright ownership is addressed first, it is not the only, or even the most critical, factor in determining the respective rights of the faculty and the University regarding use and distribution of online courses and course material.

Ownership

Under the current Copyright Policy, the University recognizes faculty copyright ownership in "non-institutional" course content and courseware created by individual instructors ("institutional"

[29] 2008 Faculty Handbook, Section on Obligations and Responsibilities of Officers of Instruction and Research - Outside Interests and Employment

courses are created under the aegis of a school or department of the University – more on this below). The University asserts copyright ownership in course content and courseware if there is an independent basis for the University's assertion of such rights. While there are several independent bases spelled out in the Copyright Policy, the independent basis of most relevance to courses created for online delivery is course content created with "substantial use of University resources, financial support or non-faculty personnel beyond the level of common resources provided to faculty."

Under current Policy, faculty will continue to own the copyright in the intellectual content of online courses that they develop or teach at Columbia. However, the development of online courses will generally entail substantial use of University resources, thereby giving an ownership claim to the University. The production of MOOCs or other online courses are in most cases resource-intensive, with additional support needed from teaching/course assistants and videographers, educational technologists, producers and platform administrators provided by the Columbia Center for New Media Teaching and Learning (CCNMTL), or from other Columbia sources. Moreover, faculty will want to take advantage of ever-changing new media and technologies to create and deliver online courses, which also may require substantial additional investment by the University. If Columbia wants to undertake a major online initiative to develop high-quality courses, that will require major investment.

While it is true that a course taught in an electronic format can be produced with minimal additional support, with faculty personally undertaking the recording and editing, and introducing technological innovations themselves, in most cases, at least at the present time,[30] additional resources, beyond the ordinary resources available to the faculty, including, for example, additional TAs/CAs, videographers, and technology provided by CCNMTL, and schools' online education offices, will be used to create such courses. Additionally, out-of-the-ordinary administrative support is needed for developing a course for online distribution beyond the University. There are contracts with outside platform providers, for example, and copyright clearances to be obtained.

The current Copyright Policy's distinction between "institutional" and "non-institutional" courses, with the former being owned by Columbia, is also instructive here. Institutional courses are defined as courses created under the aegis of a school or department of the University. Institutional courses might also be those produced collaboratively by more than one faculty member or a team of faculty and technical experts. As noted above, courses taught via electronic means that are available to an audience beyond registered Columbia students (such as MOOCs), necessarily give rise to greater institutional involvement and exposure (e.g., contractual obligations with third party platform providers, greater legal exposure for copyright infringement). Here too, while online courses such as MOOCs would seem to fit under the category of "institutional" courses, which would be owned by Columbia pursuant to existing Policy, the intellectual content of these courses is likely to be primarily the work of the faculty member.

Thus, both the faculty and the University have ownership claims to online courses developed at Columbia. Faculty will continue to own the intellectual content of the online courses they teach, and the University will own the rights to any produced recordings of those courses. These claims, taking into account applicable University policies described above, lead to the following conclusions:

[30] Over time, as the costs for producing digital course materials and videos decrease, the "substantial use of University resources" test may become less meaningful.

- Full-time faculty would need approval from the appropriate dean/vice president and the Provost in order to create a new course or teach an existing course, or a substantial part of a course, at another educational institution.
- Any licensing of a course to a commercial entity could be done only under the auspices of the University, but only with the agreement of the faculty instructor.
- Faculty could make the intellectual content of courses they teach freely available online for academic and scholarly use, through open source licensing or its equivalent. This would not be a radical change from current practice, as the University has never objected to a faculty member dedicating a course to the public.
- After departure from Columbia, a faculty member could teach at another educational institution the same online course that she or he taught at Columbia, but could not use the recordings or other materials produced by Columbia for delivery of the course, without permission from Columbia's Office of the Provost.
- After the faculty member's departure from Columbia, because of the University's ownership interest in the produced recordings of a former faculty member's course, the University could continue to utilize those recordings in ongoing teaching at Columbia, which would include allowing another faculty member to incorporate material from that course in his or her course, as long as the former faculty member is accorded appropriate credit.

Development and teaching of online courses outside of Columbia

Commercial use. Under current University policies, which include conflict of interest and conflict of commitment policies, as well as the Copyright Policy, faculty owe their primary duty to Columbia and may not teach courses at, or create course content for, a commercial enterprise without the approval of the appropriate dean or vice-president and the Provost. This should also be the case for courses taught or created for online delivery.

Irrespective of copyright ownership, current policy provides that neither the University nor the faculty can independently license or otherwise commercialize course content or courseware created or taught at Columbia. The same policy would apply to both course content taught in the classroom and course content taught online for delivery to Columbia students at Columbia or to third party institutions or individuals. In any case, no commercialization will be undertaken without the agreement of the faculty member.

Educational/non-profit use. Under current policy, and irrespective of copyright ownership, faculty may teach at other academic institutions as part of ordinary scholarly exchanges, including under visiting professorships and guest lectures. However, as is the case with commercial use, a faculty member's primary duty is to Columbia and teaching an online course at or for another institution (even an academic institution), via video or other electronic means, could conflict with that primary duty and should be permitted only with the approval of the appropriate dean and the Provost.

As stated in the Faculty Handbook, full-time faculty may not create courses or substantial parts of courses for other educational institutions, unless specifically authorized in advance by the Provost on the recommendation of the appropriate dean or vice president. Existing policy already

states that this prohibition applies equally to courses taught online, as well as to courses taught in person.[31]

As stated in the Faculty Handbook, the distinction between occasional lectures, which are a normal part of academic life, and a teaching assignment, which requires approval, is not always clear-cut. When there is any question as to whether an outside engagement falls within the range of allowable activities, current policy states that faculty should consult with the appropriate dean or vice president.

Several specific questions arise in the context:

1. Can a Columbia faculty member use an online course taught via a Columbia or Columbia-sponsored platform (such as Coursera) at another academic institution?

We recommend that the University generally permit such activity.

2. Can a Columbia faculty member use the video or audio recordings of an online course, for teaching at another academic institution?

We recommend that the University generally permit such activity.

3. Can a Columbia faculty member develop an online course, or portions thereof, as a consultant for an outside academic institution?

We recommend that this require approval from the appropriate dean and the Provost.

4. Can a Columbia faculty member make available to the public, via Creative Commons or open source licensing, an entire online course, or should faculty be required to consult with the appropriate dean, department chair and/or Provost before making such decision?

We recommend that this require approval from the appropriate dean and the Provost.

Use of online courses developed at Columbia after faculty member's departure from the University

Use by former faculty member. Current Copyright Policy provides that, irrespective of copyright ownership, a faculty member can continue to use, at another academic or not-for-profit research institution, course content and courseware she or he created or taught at Columbia, as long as the Columbia name is not used in connection with the material. However, that does not mean that the faculty member could use the recordings, videos or other materials filmed or produced by Columbia for delivery of the course. The recordings and actual footage would belong to Columbia (see above discussion under Ownership).

Use by University of former faculty member's course content. Current policy also states that a former faculty member "accords the University the irrevocable nonexclusive right to continue using, as part of its noncommercial educational activities, [faculty-owned course content] that has been made available by the faculty member, e.g., the syllabus and materials given to students. This right includes the nonexclusive right to incorporate such course content and courseware into University-owned… courses."

Some open issues remain mostly involving interpretation of existing policy. For example, for existing faculty, how should the University distinguish between allowable outside visiting professorships and impermissible teaching of all or part of an online course for another institution?

[31] 2008 Faculty Handbook, Section on Obligations and Responsibilities of Officers of Instruction and Research - Outside Interests and Employment

What if a faculty member wants to create and teach a new online course at Columbia, and the University is unable or unwilling to provide the requisite funding? In both cases we recommend that the faculty member request permission from the appropriate dean and the Provost. For faculty who have left Columbia, what are the limitations on commercial use of course content created and taught at Columbia? Are there "Institutional courses." the content of which cannot be used commercially by faculty following departure from Columbia?

In general, we recommend that all these issues be reviewed periodically to determine whether any further clarifications or changes to existing policies need to be made in the future.