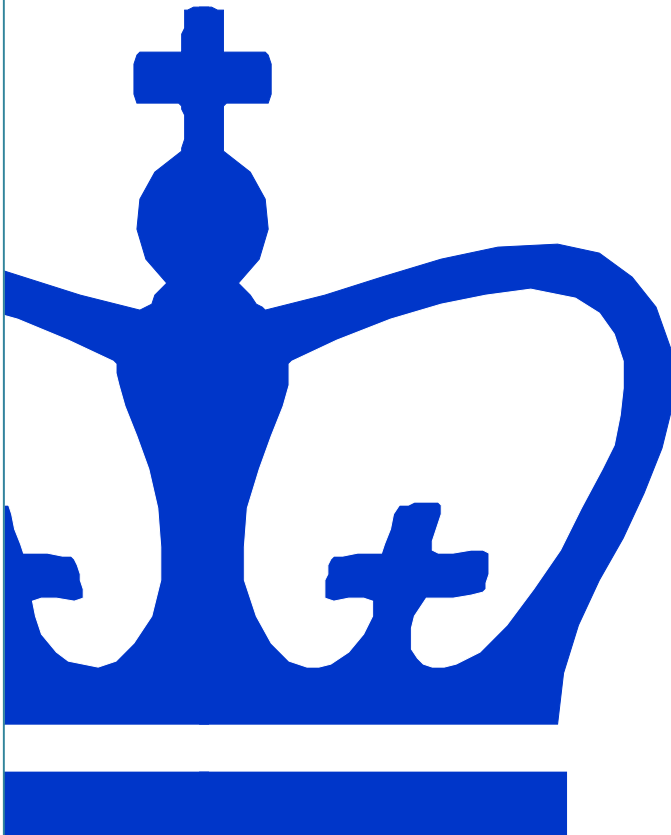


ONLINE LEARNING AT COLUMBIA UNIVERSITY

REPORT AND RECOMMENDATIONS OF THE
UNIVERSITY SENATE TASK FORCE ON ONLINE INITIATIVES

June 9, 2014



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EXECUTIVE SUMMARY

This report describes the findings and recommendations of a joint faculty-student-alumnus Task Force on Online Initiatives, conducted under the auspices of the University Senate, jointly with the Provosts Committee on Online Learning. The Task Force considered the following key question: given peer schools' move to expand their online presence, how can Columbia University leverage the enormous amount of activity currently underway to maintain its leadership in this space?

The Task Force first researched and compiled a general overview of the state of the online learning, the challenges of online learning, the growing online learning market, and different pedagogical approaches. The findings are numbered according to their Section headings in this report:

- 2.1 Higher education has a long history of distance learning and using online technologies to deliver content. Massive Open Online Courses (MOOCs), which offer open courses for free to large audiences, are the latest entrants, posing unique challenges and opportunities.
- 2.2 The online learning market is growing both domestically and globally, in the traditional distance, MOOC, and hybrid learning spaces. The financial impact on higher education is differentiated along market segments, with the professional master's programs currently facing the most competition.
- 2.3 Pedagogical approaches differ between the traditional residential, MOOC, and hybrid learning models, yet lessons learned from each can benefit the others.
- 2.4 Adopting online learning models into the traditional classroom setting can improve pedagogy, increase productivity and reduce costs in certain standardized and routine tasks.
- 2.5 Columbia is committed to understanding the challenges presented by online learning, among them potential threats to the residential model and brand name, while at the same time recognizing the potential alignment with its education and research mission.

The Task Force identified the following opportunity areas:

- 3.1 Responsibility for online initiatives at Columbia is distributed across the university, with little strategic alignment among these initiatives at various levels.
- 3.2 Columbia Global Centers provide an ideal space for distance and online learning, and offer opportunities for alumni engagement worldwide.
- 3.3 Students and alumni share a common interest in online learning and subject areas, differing with respect to the importance of degree versus non-degree programs. Students least interested in online learning emphasized the value of the classroom experience.
- 3.4 Faculty interest in offering online courses is mixed. Those most interested highlight the potential to reach a broader audience. Faculty least interested emphasized the pedagogical value of the classroom.
4. Benchmarking and defining success in the online learning space informs further progress by comparing best practices at peer institutions in online education with Columbia's strategy.

Based on these findings, the Task Force developed the following recommendations:

- 5.1 Consolidate functions and reorganize lines of authority governing Columbia's online initiatives, where it makes strategic sense, to share expertise and investment across the University, including
 - a. Build technology studios and infrastructure to support schools' online endeavors.
 - b. Archive and manage content to be repurposed across the institution and its various audiences, where appropriate.
 - c. Link online/distance learning initiatives with expansion of the Global Centers.
- 5.2 Create a University-wide faculty advisory committee that incorporates existing decision-making bodies, in particular representatives from the Senate Online Learning and Education committees, to consult on strategic initiatives and areas of investment.
- 5.2 Create transparent and clear guidelines for course selection and areas of investment that build off Columbia's strengths.
- 5.3 Develop a business model that takes into account the economic constraints of the online education space. Where feasible,
 - a. Cover overhead costs for classroom and technology upgrade to enhance pedagogy for traditional students by rationalizing current efforts.
 - b. Define a system of benchmark metrics to review online initiatives.
 - c. Identify additional resources and incremental revenue opportunities. Where practical, course offerings to non-traditional students should be self-sustaining and cover development costs.
- 5.4 Focus primarily on improving pedagogy for current Columbia students and affiliates, then look strategically for opportunities to broaden reach via online technologies.
 - a. Create Center for Teaching Excellence to both support traditional classroom pedagogy and train faculty and graduate students to incorporate new technology.
 - b. Train and fund a team of Digital Reach Assistants that can help professors incorporate new technologies into their courses.
 - c. Provide faculty adopting new technologies with basic resources such as University-wide licenses to video capturing. Currently, faculty incur these costs.
- 5.4 Focus on content provision, not service provision; do not create a unique MOOC platform and, where possible, avoid lock-in to current technology.

1. INTRODUCTION

Columbia University is deeply committed to lifelong learning, collaboration, and preeminent scholarship of its community, a commitment that guides the research and teaching of its faculty as well as the initiatives of its administration. With the recent technological advances and media attention to online learning, especially Massive Open Online Courses (MOOCs), the question arises how best to use this new technology and the pedagogical enhancements it represents to further Columbia's research and educational mission. The University Senate, in collaboration with the Provost's Faculty Advisory Committee on Online Learning, created a taskforce to review Columbia's online strategy and provide recommendations.

The goal of the taskforce's efforts is to offer an integrated review of Columbia's online initiatives, broadly defined, and the role that these new technologies can play in enhancing them. The analysis provides a snapshot of the rapidly evolving state of online learning, Columbia's strengths and opportunities in this space and a set of strategic recommendations.

This report is the culmination of past and ongoing discussions with faculty, alumni, students, trustees, and administrators on the best direction for Columbia's online programs. Input for the report was solicited widely over a two year period to ensure representation of views from all parts of the University. [Appendix 1](#) provides a roster of the Taskforce's members as well as a timeline of activities.

1.1 ONLINE LEARNING AT COLUMBIA UNIVERSITY

At present, the Columbia community utilizes online technologies in many ways, each of which are closely integrated with support structures and the goals of individual schools. The array of options run from basic learning management systems like Courseworks, where the University offers residential students online platforms for course information and assessment, to more expansive learning environments like those provided to distance students with courses either fully online or in a hybrid, partially residential, model. Examples include the School of Engineering and Applied Sciences fully online graduate courses and the School of Continuing Education hybrid certificate programs.

As a starting point, the Online Learning Task Force (OLTF) sketched out a high-level framework of available online initiatives and the various constituent bodies involved in their creation, administration, or oversight. Exhibits 1a and 1b highlight selections of this framework, identifying the school primarily responsible for administering the program, the type of program offered, the approach adopted (fully online, hybrid, etc.), the technology platform utilized, such as Pearson or Canvas, and the primary audience for the course. Where possible, the exhibit also identifies the

program's funding source. Exhibit 1a discusses initiatives currently underway in the Arts and Sciences, whereas Exhibit 1b focuses on the professional schools.

Exhibit 1a: Highlighted Online Initiatives at Columbia: Arts & Sciences

School	Program	Approach	Platform	Audience
Language Resource Center	Less Commonly Taught Languages	Shares Courses Initiative with Yale and Cornell (paid)	Polycom Viewstation/ Adobe Connect	Columbia, Yale, and Cornell students
Statistics Department	MS in Statistics; MS In Actuarial Sciences; Certificates in Core Statistics and Actuarial Sciences	Fully online (paid)	Canvas	Graduate, application-based
School of Continuing Education	Certificates; Courses for MS Degrees	Fully online (paid)	Canvas	Continuing education, application-based

What is immediately apparent from Exhibits 1a and 1b is that online learning at Columbia is exciting, diverse, and plentiful; each of the highlighted schools uses different means to reach their students and offer unique opportunities to their audience. What is also evident is that each school represents a separate silo of online initiatives, with little or no sharing of programmatic goals or even technological platform across the units. Moreover, the selection of online content available is still fairly limited; for example, there is very little penetration into Columbia College and the Graduate School of Arts & Sciences. Among the notable successes are the School of Continuing Education, offering online courses with a campus practicum to earn both certificates and professional master's degrees, and the School of Engineering and Applied Sciences (SEAS), opening three new courses to the general public on Coursera in 2013 in addition to their online programs via the Columbia Video Network (CVN). These programs do not replace existing residential programs at any of these schools. Rather, they respond to growing demand for flexible opportunities for lifelong learning and build upon the effective new technologies now available. Furthermore, they show the potential to increase touch points for alumni and Columbia affiliates, bringing these members of the community closer and making them more connected and enthusiastic about learning at Columbia.

Exhibit 1b: Highlighted Online Initiatives at Columbia: Professional Schools

School	Program	Approach	Platform	Audience
Engineering and Applied Sciences	MS, PD, Doctoral Degrees, Certificates	Fully online (paid)	Columbia Video Network (CVN)	Graduate, application-based
Journalism	Social media workshops	Fully online (paid)	Canvas	Continuing education, application-based
Business	Leadership and Strategy classes, Certificates	Fully online (paid)	Canvas	Continuing education, application-based
Physicians and Surgeons	Online classes, lectures, and live conferences	Fully online (paid)	Frameworkd	Open to MDs only
Teacher's College	MA in Computing Education	Fully online (paid)	CCTE	Graduate, application-based
SIPA	Sustainable Development Course	Online option (paid)	Canvas	SIPA students
Social Work	Classes for degree	Fully online (paid)	Canvas	Social Work students
Earth Institute	Environmental Research and Conservation Certificate	Online option (paid)	GoToWebinar	Continuing education, application-based

1.2 OBJECTIVES

Given Columbia's current online programs, a key objective is how to leverage the enormous amount of ongoing activity to make Columbia a leader in the online learning space while maintaining its pre-eminence in the world of higher education. The payoffs to this investment are threefold. Columbia can:

- Improve current pedagogy, both on campus and online, through the adoption of new technologies;
- Promote and burnish Columbia's brand, perpetuating its reputation for quality; and
- Reach a large and growing audience of lifelong learners by increasing the reach of online initiatives, consistent with Columbia's educational mission.

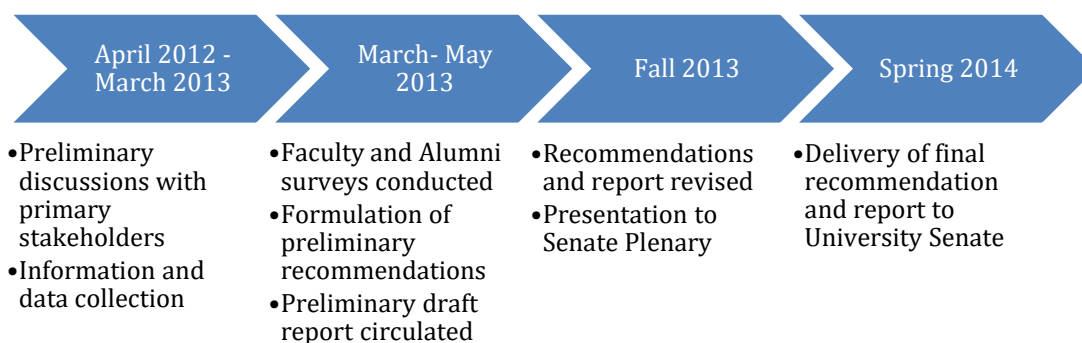
Clearly, new online learning technologies offer a manifold of benefits. Yet the taskforce is equally mindful of the potential disruptive threat these innovations pose to the traditional higher education model. Therefore, a second objective of the report is to identify how Columbia can best

strategically align itself, through internal reorganization and external partnerships, to reap the rewards of these technological innovations while mitigating potential costs.

1.3 TIMELINE AND DELIVERABLES

The following exhibit outlines the timeline of the taskforce's work and deliverables. Preliminary discussions with key stakeholders began in March 2013 and included alumni, faculty, students, and administrators to form broad goals and working groups. Information and data collection followed, including the far-reaching Quality of Life Survey, along with discussion and the formation of preliminary recommendations. These recommendations and draft report were circulated to all stakeholders and revised accordingly. The final report was delivered to the University Senate in the spring of 2014.

Exhibit 2: Timeline and Deliverables



The report is organized accordingly: Section 2 summarizes the state of online learning and provides a framework for analyzing online opportunities. Section 3 identifies opportunity areas that will enhance Columbia's current online learning efforts, drawing on survey data from Columbia faculty, students and alumni. Section 4 reviews current best practices, both at Columbia and across Ivy Plus universities in the online learning space. Section 5 highlights key strategic initiatives to further Columbia's online education efforts and provides a timeline and path toward implementation. Appendices follow.

2. CURRENT PRACTICES

Our framework for analyzing online learning programs considers three variables that determine online education outputs: audience (market segment), technology, and pedagogical techniques.¹

Exhibit 3: Framework for Analyzing Online Programs

Audience	Technology	Pedagogical Techniques
• Traditional residential students • Traditional residential students with limited distance • Distance students with limited residency • Traditional Distance	• Coursera • Canvas • edX • CourseBulder • Blackboard • OpenClass (Pearson)	• Face-to-face lectures • Face-to-face seminars • Online lectures • Online social networks • Online testing • Authentic assessments • Authentic simulations

Audience denotes the body of students to whom classes are offered. We divide the audience categories as follows:

1. *Traditional residential students*: full or part-time students who physically attend courses on one of Columbia's campuses.
2. *Traditional residential students with limited distance*: residential students temporarily away from campus, for instance study abroad, or between semesters (i.e. on winter and summer break).
3. *Distance students with limited residency*: distance students who have a short-term residency requirement (e.g. a two week introduction or final project at the start or end of a semester; eMBA).
4. *Traditional distance*: students who receive instruction exclusively outside of the traditional classroom setting through online, mail or other platforms.

Technology is defined by the tools or platforms used to offer content online. The three MOOC platforms of greatest interest are Coursera, Udacity, and edX.² However, other learning management systems like CourseBuilder, Canvas, Blackboard, 2U, and OpenClass are also players in the online space.³

¹ We are not considering the production of the digital material. Rather our focus is on the content provision and means of delivering the content.

² For more information on these platforms, see Exhibit 6.

³ We are not considering here the production of the digital material. Rather, our focus is on content provision and the means of delivering this content. If an organization developed a proficiency in media production of educational

Pedagogical approaches and techniques may differ based on the academic focus, the instructional design used by the faculty member, the audience to whom the course is directed, and the technology adopted.⁴ Taken altogether, they form the class structure and environment. For example, traditional residential students use the Courseworks platform to host assignments online and participate in a face-to-face pedagogical model with their professor; this is the physical class most prevalent on Columbia's campuses. Coursework's feature set is limited, however, allowing only for basic file sharing, group discussions, and grade disclosure—all of which faculty can deliver through free and more user-friendly services such as Dropbox and Google Groups. In contrast, distance students use a robust fully online platform that includes other pedagogical options such as social forums or short, specific lectures; sometimes these environments are MOOCs. For more information on pedagogical approaches, see [Section 2.3](#).

Careful combination of these three variables, audience, technology, and pedagogical techniques, betters current and future online practices at Columbia. The analysis can also inform Columbia's overall course offerings. Residential programs retain their unique position to serve areas of the higher education market where the commoditization of knowledge is limited and demand for individualized educational experiences is prevalent. Therefore, online learning is not necessarily a substitute for the traditional residential model. Rather, online learning enables higher education to move up the value chain of the market for knowledge.

2.1 GENERAL OVERVIEW

Higher education has a long history of distance learning and using online technologies to deliver content. Historically, Columbia has been a thought leader in this space, with initiatives including the Columbia Center for New Media Teaching and Learning, the online offerings at the School of Continuing Education, and early efforts like Fathom.⁵ SEAS's Columbia Video Network (CVN) is another strong program that Columbia has developed. More information on the design, distribution, and production of CVN can be found in [Appendix 4](#).

As shown in Exhibit 4 below, fully online programs and blended models of the late 1990's gave way first to school-as-a-service models like 2tor (now 2U) and Pearson, which aim to provide a

materials, that too could be a source of comparative advantage. However, we do not see digital media production as a natural comparative advantage of higher educational institutions as compared to third party vendors like 2U that specializes in this part of the supply chain. Nonetheless, Columbia can build a comparative advantage by adopting these existing technologies to meet student needs across the range of market segments. The Center for New Media Teaching and Learning provides one possible example of Columbia's comparative advantage in early adoption of best practices to enhance the learning environment.

⁴ Pedagogy (the art and science of teaching) usually refers to the overall approach, for example, transmission (which would include lectures), social constructivism (which would include seminars discussions), and so forth. Thus, the list does not represent "pedagogies" per se, but rather "Pedagogical Techniques."

⁵ See the [2002 University Senate report on Online Learning and Digital Media Initiatives](#), analyzing the market potential of Columbia's Fathom.com.

complete educational experience ready for immediate use. Competency-based education systems like StraighterLine (which flexibly personalize education as students demonstrate their ability) and educational partnerships such as the Cisco Networking Academy developed later on.

Exhibit 4: Online learning is not new

Late 90s	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Ad Hoc (Online Courses and Programs)													
Fully Online Programs													
Examples: University of Phoenix, Rio Salado													
School-as-a-Service													
Examples: 2tor, Academia Partnerships, Pearson													
Educational Partnerships													
Examples: Cisco Networking Academy													
Competency-Based Education													
Examples: WGU, StraighterLine, SNHU													
Blended / Hybrid & Flipped Classroom													
Connectivist MOOC													
Example: CCKOS													
Stanford, xMOOC													
Example: MITx, edX, Coursera													

MOOCs are the newest entrants in the online learning space, offering free classes and programs to an open audience in some cases. MOOCs are sometimes paired with a charge, usually under \$50, for a certificate upon completion of the course. Overall, online learning has a long history and has become an increasingly diversified space.

2.2 GROWING ONLINE LEARNING MARKET

The online learning market is growing both domestically and globally. What is also clear is that the online learning market is segmenting along different pedagogical approaches. Thus, we separate the space into three models: traditional distance, MOOCs, and hybrid learning. A table summarizing both the market and pedagogy literature for all three online learning models can be found in [Appendix 5](#). This table provides key findings and sources in bullet point format. References for the following market, pedagogy, and productivity sections can be found in [Appendix 6](#).

"I do not think we understand, however, how the Web is going to reshape what we do. All you have to do is look at the press. Five years ago no one anticipated the situation the press finds itself in now economically. And, while universities are different, you have to ask, are we the last institution to feel and experience the full very, very significant effects of this new technology and all that can be done with it?" - President Lee C. Bollinger

Recent data regarding the *traditional distance model* includes:

1. In the United States, 6.7 million students take at least one fully online course, a 10% increase from 2012.
2. Fully online courses account for approximately 11% of all U.S. enrollments, a figure expected to increase to 20% by 2014.
3. Globally, 2 billion people worldwide can be identified as potential online learners.
4. The market size of online education delivery may be \$69+ billion by 2015 (Bold, Chenoweth, and Garimella 2008).⁶

According to a January 2013 report by the Babson Research Group, the number of students taking at least one fully online course increased by over 570,000 to 6.7 million. The online enrollment growth rate of 9.3 % is the lowest recorded since Babson began collecting data in 2002 (Allen and Seaman 2013, 4). Despite this sizeable market, however, roughly half of all U.S. degree-granting institutions offer no fully online courses. However, Eduventures estimates that of the adult market (25+), 24% are currently in online programs and this market segment is expected to increase to 35-40% by 2014 (Bates 2010).

Massive open online courses, MOOCs, an emerging model, provide free content and often do not include grading. They may, however, offer low cost certificates for completion. The state of the MOOC space since September 2011 is condensed as follows:

1. Stanford offers dozens of classes to 1.6 million students.
2. Coursera⁷ and Udacity are successful examples of spinoffs extending to teachers elsewhere.
3. edX offers a single MIT class to 155,000 students: 6.002 Circuits & Electronics.
4. Harvard offers some of its most popular classes including Justice, taught by Michael Sandel, and CS50.
5. Georgia Tech—ranked #10 in Computer Science by *US News*, seven spots ahead of Columbia—is partnering with Udacity to offer a Master's in Computer Science for \$7,000.⁸

Further information with respect to MOOC's is highlighted as:

1. As of January 2013, only 2.6% of higher education institutions offered MOOCs; 9.4% have them in development.

⁶ While slightly dated, this represents the most rigorous estimate of anticipated market growth.

⁷ Given the newness of these programs it is unclear how employers view these certificates as opposed to degrees. For example, some participants of these certificate programs represented the Harvard 2-week Advanced Management Program as an Executive MBA, which does not offer a certificate, *per se*.

⁸ See [Appendix 7](#) for a detailed case study of the Georgia Tech initiative.

2. An estimated 3.17 million unique students worldwide were enrolled in courses from the major MOOC providers.
3. While completion rates can approach 20%, most MOOCs see less than 10% of their enrolled students actually completing a course (Jordan 2013).
4. The typical MOOC size is about 50,000 students.
5. One estimate has MOOC student cohort growing by a 24% compounded annual growth rate, resulting in a total student audience of over 6 million MOOC students by 2015 (Market research report by Outsell 2013).

Hybrid learning is a vital but more complex segment of the market. In 2007, the growth rate for online courses was higher than that of hybrid courses. Thus, the hybrid learning market is likely much smaller than the fully online market now. However, hybrid learning may not be very far behind its fully online counterparts, given its attractiveness to institutions as an intermediate option between revolutionary online teaching and traditional instruction. As highlighted in Exhibits 1a and 1b, Columbia utilizes this method for courses that require in-person attention. One such example is the School of Continuing Education master's degree and certificate courses, the majority of which is hosted online but also includes a weeklong on-campus practicum.

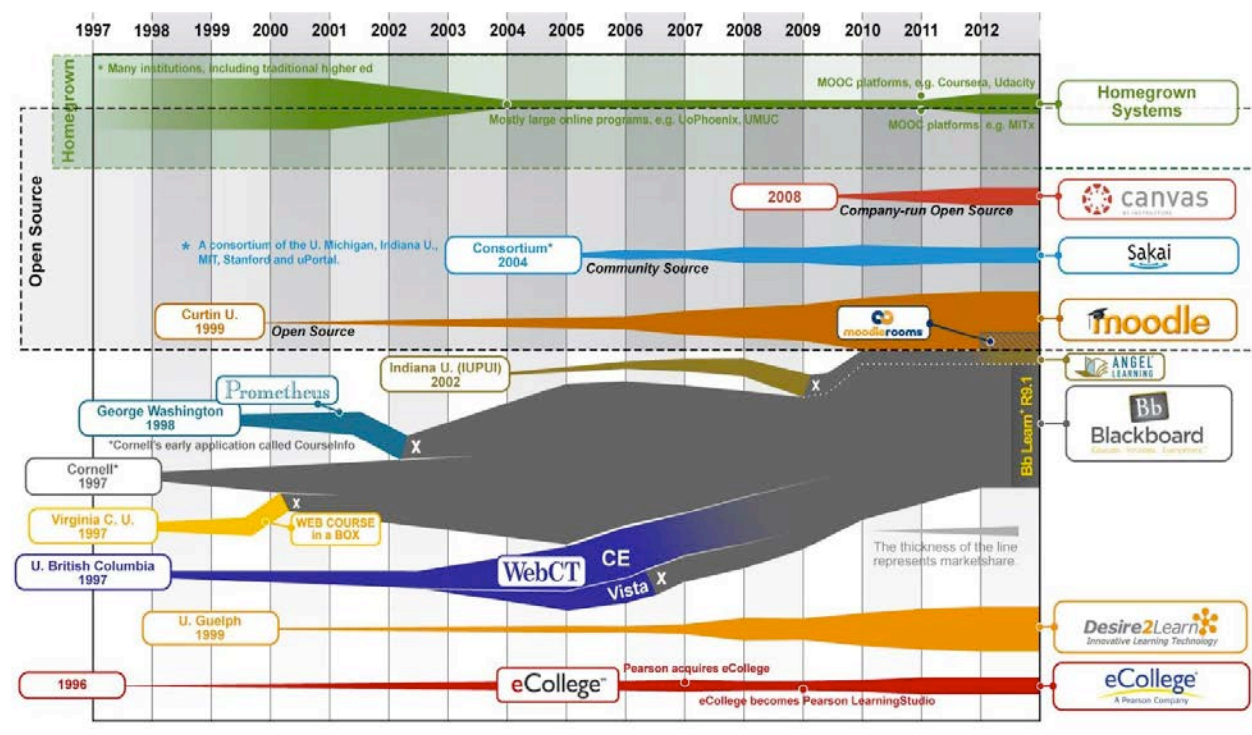
Altogether, survey research seems to point to several factors that drive the increase in online enrollments:

1. Progress in “learner-enabling technologies” that facilitate knowledge acquisition;
2. Economic forces and the need for new skills to compete in the labor market;
3. Increasing familiarity with online learning;
4. Opportunities to find new students in underserved markets and generate new sources of revenue (Green and Wagner 2011).

While enrollments grow, many institutions are changing their structures to accommodate online education efforts. In a 2010 survey, 44% of respondents reported that their campus has “reorganized the management of online education” in the past two years, and three-fifths expect to reorganize online education within the next two years. Major drivers of change included budget issues (52 % cited) and desire to coordinate campus-wide instructional resources (39 %) (WCET et al. 2010, 2). Altogether, institutions of higher learning have embraced online education far more than the general public, with only 29% of American adults believing that a course taken online provides equal educational value to one taken in a classroom—in contrast to 51% of college presidents holding that opinion (Taylor et al. 2011, 3).

We can summarize the growth and development of the online learning market by considering Exhibit 5, which measures time along the horizontal axis and market share of market participants along the vertical axis (i.e. greater thickness means more market share).⁹ The upper portion of the diagram denotes open source platforms, while the bottom half displays proprietary technology platforms.

Exhibit 5: The online market is growing and developing



The diagram highlights several key points that will help Columbia navigate within a space that has seen many players enter and exit since the mid-1990s. First of all, there has been an enormous amount of consolidation in the for-profit sector, with Blackboard absorbing smaller players and gaining market share. However, it is important to note that Blackboard (and its future affiliates, in sum) at one point enjoyed greater market share than the current level. To clarify, Blackboard's flagship product is its learning management software, in contrast to eCollege, which is an online platform owned and operated by Pearson, a multinational publishing and education corporation. Desire2Learn is another for-profit player that has so far survived the rapid consolidation of the industry.

⁹ The figure in Exhibit 6 is from *the Campus Computing Project*. A description can be found: <http://www.campuscomputing.net>. Also for a discussion see: <http://www.deltainitiative.com/bloggers/state-of-the-higher-education-lms-market-a-graphical-view>. The market share is defined as the number of universities that adopted a particular platform out of the total number of institutions of higher learning.

Moving on, it is clear that the adoption of open-source platforms such as Canvas and Moodle is increasing while community-ware platforms like Sakai are suffering decreases in market share due to an influx of third party vendors. These third party players include, for instance, MOOC platforms such as edX, Coursera, and Udacity. In a sense, the community-ware players are being crowded out by open-source learning management systems as well as new MOOC platforms, which leads us to our third and final point.

It appears that we will witness the convergence of MOOC platforms and learning management systems for residential students, which will fundamentally alter the online learning market. On the MOOC side, it is clear that platforms like Coursera and Udacity are able to incorporate more features (e.g. online discussions, document hosting) traditionally handled by learning management system. Similarly, high quality open source learning management platforms allow professors and universities to more easily make an existing course available as a MOOC.

These two market sectors have an intricate relationship. Certain learning management systems with open source platforms, such as Canvas, have the capacity to transform standard in-person courses into a MOOC. Another example of partnership to the same effect is that of Coursera to provide course management for Antioch University.

The trends exhibited in the diagram highlight two lessons for Columbia as it considers how to position itself in the online learning space. First, consolidation in the market, as illustrated by Blackboard's rapid absorption of many smaller players, emphasizes the need for Columbia to avoid "lock-in" to any particular technology or platform. Second, Columbia should avoid exclusive partnerships, even with other universities, as many current market participants are descendants of old university-developed platforms.

2.3 PEDAGOGICAL APPROACHES TO ONLINE LEARNING

The proliferation of online learning technology has important implications for pedagogy, or the art and science of teaching. On the one hand, these resources represent an unparalleled opportunity for educators to create digital teaching environments that stretch across time and space. On the other hand, these resources represent an enormous challenge, as educators consider how to translate their coursework into new learning environments. Instructional design becomes critical as faculty transform traditional classroom approaches into new, technology-enhanced learning configurations.

Faculty choices about what technologies to use and how to use them depend on decisions about instructional design. Making instructional choices in the context of these new environments introduces a new range of pedagogical considerations. Some faculty may be tempted to use technology for technology's sake, rather than what is needed: asking what pedagogical purpose is served when using technology is exceedingly important.

Specific pedagogical practices for online learning are now emerging as faculty and instructors gain more experience with digital tools. In creating e-learning environments, educators are able to move away from the idea of “covering material” through more traditional modes of teaching (e.g., lecturing) to socio-constructive designs which engage students more actively in building their knowledge in specific areas of inquiry (Conole, Littlejon, Falconer, & Jeffery, 2005; Scardemalia & Bereiter, 2006). Technology has the potential to help faculty act on best pedagogical practices in order to more fully engage students.

The challenge is to harness technology to make learning more engaging, personalized, and effective. As educators make critical transitions into these new environments, it is necessary to bring additional resources to bear, including instructional designers and technology specialists. The goal should be to create digital environments that are more user-driven, flexible and focused on the student experience (Morgan & Adams, 2009).

It is noteworthy that each of the online learning categories described above – traditional distance learning classes, MOOCs, and hybrid learning – all present different pedagogical benefits. Each type of online learning is also influenced by the platforms available, as well as the overall goal and the design of the learning experience. Therefore, these online choices are not arbitrary technology decisions, but rather decisions to be carefully considered in light of the overall pedagogical goals.

Going forward, faculty will need support to learn the technology and to explore design opportunities for making important pedagogical decisions for digital learning. As courses are designed and implemented, critical outcome data should be captured to inform next steps for the university as a whole: continual feedback for improvement through research should be a priority (Dede & Grimson, 2013).

The potential for learning in virtual environments is enormous, but educators could do much more with the digital tools available (Hemmi, Bayne & Land, 2009). Investing in this process – keeping pedagogy at the forefront – will help Columbia lead the creation of learning environments for a new generation of students. The lesson here is that different pedagogical techniques are appropriate for different market segments and technological platforms, which we now review.

2.3.1 DISTANCE OR PURE ONLINE LEARNING

As access to the Internet is increasingly common in all parts of the world, distance learning has become a player in a global concern: the right to education. Distance learning has been a route to increasing access to education and creating mega universities, open universities, and branch/satellite campuses for established institutions. For instance, in China, more than a quarter of the country’s 2800 colleges and universities use distance learning as

“I’m just very curious about on-line teaching options. I’m not sure they are right for me or my course or what the implications would be, but I would like to learn more.”

- Faculty Member

their primary education delivery method.¹⁰ Altogether, according to one estimate, two billion people worldwide can be identified as the potential market for distance learning for higher education globally, and the market size of online education delivery may exceed \$69 billion by 2015 (Bold, Chenoweth, and Garimella 2008, 6).

In terms of the domestic landscape, in fall 2002, the Babson Research Group measured a total of 1.6 million higher education students who were taking at least one of their courses online. Every year since has seen a substantial increase in online enrollment—as of January 2013, this number has jumped to 6.7 million. Yet even in 2002, 72% of schools already had some form of online offering.

What is generating enrollment growth appears to be the creation of complete online programs offering a certificate or in some cases a degree (available at 62% of online education institutions in 2012 as compared to 35% in 2002), as well as the increasing proportion of private nonprofit institutions in this online program space (48% in 2012 from 22% in 2002). Now, the number of institutions with no fully online offering has dropped from 28% to about 14%. Furthermore, about two-thirds of online students attend nonprofit institutions, and some market research predicts that this proportion will increase as more nonprofit schools begin offering online programs (Aslanian and Clinefelter 2012, 6). Thus, in a 2011 Pew survey of university presidents, 50% predicted that 10 years from now, a majority of their students will be taking classes purely online.

In terms of the demographics of those involved in traditional distance learning market segment, individuals of all ages participate in online education. About 40% of online students are younger than 30, with approximately 20% of online students younger than 25 (Aslanian and Clinefelter 2012, 6). And overall, a large majority of current online students pointed to some change or transition—often career related—in their lives as the reason for beginning an online program. That is, more than 90% of online students state that their main motivation for returning to school involved career development. Most often they desired to advance within their current career path and next to make a career switch (Aslanian and Clinefelter, 2012, 8). Regarding their courses of study, nearly 75% of students enrolled in courses that are fully-online work toward a degree, while the rest sought certificates and licenses. The most popular field of study is business, which claims 34% of online students—twice as much as the second most popular field, health professions (Aslanian and Clinefelter 2012, 11).

Why enroll in traditional online education? Reasons are varied, but generally, most online students seek convenience and flexibility given that they are older, have previous experiences in higher education, and bear other regular responsibilities (Aslanian and Clinefelter 2012, 17).

¹⁰ The report defines distance learning as highly accessible education delivered across distance and, increasingly, meant to reflect electronic and Internet-based delivery.

A meta-study conducted by the U.S. Department of Education indicates that, on average, students in online conditions (i.e., traditional pure online distance or hybrid learning) perform modestly *better* than those learning identical material through traditional face-to-face instruction.¹¹ Additionally, a study commissioned by the Higher Education Funding Council for England (HEFCE) and produced by the University of Oxford's Department for Continuing Education found that the key challenge facing distance learning was not its pedagogical model, but rather "the configuration of the supporting infrastructure, resources and business models required to support the development and delivery" of online programs (White et al. 2010, 2).

"The world of online teaching is rapidly changing due to the advent of MOOCs."

- Faculty Member

"MOOCs will change the business model of higher education and therefore the educational model."

- Faculty Member

"Oh God, don't start running MOOCs here too."

- Faculty Member

One should note, however, that interpretations of the Department of Education report should take into consideration that online and face-to-face conditions generally differed on multiple dimensions, such as the amount of time that learners spent on a task. Thus, the advantages observed for online learning conditions could be the product of those discrepancies—though, as some evidence indicates, part of the possible benefits of online learning is that it facilitates changes in other variables, e.g. learning time, that lead to better overall results.

Nevertheless, the Department of Education researchers found that, leaving hybrid online learning aside and looking at studies of pure online learning alone, fully online classes are negligibly better than face-to-face instruction with a p -value of 0.46 (statistically insignificant). This finding is similar to that of earlier summaries of distance learning that concluded instruction without face-to-face contact is as pedagogically effective as instruction in the classroom—but no better. However, it is worth noting that this may not necessarily be true for all populations or at schools that have less generous resources to devote to constructing online classes. Using a dataset containing nearly 500,000 courses taken by over 40,000 *community and technical college students* in Washington State, a more recent study conducted by Teachers College found that the population of students in the study suffered decrements in performance in online courses (Jaggars 2011, 17).

With this caveat in mind, opinion toward the efficacy of online learning has grown increasingly positive. Surveys of chief academic officers find that most rate the learning outcomes for online education "as good as or better" than those for face-to-face instruction. In 2003, 57% of academic

¹¹ This mean difference between online and face-to-face conditions across the 50 studies of pure online learning and/or hybrid learning is statistically significant at the $p < 0.001$ level. Additionally, online learning appears effective over a broad range of different content and learner types. Online learning appeared to be a slightly better learning modality for both undergraduates ($p < 0.001$) and for graduate students and professionals ($p < 0.05$) in a wide range of academic and professional studies (U.S. Department of Education, Office of Planning 2010, xv).

leaders judged the learning outcomes in online education as the same or superior to those in face-to-face. That number has jumped to 77% as of 2012 (Allen and Seaman 2013, 5).

2.3.2 MASSIVE OPEN ONLINE COURSES (MOOCs)

The latest entrant into the online learning space is the Massive Open Online Courses (MOOCs). Exhibit 6 provides a comparison of the most visible MOOCs along several key dimensions including course structure, business model and overall footprint in the market. The MOOC platforms of interest include Coursera, edX and Udacity. Others, such as Blackboard's CourseSites and the Canvas Network offer courses from a variety of colleges and universities. Canvas, Blackboard's Learn, and OpenClass (Pearson) offer learning management system services in to any teacher or faculty, allowing for experimentation and testing of platforms.¹²

Coursera has captured the largest MOOC segment and interest. The Coursera course offerings and partners list grows frequently, as more universities decide to experiment with MOOCs. The platform is fairly simple and has interesting and mostly unique video features, including video support for uploading. Processing and viewing is robust; options include fast-play (up to 2x), in-line quizzes, and captions. Peer-to-peer and traditional grading is included.

Canvas is currently in use or trial use at a number of Columbia programs, particularly those of the School of Continuing Education. Additionally, Instructure, the parent company, has released Canvas Network, a flexible platform through which institutions can choose a MOOC format or opt for a smaller online course format with more interaction. Canvas is a traditional learning management system with a simple and effective interface. Instructure offers any faculty or teacher up to five free sites through which to host their material. This platform includes support for discussions, modules, video conferencing among other features. Similarly, edX has released its learning management system open source and represents a merger of the original edX and Stanford's Class2Go learning management systems.

¹² The U.K. Department of Business Innovation and Skills produced an extensive research paper on "The Maturing of the MOOC." The document provides a detailed summary of the various perspectives on MOOCs in the higher education regarding pedagogical efficacy and learner experience, the extent to which MOOCs are seen as a disruptive technology in higher education and the emerging business model that hinges on the market value of online accreditation. See <http://www.obhe.ac.uk/documents/download?id=933>

Exhibit 6: MOOC platforms offer similar features

		<u>Coursera</u>	<u>edX</u>	<u>Pearson</u>	<u>Udacity</u>
Course Content	Course Content	Videos, Assignments, Discussion Forums	Videos, Assignments, Discussion Forums	Videos, Assignments, Discussion Forums	Videos, Assignments, Discussion Forums
	Hosting	Cloud	Cloud	Cloud	Cloud
	Voting of questions	Stack Overflow	Stack Overflow	N/A	Stack Overflow
	Multiple-answer	✓	✓	✓	✓
	Multiple Choice and Computer Auto-Grading	✓	✓	-	✓
	Instructor-grade	as override	as override	✓	as override
	Remote vs. On-campus	Segmentable to different levels of on- and off-campus	Online; based on and in parallel to in-class	Designed for campus-sized class	Varies
Business Model	Principal developer	Collaboration between Coursera and University	Owned by MIT and Harvard, collaboration with other univities	Service provider to universities via software	Seeks to become its own university, hire its own faculty
	Profit vs. Non Profit	For-Profit	Not-for-Profit	For-Profit	For-Profit
	Certificate Fee	Nominal	Nominal	Comparable to traditional course	Less than traditional course but not nominal
Footprint	Courses done and available (+starting)	390	63	130+	25
	Enrollments	3.2 million	675,000	6.7 million	400,000
	Certificate Fee	Nominal	Nominal	Comparable to traditional course	Less than traditional course

Although the concept of MOOCs has been around for some time, as illustrated in Exhibit 4, the proportion of higher education institutions offering them continues to be low. Academic leaders remain unconvinced that MOOCs are a sustainable means for offering online courses. As of the start of 2013, only 2.6% of higher education institutions currently offer MOOCs, and 9.4% have them in development. One-third of all institutions report they have no plans for adding MOOCs (32.7%), leaving 55% of schools undecided. (Allen and Seaman 2013, 8) Part of this uncertainty undoubtedly comes from ambiguity of the MOOC business model. Few services are generating direct revenues, with many still focusing on reaching a wider audience before monetization.

-Percentage of students enrolled in a MOOC who view no more than one lecture: **49**.

-Percentage who complete the course: **4**.

-Percentage of students enrolled in MOOC at UPenn last year who had already earned a college degree: **79**.

- Harper's Index, March 2014

On the other hand, MOOCs, in accordance with their name, attract many students. MOOCs have reached enrollments of about 180,000, and the typical MOOC's size is about 50,000 students.¹³ At the end of 2012, an estimated 3.17 million unique students worldwide were enrolled in courses from the major MOOC providers (i.e., edX, Udacity, Coursera, and Udemy) and other smaller providers. If one assumes that both the number of courses and institutional partnerships increase through 2015, and that growth trends will loosely resemble those of other kinds of distance education courses, one estimate has the MOOC student cohort growing by a compound annual growth rate of 24%, resulting in a total student audience of over 6 million MOOC students by 2015 (Outsell 2013, 13). Given the claim by Jordan (2013) that MOOC completion rates are usually less than 10% (occasionally approaching 20%), a rough back-of-the-envelope calculation estimates that about 600,000 students will complete a MOOC in 2015.¹⁴

Additionally, while most MOOC providers are not yet generating vast revenues, there is a potential to sustainably create MOOCs moving forward. Providers should have a wide range of business models to choose from, including:

- *Licensing*: edX recently released details of the two business models it is implementing. One allows institutions to license the edX platform to deliver the course, with edX receiving the first \$50,000 a course generates.
- *Course development*: In the second model, edX acts as a consultant and design partner, charging institutions \$250,000 for production assistance on a course and \$50,000 each time a course is offered again.
- *Examination fees*: This model which enables MOOC providers to offer courses for free, attracting large audiences while monetizing the portion of the audience which will derive measurable benefits (e.g., college credit) from successful completion of a course. Several major MOOC providers are working with proctoring businesses such as Pearson to enable students to take proctored exams.
- *Course fees*: Udacity has signed an agreement with San Jose State University to create San Jose State Plus, offering specially-created online courses for academic credit. This offering is directed particularly at students who arrive at university ill-equipped for classes and require remedial courses.
- *Matching students and employers*: Udacity, through its Career Placement Program, allows select students to choose which employers they want to share their job profile with.¹⁵

¹³ These numbers are up-to-date as of May 2013. As of that time, Coursera offered 374 courses with 70 institutional partners; EdX offered 53 courses with 27 institutional partners and Udacity offered 25 courses with 1 institutional partner. See BIS Research Paper 130 (2013: 14) for more details on the market share of the various MOOC platforms.

¹⁴ The BIS Research Paper 130 (2013: 25-33) reports similar completion rates and demographics of student enrollments.

¹⁵ Given the number of students taking the courses, however, the number of students placed with employers is miniscule. As of October 2012, Udacity was reported to have matched just 20 students with employers.

- *Sponsored courses:* As MOOC providers gain expertise in building courses, they may offer sponsorship opportunities for existing courses and/or create sponsored courses on behalf of and in partnership with commercial organizations. For example, via Udacity, Google is offering an HTML5 game development course taught by two of its employees.
- *Tutoring:* While this option has not yet been taken up, there may be potential for tutoring services to develop alongside MOOCs, or for providers to offer these services themselves. While it may seem unintuitive to pay for help to pass a free course, if that course yields college credit, MOOC tutoring may still be a more economical route than other education modalities (Outsell 2013, 19-21).

2.3.3 HYBRID COURSES

Hybrid courses feature a combination of face-to-face sessions and at-your-own-pace online learning activities. Existing literature has paid less attention to the hybrid course market relative to fully online learning and MOOCs. One study by the Babson Research Group in 2007 suggests that the market for hybrid courses is similar to that for online programs. Similar proportions of schools report offering blended courses and online courses, with slightly more offering fully online options relative to blended/hybrid options. This finding has a caveat, however,—in 2007, it appeared that the growth rate for online courses was higher than that of hybrid courses (Allen, Seaman, and Garrett 2007, 2). It is quite likely that now, six years after the study, the number of online offerings and students enrolled in such offerings has far outshot those in hybrid learning. Whether this is symptomatic of the online learning market growing or merely becoming saturated relative to the hybrid learning market is uncertain.

What we do know is that students in online learning conditions perform modestly better than those receiving face-to-face instruction. This difference in student outcomes was larger in studies that contrasted conditions that blended elements of online and face-to-face instruction (i.e., hybrid learning) with conditions taught entirely face-to-face.¹⁶ That is, hybrid learning is likely more effective than online learning. The fact that hybrid learning often included additional learning time and instructional elements not received by students in control conditions precludes us from drawing a stronger conclusion (U.S. Department of Education, Office of Planning 2010, ix). Nevertheless, many researchers asserted that equating all control variables would have been impossible—which may suggest that hybrid learning is more conducive to practices such as increased learning time (which benefits knowledge acquisition) than traditional face-to-face instruction.

In a study more recent than the Department of Education’s comprehensive meta-review, the non-profit research institute, Ithaka S+R, partnered with six public university campuses (two in SUNY,

¹⁶ The mean effect size in studies comparing blended with face-to-face instruction was +0.35, $p < 0.001$. This effect size is larger than that for studies comparing purely online and purely face-to-face conditions, which had an average effect size of +0.05, $p = 0.46$.

two in CUNY, and two in the University of Maryland system) across seven hybrid statistics courses to create an experiment using random assignment techniques. Ithaka examined (a) the impact of assignment to the hybrid format, relative to the traditional format, in terms of student completion and pass rates, (b) their performance on a standardized test of statistics, and (c) their score on a set of final exam questions that were the same in the two formats.

Using these three metrics, Ithaka found no statistically significant learning differences between students in the traditional and hybrid-format sections—a weaker conclusion than that of the Department of Education, but one that strengthens the finding that online learning can be just as pedagogically effective as traditional learning. This result held even when controlling for student characteristics, including race/ethnicity, gender, age, full-time versus part-time enrollment status, class year in college, parental education, language spoken at home, and family income (Bowen et al. 2012, 20). Yet despite this comparable learning outcome, one downside suggested by the experiment was student satisfaction—students gave the hybrid format a roughly 11 % lower overall rating, and also reported feeling that they learned less and that the course was more difficult (Bowen et al. 2012, 21-22)

2.4 INCREASED PRODUCTIVITY AND COST REDUCTION

Pedagogical improvements aside, there are also other potential benefits associated with online learning:

1. *Broadening access to education* by significantly reducing the marginal cost of providing services, particularly for students in remote locations or situations that make traditional schooling difficult (e.g. low expected enrollment);
2. *Personalizing instruction* based on individual student performance and preferences, improving learning outcomes;
3. *Optimizing usage of teacher and student time* by automating routine tasks;
4. *Reducing facilities and/or space costs* by utilizing home and community spaces in addition to traditional school buildings, and increasing possible enrollment per class; and
5. *Creating economies of scale* via the reuse and large-scale distribution of learning (U.S. Department of Education, Office of Educational Technology, vii).

Evidence for the realization of such benefits comes from one study supported by an \$8.8 million grant from the Pew Charitable Trusts. Started in April 1999 and managed by Rensselaer Polytechnic Institute, the study gave grants of \$200,000 each to thirty institutions of higher learning to use technology to achieve quality enhancements, as well as cost savings, in a number of large-enrollment courses across multiple qualitative and quantitative disciplines. The thirty institutions included research universities, comprehensive universities, private colleges, and community colleges in all regions of the United States.

Results show that all thirty institutions reduced costs by about 40 % on average, with a range of 20% to 84%. Additionally, these schools saw increased course-completion rates, improved retention, more favorable student attitudes toward the subject matter, and increased student

satisfaction with the mode of instruction. And finally, what is notable about these improvements is that multiple online modalities yielded positive results. Depending on their needs, institutions employed different models of online learning to reform their courses—models that ranged from providing supplemental online material to placing classes fully online (Twigg 2003, 30).

2.5 INSTITUTIONAL FOCUS ON THE CHALLENGES OF ONLINE LEARNING

The promises of online education can only be reaped if balanced against the challenges posed. Internal discussions at Columbia and participation by Columbia affiliates in public forums reveal a keen awareness of the challenges of online learning in many different areas.

Three significant concerns with respect to online learning are:

1. Threats to the residential model of higher education;
2. Creation of celebrity professors and subsequent effects on the professorship at large; and
3. Weakening of the University brand name by diluting it across many programs and attaching it to programs with open admissions.

“As faculty stars relocate to cyberspace, how can institutions sustain the community of teachers and students that has been the essence of the university for a thousand years?”

-Professor Andrew Delbanco, MOOCs of Hazard, New Republic March 2013

The first of the above sweeps many challenges under a single umbrella, including but not limited to issues of pedagogy and financial stability. As we will later discuss in Section 3.3, [Interest in Online Learning](#), students who expressed disinterest in online courses indicated that the most important reason for their lack of enthusiasm was pedagogical; they believed that the quality of online learning is inferior to traditional in-class learning (38% of responses). Others answered similarly, “the on-campus in-classroom experience is important,” which echoes the reasoning of the first (27% of responses). However, we should note that very few of these students had any experience with online learning.

These issues of pedagogy are not taken lightly. Online learning can be used, however, in ways that benefit on-campus in-person learning, as decided by an assessment group of major stakeholders and course department in particular. This governance body is discussed in 5.2.2, [Develop an Assessment Structure](#), and pedagogy is further examined in 2.3, [Pedagogical Approaches](#). Financial concerns, also significant, are expounded upon in 5.3, [Adopt an Economically Viable Business Model](#).

Online learning, by its very nature, is disruptive. Contrary to the traditional residential model, online education involves distributing material created by a small cadre of professors to a large audience who may never meet. In some cases, this material includes the professors’ voices and/or videos of in-person lectures. As a result, online learning has the potential to create a select group of celebrity professors. Columbia Professor Andrew Delbanco (American Studies) considers this

concern in his March 2013 article in *New Republic* magazine, “MOOCs of Hazard.” “MOOCs seem likely to spur more demand for celebrity professors in a teaching system that is already highly stratified. Among tenured faculty, there is currently a small cadre of stars and a smaller one of superstars—and the MOOCs are creating megastars.” Furthermore, he writes, “[a]s master-teachers go global, lesser-known colleagues fear being relegated to a supporting role as glorified teaching assistants.” Faculty echoed these concerns in an anonymous survey, further analyzed in Section 3.3, [Interest in Online Learning](#).

Online learning and degree or certificate achievement also raises questions regarding the University brand. We differentiate between two types of branding questions: questions of quality and questions of quantity.

Questions of quality concern the academic excellence, effectiveness, and platform usability of the content in online courses and programs. Any content offered online by the University must uphold the same standards of excellence as in-person courses at Columbia, both in New York City and in Columbia’s global programs around the world. These standards should be established and evaluated consistently, as discussed in Section 5.2, [Organize and Evaluate](#).

Discussions of the quantity of online courses primarily pertain to brand dilution through Columbia’s recognition of courses that have open admissions and lack an enrollment cap. These high level questions become increasingly important at the school level, when online courses are identical to those offered on campus.

Market segmentation differentiated by certification status could offer a way to reframe these question areas as opportunities. Clearly distinguishing between online certificates or degree programs and on-campus residential programs could allow Columbia to expand its reach without threatening the institution’s campus programs.¹⁷ We note also that online learning is one path toward the University’s goal to inspire all students to spend time abroad during the course of their Columbia education. Online options for courses hosted on-campus could allow certain subsets of the student body, for example the pre-medical population, the opportunity to fulfill their requirements while studying abroad. Offering online courses in a way that is responsible to the University brand, deliberate in its mission, and consistent with the educational excellence of Columbia’s campus and global programs is an important way to support Columbia’s continued preeminence in higher education.

¹⁷ This is one of the eternal questions of marketing: can you create a two-tier offering of products that share a brand, but offer a fundamentally different product (some successes include Armani vs. Armani Exchange, Courtyard Marriott vs. JW Marriott). It should be noted that Columbia has tried this before: the Trustees of Columbia created and ran Seth Low Junior College in Brooklyn in the early 20th century. It is important not to push hard on a market segmentation strategy as it can devalue the online programs, making them unattractive.

3. OPPORTUNITY AREAS

A number of key opportunities exist for Columbia to build on its current best practices and leverage its institutional strengths, brand, and people to further strengthen its position in the online learning space. We note three types of opportunities. First, Columbia's online initiatives can collaborate and align with each other. Second, the stakeholders at each school can interact and communicate better with each other. Third, all online initiatives can reinforce Columbia's brand by aligning with the University's broader educational mission and campus community in New York City.

3.1 STRATEGIC INSTITUTIONAL ALIGNMENT

Responsibility for online initiatives is currently subdivided across the university. While there are many advantages to decentralized decision-making, flexibility to adopt programs to market demand and a direct link between revenue and expense, insufficient strategic alignment and communication among online programs at various levels creates redundancy and inefficiencies in the system. This is a legacy of the

"Good for Columbia to move forward with this platform... but it needs to be done centrally with strong tech support. [I] would suggest developing an On-Line Learning IT Department that would work with faculty to build this online course work - and not leave it to individual faculty"

- Faculty Member

organic growth of Columbia's online engagement, which occurred without advance comprehensive planning of Columbia's overall online footprint on an institutional level. Thus, many different offices are responsible for many different functions. As a result, current online initiatives are associated with overlapping, and sometimes, conflicting lines of authority, isolated in dispersed silos, as illustrated in Exhibits 1a and 1b.

For example, Exhibit 7 shows various functions falling under key stakeholders (faculty, students, and alumni) and institutional priorities (collaborative research, government and public relations, and budgeting). The exhibit highlights the numerous, and at times conflicting, priorities and goals that the various stakeholders express when considering the opportunities of online learning.

Exhibit 8 highlights the numerous decision makers and overlapping lines of authority associated with the execution of these functions, by stakeholders and institutional priority. Combined, the exhibits demonstrate the difficulty in getting all the potential veto players to agree on a common agenda. The charts also raise questions regarding if the current structure allows for the most effective use of Columbia's marginal dollars and if faculty and students' needs are best met with the current array of decision making authority and resource allocation. Greater communication and strategic alignment at all levels of the online initiatives are the first significant opportunity.

Exhibit 7: Many key functions fall under different priorities

Columbia University online initiatives					
Stakeholder priorities			Institutional priorities		
Faculty affairs	Student affairs	Alumni affairs	Research and collaboration	Institutional, government, and public relations	Finance and budget
- Research and scholarship collaboration - Cross-faculty initiatives - Expanding and teaching course reach - Pedagogy and learning theory development	- Study and research abroad - Greater access to class variety - Pedagogy and tools for learning - Simultaneous collaboration - Scheduling flexibility	- Access to course material - Communication with and connection to Columbia community - Online mentoring & externships / internships - Industry partnerships	- Services for remote partners - Online research tools - Access to research material - Ability to share and collaborate with wide audiences	- Joint degree administration - Branding in online learning space - Strengthening ties to Global Centers - Increase in Columbia's reach	- Concurrent with major global initiatives - Development priorities - Revenue generation from online learning - Strengthening ties to alumni and alumni support

Exhibit 8: Decision-making is split among different functions

Columbia University online initiatives					
Stakeholder priorities			Institutional priorities		
Faculty affairs	Student affairs	Alumni affairs	Research and collaboration	Institutional, government, and public relations	Finance and budget
				President	
Provost				Provost	
				Deans	
Faculty				Faculty	
		AR & Dev			
CNMTL				CNMTL	
				University Senate	
				Secretary	
Institutes				Columbia Institutes	
				Global Centers	
	Students				
		Alumni			

3.2 GLOBAL CENTERS AND ONLINE LEARNING

Columbia's Global Centers provide a unique opportunity to combine the university's impressive global presence with its budding online initiatives.

As described in the [University Senate's 2012 Global Initiatives Report](#), the Columbia Global Centers could serve as regional sites for students enrolled in "blended programs" that have a significant distance-learning component, punctuated by short periods of face-to-face interactions with Columbia faculty. These sites could also anchor purely online or distance programs. The 2012 report stated, "distance learning offers a unique

opportunity to generate incremental revenues to support ongoing activities at the CGCs, and it expands our programmatic reach to audiences heretofore outside Columbia's customary ambit."

"I am running my own business that requires frequent overseas trips. The online learning makes it easier for me to take classes wherever I am."

- Student

"[Online learning] would help [me] be flexible about teaching commitments when doing research work overseas. Data collection and teaching time often conflict."

- Faculty Member

The alumni represent a vital audience for Columbia in many ways. In addition to assisting the University in meeting its financial development goals, the alumni base also offers myriad of other opportunities for the University to further its multi-pronged mission of education, research and community engagement. Numerous alumni initiatives are underway at all times, any number of which may be enhanced with an online learning component.

For example, currently the alumni relations staff is undertaking the global roll-out of a significant online community platform called NationBuilder. This platform provides our alumni clubs and affinity groups greater support as well as greater autonomy. NationBuilder will facilitate the sharing of best practices for program planning and execution and coordinate those activities with the Morningside campus. It will help accelerate regional leadership training, the payment of funds and sharing/updating of data in the central university alumni database. Online learning offerings may be able to provide synergies with NationBuilder for our regional clubs to enhance their programming content. Traveling faculty oftentimes will visit alumni clubs as part of a book tour or lecture series. Online learning may provide a model for our faculty to interact with alumni as part of their travels, (e.g. Jeffrey Sachs offering an online mini-class on sustainable development in conjunction with a book tour to a number of cities world-wide that is coordinated by Columbia's regional clubs).

As Columbia seeks to expand the educational portion of this mission via online learning, it is important that alumni leaders and alumni relations staff are included in its planning and execution. The report of the Senate Alumni Relations Committee included in [Appendix 11](#) herein, discusses several additional motivations and opportunities for alumni to make use of online learning.

3.3 INTEREST IN ONLINE LEARNING

In fall 2013, Columbia offered a total of 162 online courses in various schools and departments. The majority of these courses were hosted by Graduate School of Engineering and Applied Sciences with 114 course offerings and Continuing Education with 38 courses. Online classes covered a wide range of topics from Financial Engineering to Neuroscience Ethics (a list of these courses can be found in [Appendix 8](#)) and various levels of accreditation from Master of Science degrees to Certificates of Completion.

"[I'm interested in] the ability to learn more! Intellectual growth!"

- Student

"I'm interested in reaching international audiences in interactive learning activities."

- Faculty Member

For the most part, the current opportunities for online learning respond to increasing interest in the Columbia community and in the realm of higher learning as a whole. Clearly, Columbia has much more room to develop its online learning programs. Moreover, it is appropriate to strategically enter educational market niches where Columbia has a particular strength. But most of these programs have been developed at the school or department level with little coordination across the institution. Also, little has been done to test the proposition that the Columbia community finds value in the online model and that such investments are sustainable in the long run.

As a first cut to address these questions, the University Senate Task Force on Online Learning conducted a survey of all students, alumni and faculty over the 2013 spring term. For the student and alumni groups, the questions focused on overall demand and objectives for taking online courses. For the faculty, survey questions centered on professors' adoption of current online tools and their willingness to supply courses that use online learning methods.¹⁸

3.3.1 STUDENT AND ALUMNI DEMAND FOR ONLINE LEARNING

Within Columbia, students and alumni are very interested in online learning; notably, the interest level is extremely high among alumni. The survey results, shown in Exhibit 9a, which compares alumni and student interest, yield that 56% of alumni identified as "very interested" in taking online courses, and an additional 36% as "somewhat interested." Fourteen percent of students were "very interested" in taking online courses, and another 34% were "somewhat interested." Furthermore, those who have taken online courses largely found them to be a positive experience.

¹⁸ More information on these surveys can be found in [Appendix 10](#), including the questions asked in the faculty, student and alumni surveys, respectively. In addition to engaging in these surveys, the Senate Faculty Affairs Committee has listed a set of concerns that online learning raise in [Appendix 9](#), including issues around academic freedom, intellectual property, and equity. The alumni have voiced their perspective through the Senate Alumni Relations Committee by drafting a report on Online Learning, which can be found in [Appendix 11](#).

In the same survey, 83% of alumni who had taken an online course found it to be a positive experience, while 76% of students who had taken an online course found the same.¹⁹

Exhibit 9b demonstrates consistent interest in online learning among students across degree programs, undergraduates, PhD and other graduate students. Interestingly, graduate students were over twice as likely to have taken an online course as undergraduates.

Exhibit 9a: Interest in online learning is high among alumni and students

Are you interested in taking online courses?

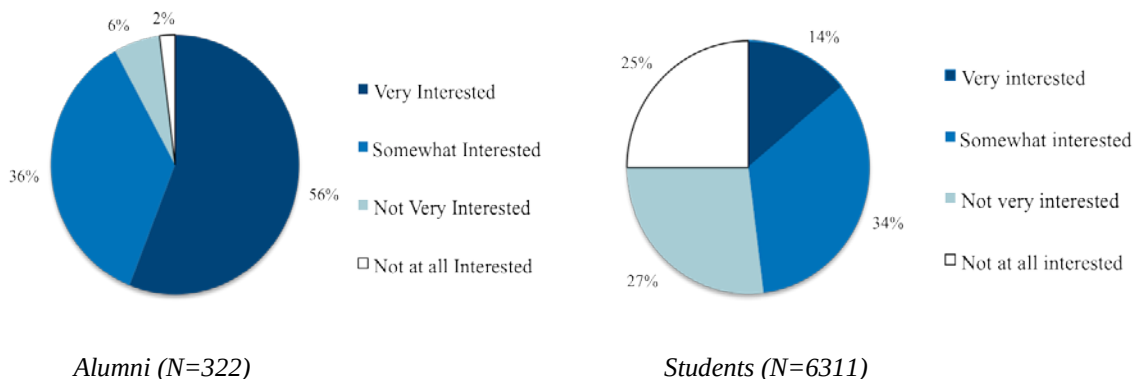
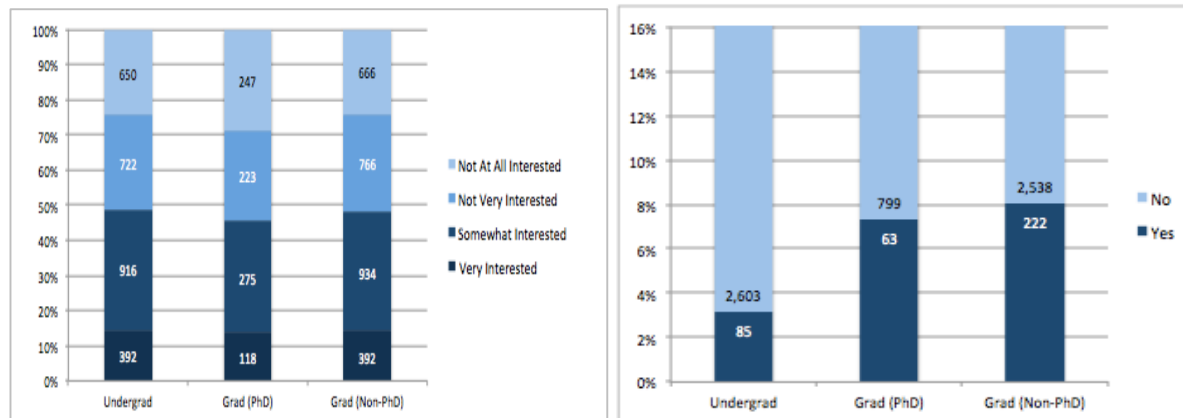


Exhibit 9b: Interest in online learning is high among students across degree programs

Are you interested in taking an online course?

Have you taken an online course before?



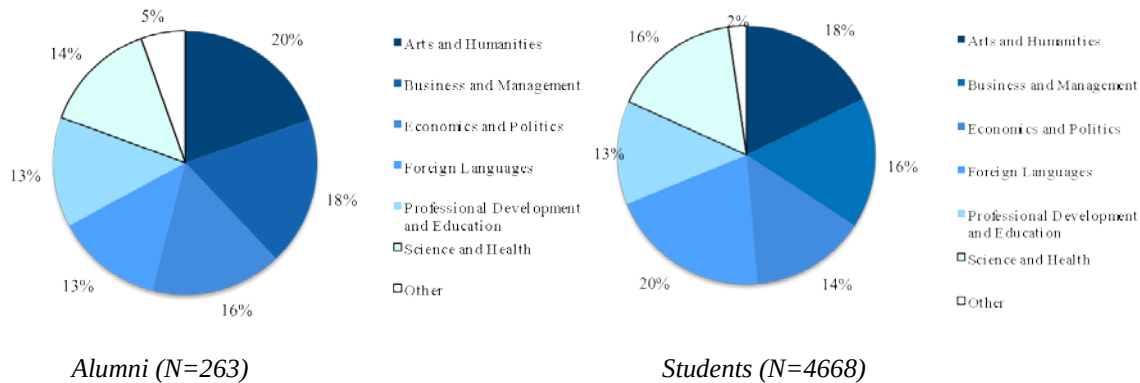
Alumni and students also share similar interests in subject matter, with 10 to 20 percent of both students and alumni citing their interest in Arts and Humanities, Business and Management, Economics and Politics, Foreign Languages, Professional Development and Education, and

¹⁹ Note that survey selection bias may be particularly pronounced for alumni respondents – only 322 took the survey. For instance, respondents may be more engaged with the Columbia network/experience than average alumni.

Science and Health. By a small margin, alumni preferred Arts and Humanities while students were most interested in Foreign Languages.

Exhibit 10a: Alumni and students share subject interests for online learning

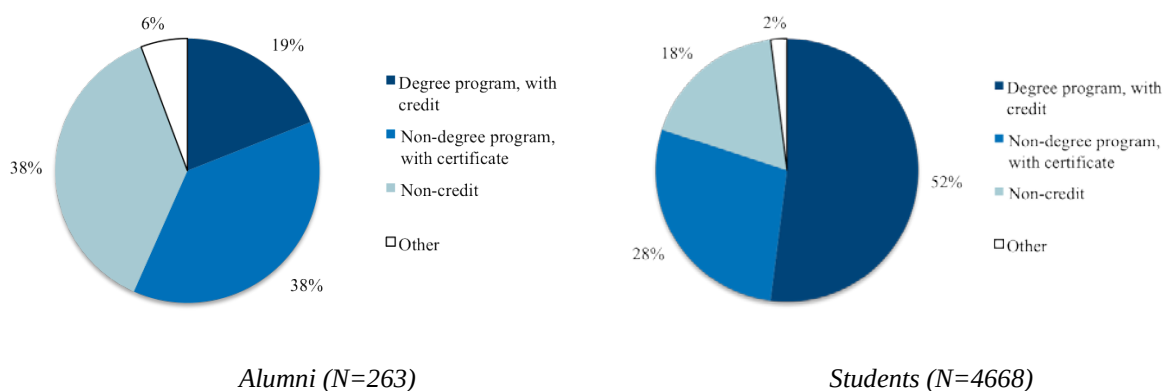
What subjects of University-sponsored online courses would you be most interested in?



While alumni and students share a significant interest in online learning and in subject matter, they differ with respect to their interest in for-credit versus non-credit programs. As seen in Exhibit 9, students strongly prefer degree programs to non-degree programs, while alumni lean toward non-degree programs with certificates.

Exhibit 10b: Alumni and students diverge in preference for credit v. non-credit

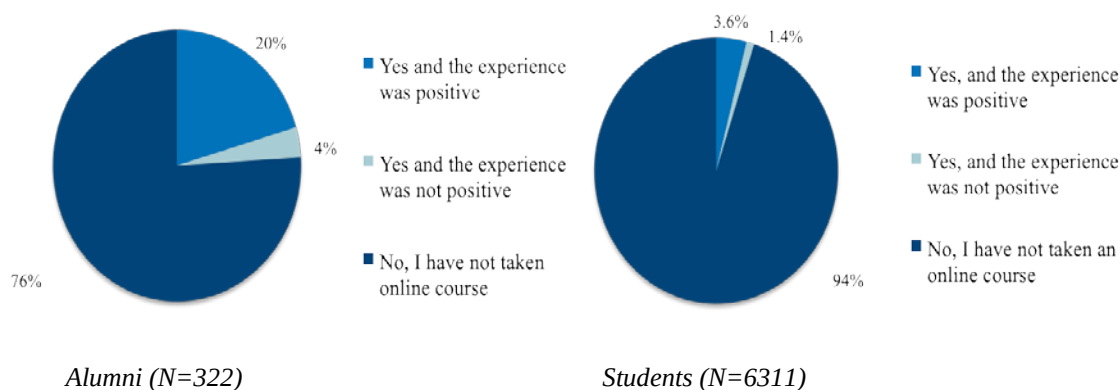
What kind of University-sponsored Online courses would you be most interested in?



Despite this significant interest, only a small number of students and alumni have taken online courses. As shown in Exhibit 11, 76% of alumni and 94% of students said they had never taken an online course. The difference between interest level and past experience here suggests a great opportunity to expand Columbia's online programming.

Exhibit 11: Experience with online learning is low

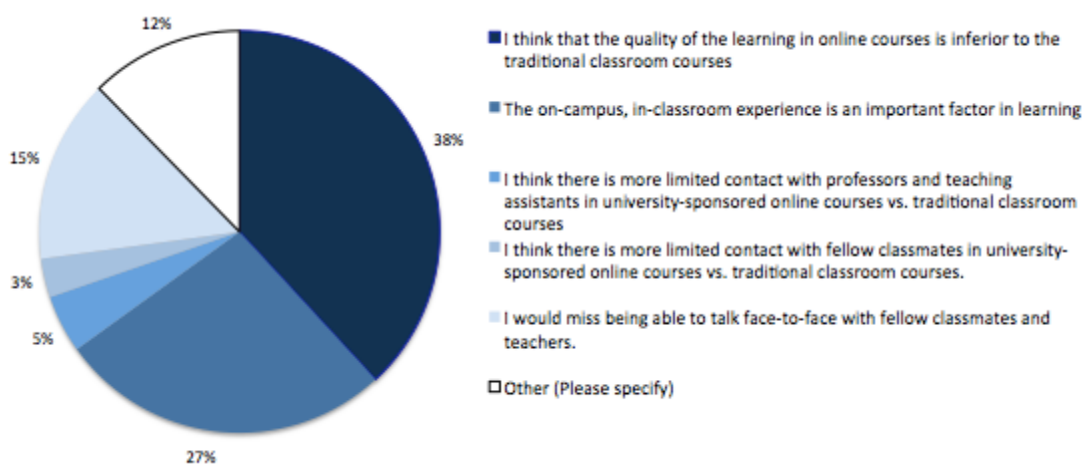
Have you ever taken an online course before? Was it a positive experience?



An openness to use online tools combined with a lack of deep familiarity with the services and opportunities available suggests that the online learning potential is not being fully leveraged. A central repository and clearinghouse for information or at least a defined point of contact available to student and alumni alike will significantly aid efforts to improve knowledge of and access to all levels of Columbia's online initiatives.

It is important to note that students who originally expressed disinterest in online courses indicated that the most important reason for their lack of enthusiasm was pedagogical; they believed that the quality of online learning is inferior to traditional in-class learning (38% of responses.) The second most important reason, i.e. that the on-campus in-classroom experience is important (27% of responses) echoed the first. The formal breakdown of these responses can be seen in Exhibit 12.

Exhibit 12: Students believe on-campus learning to be important



From this data, we understand that students value the on-campus, in-person experience. We affirm that any online learning initiatives should not be considered a replacement for the campus experience but rather as supplementary tools and programs.

3.3.2 FACULTY SUPPLY OF ONLINE TEACHING

It is also vitally important to consider the faculty perspective. Nationally, faculty interest in online learning has been lukewarm thus far. For the past nine years, only one third of chief academic advisors nationwide have reported that their faculty members “accept the value and legitimacy of online education,” (Allen and Seaman 2013, 6).

As survey data indicates, a majority of faculty believe that teaching online courses is both a labor-intensive undertaking and is not adequately incentivized by their institutions. However, much of this labor cost would be incurred up front, with the marginal cost of adding additional courses being relatively low. Although schools have offered faculty a range of financial and non-financial incentives for *developing* online courses, such support has been lacking for the *teaching* of courses, (McCarthy and Samors 2009, 31). This is an obstacle to creating and sustaining new online content, as roughly 64% of surveyed faculty believe that online course material takes more effort to teach than face-to-face equivalents (Seaman 2009, 26). This perception of increased difficulty is borne out by the observation that approximately half of part-time and full-time faculty-members who teach online courses are required to complete significant amounts (an average of 22 hours’ worth in the survey sample) of training (WCET et al. 2010, 1).

“My subject has been taught more or less the same way for over 2000 years--I see no good reason for changing things now!”

- Faculty Member

“[I] would truly welcome expansion of such academic services. CU needs to get with the rest of the world and open up.”

- Faculty Member

Notably, faculty acceptance of online learning is not necessarily higher among younger professors who are more technology-savvy and/or familiar with online learning. Indeed, survey data indicates that those with the least amount of teaching experience, (i.e. 0-5 years), are the least interested in teaching online courses, whereas senior faculty (i.e. those with 20+ years of experience) teach online materials at rates equivalent to the rest of faculty (i.e. those with 6-19 years of experience) (Seaman 2009, 15). Undoubtedly, the age gap reflects the need for junior faculty to spend their effort in publishing to gain tenure.

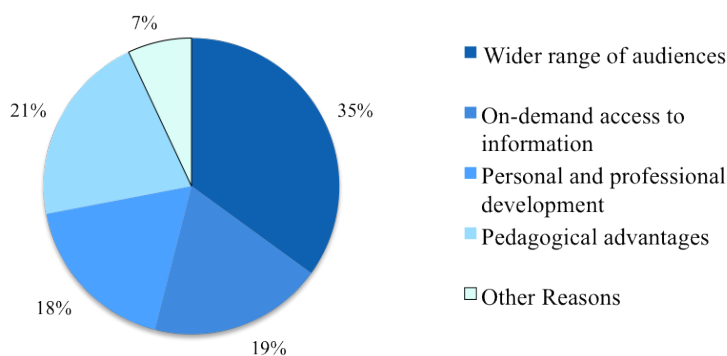
Many faculty members are thus reluctant to adopt this new form of media. These data, along the antidotal evidence and parallel arguments raised by the Senate’s Faculty Affairs Committee in [Appendix 9](#), suggestion that one of the key factors to expand Columbia’s online offerings is to reduce the barriers to faculty adopting online teaching tools. Recommendations on how to meet these needs are presented in [Section 5.5](#) below.

In a survey conducted of Columbia faculty during the first two weeks of April 2013, 64% of the 451 respondents used an online learning management system like Courseworks in their courses. Yet only 11.5% of the faculty polled stated that they have taught an online course (e.g., MOOC, hybrid or flipped classroom). Of those faculty who had taught online courses, 80% felt that the online teaching contributed significantly to the course material.

Furthermore, 42% of the faculty indicated that they would be interested in teaching some form of online course. When asked the most important reason for wanting to teach online, Exhibit 13a illustrates that 35%, the largest share of faculty respondents in the survey to Columbia faculty, reported “wider range of audiences” as the primary motivation to developing online content. These results suggest that faculty interest in online learning is largely audience-driven and could be heightened with examples of classes with impressive and successful reach.

Exhibit 13a: Faculty want to reach a wider audience

What reason is most important for wanting to teach online?



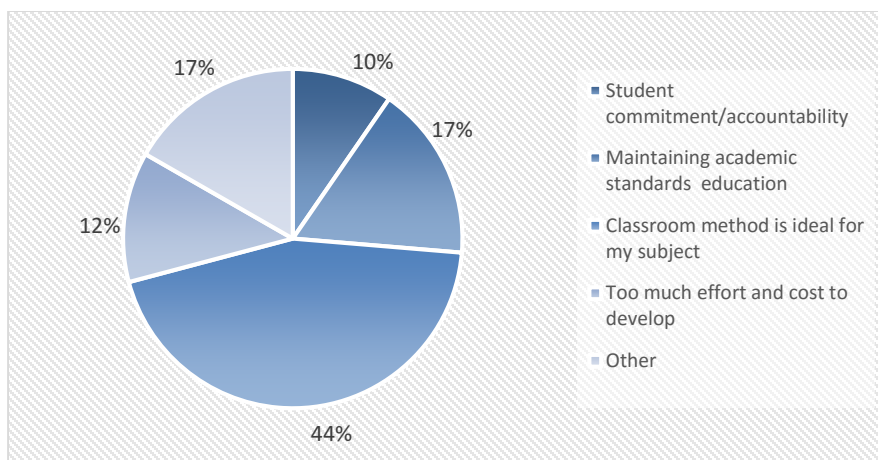
Faculty (N=206)

For those faculty who were uninterested in teaching online courses, 44% stated that the most important reason for not wanting to teach online was that they viewed the classroom method as the best pedagogy for their subject, while 17% emphasized the need to maintain academic standards.

Columbia faculty interest in teaching online courses remains mixed, mirroring national sentiment. The survey results also indicate that a while a substantial minority of the faculty see the pedagogical advantages of online teaching, a more significant portion still believe that traditional in-class teaching methods are best. The importance of the in-class learning environment for the faculty echoes the weight students placed on face-to-face contact with professors. Therefore, online learning should not be viewed as a substitute for the residential-college educational model. Rather, if done right, online learning tools can enhance current classroom pedagogy and, where appropriate, broaden faculty reach to non-traditional audiences.

Exhibit 13b: Faculty view the classroom method as best

What reason is most important for not wanting to teach online?



Faculty (N=209)

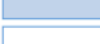
4 BENCHMARKS AND DEFINITION OF SUCCESS

In order for Columbia to be a thought leader in online initiatives and a custodian of a unique value proposition for online activities, it must better understand the initiatives of its peer institutions. Currently, we operate with only a headline-level understanding of peer institutions' initiatives, such as MIT and Harvard's joint venture, edX. Evaluating best practices of other institutions on a more granular and tactical level will be fundamental for Columbia to best understand how to approach, implement, and evaluate changes that best serve its interests.

4.1 PEER SCHOOL COMPARISON

Exhibit 14 presents a "heat map" analyzing the depth and intensity of peer institutions' programming at a high level. The initiatives are separated into credit-bearing programs and certificate or non-credit programs, as these categories have different potential effects on Columbia's brand and implications for Columbia's credit-bearing residential programs. The second row divides these programs along the four targeted student audiences described in [Section 2](#) above: traditional residential, traditional residential with limited distance, distance students with limited residential and traditional distance. The color guide on the right-hand side indicates the number of courses offered in each of the categories by institution, ranging from no courses offered to over one hundred. The red triangle denotes if a school offers a course to traditional residential students at the same time it makes that course available to distance or non-residential students.

Exhibit 14: High-level overview of online programming among peer schools

Peer school	Credit-Bearing Programs				Certificate/Non-Credit Programs			GUIDE
	Traditional Residential	Trad. Res w/Limited Dist	Dist. Students w/Limited Res	Traditional Distance	Non-HS Cert. Programs	General Public w/o Admissions Reqt.	High School	
 Columbia								
 Brown								
 Cornell								
 Dartmouth								
 Harvard								
 Penn								
 Princeton								
 Yale								
 Chicago								
 Duke								
 Hopkins								
 MIT								
 Stanford								

4.2 BEST PRACTICES

Looking at the directly administered online initiatives of Columbia's peer schools in the Ivy-Plus cohort, we note that Columbia has a number of unique advantages. First, Columbia has one of the widest reaches of any school, covering all segments of the population, except for the category of traditional residence with limited distance. The School of Continuing Education has just begun offering a residential summer high school program. Second, Columbia offers a wide range of high quality programs as exemplified by the wholly online Master's in Statistics discussed in [Appendix 2](#), and the hybrid certificate program in Health Information Technology discussed in [Appendix 3](#).

Importantly, our investigation of the online learning space found that several schools, such as Duke, Johns Hopkins, and Stanford, had significant online offerings largely separate from their traditional residential students. On the other hand, certain programs at Columbia, Cornell, Penn, and Yale seem designed to leverage existing resources and expand academic offerings to traditional residential students. At Columbia, Cornell, and Yale, a three-university consortium provides instruction in rare and advanced languages by allowing such courses to be offered via videoconference when regular demand at any one institution would not be enough to support a class. Similarly, Penn, for instance, offers summer language programs to its traditional full-time students, allowing them to continue their learning and practice of language skills. Expanding online programs targeted at full-time students beyond language programs is a natural next step in the progression of online learning. Examples of other offerings include courses in the natural

sciences and other research-based disciplines where there is a comparatively small supply of faculty available for teaching.

A number of institutions, including Johns Hopkins and Duke, offer M.S. and M.A. degrees that can be completed entirely online. Students can take courses online or in the classroom and receive degrees that do not indicate the method of instruction. In general, this practice seemed more common in the science and engineering disciplines, although programs in other areas exist as well. Notably, some universities employ a hybrid model, requiring students to complete coursework online before visiting campus (or another site) for short “residencies”—executive M.B.A. programs are prime examples of this practice.

Furthermore, the universities we researched have entered the MOOC space to varying degrees, both in terms of quality and number of courses. Platforms like Coursera, on which a number of schools have hosted courses, represent fairly high quality entrances into the space whereas other schools like MIT have taken a high volume but less interactive approach, opting to simply post course materials. While it is still unclear if MOOCs will generate significant revenue, they can help develop the brand of an institution as a form of community engagement and an embrace of 21st century technology.

For a more comprehensive school-by-school peer review, see [Appendix 12](#), which provides a detailed overview of online learning programs in the Ivy League. [Appendix 13](#) provides a brief description of key terms used in the peer school study.

4.3 DEFINITION OF SUCCESS

Three benchmarking criteria worth consideration in the evaluation of online initiatives include:

1. Leveraging greater use of existing intellectual resources and methods at home institutions;
2. Exploring new pedagogical methods to enrich the current curriculum; and
3. Enhancing the level of engagement of current, future, and former students.

The aforementioned three-university language consortium is an example of leveraging greater use of existing resources. The language consortium allows each school to provide offerings that would otherwise have not existed with the demand from a single school—moreover these offerings benefit from economies of scale at other schools, with each school offering multiple languages. MIT, with its proprietary OpenCourseWare platform, also uniquely leverages existing resources by posting thousands of course lectures, notes, and assignments online for public consumption. While this program does not generate revenue, it positions MIT as a leader in the open segment of the online education space and is an important form of institutional community outreach.

Another factor in defining success of online initiatives is the ability and the support to explore pedagogical innovations, such as the flipped classroom, where Harvard is making strides as a first mover in the space. At Harvard, certain classes in the sciences and mathematics, including an

introduction to differential equations course, are exploring a flipped classroom model where lectures are being migrated to online videos and more of the in-class time is being dedicated toward group problem solving. While this style is not particularly new, it stands in contrast with the structure of most university courses.

Online learning also has the ability to help bridge the gap between current students and alumni, or, as Dean James Valentini describes them, “future alumni” and “former students.” Forever Duke provides a means in which a traveling physical program, not dissimilar from “One Day University” programs, is augmented by Duke’s online offerings through Coursera and its proprietary platform. However, Duke’s current online offerings with respect to alumni engagement are not exclusive to Duke Alumni. Creating an element exclusive to a University’s alumni base could enhance engagement and provide a significant incremental revenue opportunity relative to the lay-user.

Columbia, with its storied Core Curriculum and the ability to tie-in New York City as an alumni-specific outreach tool is uniquely positioned to take advantage of such opportunities for alumni engagement. Furthermore, its entrance into the online language education space could prove important, given that there are currently very few online language courses by Columbia’s peer schools and thus is an area with growth potential.

5. KEY STRATEGIC INITIATIVES AND TIMELINE FOR IMPLEMENTATION

We summarize current best practices and opportunity areas as follows:

1. **Focus online learning efforts**, first and foremost, on current students and affiliates.
2. **Emphasize content provision** over technology development (i.e., we should not develop our own MOOC platform).
3. **Avoid lock-in** to any single technology platform or vendor.
4. **Rationalize and consolidate** core functions. Where feasible, centralize common overhead costs for classroom and technology upgrades to enhance pedagogy for traditional students.
5. **Incentive faculty** to adopt new technologies in current courses, such as providing course relief and/or a Digital Research Assistant.
6. **Adopt transparent and clear guidelines** when deciding on areas of investment. Course offerings to non-traditional students via MOOCs or third parties should highlight current strengths and reasonably cover development costs.
7. **Foster** university-wide **faculty governance** by incorporating existing decision making bodies (e.g., include representatives from the Senate Online Learning and Education committees).

Building on these best practices and leveraging Columbia's historic comparative advantages in innovation, location, and decentralization, the taskforce offers a series of strategic initiatives to strengthen Columbia preeminence in online education. The purpose of these initiatives is to improve accountability, transparency, and information flow across the various units engaged in online activities, and thereby ensure that the allocation of resources align with the university's overall goals for teaching, research and outreach.

5.1 REALIGN ONLINE INITIATIVES

5.1.1 CENTRALIZE A LIMITED NUMBER OF FUNCTIONS

Columbia's online activity has grown organically; online initiatives are a natural extension of Columbia faculty's international research and collaboration efforts. Consequently, a wide variety of administrative and logistical functions are dispersed across Columbia, leading to confusion from faculty and students as to where, when, and how to engage with online initiatives outside of their immediate departments. Further online learning initiatives at Columbia should complement and coordinate with its already rich portfolio of online opportunities, many of which are established and administered at the school level. As tasks associated with this mandate lie exclusively with academic entities, the lines of authority are confusing and often redundant. Because responsibility for online initiatives is subdivided across the University, there is a lack of strategic alignment between online initiatives at various levels. To that end, **we recommend that the lines of authority governing Columbia's online initiatives, including Continuing Education, Center for New Media Teaching and Learning (CNTML), and Office of Digital Initiatives, and a limited subset of functions be consolidated under central administration or a central platform.**

Care and diligence should be exercised in selecting these functions, as it is intended that the establishment and operation of academic exchanges of any type remain with the deans and their respective faculty. Specifically, these functions should be administrative and logistical only and deal with situations where more than one school is involved, or where the online initiative in question represents the university as a whole. Broadly, these functions should unify both Columbia's own online initiatives, and Columbia's role in hosting initiatives with peers and partners. Under this framework, central institutional support enables innovation at the individual school and faculty level.

Examples of new or widely dispersed operations with no single point of responsibility and therefore ideal candidates for consolidation include:

1. Offering course material online to existing residential students and supporting online discussion and coordination between classmates.
2. Official institutional exchanges and visits, necessary for hybrid model programs.

3. At times and when appropriate, assist individual deans with establishing cross-faculty partnerships.

An administration-based platform, because of its centrality, could substantially improve production quality and utilize economies of scale not currently leveraged by the existing independent online initiatives.

School-based platforms are conducive to instructor familiarity and comfort with the online tools. School-based platforms might support more specialized courses online and course-specific pedagogy. Both the benefits of administration and school-based models could be leveraged in a structured form of oversight and direction given administratively to school-specific online initiatives, both to those that exist and those that are yet to be developed.

5.1.2 REORGANIZE ONLINE INITIATIVES

The current organizational structure related to the creation, delivery and maintenance of online learning programs and courses is sketched out in the left-hand panel of Exhibit 16, under the heading of Status Quo. Here we see parallel decision-making structures, each with distinct reporting chains. As illustrated in Exhibits 1a and 1b and detailed in [Appendix 8](#), much of the ongoing efforts on online learning takes place at the individual schools, with Continuing Education and the School of Applied Engineering maintaining the most robust programs. We also see from the current structure that the work of the schools is undertaken largely independent of the activities of the Chief Digital Officer, the Center for New Media and Teaching and Learning or with any reference to the Learning Management Systems (e.g., Courseworks) developed and maintained by the Teaching and Learning Applications (T&L Apps) unit in CUIT.

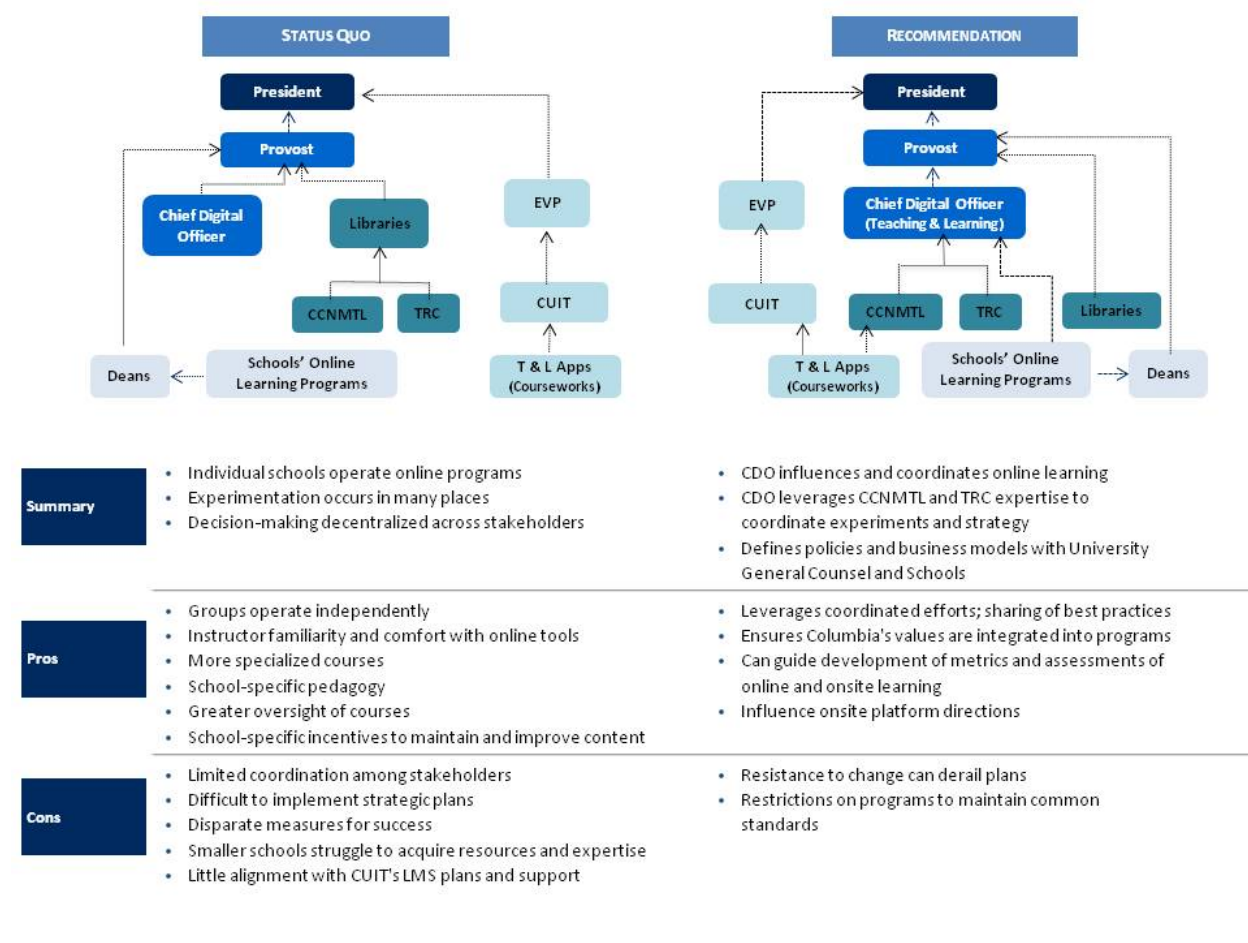
A summary of the Status Quo organization highlights that individual schools operate their own online programs with no cross-reference to what is going on in other schools or centrally. Experimentation occurs in many places in the organization, by the schools, by CUIT, and by the Libraries via the Center for New Media Teaching and Learning and The Teaching Resource Center. Decisions about what programs and courses to offer and the resources to allocate are disseminated across stakeholders.

On the plus side, a decentralized organizational structure enables groups to operate independently of one another, making programs more flexible and responsive to their core constituents. Courses can be more specialized and tailored, adopting school-specific pedagogy. Consequently, the schools have the incentives to maintain and improve on the course content. The downside of a decentralized structure is a lack of coordination and shared-expertise across schools. Moreover, smaller schools with limited resources may be unable to incur the steep learning curve and startup costs online programs entail. In addition, there is limited opportunity for strategic alignment between the learning management systems that are developed and maintained by the central

administration and online platforms adopted by the schools, thereby increasing redundancy with no common benchmarks to evaluate success.

Taking into account both the strengths and challenges of the current organizational structure the task force recommends an architecture that incorporates both the expert knowledge based in the schools and the need to coordinate offerings across the university and reduce production and overhead costs. One possible proposal is illustrated in the right-hand panel of Exhibit 16, labeled Recommendation.

Exhibit 15: Proposed Organization Structures



Here we see that the Chief Digital Officer, which should probably be renamed, coordinates online courses but also facilitates the adoption of online technologies into the pedagogy of existing courses. The Chief Digital Officer thereby leverages the expertise of the Center for New Media Teaching and Learning and an enhanced of the Teaching Resource Center (TRC) to coordinate

experiments in teaching and learning and set strategy.²⁰ The Chief Digital Officer helps define university-wide policies, working with the University Senate, General Counsel and schools.

The advantage of this hybrid organizational model is that it leverages coordinated efforts and sharing of best practices, and thereby provides a common standard for developing metrics and assessment tools for online and onsite learning. The difficulties in implementing this reorganization rest in resistance to change and restrictions on programs to use common standards and approaches as well as shared resources.

Whatever model is adopted, Columbia should seek excellence in its online content by identifying the overlap between its institutional strengths and more undeveloped areas in the online education space, also keeping in mind where it might be best to take advantage of existing platforms. Moreover, it is essential to strike a balance between programs aimed at Columbia affiliates and programs meant to engage the broader public. The proposed division of labor that allows schools to continue to serve traditional constituencies alongside a Chief Digital Officer that emphasizes broader audiences may achieve both objectives.

5.2 ORGANIZE AND EVALUATE

5.2.1 DEVELOP METRICS TO EVALUATE ONLINE LEARNING

To address the opportunity areas of a lack of a defined mission and benchmarks for success, **we recommend that, in consultation with stakeholders, a review system based on a series of metrics be developed for online learning.** This review system should address the following questions:

1. Is online learning being effectively utilized?
2. Is online learning improving Columbia's brand and presence?
3. Is online learning facilitating collaborative efforts that otherwise would not have taken place?
4. What additional resources would online learning programs require to better address its mission?

"This is a very interesting area and while there's a lot of uncertainty about the future, it is really important that we have a dialogue and potentially a plan for this growing part of higher education."

– Faculty Member

²⁰ The current Teaching Resource Center mostly assists graduate students in acquiring basic skills to effectively lead sections that are attached to larger introductory courses or part of the Core Curriculum. An expanded Teaching Resource Center that also provides direct support to faculty in delivering course content to traditional as well as nontraditional online students could give Columbia a competitive advantage in adopting pedagogical techniques to match both audience type and technology platform.

The set of specific metrics or criteria should be developed in consultation with all stakeholders. At minimum, the metrics should include:

1. Number of students served through online programs
2. Number of degrees and/or certificates granted through online programs
3. Revenue generated by online programs

Accordingly, a comprehensive review of each online program should be undertaken at least every two years to reassess resources and needs.

5.2.2 DEVELOP AN ASSESSMENT STRUCTURE

To assist in oversight and evaluation, **we recommend additions to the existing advisory and governance structure.** The group will serve a dual mandate, both to advise decisions requiring broad stakeholder input, in particular the recommendations listed above, and to represent the interests of their constituencies.

The advisory and governance structure should be modeled on similar existing structures throughout the university, notably the Columbia University Arts Initiative. A recommended membership list may be found in the box at the right.

Membership:

- *Faculty steering committee*
- *Advisory boards for each center with donors, regional thought leaders, and alumni*
- *At least one dean of an undergraduate school*
- *At least one dean of a graduate school or faculty*
- *At least one director of an online program*
- *Tenured faculty*
- *Full-time researchers*
- *Student Advisory Council*
- *University Senate representative*
- *Alumni representative*

5.3 ADOPT AN ECONOMICALLY VIABLE MODEL OF ONLINE LEARNING

To take advantage of the developing online learning space, the University must proceed with caution to avoid committing to content delivery methods that, although perhaps are significant to the evolution of the space, may not be optimal when the online learning industry reaches maturity. The supply of online providers has been growing rapidly, and many of them will likely not survive, given that quick consolidation into large, cross-platform participants like Blackboard and Scholastic Publishers is a definitive market feature. For instance, the current MOOC and learning management system delivery methods might fall by the wayside as consortiums of large publishers with considerable market power are digitizing the notion of the textbook and offering it online. The behavior of these publishers points to the trend of adopting new technologies to supplement current teaching methods. In other words, as opposed to the entirely online approach of MOOCs, universities favor leveraging new technologies—like interactive digital textbooks—to augment students' classroom experience.

The demand population of the online learning market is highly diversified, and Columbia has a competitive advantage in servicing only a small portion. Therefore, Columbia must investigate which technology works best for its natural audiences, that is, which components of the online learning demand curve (market segments) can Columbia uniquely serve at a low marginal cost. Moreover, since we already see a wide range of competing technology platforms, Columbia should **invest in content provision** instead of building competing platforms.

In short, the University, with its renowned faculty and research centers, has a competitive advantage in developing content in the online space—it should seek to **partner with a range of delivery systems to reach broader audiences**. The attrition we see in the online learning space means that it is important to avoid signing long-term contracts with online delivery service providers that may not retain leadership positions in the space. Practically, the University should **focus on developing its internal capacity to generate online content**. Columbia should encourage professors to use online tools in their courses while also developing an action plan for creating online versions of popular courses that can be distributed across platforms.

Particularly, the University should consider **raising funds to establish a digital research center**, perhaps as part of the Teaching Resource Center, which would assign staff to curate content for online offerings. Personnel would assist professors in efforts to digitize their course materials and make use of online content delivery platforms. We see potential to generate revenue by collecting royalties from Columbia content released on private platforms and by perhaps recovering advertisement dollars from content published online (e.g. click-through advertisements to the Columbia YouTube channel).

5.4 FOCUS ON EXISTING COLUMBIA STUDENTS AND AFFILIATES

5.4.1 TOOLS FOR FACULTY AND RESEARCHERS

Columbia makes available a number of resources for faculty and researchers. Examples include:

- **CourseWorks** is Columbia University's online course management system. With CourseWorks, instructors can easily manage course materials, class meetings, assignments, and student collaboration from a single website.
- **Edblogs** make it easy to share course content and create an online community using a blogging format. Educational blogging can be used to promote classroom discussion, conduct student journaling and reflective writing assignments, and create online portfolios.
- **Columbia Wikispaces** is a simple, web-based wiki platform that makes group activities and course management flexible and customizable. Wikispaces is notably different from a course management system because of its ability for students to contribute multimedia content and to collaborate on assignments.
- **Columbia Wikischolars** is an online collaboration service for Columbia University researchers and scholars. Columbia researchers, instructors, and graduate students can

request a Wikischolars wiki site. A wiki is a website that is easy to create, update, and revise without having to know a technical or programming language. Wikis facilitate collaboration by allowing multiple organizers and members from within and beyond the university.

- **Columbia on iTunes U** can be used to deliver course media to students, faculty, and the public through Apple's popular iTunes application. This service allows faculty to publish and manage collections of course lectures, course-related media files, and campus events that students can access anytime.
- **The Columbia University YouTube** channel provides access to Columbia-produced academic videos and enables instructors and administrators to share videos online for educational, promotional, and other uses.
- **Mediathread** is an innovative new platform that supports multimedia analysis within a communal environment. Users of Mediathread are able to lift video, audio, and image items from a range of digital collections and then work with them in a course-specific website to produce multimedia essays that can be submitted for instructor review.

If we want the faculty to adopt these tools into their classrooms, we need to make it easy for them to do so. Some current tools are Canvas, Coursera, CourseBuilder, Blackboard, and OpenClass (Pearson), although we anticipate new tools and greater access to other, existent tools in the next year. To facilitate integration into the classroom, we need to make these tools readily available and—likely—offer access to those who could teach faculty how to use them. **An enhanced Teachers' Resource Center provides one possible source.**

We also recommend a focus on the need for university-wide licenses, for basic tools like Screen Flow and other third party technologies necessary to incorporate digital pedagogies into the traditional classroom experience. Of course, the faculty would need access to funds to facilitate moving current content to new digital formats.

5.4.2 ACCESS FOR STUDENTS

Access for students entails how we will make materials available to various student bodies. In particular, how will students at Columbia benefit from incorporating online learning techniques into the current curriculum? For example, do we offer a flipped-classroom models alongside traditional in-class offers, letting students take the both courses for credit, or treat separately?

Already pedagogies and content developed for MOOCs and other online efforts have been filtering back to on-site students. For example, the mastery pedagogy used by Coursera relies on quizzes and frequent testing. Such testing is supported by cognitive theorists as effective, especially when such testing includes the immediate and detailed feedback that allow students to learn from their mistakes and students can take the quizzes multiple times until they master the material. Testing features within Sakai (SAMigo) are increasingly being utilized for similar gains with on-site students, with Columbia University Medical Center (CUMC) Schools taking a lead.

Faculty teaching MOOCs have benefitted from large investments (some coming from Columbia and some from external sources) in the production of video content for their courses. This content in almost all cases is also being used for the benefit of Columbia students. Additionally, much of this content is being created as open content and available from multiple repositories. When lectures and presentations are recorded, faculty are also experimenting with different kinds of class sessions that lean toward more student-centered engagements. Numerous faculty have participated in workshops to discuss how to best flip their classroom, so that instructors can be more active and involved in student learning.

Another interesting gain from MOOC experimentations is that faculty presentations go through a fairly comprehensive quality assurance review when thousands of students use them and send comments. Many of those suggested fixes, updates, and improvements are then being brought back into the on-site courses. For example, at the suggestion of various online students, slideshows for one MOOC were improved to include call-outs and highlights on each slide to make it easier to understand the review of complex illustrations and graphics. These updated and much-improved slides will be used for the Columbia course.

5.4.3 FOCUS ON CONTENT PROVISION

Focusing on providing services and facilitating content development are key. Strategic resource allocation should be directed toward enabling the faculty to adopt and readily use the technology in the classroom and, where it makes sense, in online or hybrid/low residency settings and perhaps even MOOCs. The more Columbia organizes and leverages open collaborative efforts with like-minded institutions, the more it can accomplish; and the more that it integrates with external online services over homegrown versions, the faster it can develop new services for its constituents at commodity prices.

For Columbia to foster these kinds of interdependencies, Columbia has to be open and willing to guide the institution through the many facets of this change, including overcoming thorny policy and legal issues.

5.5 RECOMMENDATIONS AND TIMELINE FOR IMPLEMENTATION

Columbia's next steps to build on strengths and expand reach can be summarized as follows:

5.5.1 EXPAND CAPACITY TO DEVELOP ONLINE COURSE CONTENT

- Create Center for Teaching Excellence to facilitate faculty adoption of new technology and share learning across the university.
- Build technology studios and infrastructure to support units.
- Archive and manage content to be repurposed across courses.

- Focus on content provision, not service provision; do not create a unique massive open online course (MOOC.) Avoid lock-in with current technology.

5.5.2 DEVELOP INTERIM COURSERA/EDX PILOT COURSES

- Faculty can adopt a flipped-classroom model, leveraging technological capabilities to enhance pedagogy for on-campus students.
- Schools can package content for degree students, either in purely online or hybrid programs.
- Revenue generated should cover development costs.

5.5.3 ENCOURAGE LINK BETWEEN GLOBAL CENTERS, ALUMNI AFFAIRS AND DISTANCE/ONLINE LEARNING PROGRAMS

- Alumni is an underserved population for online programs.
- Bundle online content to meet needs of Global Centers' constituencies.
- Expands Columbia's reach to new audiences and donor base.

Many of the initiatives recommended here are currently underway. Multiple Columbia schools are currently tightening their online programs, actively shoring up their business model and expanding their access to various constituent groups. Nonetheless, considerable work remains. The following action items are divided by two and three to five year timeframes.

Over the next two years, reasonable goals include:

1. Explore interim Coursera or edX programs;
2. Reorganize online functions under a Chief Digital Officer;
3. Create Teaching Resource Center;
4. Expand capacity to develop online course content and share experience and investment across the university; and
5. Create an advisory and governance structure to review online learning at Columbia.

Over the next three to five years, reasonable goals include:

1. Build technology studios and infrastructure to support development of online content;
2. Archive and manage content to be repurposed across the institution and courses;
3. Develop hybrid courses in conjuncture with expansion of the Global Centers, while experimenting with various distance learning models linked to more traditional programs like the Global Scholars and study abroad;
4. Finalize the business models for online learning programs;
5. Advertise and market online learning programs, highlighting their activities, ongoing opportunities, and future benefits.

APPENDICES

APPENDIX 1: SENATE ONLINE LEARNING TASK FORCE

The Senate Online Learning Task Force is a University-wide group, including faculty, students, alumni and administrators from the School of Continuing Education, Arts and Sciences, and Professional Schools. The Task Force primarily focuses on three central themes: 1) Pedagogy, 2) Technology and 3) Audience. The Task Force delivers a report identifying Columbia's key strategic opportunities and challenges in the emerging online learning space.

1.1 TASK FORCE ROSTER

- | | |
|--|---|
| • Adam Cannon, Computer Science | • Sen. James Applegate, Astronomy, Physics |
| • Sen. Akshay Shah, Student, SEAS | • Kristine Billmyer, Continuing Education |
| • Sen. Anjelica Kelly, Columbia Business School | • Sen. Letty Moss-Salentijn, Dental Medicine |
| • Assaf Zeevi, Columbia Business School | • Maneesha Aggarwal, Information Technology |
| • Sen. Cleo Abram, Columbia College | • Sen. Matthew Chou, Columbia College |
| • Sen. K. Daniel Libby, Senate Alumni Relations | • Maurice Matiz, CCNMTL |
| • David Madigan, Statistics | • Sen. Philip Stephenson, Journalism |
| • Dennis Tenen, English & Comparative Literature | • Sen. Richard Sun, Columbia College |
| • Donald Davis, Economics | • Sen. Selim Lika, Continuing Education |
| • Eitan Grinspun, Computer Science | • Sen. Sharyn O'Halloran, Political Science, SIPA |
| • Ellen Meier, Teachers College | • Sen. Soulaymane Kachani, Industrial Engineering |
| • George Hripcsak, Biomedical Informatics | • Sree Sreenivasan, Journalism |
| • Sen. Gerald Sherwin, Senate Alumni Relations | • Marni Stein, Continuing Education |

1.2 A SUMMARY OF DELIBERATIONS OF THE UNIVERSITY SENATE TASK FORCE ON ONLINE LEARNING, 2012-2014:

Fall 2012

September 19, 2012

First meeting. Remarks from Sree Sreenivasan, Chief Digital Officer

September 26, 2012

Informal discussion with Daphne Koller, co-founder of Coursera, the purveyor of Massive Open Online Courses (MOOCs); Columbia has signed on to sponsor produce MOOCs with Coursera in two engineering subjects.

December 5, 2012

Presentations from members Maurice Matiz, co-director, Center for New Media Teaching and Learning, on the range of online programs available at Columbia, the work of the CNMTL, and trends in the online learning marketplace; and Prof. Ellen Meier of Teachers College, on online pedagogy and the importance of course design.

Spring 2013

January 28, 2013

Presentation from Prof. Hitendra Wadhwa of the Business School on online courses he has developed at using the Canvas platform.

February 20, 2013

Presentations from Marni Baker-Stein, senior associate dean for curriculum and instruction in the School of Continuing Education, on technologies that SCE uses to support its online programs; Maurice Matiz on an overview of platforms and web services.

March 12, 2013

Presentation from Andrew Hermalyn, executive vice president, 2U Inc, and his EVP for production, Ian Van Tyl, on for-credit online academic programs that their company provides in partnership with a number of universities; 2U also manages administrative services online for colleges and universities.

March 27, 2013

Task Force planning session: tasking for the final report.

April 16, 2013

Second informal discussion with Coursera co-founder Daphne Koller.

May 7, 2013

Task Force planning session; further tasking for the final report.

Summer 2013

June-July 2013

Contributions from various working groups incorporated into the report.

August 11, 2013

Draft version of the report circulated for comments

September--October 2013

Revisions incorporated into the draft document

Fall 2013

October 28, 2013

Task Force discussed recommendations of the report.

November 12, 2013

Revised version of the report discussed

December 6, 2013

Presentation of recommendations made to the Senate Plenary

December 13, 2013

Presentation of recommendations made to the Trustee Education subcommittee

Spring 2014

January-April 2014

Senate Task Force worked with the Provost's Faculty Committee on Online Learning to coordinate efforts. Additional revisions made to the report.

June 2014

Final report issued

APPENDIX 2: VIGNETTE ONLINE MASTER'S IN STATISTICS

Our online Statistics M.A. program aims to make high-quality Columbia classroom instruction available to the diverse range of qualified students who are unable to enroll in standard classes due to geographical or other practical constraints. Our courses are driven by (1) directed self-learning, and (2) highly interactive sessions with instructors that are tailored to student needs. For directed self-learning, students take on readings and practice exercises that are designed to actively engage the students with the material. Based on extensive feedback from this introductory section, instructors can observe where students are doing well and where they are struggling. This informs how they will choose to lead interactive sessions. Interactive sessions allow students to ask specific questions and hone in on any trouble spots. Classroom coaches (TAs) will also be available to assist students one-on-one. We generally take an interactive, high-touch approach to ensure that we can deliver a high-quality level of instruction. The program goes live in fall 2013.

Creation of the first two courses:

We went through two iterations of development. Initially, we tried to both change the content of the course, and make modifications for the online environment. The intended content change was from a primarily theoretical course into one that integrated theoretical and applied material, in an attempt to give students a full picture of the context for the material.

In the end it proved to be too much to try to create all-new content and adapt it for online. We then decided to stick as close as possible to the original class (4109), with some changes that we thought would be better from a self- and distance- learning perspective. This has worked much better, and I think will let us see where things are working well or not so well (without being confounded by the possibility that issues are due to the new content, rather than the format itself).

David Madigan

Shawn Simpson

APPENDIX 3: CASE STUDY—HEALTH INFORMATION TECHNOLOGY BLENDED SIX-MONTH CERTIFICATE COURSE**Department of Biomedical Informatics, Columbia University****Frances Morrison, Virginia Lorenzi, George Hripcsak****March 2013**

Since March 2010, our department has been running a program to teach individuals from a variety of backgrounds how to function in the Health Information Technology (HIT) workforce. The impetus for this program came mainly from federal funding we received to give students tuition assistance for a workforce program to transition them to HIT. Being a highly academic department with only a few forays into shorter training programs or “short courses,” creating a longer skills-based program required some thinking. With Cornell, our partner in the grant, we approached the development of this program methodically and with some thought over the course of nine months. Below is a description of the development of the program as well as how it has evolved over four sessions since January 2011. The program was developed with the help of the Center for New Media Teaching and Learning and initially administered by the School of Continuing Education.

3.1 DEVELOPMENT

The main priority of the program was to train people who are transitioning careers to work in the field of HIT. This meant the program had to be work friendly and fill different knowledge gaps for a variety of people from other fields. To be work friendly, we wanted the course online, but this seemed to have the potential to leave people feeling isolated; we wanted to give them a sense of a peer group. Under the guidance of John Zimmerman (Center for New Media Teaching and Learning) and colleagues we learned about team-based learning, which seemed like the ideal approach for these students. We could combine people with different backgrounds into teams that would work together throughout the six month program. They could fill in each other’s knowledge gaps and provide an established peer group. It also had the advantage of mimicking the workforce reality in Health IT where people with different skills work together on a single project. Although team-based learning is an approach that has been proven for classroom teaching, it has not been used extensively for online teaching, so the team-based learning approach evolved as the course moved forward.

Developing the curriculum proved a different kind of challenge, where we had to find a compromise between academic and workforce training. Since our department has focused to a large extent on academic and research methods in the master’s and PhD curriculum, we had to infuse some practical skills into the academic concepts we wanted to teach. Working with Cornell we assembled an advisory committee, the Certificate Program Advisory Committee. This group

met weekly for about 6 months and helped us decide what topics we needed to cover and how to teach practical skills. The group had people from many different areas of Health IT, including individuals from a community college, a government workforce-training program, a private hospital, a private clinical practice, teaching hospitals, and a pharmaceutical company. Much of the meeting content centered on the question of what skills and knowledge these experts would expect from someone they hired. These meetings provided us with the topics we needed to cover, what type of long project to assign, how to incorporate real systems, and how to incorporate job seeking skills into the course.

3.2 LOGISTICS

Platform

One of the biggest challenges was setting up the course using Sakai. The team-based learning approach relies on students studying the materials, taking a quiz individually, taking the same quiz with the team, and then working on the assignment or project. This cycle happens weekly in rapid succession over 24 weeks, with multiple places in Sakai to retrieve recorded lectures, lecture PowerPoints, assigned readings, quizzes, and assignments. We set up the entire course based on the Sakai calendar with links to everything they had to do in one place listed for each week, including deadlines, exams, in-person schedules, et cetera. Managing hundreds of links was incredibly difficult and broken links was probably the biggest complaint from students, especially in the beginning. By the third cohort, broken link problems were almost nonexistent as long as only one person managed the calendar and edited links.

Lecture Recordings

Recorded lectures were provided by selected domain experts, who were mostly Columbia and Cornell faculty. We guided the content in a general way, but lecturers had a lot of leeway in what they discussed. It was structured so that each lecturer might do a single lecture or a month long series on a topic, which depended on how much we had decided to focus on a subject. This approach had advantages and disadvantages. Some students found the lectures too unconnected or repetitive, but some appreciated having experts from various domains speak on a topic. In general, it seemed the best format for mid-career adult learners. Students generally wanted more access to the lecturers for questions and information; this was not outright discouraged, but due to time constraints and the number of students, we attempted to answer questions ourselves rather than connect them with faculty.

Sakai provides a tab for Echo recordings within each course, and these recordings are available in multiple formats so they can be heard on video, iPod, etc. Students have tended to find these recordings to be one of the best things about the course. We instructed people who were recording to do so in a quiet room, to check their sound, and record short sections at a time (no more than 20

minute segments), and this was the best approach. We also provided links to the powerpoints so they could print and take notes while listening.

Some difficulties with the echo recordings are that they are listed reverse chronologically and we are unable to modify the titles, the order, or delete obsolete recordings. Students have to rely only on the link we provided in the calendar, which was the streaming echo link. When students try to find another format for a lecture (e.g., if they want to listen to the mp3 instead of watching the streaming echo link), it is nearly impossible to find in the recordings tab. This has proven a source of frustration for some students although we created instructions on how to find and download lectures. This is especially frustrating for students with unreliable internet access who have to download the lectures rather than listen to them streaming.

Specialist Assignments

To develop a high level of expertise, students are required to complete in-depth work in either Health Information Management and Exchange or Security and Privacy (in the fourth session we are merging these). They are required to complete progressively challenging assignments at home designed to increase experience and skills and familiarity with HIT terminology, standards, and technology in the area they chose. When we first began teaching the specialty work, we dedicated the last two months to this effort with most work being done remotely. The assignments proved too challenging for the students over that short time period. However, we still wanted to teach the material during the course.

To provide a balance—starting from the second session and increasing in the third session—a good number of the afternoons of the last three in-persons are focused workshops and assignment orientation for the specialty work. Many students struggle at first in the specialty work but grow in confidence, especially when using the discussion board, which is monitored by specialty experts. We also hold evening extra help calls (“Office Hours”) to answer questions. Creation of these sophisticated assignments that are meant to satisfy numerous learning objectives and immersion in subject matter has also proven challenging, especially since the students have such a variety of knowledge and experience gaps. Each session we have improved the assignments and are now starting to feel that they are becoming more solid—the assignments remain intentionally difficult but we provide more upfront training in the in-person sessions, clearer directions and support documentation, and provide strong support through the discussion board and office hours such that the majority of our hard-working students excel at them and learn a great deal in the process.

Project to Create a Project Plan

We provided advisors for the teams to assist them through a team project, which was to create a project plan for a fictional Electronic Health Record (EHR) implementation. The first session, we assigned faculty as advisors but later used alumni of the course. They tended to provide more pragmatic help on the project as well as a workforce perspective. We also recruited a large number

of alumni to be TAs and Project/Team Advisors, and found this helpful in managing the details of the course as well as some career advice to students.

The main team effort of the course is to create a detailed multi-faceted project plan (budget, work breakdown, risk assessment, scope, etc.) for a fictitious EHR implementation including initial preparation for Meaningful Use. The teams need to create a 20 page document and are given a specific amount of imaginary money to work with. The objectives of this assignment include interdisciplinary teamwork skills, interdisciplinary communication skills, project planning skills, and experiential learning about EHRs and Meaningful Use.

We found we had to clarify the sections and guidance for the project plan extensively, although these types of documents tend to vary greatly in the real world. We also had project advisors grade two projects, but found that their feedback was too diverse and we had to step in and edit their feedback a good deal. In addition, we shortened the project from three to two months, which made it less of a dominant part of the course and gave more time to do other types of assignments. This also makes it more intense for students and puts more strain on the team relationships. Discord would often be triggered by contention around what to include/not include in the 20 pages, agreeing how to spend the money, different understanding of what the assignment was, and the need to meet the project deadline.

3.3 STUDENT ENGAGEMENT

Teams

We found that we did end up with students with a wide variety of backgrounds, including clinical care, public health, IT, law, marketing, as well as business. The team experience seemed extremely beneficial in providing a support system and a place to ask questions to each other (and, frankly, a way to vent about the course when there were challenges). It also provided a small cohort of peers to support each other through the program, which was quite rigorous. Teleconference calls and email were the preferred mode of communication for the vast majority of teams. Skype and Google-docs were third and fourth respectively.

We had found problems with team dynamics in the first two sessions that had to do with personality issues especially considering the multi-disciplinary nature of the teams. We decided to be more hands on in addressing these issues in the third session. We hired a recent graduate to kick off the teams with team building exercises, talk to the teams, attend team conference calls, and discuss team problems with the advisors. This turned out to be a suboptimal approach and we had people quit their teams for the first time in over 200 students. Our theory is that the high level of focus on team dynamics may have raised their expectations about how well their teams should work together and were disappointed by their team's functioning as a result. However, we learned a lot from the third session because of this in-depth involvement, which we put into place for the fourth

session. We have kept some of the new ideas such as team building and close support of graduates who are team project advisors.

We now have a balance between supporting teams and at the same time encouraging self-sufficiency and realistic expectations. We also worked on improving the clarity of the Project Plan assignment to reduce contention, which we hope will make this central assignment run smoother.

In-person sessions

To give people greater sense of connection, we decided to have monthly full-day in-person sessions where people could mingle with instructors and other students and ask questions face-to-face. These were originally scheduled for Saturdays to be completely work-friendly but we found that logistics in the classrooms and finding instructors were both difficulties we could not overcome, so we switched to Fridays after the first cohort. Remote video access to the classrooms in Hammer was not possible, so students' physical presence was required.

The in-person sessions started as a lecture format for the first cohort. This was combined with some cases in a traditional team-based learning format. However, this seemed to be a day that was too long and provided too little interaction. For the second cohort, we focused more on workshops that provided a specific technical or career improving skill. This type of teaching is referred to as “flipping the classroom” and the students really enjoyed it. We also took advantage of the hospital and medical school IT resources to provide students with object lessons in HIT—such as tours of ancillary departments and hospital specific EHR training. We continued to have some expert lectures focused on real world IT.

However, this form of teaching has its own challenges especially in logistics. For example, we ran tours of departments, which required careful timing, tour guides, directions to locations, and chaperones. Hands on activities on the computers depended on the computers and the software working and since students had different skill sets, staffing and right-sizing these exercises was critical. We invented several workshops, which involved groups of students to solve problems using a particular skill and then sharing their work—we worked at getting the directions and the timing correct on this as well. We often need several teachers in the classroom to support activities—often we are able to ask graduate TAs to come in and help, however, which has the added benefit of fostering community. For some of the workshops, we needed to set up a real EHR system that the students could play with in Hammer where the classes were. For this, we had to set up an open source EHR on a virtual machine in our department that could be accessed through the firewall via VPN. Needless to say, the technical challenges were huge and we are still grappling with how to have 60 people log into the system simultaneously.

We used also the in-person as an opportunity to develop a network of peers. During the in-person sessions, we served lunch in Hammer, which allowed students to stay and mingle with each other and the instructors. Because many of the teams had members who lived far away, this was a good time for teams to meet face to face.

Discussion Board

The discussion board became increasingly important as a way to engage students in the course and with each other. The number of posts on the discussion board increased with each cohort even as the number of students decreased. We encouraged increased participation in the discussion board by creating assignments and having them post responses to the board. This familiarized them to the board and got them into the habit of using it. If a student emailed with a question, we had them post it on the board and answered it there rather than emailing the response directly.

We had the weekly TA on-call monitor the board but found that they tended to monitor as an observer rather than to post messages. Students were generally able to answer their own questions but reported that they wanted more instructor involvement. We then instructed TAs to post responses even when no response was necessary, simply to add their presence.

We have found that as we increased instructor activity on the board and required them to post assignments there, participation increased. In the cohort of 60 students, people added links to interesting news items and jobs and asked questions about the course, both in terms of logistics and content. A few individuals tended to post very actively and some remained fairly inactive, with the majority being moderately involved. We have found with a smaller cohort of 30, the discussion board participation has lagged compared to the prior cohort. This may be that it is a more reserved group or because some optimal number of students is required to keep an active board, likely around 50 to ensure the three to four very active individuals who post regularly and keep discussions going. Also, the second half of the session is when the highest participation on the discussion board occurs because that is when the more technical non-team based assignments occur (the specialist work).

Discussion Board Participation by Cohort

SESSION	NUMBER OF STUDENTS	NUMBER OF POSTS ON DISCUSSION BOARD
1	92	110
2	70	1900
3	58	2600
4	29	204 (at 3 months)

Teaching Assistants and Project Advisors

We increased the number of Teacher Assistants (TAs) and Project Advisors (PAs) with each cohort, using the top students from prior sessions—we have also increased our guidance and support of our TAs and Pas including a retreat and weekly calls. Other graduates have helped by visiting the class and providing a short talk, chaperoning tours, and helping plan graduations. By keeping alumni involved in the program, we are able to better understand what it's like to be a student in the program. Also, we are fostering a cross-session community of all the certificate students and graduates.

3.4 EVALUATION

We evaluated the course in a variety of ways, including:

- Weekly assessment of the course in the team quiz
- Anonymous “Suggestion box” always open in quiz section
- Peer evaluation
- Course evaluation after completion
- 6-month Employment follow up

For three cohorts, 82, 88, and 90% of students said they achieved their goals for the course. The cohorts reported that their feeling of being prepared to work in the Health IT field increased considerably compared to how they felt before starting the course. And 45% of students from the first cohort have found a new Health IT job within six months of the course (we are still collecting data from the other cohorts).

Results from the first and second cohorts indicate that the majority of students were extremely likely recommend the course to colleagues and friends (and have actually done so). Most people who attended the second cohort had heard about the program from a colleague or friend rather than the Internet or Office of the National Coordinator for Health Information Technology (ONC) website, where the funding originated.

Students were enthusiastically positive toward the program for the most part, as evidenced by both emails and a high level of referral to friends and colleagues. They reported that the work was intense but they felt engaged with the work, their peers, and with the instructors. Many felt that the in-person sessions gave a strong sense of community and the teams provided a network that supported learning. Instructor responsiveness was an important feature of feeling engaged as well. A strong network of students has resulted from the program, with previous graduates hiring more recent graduates.

The course evaluation revealed the following about the team-based approach. While recorded lectures were rated the aspect that they learned most from (and later the in-person sessions rose to the top), the team-based project consistently came in second. The project was also rated the most difficult part of the program. Students commented that they most liked: “group work, feeling the excitement of being a part of something current”; “working with group members was rewarding, albeit challenging”; “I liked the team approach and team interaction...the educational model uses was excellent in my opinion”; “team collaboration and project work was very valuable”; “working with willing team members who are willing to put time”; and “the capstone project.” Others noted difficulties: “would like more team building at the first In-Person session; virtual team was difficult”; and “the team-based learning concept ... was not the best approach for learning.”

In summary, the program has been a huge success, with 90 students having completed training so far and 88 in training now. Our blended learning with an online team-based learning approach has been labor intensive, has seen some difficulties, and has evolved with experience, but the outcome has been a large group of satisfied graduates who have remained connected after graduation, almost half of whom have obtained new employment because of the certificate.

APPENDIX 4: COLUMBIA VIDEO NETWORK DISTRIBUTED PRODUCTION

Soulaymane Kachani

4.1 PRODUCTION EVERYWHERE:

The Fu Foundation School of Engineering and Applied Science is experimenting with a new distributed production system (CVN-DP) that could bring high-end video production to every classroom. CVN-DP would place a compact engineered high-end production system seamlessly into any room (e.g. in Morningside, Manhattanville, Global Centers, and partner institutions).

It is designed around a simple, modular production platform creating distributed studios with a small-footprint equipment installation, capable of adapting to any room layout and size;

- ***Small classrooms***
- ***Large classrooms/auditoriums***
- ***Private studios***

Small-scale design easily integrates with existing room equipment, with only minimal reliance on various university parties currently responsible for managing classrooms (e.g. CUIT eRooms, the Office of the Registrar, Facilities).

4.2 SIMPLE STUDIO PRODUCTION:

Significantly automating production makes it possible for professors to create high-quality digital course material in a private studio or directly from the classroom, after only brief/minimal training. Digital course materials captured both in studio and classroom may be streamed live online, uploaded for sharing with the class, or edited in post-production, before made available to students online.

Simple studio and classroom production will be supported with basic easy-to-use production training materials (text & with images), training videos (highlighting/utilizing the very equipment and production methods in use), as well as, in-person training and remote technical support.

4.3 DISTRIBUTED STUDIOS:

Three Distributed studio designs for a range of classroom layouts, sizes, and production scenarios:

- ***Small classroom studio (\$3k)***, multiple high-definition (HD) USB cameras, wireless microphone, Mac mini production computer, additional modular system redundancies.
- ***Large classroom studio (auditoriums) (\$6-7k)***, HD point-to-zoom (PTZ) camera, wireless microphone, Mac mini production computer, additional modular system redundancies.

- **Private studio (\$3-4k)**, digital writing tablet, HD USB camera, USB microphone, Mac production computer, lighting, green/white screen, sound-control, ventilation, additional modular system redundancies.

4.4 DISTRIBUTED PRODUCTION:

CVN-DP classrooms are programmed for three primary production scenarios:

- **Remote live production** (Distributed production staff carry out entire live production remotely)
- **Pre-scheduled automated production** (schedule time-based fully automated production, no direct Distributed production staff involvement, no Professor involvement)
- **Professor-initiated automated production** (in-room Professor initiated and controlled production, no direct Distributed production staff involvement)

4.5 SCALABLE PRODUCTION:

Smart modular component design establishes a fully scalable classroom production system with dramatically lower per-room installation costs, as well as lower operating costs, compared with traditional production methods.

Modular production components allow for direct replacement and backup, as well as simple integration of future system upgrades, significantly limiting production downtime.

4.6 BEYOND COURSEWORKS:

Distributed production with the Engineering School's development of the OpenEdX learning management system, creates an online learning ecosystem, blending classroom studio production and the new tools of online learning.

4.7 FLIPPING THE CLASSROOM:

Distributing recorded class videos to students via the OpenEdX learning ecosystem will provide insights into both the professor's teaching, as well as the student's real-time learning, creating a digital feedback loop, making professor-student interaction more effective and valuable.

Assigning class videos and online problem-sets as pre-class-requisites (with compliance confirmed online) creates a leveling of the class discussion, equilibrating the classroom playing field of knowledge, as well as the students ability to knowingly and effectively prepare from online materials, in advance, and changing the entire dynamic of the classroom interaction.

4.8 COLUMBIA DIGITAL LEARNING TOOLS:

Parsing and unpacking all the data of online learning, continuously evolving analytics present real-time student learning outcomes in action, opening up new parts of the curriculum with the effective pace of traditional teaching and learning methods.

The online learning tools of Distributed production promote best practices with hands-on faculty innovation, incorporating student feedback, current research on the science of learning, creating unique digital learning tools.

4.9 BENCHMARK:

Echo360 is an off-the-shelf classroom production system offering a comparable type of production, carried out with minimal human operation. At a cost of \$2-3k per room (excluding additional \$3-4k cost of video camera and wireless microphone), Echo360 places a small “*cable-box style*” computer in the room, capable of basic quality production (without the possibility for improvement), without additional production options. No capability for different classroom designs/layouts or private studios, and no possibility for post-editing enhancements. Further, Echo360 ties Columbia to a closed, private platform, fee/subscription based service provider, with minimal university identity branding and personalization.

CVN-DP

DISTRIBUTED PRODUCTION ECOSYSTEM

- **Hardware:**
 - Classroom as a Studio ~\$3-7k
 - Private Studio ~\$3-7k
- network level automation
- live streaming
- remote view / present
- remote production
- self automated production
- scheduled production



Small studio setup for Coursera
Spring 2013



501 NWC building setup
August 2013




- **Ecosystem:**
 - Distributed Production
 - OpenedX

APPENDIX 5: SUMMARY OF SECTION 2 LITERATURE

Type of Course	Market Research	Pedagogy Research
Pure Online	- January 2013 online enrollment was 6.7 million students, up from 1.6 million in 2002. - Growth may be driven by complete online programs (available at 62% of institutions in 2012) and increasing proportion of private nonprofits (48% in 2012). - Source: Babson Research Group (2002, 2013). Research sample comprised all active degree-granting higher education institutions in the US. 50% of university presidents predict that in 2021, a majority of their students will be taking classes purely online. - Source: Pew Research Center (2011)	- As effective as face-to-face in the classroom—but no better. - Source: Department of Education (2010). Meta-study covered 45 papers that included both traditional online learning with admission requirements as well as professional training programs. - Performance suffered in online courses for community and technical college students in Washington State. - Source: Teachers College (2011) - In 2003, 57% of academic leaders judged online learning outcomes to be the same or better than those of face-to-face. - That number has jumped to 77% as of 2012. - Source: Babson Research Group (2013)
MOOCs	- As of January 2013, only 2.6 percent of higher education institutions offer MOOCs. 9.4% have them in development. 33% of institutions report they have no plans for adding MOOCs. 55% are undecided. - Source: Babson Research Group (2013) - By the end of 2012, ~3.17 million students worldwide were enrolled in MOOCs. - Enrollment estimated to grow by 24% annually, resulting in over 6 million students by 2015. - Source: Outsell (2013)	— —
Blended/Hybrid	— —	- Students receiving blended/hybrid instruction perform better than those in traditional face-to-face classes. - Source: Department of Education (2010) - There are no significant learning differences between traditional and hybrid-format classes. - One downside was student satisfaction—students gave the hybrid format a roughly 11% lower overall rating. - Source: Utah S+R (2012). Research sample comprised seven hybrid statistics courses across six public universities.

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APPENDIX 7: GEORGIA TECH-UDACITY PARTNERSHIP: A CASE STUDY

Donald Davis

7.1 INTRODUCTION

Online learning is as much – arguably more – about economics as pedagogy. This section draws on economic concepts, both macro and micro, as well as economic history, to help frame and inform the choices Columbia will make about online education.

Recent efforts in the online higher education space have two fundamental driving forces. The first is the decades-long rise in the cost of higher education at a rate faster than general inflation. Above all, this owes to what Baumol and Bowen term the “cost disease.”²¹

It is not surprising that higher education is particularly prone to the cost disease, since teaching methods have not changed drastically since the introduction of printing. An old adage in economics holds that “things that can’t go on forever won’t.” The decades of rapidly rising tuition have stimulated a search for alternative ways of delivering the product that are less costly, such as online education.

The second fundamental driving force in the online education space is technological change. It is easy to be wowed by the new opportunities to distribute courses online and conclude too readily that a revolution is nigh. At the same time, it is simple to point to past efforts at distance education, online or not, which have failed to revolutionize the sector and conclude that the hoopla stirred up by the MOOCs is so much hype and that the coming changes will be incremental, gradual. Which of these scenarios is closer to the truth is a difficult problem, one to which we can only begin to give an answer.

The collision of the “cost disease” with the proffered solution of online education raises the central question: Will we see a slow incorporation of online tools into the traditional modes of education or are we in the early stages of education’s industrial revolution? The history of technological change suggests that this will be a difficult, albeit crucial, question to answer. Technical change can proceed slowly, slowly, slowly – and then wholly transform a sector in short order.

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

²¹ 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 for example “The Cost Disease in Higher Education: Is Technology the Answer?”, William G. Bowen, 2012.

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.

7.2 NOT THE MOOCS

Much of the recent attention and excitement about online learning has focused on the MOOCs because of the very large numbers of “students” enrolled. And so much of the conversation has focused on whether these free courses will be able to provide credit and whether or not there is ultimately a business model to sustain it.

In some respects, though, this is a distraction because it is not even an accurate representation of what the MOOCs themselves are doing, which represents a much wider range of experiments in online education.²² In the discussion that follows, we will not focus most of our attention on the MOOCs per se, but rather on what they are actually doing, which is at times quite different than the open courses of the acronym. See the discussion of the Georgia Tech-Udacity effort below for an example.

7.3 IS ANYTHING NEW?

A fundamental question to consider is: Is there really anything *new* in the online teaching realm? Have we not had the capability to produce and distribute this content via film, television, videocassettes, DVDs, and via the web for the past few decades? If these capabilities have had at most a modest impact on the higher education sector thus far, why should we think this time will be any different? This is a valid question that deserves an answer. As suggested above, technological change is never solely about technology; it is also about the market context. Here the relevant market context is the continuing “cost disease” raising tuition costs, which makes alternatives that economize on ever more expensive skilled labor more attractive. In terms of the technology itself, one part of the answer may come from thinking about the list of innovations just

²² A more descriptive name should reflect that these are venture capital-backed, research-based, online teaching startups, or what we could term “VC-Robots.”

mentioned. What, really, is the difference between movies and television, between either of these and videocassettes, between these and DVDs, or between having a physical DVD and streaming over the web? Undoubtedly, there are many answers to that question, but one common theme is that they differ not so much in the production technology – all are means of conveying video and sound – but in the consumption technology. Movies require going to a theater; television can be watched at home; videocassettes and DVDs allow time-shifting of viewing; online streaming allows time-shifting and greater convenience. This suggests that potential answers to the “what is new?” question include hardware – smartphones and iPads that greatly increase the ease of using resources – and software that is cumulatively better for accessing and managing the content, and making it more interactive. These elements may or may not be enough to help launch large changes. But they are potentially an answer to why this time may be different.

7.4 AN INDUSTRIAL REVOLUTION IN EDUCATION?

The big question 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 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? 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.²³ 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.²⁴ 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

²³ Christensen, Clayton M. [*The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*](#). Boston, MA: Harvard Business School Press, 1997.

²⁴ Indeed, many of the California state colleges and universities are undertaking considerable experimentation in this dimension.

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!²⁵

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 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.²⁶

7.5 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 a face-to-face master's 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 % of the face-to-face cost. They plan to launch the program with enrollments starting at 600 the first year and 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 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 master's level degrees. And, since master's degrees typically have a much more circumscribed curriculum than undergraduate education, lessons learned there may not be directly applicable elsewhere.

²⁵ 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. See *Highway Statistics Summary to 1995*, Federal Highway Administration, Table MV-200. <https://www.fhwa.dot.gov/ohim/summary95/mv200.pdf>.

²⁶ 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 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.

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 % of the total number of computer science master's degrees awarded in 2011-2012 by all US universities public and private.²⁷ Georgia Tech and Udacity aim to be very, very big players on the national and global stage.

- The Georgia Tech program is an immediate challenge to existing online master's 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 % of the current face-to-face cost.
- If this succeeds in computer science, it cannot be long before a similar effort is made for master's programs in other technical fields.
- Indeed, efforts will surely be made to extend this to a wide variety of master's 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 master's 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.

7.6 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.

²⁷ See Table 7 in Zweben, Stuart, "Computing Degrees and Enrollment Trends: From the 2011-2012 CRA Taulbee Survey, Computing Research Association.

That such changes are likely to come first and most directly to the non-elite sector does not imply that the top colleges and universities will be unaffected. We live in a larger ecology. We must consider how this changed environment will affect us.

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 one-quarter of one percent of the total.²⁸

The new technologies are all about increasing returns to scale. This raises the prospect that one or a few gigantic educational firms could emerge.²⁹ The concentrating force is evident 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.³⁰ 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 master’s 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

²⁸ *Digest of Education Statistics 2012*, National Center for Education Statistics, Table 221, http://nces.ed.gov/programs/digest/d12/tables/dt12_221.asp.

²⁹ An interesting parallel is the market for textbooks, where increasing returns come from the very large fixed costs associated with producing and marketing a textbook. The top four textbook publishers account for nearly 90 % of the market (Eli Noam, *Media Ownership and Concentration in America*, 2009, p. 149).

³⁰ 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 % of the increase in for-profit enrollments during the last decade occurred because of the expansion of for-profit chains.” (p. 141)

firms were to succeed in this, we have to consider if they might eventually also become a significant competitor for top students.

7.7 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 the 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.³¹

7.8 DOES IT MATTER WHETHER ONLINE EDUCATION IS LED BY NON- OR FOR-PROFITS?

If an online education revolution is coming, does it matter whether it is led by for-profit firms or traditional non-profit colleges and universities? Will they make different choices and do these matter for our core values? A series of writers from Clark Kerr to Jonathan Cole have written about the rise of the modern research universities in the post-WWII period. From an economic perspective, the reasons for government or non-profit interest in this sector is that the benefits of an educated populace and of the basic research undertaken at these colleges and universities extends well beyond what can be captured by a private firm. A government or non-profit university may be willing to spend real resources on research, and supporting and training new scholars that will not show up in the bottom line. A private firm will not. A strong flavor of this is present already in the Georgia Tech-Udacity deal, where they plan to expand from a face-to-face program of 100 to an online program for 6,000 in just three years. The efficiency of having the private firm involved is evident in that the online degree is projected to cost barely 15 % of the face-to-face degree. The possibility of this undermining the broader scholarly activity is that the projected sixty-fold expansion in Georgia Tech's instruction will be undertaken with no new professors and no new PhD students. In short, there is a strong suggestion that the leadership – for-profit or non-profit – does matter.

³¹ 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. See Bernheim, Alfred L. *The Business of the Theatre: An Economic History of the American Theatre, 1750-1932*. New York: Benjamin Blom, Inc., 1964.

7.9 THE PATH FORWARD

The Task Force has not come to a conclusion about where the online market will be in three, five, or ten years, or indeed whether we are more likely to see incremental or disruptive change. What we do agree on is that if there is disruptive change, the stakes can be quite high. Accordingly, we believe that it is essential that we (1) Monitor developments closely on an ongoing basis; (2) Develop a strategy that is robust in the sense that it protects Columbia's highest values and opportunities whatever the path of change; and (3) That we seek common cause with colleges and universities that share these values.

APPENDIX 8: INVENTORY OF ONLINE COURSES (FALL 2013)

School	Courses
Continuing Education	38
Nursing	3
Social Work	5
Graduate A&S	2
Graduate SEAS	114
Total	162

Note: All SEAS CVN courses can be audited (taken for no credit)	
School	Course
Continuing Education	ACTU K4621 001 INVESTMENT & ALM FOR ACTU
Continuing Education	ACTU K7003 001 TOPICS: PROPERTY/CASUALTY
Continuing Education	BIET K4310. Fundamentals of Bioethics.
Continuing Education	BIET K4400. Clinical Ethics. 3 pts.
Continuing Education	BIET K4450. Research Ethics. 3 pts.
Continuing Education	BIET K7001. Topics in Neuroscience and Ethics. 3 pts.
Continuing Education	BUSI K3998. Math Methods for Business. 3 pts.
Continuing Education	BUSI K3998. Math Methods for Business. 1 pt.
Continuing Education	BUSI K4003. Corporate Finance. 3 pts.
Continuing Education	BUSI K4001. Introduction to Finance. 3 pts.
Continuing Education	BUSI K4010. Managing Human Behavior in the Organization. 3 pts.
Continuing Education	BUSI K4009. Financial Accounting. 3 pts.
Continuing Education	BUSI K4020. Introduction to Marketing and Marketing Management. 3 pts.
Continuing Education	IKNS K4335. Visualization of Information (Online). 3 pts.
Continuing Education	BUSI K4025. Marketing Strategy. 3 pts.
Continuing Education	IKNS K4336. Social Media in the Organization (Online). 3 pts.
Continuing Education	IKNS K4337. Building Successful Knowledge Services for Organizations (Online). 3 pts
Continuing Education	TMGT K4116. Technology in the Business Environment. 3 pts.
Continuing Education	TMGT K4115. Accounting and Finance for Technology. 3 pts.
Continuing Education	TMGT K4125. Technology and the Law. 3 pts.
Continuing Education	TMGT K4126. Strategic Advocacy for Technology Executives. 3 pts.
Continuing Education	TMGT K4118. Behavioral Challenges in Technology Management. 3 pts.
Continuing Education	TMGT K4120. IT and Operations Management. 3 pts.
Continuing Education	TMGT K4123. Managing Emerging Technologies. 3 pts.
Continuing Education	TMGT K4124. Knowledge Management. 3 pts.
Continuing Education	TMGT K4122. Strategic Project Management. 3 pts.

School	Course
Continuing Education	TMGT K4128. Sales and Marketing. 3 pts
Continuing Education	TMGT K4129. Relationship Management. 3 pts.
Continuing Education	TMGT K4130. Supply Chain and Matrix Management. 3 pts.
Continuing Education	IKNS K4303 Enterprise-Wide Applications and Project Portfolio Management. 3 pts. (Offered Online)
Continuing Education	IKNS K4301. Management and Leadership in the Knowledge Domain. 3 pts. (Offered Online)
Continuing Education	IKNS K4300. Information and Knowledge in the 21st Century Economy. 3 pts.
Continuing Education	IKNS K4302 001 FINDABILITY & INNOVATION
Continuing Education	IKNS K4350 001 CAPSTONE PROJECT SEMINAR
Continuing Education	IKNS K4303. Enterprise-Wide Applications and Project Portfolio Management. 3 pts. (Offered Online)
Continuing Education	IKNS K4305. Networks and Collaboration: Issues and Methods. 3 pts.
Continuing Education	IKNS K4304. Business Analytics and Strategic Intelligence. 3 pts. (Offered Online)
Continuing Education	IKNS K4306. Information Policy and Regulation: Intellectual Property, Ethics and Litigation. 3 pts.
Open to all schools	CPLS W3920 001 WORDS AND PICTURES
Nursing	NURS N8290 001 INCORP GENETICS-ADV NURS
Nursing	NURS N9538 001 ADV SEM IN CLINICAL GEN
Nursing	NURS N9600 001 LEGAL/ETHICAL ISSUES
Social Work	SOCW T6009 006 STATISTICS
Social Work	SOCW T6011 001 FIELD EDUCATION SEMINAR
Social Work	SOCW T6501 007 SOCIAL WORK RESEARCH
Social Work	SOCW T6801 009 SOCIAL WELFARE POLICY
Social Work	SOCW T7100 020 FOUNDATIONS OF SOCIAL WRK
Graduate Arts & Sciences	ELEM FR ONLINE 1 PROF/GRAD ST
Graduate Arts & Sciences	Statistics W4105 section 002
Graduate SEAS	APMA E4150 - Applied Functional Analysis
Graduate SEAS	APMA E4200 - Partial Differential Equations
Graduate SEAS	APMA E4300 - Introduction to Numerical Methods
Graduate SEAS	APMA E6302 - Numerical Analysis of Partial Differential Equations
Graduate SEAS	APMA E4204 - Functions of a Complex Variable
Graduate SEAS	APPH E6081 - Solid State Physics I
Graduate SEAS	APPH E4130 - Physics of Solar Energy
Graduate SEAS	APPH E4200 - Physics of Fluids
Graduate SEAS	BMEN E4001 - Quantitative Physiology I: Cells and Molecules
Graduate SEAS	BMEN E4300 - Solid Biomechanics
Graduate SEAS	BMEN E4440 - Physiological Control Systems

School	Course
Graduate SEAS	CIEN E4241 - Geotechnical Engineering Fundamentals
Graduate SEAS	CIEN E4111 - Uncertainty and Risk in Infrastructure Systems
Graduate SEAS	CIEN E4130 - Design of Construction Systems
Graduate SEAS	CIEN E4242 - Geotechnical Earthquake Engineering
Graduate SEAS	CIEN E4100 - Earthquake & Wind Engineering
Graduate SEAS	CHEN E4620 - Introduction to Polymers and Soft Materials
Graduate SEAS	CHEN E4330 - Advanced Chemical Kinetics
Graduate SEAS	CHEN E4130 - Advanced Chemical Engineering Thermodynamics
Graduate SEAS	CHEN E4750 - The Genome and the Cell
Graduate SEAS	COMS E6998-2 - Topics in Computer Science: Mobile Computing
Graduate SEAS	COMS E6125 - Web Enhanced Information Management
Graduate SEAS	COMS E6232 - Analysis of Algorithms, II
Graduate SEAS	COMS E6261 - Advanced Cryptography: Lattices and Homomorphic Encryption
Graduate SEAS	COMS W4187 - Security Architecture and Engineering
Graduate SEAS	COMS W4156 - Advanced Software Engineering
Graduate SEAS	COMS W4118 - Operating Systems
Graduate SEAS	COMS W4167 - Computer Animation
Graduate SEAS	COMS W4705 - Natural Language Processing
Graduate SEAS	COMS W4252 - Introduction to Computational Learning Theory
Graduate SEAS	COMS W4111 - Database Systems
Graduate SEAS	COMS W4772 - Advanced Machine Learning
Graduate SEAS	CBMF W4761 - Computational Genomics
Graduate SEAS	COMS W3101-7 - Programming Languages: C#
Graduate SEAS	COMS W4160 - Computer Graphics
Graduate SEAS	CSOR W4231 - Analysis of Algorithms, I
Graduate SEAS	COMS W4735 - Visual Interfaces to Computers
Graduate SEAS	COMS W3101-1 - Programming Languages: Java
Graduate SEAS	COMS W4112 - Database Systems Implementation
Graduate SEAS	COMS W3101-6 - Programming Languages: Matlab
Graduate SEAS	COMS W4115 - Programming Languages and Translators
Graduate SEAS	COMS W4180 - Network Security
Graduate SEAS	COMS W4203 - Graph Theory
Graduate SEAS	COMS W4236 - Introduction to Computational Complexity
Graduate SEAS	CSEE W4119 - Computer Networks
Graduate SEAS	EACE E4560 - Particle Technology
Graduate SEAS	EAEE E4190 - Photovoltaic Systems Engineering and Sustainability
Graduate SEAS	EAEE E4003 - Introduction to Aquatic Chemistry
Graduate SEAS	EAEE E4160 - Solid & Hazardous Waste Management
Graduate SEAS	EAEE E4550 - Catalysis for Emissions Control

School	Course
Graduate SEAS	CIEE E4252 - Environmental Engineering
Graduate SEAS	CHEE E6252 - Applied Surface and Colloid Chemistry
Graduate SEAS	CHEE E4050 - Principles of Industrial Electrochemistry
Graduate SEAS	EAIA W4200 - Alternative Energy Resources
Graduate SEAS	ELEN E4193 - Modern Display Science & Technology
Graduate SEAS	ELEN E4944 - Principle of Device Microfabrication
Graduate SEAS	ELEN E6770 - Topics in Telecom Networks: Next Generation Networks
Graduate SEAS	ELEN E6950 - Wireless and Mobile Networking I
Graduate SEAS	ELEN E6904 - Topics in Antenna Design
Graduate SEAS	ELEN E4060 - Intro to Genomic Information Science & Technology
Graduate SEAS	ELEN E4488 - Optical Systems
Graduate SEAS	ELEN E6412 - Lightwave Devices
Graduate SEAS	ELEN E6010 - Systems Biology: Design Principles for Biological Circuits
Graduate SEAS	ELEN E4511 - Power Systems Analysis
Graduate SEAS	ELEN E6318 - Microwave Circuit Design
Graduate SEAS	ELEN E6880 - Topics in signal Processing: MIMO Wireless Communications
Graduate SEAS	ELEN E4301 - Introduction to Semiconductor Devices
Graduate SEAS	ELEN E4702 - Digital Communications
Graduate SEAS	ELEN E4810 - Digital Signal Processing
Graduate SEAS	ELEN E4815 - Random Signals and Noise
Graduate SEAS	ELEN E4896 - Music Signal Processing
Graduate SEAS	ELEN E6320 - Millimeter-Wave IC Design
Graduate SEAS	ELEN E6945 - Device Nanofabrication
Graduate SEAS	ELEN E6951 - Wireless & Mobile Networking II
Graduate SEAS	MEEM E6432 - Small Scale Mechanical Behavior
Graduate SEAS	MEBM E4439 - Modeling and Identification of Dynamic Systems
Graduate SEAS	MECE E6313 - Advanced Heat Transfer
Graduate SEAS	EEME E4601 - Digital Control Systems
Graduate SEAS	EEME E6601 - Introduction to Control Theory
Graduate SEAS	ENME E4332 - Finite Element Analysis I
Graduate SEAS	ENME E4202 - Advanced Mechanics
Graduate SEAS	MECE E4314 - Energy Dynamics of Green Buildings
Graduate SEAS	MECE E4431 - Space Vehicle Dynamics and Control
Graduate SEAS	MECE E4501 - Geometrical Model
Graduate SEAS	MECE E4604 - Product Design for Manufacturability
Graduate SEAS	MECE E4610 - Advanced Manufacturing Processes
Graduate SEAS	MECE E6400 - Advanced Machine Dynamics

School	Course
Graduate SEAS	MECE E4609 - Computer Aided Manufacturing
Graduate SEAS	MSAE E3103 - Elements of Materials Science
Graduate SEAS	MSAE E4090 - Nanotechnology
Graduate SEAS	IEOR E4601 - Dynamic Pricing & Revenue Management
Graduate SEAS	IEOR E4998 - Managing Tech Innovation & Entrepreneurship (non-credit bearing)
Graduate SEAS	IEOR E4001 - Design and Management of Production and Service Systems
Graduate SEAS	IEOR E4550 - Entrepreneurial Business Creation for Engineers
Graduate SEAS	IEOR E4003 - Industrial Economics
Graduate SEAS	IEOR E4000 - Production Management
Graduate SEAS	IEOR E4004 - Introduction to Operations Research: Deterministic Models
Graduate SEAS	IEOR E4106 - Intro to Operations Research: Stochastic Models
Graduate SEAS	IEOR E4404 - Simulation
Graduate SEAS	IEOR E4418 - Logistics and Transportation Management
Graduate SEAS	IEOR E4510 - Project Management of Complex Systems
Graduate SEAS	IEOR E4520 - Applied Systems Engineering
Graduate SEAS	IEOR E4571 - Systems Engineering Tools and Methods
Graduate SEAS	IEOR E4602 - Quantitative Risk Management
Graduate SEAS	IEOR E4701 - Stochastic Models for Financial Engineering
Graduate SEAS	IEOR E4706 - Foundations of Financial Engineering
Graduate SEAS	IEOR E4710 - Term Structure Models
Graduate SEAS	IEOR E4731 - Credit Risks & Derivatives
Graduate SEAS	IEOR E4007 - Optimization Models and Methods
Graduate SEAS	IEOR E4703 - Monte Carlo Simulation
Graduate SEAS	IEOR E4707 - Financial Engineering: Continuous-Time Asset Pricing
Graduate SEAS	IEME E4310 - Technology & Strategic Issues in Manufacturing Enterprises
Graduate SEAS	SIEO W4150 - Introduction to Probability and Statistics

APPENDIX 9: ONLINE LEARNING – SOME IMPLICATIONS FOR FACULTY

University Senate, Faculty Affairs Committee

The emergence of new media in the past few decades has increased the availability of a variety of teaching resources for educators at all levels of education.

The recent acceleration of new media applications, especially in enabling on-line learning, has forced institutions of higher learning, including Columbia University, to consider how these applications will affect the institution's standards and practice, and more importantly, the quality of education. If after due deliberation of all parties involved a decision is made to mainstream on-line learning in this university, there is the need for a significant investment in the infrastructure needed to address some of the faculty concerns listed below.

9.1 FACULTY CONCERNS

While some members of the faculty have seen the emergence of new media resources as a wonderful enrichment, and have embraced their use enthusiastically from the outset, others have hesitated to adopt them. The reasons for this hesitation to adopt and, in some instances, the outright rejection of the use of new media, are varied and include arguments such as

Status quo preferred:

- This is the way I learned the material and I see no reason to change it
- I have developed my own style of teaching and I am comfortable with it
- My students like the way I teach and they have not asked for changes
- **This is an Ivy-League institution: face-to-face interactions of faculty and students are an essential component to maintain the quality of this unique learning environment.**

Fear of the new and concern about additional workload:

- I am totally technophobic; I would need help every step of the way
- I would need to develop new skills to incorporate new media in my teaching
- **Adoption of new technologies will require a lot of extra time, which I might prefer to use for my research.**

We consider the above arguments in bold most important and worthy of discussion between faculty and administration. In addition, we suggest that the discussion should include the following faculty concerns.

9.2 POTENTIAL INTERFERENCE WITH ACADEMIC FREEDOM

A faculty member who is appointed to teach a certain subject should be trusted to teach the subject as he/she deems most effective. Alternative methods of teaching (e.g. new media, interactive on-line modules) should not be imposed based on cost consideration alone, and against the wishes

and/or better judgment of the faculty. Traditionally “a laissez faire approach has been applied to teaching, where teaching varies as the professor sees fit” (Kevin Carey, Chronicle of Higher Education, August 2, 2013). We see this traditional approach as being based on academic freedom, and disagree with Carey’s comment that a (unilateral) control by the professor over methods of teaching is nowhere included in academic freedom. The discussion simply may not have been broad enough or it may not have foreseen the implications of newer educational tools. A decision by the university’s administration to incorporate on-line learning resources should not imply that a faculty member is forced to adopt these resources.

9.3 ONLINE DELIVERY AT LOWER COST THAN FACE-TO-FACE

“On-line learning in many of its manifestations, can lead to at least comparable learning outcomes relative to face-to-face instruction at a lower cost” (William G. Bowen, Tanner Lecture, Stanford). The concern is reasonable that on-line learning by being more productive may lead to less face-to-face instruction, which in turn might mean fewer faces on the faculty side.

These concerns need to be addressed in an ongoing dialogue between faculty and university administration. In the best of all outcomes, a good use of on-line learning options may lead to an enriched educational landscape with greater student engagement and better use of the intellectual strengths of the faculty. The faculty may become more comfortable with that idea if a good infrastructure is developed for on-line learning material based on the educational insights and wishes of the faculty. Most importantly, the time involved in conversion from traditional to new media methods should not be underestimated. Faculty time and technical support are at a premium and may in the short term be very costly to the institution.

APPENDIX 10: SURVEY ON ONLINE LEARNING

10.1 THIRD PARTY SURVEYS

The current state of data-driven research in establishing the size and characteristics of the audience for online learning (i.e. the “market”) is somewhat weak. The primary source of regularly updated figures on institutional involvement in online learning comes from the Babson Research Group, which regularly surveys about 4,500 U.S. institutions of higher learning that fall within the set of schools within the College Board’s coverage. The latest response rate to this survey was 62.3%, but non-responding institutions are often those with low enrollment—meaning that Babson’s analysis theoretically represents 83.3% of U.S. higher education enrollments (Allen and Seaman 2013, 32).

Despite this strong response rate, there are a number of issues with relying on Babson’s data. First, the state of online education market research should not depend on only one major survey. A dearth of additional data prevents better exploration into new opportunity areas, and creates a potential risk of decision-makers working blind if Babson’s should cease further online studies. Secondly, Babson’s work does not deeply explore the individual-level preferences of those who are considering entering the online learning space (or are already in it). There is some research on faculty opinions toward online education, but it has two weak points: (i) it asks chief academic officers what they think their faculty’s opinion is, instead of directly surveying faculty, and (ii) it does not break down the rationale for faculty opinion, whether positive or negative. And thirdly, no surveys (including Babson’s) seem to have any up-to-date information on the hybrid learning space, with the latest market-related research being from 2007.

This lack of micro-level fundamentals in the current research carries over to other surveys as well. For instance, the Pew Research Center asked a number of questions about online learning—but directed them at college presidents instead of persons in higher education at large. This of course has the advantage of giving one a higher-level picture of perceptions toward online learning, but not necessarily what the actual demand for the online education services are on the ground. For instance, one question in the Pew “Higher Education Elites” survey asks college presidents to provide *their best guess* for “what percentage of [their] (undergraduate) students will be taking at least one course online” 10 years from now. The figures provided by highly selective 4-year colleges was that 74% of respondents believed less than half of their students would be taking at least one course online, followed by 26% who believed that half or more of their undergraduate student bodies would be online—but how instructive are these numbers when they could largely depend on untested opinions and/or existing studies such as the Babson reports?

10.2 COLUMBIA’S SURVEY: METHODOLOGY AND FINDINGS

To allow more data-driven analysis, the Task Force surveyed large numbers of individuals within the Columbia community from the three key stakeholders in the online learning market: faculty,

alumni, and current students. The Task Force asked each subgroup a consistent set of questions, sometimes tailored slightly to meet the needs and constraints of each subgroup. These questions were generally of the following nature:

1. Have you taken a university-sponsored online course in the past 12 months?
 - a. [If yes] Thinking about the last online course you took, how was your experience with this course?
2. How interested would you be in taking university-sponsored online courses?
 - a. [If not interested] Please select the reason that is most important for your disinterest in taking a university-sponsored online course.
3. What kind of programs would you be most interested in for university-sponsored online courses?
4. What subjects of university-sponsored online courses would you be interested in taking?

Additionally, by use of four- and five-point scales on some questions, the Task Force was able to find information not only on the preferences of each group, but the intensity of those preferences. The responses were instructive.

The faculty survey (n=451) revealed that about 11.5% of respondents teach at least one of their courses online, and that of that fraction, 80% found that online learning contributed positively to the course. Additionally, 42% of the sample—i.e. 30% more than those who teach online courses—are interested in teaching some form of online course. The most important reason for such willingness is the ability to reach a wider audience, as cited by 35% of those looking to conduct an online course. Interestingly, coming in second as the most significant single benefit for teaching online is pedagogical advantages, as cited by 21%.

Yet, when asking the faculty subset that is not interested in teaching online why they feel opposed, an overwhelming plurality (45%) say that it is because the traditional classroom environment is ideal for their subject. The second-most prominent reason, “maintaining academic standards,” is cited by only 17%. Thus, one sees a divide between the substantial minority of faculty who believe that online learning has its pedagogical advantages, and the more significant portion who still believe that traditional methods are best.

The alumni survey (n=313) found that respondents strongly support the idea of online courses despite most of them never having taken an online course. That is, 76% of sampled alumni have never taken an online course—but 92% indicated they would be interested in doing so, with 56% expressing the highest level of interest (i.e., “very interested”). Additionally, respondents see online courses as primarily learning opportunity as opposed to a chance to earn an additional degree, with 74% indicating they would be most interested in taking non-credit courses.

In terms of interest in subject areas, the distribution of interest was relatively uniform across all the subjects surveyed, i.e., Arts and Humanities, Business and Management, Economics and Politics, Foreign Languages, Professional Development and Education, and Science and Health. The subject with the most interest was Arts and Humanities, followed by Business and

Management—a finding which is contrary to existing literature such as Aslanian and Clinefelter (2012), which indicate that business and professional development are the primary drivers for current online learners.

The student survey (n=6311), conducted through the Policy Addendum of the Senate Student Affairs Committee's Quality of Life Survey, revealed interesting differences between alumni (one primarily online learning audience) and students. First, only 6% of students have taken a university-sponsored online course, and of those 6%, 60% found their experience either "somewhat positive" or "very positive," suggesting the potential for a great deal of pedagogical improvement in the online space. Second, in terms of interest in online learning at large, only 48% indicated that they would be interested in online courses—almost half the percentage in the alumni sample. Respondents who expressed disinterest indicated that the most important reason for their lack of enthusiasm was pedagogical; namely, that they believed that the quality of online learning is inferior to traditional in-class learning (38% of responses). The second most important reason, i.e. that the on-campus in-classroom experience is important (27% of responses), echoed the first. Given that meta-studies indicate that online learning can in fact be superior to in-class learning, this disparity between evidence and opinion reveals that students need to be better informed of the comparative advantages of online learning.

Additionally, unlike alumni, students would prefer a degree program over a non-degree program, with 52% looking for a credit-bearing classes with a degree option. In general, students are more oriented toward credentials, with only 18% being most interested in non-credit online classes that do not lead to some sort of certificate.

Digging deeper into these preferences, the Quality of Life Survey had an additional question not seen in the alumni survey that asked which aspects of online learning are most appealing. Two desirable characteristics of online learning stood out prominently, attracting 60% of respondents. These two were (i) the ability to take classes during the same semester that would not otherwise fit in one's schedule, and (ii) the ability to take classes over the summer that would not otherwise fit in one's schedule. The third most important aspect, selected by 39% of those surveyed, was the capability to make up classes for which one was absent. Therefore, it appears that much of what would drive the demand for online learning is scheduling and time constraints that are particularly imposing in the traditional classroom model.

In terms of subject area interest, the distribution of preferences was once again relatively uniform in the survey of students. The difference between alumni and students is that students more generally prefer foreign language classes, followed by the Arts and Humanities, and Business and Management. To illustrate this difference, only 38% of sampled alumni expressed interest in Foreign Languages, whereas 53% of students did.

Furthermore, because the Quality of Life Survey collected a wide range of respondent demographic information, it is possible also perform an analysis of the effects of different student

characteristics on their attitude toward online learning. Specifically, one analysis of note is the correlation between one's interest in taking a university-sponsored online course, and which Columbia school one attends, and whether one identifies as an international student. Running a regression on these variables finds the following statistically significant relationships at the 10% level or stronger:

- In order of descending magnitude, being a student from the following schools indicates a *higher* level of interest: Nursing, SCE, GS, MPH, SEAS (graduate students), Teachers College, SIPA
- In order of descending magnitude, the following schools indicate a *lower* level of interest: Law, GSAPP, GSAS
- Being an international student is correlated with about a 6.3% increased interest in online learning.

In terms of the magnitude of these effects, they can be quite large. For instance, on the four-point scale of “very interested,” “somewhat interested,” “not very interested,” and “not at all interested,” students from Nursing have 0.361 additional points of interest—a 9% increase on the scale. Therefore, identifying these key audiences and exploring how to best serve their online education needs could prove to be a key opportunity area moving forward.

10.3 STUDENT SURVEY QUESTIONS

The following was included in the Quality of Life Survey, which was released April 8, 2013, and closed April 29. The survey reached 36296 students and garnered 5958 responses.

1. **Have you ever completed an online course?** Yes/No
2. **Do you have a positive/neutral/negative impression as compared to a traditional course? Check the box that applies: (Make additional comments in the open ended section)**
 - a. Positive impression
 - b. Neutral impression
 - c. Negative impression
3. **Would you be interested in taking online courses?** Yes/No
4. **Check the program(s) that apply: (for those interested)**
 - a. Online credit toward degree
 - b. Non-degree but certificate
 - c. Non-credit only (including continuing education)
5. **What aspect of online learning is most appealing to you?**
 - a. The ability to take major requirements while studying abroad (e.g., through Columbia's Global Centers)
 - b. The ability to take classes during the same semester that would otherwise not fit in my schedule.

- c. The ability to take classes over the summer that would otherwise not fit in my schedule.
 - d. The ability to hold class meetings outside the classroom and/or with students from other sections.
 - e. The ability to make up classes for which I was absent.
 - f. Other (please specify)
6. **Please enter any additional or supporting comments here.**

10.4 ALUMNI SURVEY QUESTIONS

The following was included in Alumni Survey, which was released April 8th 2013 and closed April 29th 2013. The survey reached over 100,000 alumni through either direct electronic mailings or in the Newsletters that contained direct links to the survey.

- 1. **Have you ever taken an online course?** Yes/No
- 2. **Do you have a positive/neutral/negative impression as compared to a traditional course? Check the box that applies: (Make additional comments in the open ended section)**
 - a. Positive impression
 - b. Neutral impression
 - c. Negative impression
- 3. **Would you be interested in taking online courses?** Yes/No
- 4. **Check the program(s) that apply:** (for those interested)
 - a. Online credit toward degree
 - b. Non-degree but certificate
 - c. Non-credit only (including continuing education)
- 5. **Please enter any additional or supporting comments here**

10.5 FACULTY SURVEY QUESTIONS

The following was included in the Faculty Survey, which was released April 1, 2013 and closed April 15, 2013. An initial request was sent on April 1, 2013 with a reminder on April 8, 2013. The survey reached all faculty members in the Morningside and Medical campuses and garnered 451 total responses. The following questions were asked:

- 1. **Do you upload most of your course content to an online learning management system like CourseWorks, a school-specific online system or personal website, etc.?** Yes/No
- 2. **Do you teach any of your courses fully or partially online, including Massive Open Online Courses, Hybrid/Blended courses, or a Flipped Classroom (e.g., videoed lectures posted online)?** Yes/No
- 3. **Has online teaching contributed to / made no impact on / detracted from the course?**
 - a. Online teaching contributed to the course

- b. Online teaching made no impact on the course
 - c. Online teaching detracted from the course
 - d. Please enter any supporting comments
4. **Are you interested in teaching an online course, including Massive Open Online Courses, Hybrid/Blended courses, or a Flipped Classroom (e.g., videoed lectures posted online)?** Yes/No
5. **What reason is most important for wanting to teach online?**
- a. Wider reach of audiences
 - b. On-demand access to information
 - c. Personal and professional development
 - d. Pedagogical advantages
 - e. Other reasons (specify below)
 - f. Please enter any supporting comments
6. **What reason is most important for not wanting to teach online?**
- a. Uncertain student commitment/accountability
 - b. Maintaining academic standards for course/subject or devaluing education
 - c. Classroom method is ideal for my subject
 - d. Too much effort and cost to develop
 - e. Other reasons (specify below)
 - f. Please enter any supporting comments
7. **Please feel free to enter any additional comments.**

APPENDEIX 11: REPORT OF THE ALUMNI RELATIONS COMMITTEE

“A Perspective on Online Learning – Audiences”**Alumni Relations Committee****Columbia University Senate****June 11, 2013**

As the chairs of the Senate Alumni Relations Committee, we welcomed the opportunity to be a part of the Senate Task Force on Online Learning. Over the past year we have met with many experts in the field as well as various persons of interest across the university community. These meetings have been either before our Alumni Relations Committee, the Online Learning Task Force or in separate individual meetings with us. The Chair of the Senate Executive Committee has identified three areas of emphasis for the Task Force on Online Learning: Pedagogy, Technology and Audiences. Because alumni are an important target audience, we focus this report in discussing the various audiences addressable for online learning, the motivations behind each audience and how that leads to understanding the challenges and opportunities available to each.

In addition to helpful feedback and comments from members of the Senate Alumni Relations Committee, we would especially like to also thank the following people for their review and/or thoughtful comments on an earlier draft of this report. Of course we take responsibility for all final opinions and perspectives offered in this report.

- Peter Awn Dean of the School of General Studies
- Kristine Billmyer Dean of the School of Continuing Education
- Lisa Carnoy University Trustee, Chair - Alumni Relations & Development
- Mort Friedman Senior Vice Dean Emeritus - SEAS
- Lilian Hsu Vice President of Alumni Relations - CEAA
- Donna MacPhee Vice President for Alumni Relations - CAA
- Jessica Marrinaccio Dean of Undergraduate Admissions
- Safwan Masri Vice President for Global Centers
- Emily Morris Director - Alumni Services & Outreach
- Sharyn O'Halloran Chair of the Senate Executive Committee
- Richard Sun Co-Chair of the Senate Student Affairs Committee
- Sree Sreenivasan Chief Digital Officer, Columbia University
- Hitoshi Tanaka President of the Columbia Engineering Alumni Association
- James Valentini Dean – Columbia College
- George Van Amson Chair of Columbia Alumni Association (CAA)
- Kyra Tirana Barry President of the Columbia College Alumni Association (CCAA)

11.1 MODALITIES

Although it is outside the purview of this report, it is useful at the outset to discuss briefly some of the “modalities” of online learning that are in use today. Here we refer to the combination of pedagogy and technology that differentiate various online learning offerings. Certain modalities are more readily associated with certain audiences and purposes for online learning. However, it is important to keep in mind that this list is neither exhaustive nor immutable. Any primary association of a certain modality with a particular audience might be expected to change over time.

- “Discussion Hangouts” –

A platform whereby class members are synchronously placed in a chat room together with video and audio connection. A facilitator is used to guide the discussion.

- “Flipped Model” –

A platform whereby traditional classroom lectures are performed via asynchronously completed video modules. In-person meetings are utilized for hands-on learning and deeper exploration of the subject matter.

- “Hybrid Model” –

A platform whereby online education is augmented with in-person learning at the outset and conclusion of the program and/or at regular intervals during the program or course. Oftentimes, in-person meetings are utilized for introductory discussion and capstone projects.

- “Massively Open Online Course” (MOOCs) –

A platform whereby large numbers of students take a course structured so as to require minimal or no ongoing provider investment in the course. Video lectures, peer discussions/evaluations and automated evaluation tools are used.

- “Static Information” –

A platform whereby library and/or course reference materials are available in support of a course offering or for general reference.

Note that we will be not addressing the “Mission” or “Educational Purpose” for online learning generally or as it applies to various audiences and modalities; nor will we be discussing their “Funding Model(s)”. These are worthwhile topics for a separate discussion. Please also note that in the interests of brevity and to enhance the immediacy of many of the topics raised, we will limit the use of numerous examples and anecdotal evidence in making our points. Instead, we welcome questions and further discussion for those who may be interested in learning more about our thinking on these matters and what we have learned from numerous discussions.

11.2 TARGET AUDIENCES

11.2.1 ALUMNI

Alumni are a microcosm of many other audiences discussed in this report. However, they also have many unique characteristics and opportunities that should be addressed. Here we list several motivations and opportunities for this important constituency.

- a. To Remain Current in Their Profession
- b. To Change Professions
- c. For Personal Growth Outside Their Profession
- d. For Social Networking with Like-Minded People
- e. To Give Back to the University Their Skills and Experiences as Adjuncts or Instructors
- f. To Facilitate Regional Programming (e.g. With traveling faculty, book groups etc)
- g. For Alumni Regional Leadership Development Tools (e.g. Sharing best practices etc)
- h. For Development Opportunities with Alumni, Parents, Friends and Benefactors

11.2.2 UNDERGRADUATE AND GRADUATE STUDENTS

In spite of its penultimate position in our list of audiences, in fact the extant student population is, and should always remain, the primary audience for any new academic initiative undertaken by the university. Below we discuss various audiences within the student population and how they are or could be addressed with online education.

- a. Remote Fully Matriculated Students –

The Fu Foundation School of Engineering and Applied Sciences (SEAS) operates one of the few traditional online fully-accredited platforms for fully matriculated students pursuing a remote education. This platform (Columbia Video Network or CVN) has been operating for more than 10 years and has been very successful. Students earn a traditional Columbia University diploma. Admission and graduation standards are equivalent to that required of on-site students.

The School of Continuing Education has created a sophisticated online/hybrid learning platform that blends Columbia faculty knowledge with SCE's instructional design expertise, an unparalleled learning analytics engine, and social content and communication tools for a rich and rigorous online learning experience. This platform enables students to connect and interact in real-time and asynchronously with faculty and peers; share knowledge and build powerful relationships and

learning communities; exercise social, team and leadership skills; give and receive feedback on work and ideas; and support each another in the pursuit of shared learning goals.

Both of these programs could be models in that they have addressed many of the pedagogical and logistical issues of addressing this audience.

b. Enhanced Learning for Traditional On-Site Students –

“Discussion Hangouts” lend themselves naturally to seminar-style humanities courses. Utilizing technology could allow for an enhanced learning experience over in-person seminars, e.g. the use of remote guest speakers, multimedia learning tools and collaborative initiatives with leading external institutions. This could also alleviate programmatic challenges for students to take advantage of the Columbia Global Centers (CGCs), remote internships etc. while continuing their studies in core curriculum classes.

“Flipped Model” lends itself more naturally to math, science and engineering classes. This modality has the advantage of allowing students in technical fields to allocate their time much more effectively. Undoubtedly, many existing students in these fields would currently benefit from online tools that would alleviate their need to schedule interaction with professors and teaching assistants or make better use of that time.

c. Enhanced Learning for Non-Traditional or Overseas Students –

While the advent of the CGCs presents many exciting opportunities for Columbia students, it also presents many challenges. Online learning may alleviate many scheduling and other logistical challenges faced by students wishing to pursue a non-traditional education or take advantage of the CGCs or other study abroad program.

11.2.3 RESEARCH OFFICERS AND DOCTORAL/POST-DOCTORAL STUDENTS

Of course research officers and doctoral students already utilize a plethora of online research tools and platforms for their research—much of this “Static Information” as described above. We expect that as research increasingly becomes more collaborative across institutions and geographies, online tools will be utilized ever more so. Here we do not offer specific suggestions or examples of how online learning will impact and possibly transform this constituency. Instead we note that this potential audience shares many attributes with students, alumni and other life-long learners. We believe any standing committee charged with overseeing the development, implementation and governance of online learning should include member(s) from this important Columbia constituency.

11.2.4 OTHER LIFELONG LEARNERS

Many pedagogical issues will need to be addressed with the advent of online learning across any of the various audiences and modalities - but perhaps none more so than with the general audience of lifelong learners. Traditional diplomas, certifications, continuing education credits, professional designations and even high school credits, all either on a standardized or customized basis, can be envisioned. These issues will need to be addressed by the governance structure currently in place or underway at the university (e.g. the Provost, Committee on Instruction, Senate Education Committee, and Chief Digital Officer etc.). Here we mention several potential audiences for online learning and discuss each briefly.

a. High School Students –

The School of Continuing Education (SCE) already has a very successful onsite program and a hybrid onsite/global high school program. Various online learning modalities might be considered for reaching a larger high school audience in a cost-effective manner. This may prove very helpful in furthering the educational mission of the university and/or in enhancing the admissions objectives of the university. The SCE already has experience and strong expertise in online education.

b. Individuals-at-Large –

Columbia has already entered the MOOC space with three offerings in partnership with Coursera that have been well received. Additional discussions with other MOOC partners are in various stages. It is important that Columbia learn and be prepared to apply its knowledge from this initiative. To this end, we are encouraged to see Columbia's Chief Digital Officer fully engaged in this nascent initiative.

c. Corporate/Cultural/Educational and Governmental Institutions –

Online learning can be used to provide a customized educational tool for external organizations, their employees or their own target audiences. There may be significant opportunities for strategic partnerships with such organizations that could be initiated or enhanced with online learning modalities. The Medical Center, Schools of Public Health, Business, Engineering, Law, Social Work, Continuing Education, and Teacher's College all come readily to mind as potential partners with public and private institutions in furthering their educational mission internally or externally.

d. Domestic and International Executive Programs within an Industry –

Hybrid, Flipped and MOOC models all provide excellent cost-effective ways to address the needs of this target audience. Additionally, the CGCs can be utilized to augment the programmatic offerings of these models internationally. Ironically, the developments in online learning currently underway - in partnership with the CGCs as envisioned at Columbia - may offer a powerful, cost-effective way to export Columbia's educational services globally. (As we know, the CGCs have

purposefully not been positioned to do this. Instead they have been positioned presciently to allow Columbia's core constituencies to better learn from the world in which we live.)

11.2.5 COLUMBIA GLOBAL CENTERS (CGCS)

As should be evident by now, the CGCs are an important target audience/strategic partner for many of the online learning modalities discussed in this report. All of the other target audiences listed above and below have important contributions to make in furthering the manifest destiny of the CGCs. Furthermore all of these same audiences have much to gain in utilizing the CGCs in conjunction with online learning modalities at Columbia.

- a. Alumni
- b. Undergraduate and graduate students
- c. Research Officers and Doctoral/Post-Doctoral Students
- d. Other Lifelong Learners

11.3 CONCLUSION

Many challenges lie ahead as Columbia seeks to maximize the potential of new learning technologies. Chief among these will be issues of pedagogy, branding, standardization, quality control and funding - among other issues that are perhaps as yet unknown. However, Columbia has already shown itself to be quite far-sighted in elevating this issue in the Senate and in the Provost's office and in creating the Office of Chief Digital Officer.

As should be evident in reading this report, the emerging world of online education has the potential to transform virtually every audience that currently touches the university - including students, prospective students, alumni, institutional partners and the world-at-large. We offer merely one thoughtful perspective on how to categorize and think about these evolving audiences collectively and the opportunities and challenges they represent. We encourage members of the Task Force and the Administration to continue the conversation with various stakeholders of the university in how best to target the key audiences addressable in Columbia's emerging online education presence.

We think it is helpful to focus on all of the audiences collectively in mapping out Columbia's online learning strategy. While we don't think our report should be the final discussion on this critical topic, we do believe online learning for our alumni needs to be considered in every discussion as an integral component to Columbia's overall approach to this fast emerging new educational paradigm.

Respectfully submitted,

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Senate Alumni Relations Committee, Co-Chair

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Senate Alumni Relations Committee,
Co-Chair

12. PEER SCHOOL COMPARATIVE STUDY

Detailed overview of online programming in the Ivy League

School	Types Present	Detail
 Brown	Tuition Paying Traditional Distance High School MOOC Certificate/Non-Credit	Name: Emporio Impressa and Brown Executive MBA Audience: eMBA (traditional distance with limited residency) Description: Brown University has two online programs.³² The first is a 15-month Executive MBA program offered by Brown and the IE Business School in Madrid, Spain. The program consists of about five portions, which require of a short residential program followed by an online module. The program allows Brown to offer an MBA without having its own business school. The program claims to infuse a top-notch business program with a liberal arts philosophy.³³
		Name: Brown Pre-College Audience: High School Description: Brown also offers eight pre-college courses designed to prepare students for college. The courses are not introductory courses so much as programs aimed to expose students to certain fields or give them general college readiness. For instance, Brown offers courses called “Lessons in Leadership” and “Exploring Engineering”. Courses are graded only as complete or incomplete and are delivered in an asynchronous format, albeit they employ a variety of “rich media and Web 2.0 tools”.³⁴
		Name: Coursera Audience: General Public No Admissions Requirement Description: Brown has posted three courses on Coursera: an archeology course, a math/computer science course, and an English course.

³² <http://www.brown.edu/ce/faculty/online/>

³³ <http://www.iebrown.com/liberal-arts-and-management.php>

³⁴ <http://onlinecourselearning.com/brown/why-brown-pre-college/>

School	Types Present	Detail
 Cornell	Tuition Paying Traditional Distance Certificate/Non-Credit	Name: Cornell School of Continuing Education Audience: Traditional Distance Description: Cornell University has a two-tiered approach to online education. On one side, it offers courses for credit through its School of Continuing Education and Summer Sessions while also operating a for-profit online learning subsidiary called eCornell.³⁵ For more than five years, Cornell's SCE has allowed students to take online, credit-bearing courses during summer and winter sessions.³⁶ As of March 31, 2013, the SCE online offerings include about 25 courses including management courses designed for professional development purposes, upper-level American Studies courses, and several introductory courses in economics and political science, among others. Cornell charges \$1155 per credit hour.³⁷ The program allows students to contact professors or teaching assistants via email, phone, online platforms, etc. with questions about assignments or material. Grading varies by class and is meant to mirror that of an on-campus course.³⁸
		Name: eCornell Audience: Traditional Distance (Certificate) Description: eCornell offers a wide range of professional development courses including programs in human resources management, hospitality and food service management, marketing, health care, and nutrition. The dominant products offered by eCornell are its certificate programs consisting of roughly six courses each taking three to six hours to complete. Cornell charges \$3,600 for many of these certificates, although the individual courses are available for purchase as well (the certificate program costs less than purchasing the courses individually).³⁹ Cornell's renowned School of Hotel Administration effectively offers many of the courses on the eCornell platform. For the most part, eCornell courses appear to be

³⁵ http://www.cornell.edu/about/facts/faq_profile.cfm?id=932

³⁶ <http://cornellsun.com/node/25523>

³⁷ <http://www.sce.cornell.edu/ss/tuition/index.php>

³⁸ <http://www.sce.cornell.edu/dl/faq.php#6>

³⁹ <http://sha.ecornell.com/individual-catalog-downloads-sha/>

School	Types Present	Detail
		asynchronous, although the site stresses that students can interact with each other and instructors via discussion boards and other mediums.
		Name: Coursera Audience: MOOC Description: As of March 31, 2013, Cornell only offers one MOOC, entitled “Marketing the Hospitality Brand through New Media” and offered as a joint venture between Cornell’s hotel school and eCornell.
 Dartmouth	Certificate Program	Name: Certificate Program Audience: Traditional Distance Description: Dartmouth College offers a singular online certificate program in the “Fundamentals of Value-Based Health Care” through the Dartmouth Institute for Health Policy & Clinical Practice. It consists of five sequential eight-week courses. When purchasing all the courses together, the certificate costs about \$6,500. ⁴⁰
 Harvard	Tuition Paying Traditional Distance MOOC	Name: Harvard Extension School Audience: Traditional Distance Description: Harvard uses two platforms for delivering online courses: Harvard Extension School online and edX (HarvardX). The Harvard Extension School offers many courses online for credit spanning the humanities, social sciences, sciences, and professional development and management material. The areas in which HES offers the most courses are Computer Science, Environmental Studies, Government, and Management. HES also offers some important introductory courses such as “Principles of Economics”, “Introduction to Statistics”, and “Introduction to Fiction Writing”. ⁴¹ Transcripts do not indicate whether courses are completed online or on-campus, and some courses offer the option of attending lectures online or on-campus—the HES courses are taught in a synchronous format, meaning that students must follow the course schedule along with their peers. Testing must occur on-campus or at an approved test

⁴⁰ <http://www.tdiprofessionaleducation.org/certificate.html>

⁴¹ <http://www.extension.harvard.edu/distance-education/online-course-offerings>

School	Types Present	Detail
		proctoring site. Costs vary by course, but many appear to be in the \$1,000-\$2,000 range.⁴² HES offers some degree options, and online courses can be used to complete requirements for these programs. Name: edX (HarvardX) Audience: MOOC Description: Harvard's other online venture is HarvardX, its page on the edX platform. Currently, Harvard offers seven courses on edX, including "Justice" and "Introduction to Computer Science I". Students must complete assignments to earn a certificate of completion from HarvardX, and courses are offered in both asynchronous and synchronous formats. For instance, the computer science course simply requires that students complete eight assignments at their own pace whereas "Justice" invites students to respond to weekly poll questions and participate in live dialogues.⁴³
 Penn		Name: Penn Continuing Education Audience: Traditional Distance Description: The University of Pennsylvania has online offerings through its professional schools along with some summer courses that award undergraduate credit.⁴⁴ Additionally, Penn has posted some courses on the Coursera MOOC platform. Penn's School of Dental Medicine, School of Medicine, School of Nursing, and Wharton Business School

⁴² <http://www.extension.harvard.edu/distance-education>

⁴³ https://www.edx.org/university_profile/HarvardX

⁴⁴ <http://www.upenn.edu/programs/distance.php>

School	Types Present	Detail
		offer continuing education programs. The specific course offerings vary in terms of type of credit granted and breadth of offerings, but Wharton especially seems committed to making use of available technologies to facilitate its Executive MBA programs.⁴⁵ The medical school appears to primarily offer short one-lecture mini-courses for which students must take a post-viewing assessment to earn a continuing education credit.⁴⁶ Name: Penn Summer Online Audience: Residential w/ Limited Distance Description: Penn offers a range of classes online during its summer sessions, allowing students to take courses while away from the university. Penn is one of the few universities to offer language courses, offering Arabic, Chinese, German, Italian, Korean, and Polish.⁴⁷ Notably, Penn also offers a calculus sequence online over the summer. These courses are delivered in a synchronous, fairly integrated format with significant instructor interaction. Name: Coursera Audience: MOOC Description: Penn has posted 21 courses on Coursera across various disciplines.⁴⁸ The university grants a certificate of completion to students who finish course assignments. Recently, the American Council on Education approved a single-variable calculus course on Coursera to be credit bearing. ACE recommended that Penn grant students credit upon completion of the course and passage of a proctored test; non-Penn students would be able to take a test that was proctored via webcam. Penn will allow students to take a test upon completion of the course to count towards completion of

⁴⁵ <http://executiveeducation.wharton.upenn.edu/global-wharton/integrated-learning-technologies.cfm>

⁴⁶ <http://penncmeonline.com/online-cme>

⁴⁷ http://www.sas.upenn.edu/summer/courses/online_courses

⁴⁸ <https://www.coursera.org/penn>

School	Types Present	Detail
		a pre-requisite, and advance the student to the next course in the series.⁴⁹ This is one of the first instances in which a Coursera class has been approved to grant credit.
 Princeton	None/other	Name: Coursera Audience: MOOC Description: Princeton University only offers online courses through Coursera to “enhance learning at Princeton and extend its educational resources beyond campus”.⁵⁰ Princeton’s Coursera page currently has nine courses, and while seven of the nine are technical (mostly computer science) courses, the university also offers “History of the World since 1300” and “Introduction to Sociology”.⁵¹ Princeton does not award any certificates or statements of completion for Coursera courses.
 Yale	Satellite campus	Name: Open Yale Courses Audience: MOOC Description: Yale University operates two proprietary online learning platforms: Open Yale Courses and Yale Summer Session Online. OYC is a repository for course lectures, notes, assignments, and exams, allowing students to take courses in an asynchronous non-credit format. Yale began recording courses for OYC in fall 2006 and now contains 42 courses across various disciplines.⁵² Name: Yale Summer Session Audience: Residential w/ Limited Distance Description: On the other hand, Yale offers about 15 summer courses for credit, delivered in an integrated, synchronous format. Students must arrange to travel to New Haven or find a test-proctoring site to complete final examinations if the course requires such an exam. The courses cost \$3,300 each

⁴⁹ <http://www.thedp.com/article/2013/02/coursera-calculus-course-first-to-be-considered-for-credit>

⁵⁰ <http://www.princeton.edu/main/news/archive/S34/91/85O26/index.xml?section=topstories>

⁵¹ <https://www.coursera.org/princeton>

⁵² <http://oyc.yale.edu/courses>

School	Types Present	Detail
		and are worth 1 Yale credit (equivalent to 4 credits elsewhere). ⁵³
		Name: Language Consortium Audience: Traditional Residential Description: Yale has also partnered with Columbia and Cornell to offer less popular language courses. With the help of this partnership, a student at one school can connect virtually to a classroom at another to take a language not offered on-campus.⁵⁴ Languages include Dutch, Romanian, and Tamil.

⁵³ <http://summer.yale.edu/find-your-program/online-courses/important-information>

⁵⁴ <http://news.yale.edu/2012/12/19/report-committee-online-education>

Detailed overview of online programming in Peer Schools

School	Types Present	Detail
 Chicago	Traditional Distance	Name: School of Continuing Liberal and Professional Studies Audience: Continuing Education Description: The University of Chicago has a singular online learning platform offered through its Graham School of Continuing Liberal and Professional Studies. It contains two certificates: one in Clinical Trials Management and one in Medical Writing and Editing. UChicago uses a system called “Chalk” to deliver the online courses and allow students to interact with instructors. The certificates both require five to six courses costing \$1,365 each.⁵⁵
 Duke	Traditional Distance Traditional Residential (Limited Distance) MOOC	Name: Various Professional Schools Audience: Traditional Distance Description: Duke University offers a variety of online programs through its various schools, including an M.A. in Christian Practice from the Divinity School, Master of Environmental Leadership, a Master of Engineering Management, and an M.S. in Nursing.⁵⁶ These programs attempt to limit residential requirements and are mostly aimed at students who are employed full or part-time. Duke is also committed to maintaining standards and recognition across course delivery formats. For instance, the Master of Engineering Management program degrees and transcripts do not indicate whether the program was completed online or on campus.⁵⁷ Also, for reference, this engineering management program costs \$5,505 per course and consists of eight courses, meaning that the two-year, part-time program costs \$44,040 plus additional fees for course materials and the residencies.⁵⁸ The M.S.N. program costs \$1,425 per credit and consists of 36-60 credits.⁵⁹ The

⁵⁵ <https://grahamschool.uchicago.edu/content/online-learning>

⁵⁶ <http://onlinecourses.duke.edu/online-programs-at-duke/>

⁵⁷ <http://memp.pratt.duke.edu/distance>

⁵⁸ <http://memp.pratt.duke.edu/distance/tuition-financial-aid>

⁵⁹ <http://nursing.duke.edu/financial-aid/tuition>

School	Types Present	Detail
		Master of Environmental Leadership program, which is taught entirely online, costs \$15,350 per semester and takes four semesters to complete.⁶⁰ There appears to be no distinction in costs or credit between online and on-campus courses. One should also note that Duke's School of Business offers a five to six-term, 15 month Executive MBA program consisting of short residential sessions and online modules. The Duke School of Continuing Studies offers a Paralegal Certificate program online for \$6,995 and an online Legal Nurse Consulting Certificate for \$2,495.⁶¹⁶²
		Name: Duke Summer School Audience: Both Traditional Distance and Traditional Residential Description Aside from its professional school online programs, Duke offers some basic summer school courses available online for credit. These include "Writing for Public Policy" and "Data Analysis and Statistical Inference".⁶³ These courses cost \$2,895, which is the same as for on-campus courses.⁶⁴
		Name: Talent Identification Program Audience: Traditional Distance Description: Duke also operates its fairly well known Talent Identification Program for pre-college students. The program has two sets of programs: eStudies and eSeminars. The eStudies range in topic from general college-readiness courses like "Academic Writing" to more specific courses like "Cryptology". Each course costs \$850 with fees and span seven weeks during the summer. Most of the work can

⁶⁰ <http://www.nicholas.duke.edu/del/del-mem/tuition-fees-financial-aid>

⁶¹ http://learnmore.duke.edu/certificates/paralegal_online/

⁶² <http://learnmore.duke.edu/certificates/lnc/>

⁶³ <http://summersession.duke.edu/courses/online-courses>

⁶⁴ <http://summersession.duke.edu/tuition>

School	Types Present	Detail
		be completed asynchronously. eSeminars have somewhat more specific topics, including courses like “Who Is Watching Your Genes?” and “Do We Own Ourselves? The Philosophy or Privacy”. These courses require students to connect via video chat once per week, and the programs last about six weeks. Each seminar costs \$175 with fees.⁶⁵ Name: Coursera Audience: MOOC Description Lastly, Duke has posted 11 courses on Coursera, including “Introduction to Genetics and Evolution” and “Sports and Society”. Students earn a statement of accomplishment for completing these open courses.⁶⁶
 Johns Hopkins	Traditional Distance High School	Name: Krieger Arts & Sciences Audience: Traditional Distance Description Johns Hopkins University has robust offerings for high school students, graduate students, and professional development programs, including significant options in the sciences. JHU’s Krieger School of Arts & Sciences offers Advanced Academic Programs in subjects including applied economics, biotechnology, communication, and museum studies, awarding M.A. and M.S. degrees for coursework completed entirely online. Tuition is the same as the equivalent on-campus option—most courses cost between \$3,000 and \$3,500, and the degrees consist of around ten courses. AAP also includes some certificate programs. This division of JHU’s online offerings alone has twelve master’s and certificate programs, each containing many courses.⁶⁷ AAP does not distinguish between courses taken online or on-campus on degrees or transcripts. Similarly, JHU has platform called Engineering for Professionals that offers eight master’s and certificate

⁶⁵ <http://www.tip.duke.edu/node/47>

⁶⁶ <https://www.coursera.org/duke>

⁶⁷ <http://advanced.jhu.edu/academics/online-programs/>

School	Types Present	Detail
		programs each containing multiple courses. Engineering for Professionals offers a total of more than 140 courses, each costing about \$3,330.⁶⁸ Name: Bloomberg School of Public Health Audience: Traditional Distance Description JHU's Bloomberg School of Public Health has allowed students to take a wide array of courses online as well.⁶⁹ Although the other JHU programs may have a similar requirement as part of registration, the Bloomberg School states that all students must complete a mini-course entitled "Introduction to Online Learning" before enrolling in any online course.⁷⁰ For part-time and/or internet-based students, JHU charges \$923 per credit and expects students to complete 80 credits in two to three years.⁷¹ JHUSPH also offers many course lectures online via its Open Courseware platform, designed for students seeking to accumulate knowledge but not credit.⁷² Name: Center for Talented Youth Audience: High School Description: JHU Center for Talented Youth (specifically CTYOnline) is the university's online platform for classes aimed at pre-college students. There are offerings for students ranging from grades K-12, and courses are offered in self-paced (asynchronous) or synchronous formats.⁷³ For self-paced courses, JHU charges for three-month windows, with three months of tuition being \$704, six

⁶⁸ <http://ep.jhu.edu/online-learning>

⁶⁹ http://distance.jhsph.edu/offerings/full_web.cfm

⁷⁰ <http://distance.jhsph.edu/core/index.cfm/go/course.home/cid/90/>

⁷¹ <http://www.jhsph.edu/admissions/tuition-and-fees/index.html>

⁷² <http://ocw.jhsph.edu/index.cfm>

⁷³ <http://cty.jhu.edu/ctyonline/about/formats.html>

School	Types Present	Detail
		months for \$1,352, and nine months for \$1,938. The more synchronous, session-based courses cost between \$510 (introductory language arts) and \$1,306 (Advanced Placement courses). JHU CTY also offers Arabic, Chinese, and Spanish language classes in addition to English for non-native speakers.⁷⁴ The course offerings are fairly broad and include most K-12 subjects along with some special interest courses on topics like forensics, for instance
 MIT	Research center	Name: edX (MITx) Audience: MOOC Description: MIT's online strategy consists almost entirely of MOOCs, and it operates on two platforms: edX (MITx) and its propriety MIT OpenCourseWare system. MIT offers nine courses via MITx. Of the nine, eight are technical computer science, electrical engineering, or physics courses while the university also offers a class entitled "The Challenges of Global Poverty". MIT awards certificates of completion to students who complete all assignments for the MITx courses. The courses operate in a synchronous format in which students are required to keep up with assignments on a weekly basis.⁷⁵ Name: OCW Audience: MOOC Description: MIT operates perhaps the premier MOOC platform in terms of scope with its OpenCourseWare system. OCW includes materials from 2,150 courses and claims to have had 125 million visitors to the site.⁷⁶ Although MIT has obvious strengths in science, technology, engineering, and math (STEM), OCW also includes many humanities and social science courses as well. OCW's strength is its breadth, but it does not deliver content in a synchronous format or award credit. As the title of the platform suggests, OCW is simply a repository for course notes, assignments, lectures, and exams. Part of the

⁷⁴ <http://cty.jhu.edu/ctyonline/tuition/>

⁷⁵ https://www.edx.org/university_profile/MITx

⁷⁶ <http://ocw.mit.edu/about/site-statistics/>

School	Types Present	Detail
		program's mission is to improve curricula across the globe by making their materials available to students and instructors. ⁷⁷
 Stanford	Research center	Name: Coursera, Class2Go, Stanford eCorner Audience: MOOC Description: Stanford University offers MOOCs through four platforms: Coursera (which actually redirects to Stanford Online), Class2Go, Stanford eCorner, and Stanford Engineering Everywhere. Stanford eCorner is essentially a repository for lectures and speeches about entrepreneurship that not necessarily fulfill the qualifications of a MOOC.⁷⁸ Through Coursera and Class2Go, Stanford offers about 25 MOOCs across a variety of fields, although most offerings are in the STEM disciplines. Both platforms award certificates of completion and are capable of delivering courses in a synchronous format.⁷⁹ It should be noted that two Stanford professors founded Coursera.⁸⁰ Stanford Engineering Everywhere offers some fairly high-level technical courses using an open courseware format, meaning that the site simply contains class lectures, notes, assignments, and exams.⁸¹
		Name: Center for Professional Development Audience: Traditional Distance Description: Stanford's Center for Professional Development allows students to take many courses online for credit toward completion of a number of certificate and graduate degree programs. Graduate and professional certificates consist of three to six courses while the requirements for master's degrees are more extensive. Base tuition for online and on-campus courses at CPD is \$1,320 per unit (courses consist of at least three units), but students

⁷⁷ <http://ocw.mit.edu/about/>

⁷⁸ <http://ecorner.stanford.edu/>

⁷⁹ <http://online.stanford.edu/courses>

⁸⁰ <https://www.coursera.org/about/team>

⁸¹ <http://see.stanford.edu/see/courses.aspx>

School	Types Present	Detail
		can audit an online course for \$1,150. Credit toward a master's degree increases to \$1,340 per unit. Professional development courses are offered more cheaply online than on-campus (more than 50% discount for some classes). Stanford offers a discounted rate for students affiliated with the United States Armed Forces.⁸² Name: Stanford Online High School Audience: Traditional Distance Description: Stanford also has a robust online high school program that is fully accredited and diploma granting that serves grades 7-12. OHS offers many courses through this program, charging \$3,500 per course, \$10,300 for part-time enrollment for the academic year (up to three courses), and \$16,600 per year for full-time enrollment (four or more courses). The program also offers students various services like college counseling and student groups, for instance.⁸³ The program also promises a high level of interaction with instructors to guide students through the coursework.

⁸² <http://scpd.stanford.edu/becomeAStudent/tuitionAndFees.jsp?expandMenu=becomestudent#professional><http://scpd.stanford.edu/becomeAStudent/tuitionAndFees.jsp?expandMenu=becomestudent#professionalone-time>

⁸³ <http://epgy.stanford.edu/ohs/>

13. COMPARISON CHART DEFINITIONS

13.1 CREDIT BEARING PROGRAMS:

Traditional Residential: Students “in residence”; full or part-time students who physically attend courses at the University’s campus. These students include commuter students who attend courses.

Traditional Residential with Limited Distance: Traditional residential students who are temporarily away from campus, for instance study abroad, or between semesters (winter and summer break)

Distance Students with Limited Residency: Traditional distance students who have a short-term residency requirements (e.g. a two week intro or final project at the start or end of a semester; eMBA).

Traditional Distance: Students who receive instruction exclusively outside of the traditional classroom setting through online, mail or other platforms.

13.2 NON-CREDIT/CERTIFICATE PROGRAMS: COURSES THAT DO NOT RESULT IN AWARDING OF ACADEMIC CREDIT TOWARD A DEGREE

Non-HS Certificate Programs: Programs that result with the awarding of a certificate, taught at the post-secondary level with some sort of application process, even if admission is de-facto guaranteed.

General Public without Admissions Requirement: Courses available online to anyone; no application necessary

High School: Courses geared toward HS students with or without an admissions requirement

13.3 METHOD OF DELIVERY:

Synchronous: Courses that are delivered in real-time. Live interaction between instructors and students, can be both lecture-based (students all watch lecture at the same time, and professors respond to audience reaction), or seminar based (live discussion with students and preceptors)

Asynchronous: Course materials and assignments posted online. Students are able to move at their own pace but still have general deadlines and are able to ask questions to instructors and TAs.

Course Materials Posted Online: Lecture Videos, Slides, and Assignments posted online but there is no deadline or mechanism for the submission of course materials or ask questions.

None: The University does not offer online course content to this audience.