MOOC Trends and Implementation at Community Colleges
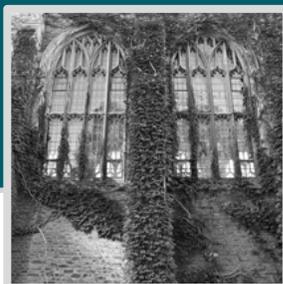
In the following report, Hanover Research reviews emerging trends in the use of Massive Open Online Courses (MOOCs) in higher education, and particularly at community colleges. Hanover Research explores developments in retention rates of MOOCs and efforts to award credit for MOOC completion. The review concludes with an analysis of the potential for MOOCs to be used as tools for remedial education, along with seven profiles of community colleges offering MOOCs or similar programs.

HANOVER RESEARCH

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INTRODUCTION

Massive Open Online Courses (MOOCs) have rapidly gained popularity in the last several years, with some supporters hailing them as the next big movement in higher education.[1] Yet many questions remain about the impact MOOCs will have on the structure of postsecondary education and student learning. In this report, Hanover Research reviews recent trends in the MOOC movement, with a special focus on efforts to adapt the MOOC format to community college settings.

MOOCs hold a number of potential benefits for community colleges: the prospect of free or nearly free access to college-level courses — including those instructed by faculty at elite institutions — is potentially revolutionary for low-income populations, which community colleges traditionally serve. In addition, MOOC experts have emphasized that online content provides scheduling flexibility for students with competing life demands, and students needing remedial coursework can use online content to adopt a more targeted approach to filling in gaps in their educational backgrounds.[2]

In this report, Hanover Research analyzes recent trends in the MOOC movement, including attempts to implement MOOCs at community colleges. The report proceeds at follows:

- **Section I: Overview of the MOOC Movement** summarizes the history of MOOCs and reviews major benefits and drawbacks of the MOOC format, as identified by educational experts.
- **Section II: Best Practices in Online Learning** reviews the latest research on the effectiveness of online learning, with special attention to the needs of community college students in online environments. Because there is little systematic data on the effectiveness of MOOCs — at community colleges or otherwise — this review highlights general principles that community colleges can apply to their own MOOC initiatives.
- **Section III: Trends in MOOCs Across the Academy** examines recent trends in the MOOC movement, primarily at four-year institutions, with regard to three critical areas of concern: completion rates, course credit, and the costs associated with developing and delivering MOOCs.
- **Section IV: Trends in MOOCs at Community Colleges** looks at recent efforts to leverage the advantages of MOOCs and similar course formats at community

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[1] Pappano, L. "The Year of the MOOC." *The New York Times,* November 2, 2012. http://www.nytimes.com/2012/11/04/education/edlife/massive-open-online-courses-are-multiplying-at-a-rapid-pace.html?pagewanted=all&_r=0

[2] Mangan, K. "MOOCs Could Help 2-Year Colleges and Their Students, Says Bill Gates." *The Chronicle of Higher Education*, October, 2013. http://chronicle.com/article/MOOCs-Could-Help-2-Year/142123/

colleges, including a detailed analysis of the prospects for using MOOCs to address the needs of remedial students.

▪ **Section V: Profiles of MOOC Programs** profiles community colleges that have used MOOCs and MOOC-like programs.

KEY FINDINGS

▪ **The number and diversity of MOOC offerings have continued to expand in the last two years.** New MOOC platforms have emerged around the globe, university partnerships with MOOC providers have proliferated, and topics covered by MOOCs have expanded to encompass the entire postsecondary curriculum.

▪ **Multiple viable models for MOOCs have emerged, each aimed at different kinds of students.** MOOCs differ in terms of whether they are entirely free or fee-based, whether they provide college credit for successful completion, and whether they follow a defined schedule or are self-paced. These different models can be well-adapted for the needs of diverse students, from remedial adult learners to curious postgraduates.

▪ **Retention and completion rates for traditional MOOCs remain low, but some models have shown promise in increasing retention.** Students are more likely to complete a MOOC if they register to receive a verified certificate of completion, often requiring a small fee. Whether a low completion rate is undesirable depends on the goals of the MOOC and the students it seeks to serve.

▪ **Many institutions — community colleges in particular — are exploring the use of noncredit MOOCs to increase access to remedial education among underprepared students.** MOOCs offer the possibility of allowing students to improve their basic skills and test into college-level courses without having to pay for remedial classes. However, there is doubt about whether the MOOC format is appropriate for the unique needs of developmental learners.

▪ **The traditional MOOC format will likely need to be adapted to meet the needs of community college students.** Research has established that community college students often struggle with online learning environments, and the MOOC format can exacerbate these challenges. Therefore, implementing MOOCs effectively at the community college level may require breaking from established MOOC models, for example by:

   o Incorporating in-classroom components to create a "blended" or "flipped" course;

   o Developing course materials internally to ensure they are appropriately structured for the students that the institution serves.

SECTION I: OVERVIEW OF THE MOOC MOVEMENT

In this section, Hanover Research provides a brief overview of the history of the MOOC movement and a summary of benefits and drawbacks experts have identified with the MOOC format thus far.

HISTORY OF MOOCS

MOOCs are an extension of the Open Education movement, which for several decades has sought to make educational resources widely accessible, regardless of the technological format in which they are packaged.[3] More recent origins of the modern MOOC can be found in online courses with a small number of tuition-paying, credit-earning students along with a large number of participants from the general public. From 2007 to 2008, Canadian professors George Siemens and Stephen Downes developed these "learning networks," which were dedicated to relatively unstructured exploration of a topic.[4]

In 2011, computer scientists at Stanford University offered the first modern MOOCs,[5] with Harvard University and the Massachusetts Institute of Technology (MIT) quickly following.[6] These courses, mostly in computer science, were free of charge, open to anyone with an internet connection, and attracted a large number of enrollees.[7]

A number of MOOC providers have emerged since these initial offerings, beginning with the "big three" of Coursera, Udacity (both for-profit companies operated by Stanford computer science faculty) and edX (a non-profit operated by Harvard and MIT).[8] While Coursera continues to dominate the MOOC landscape, institutions may now choose from among a wide range of platforms; Figure 1.1 shows the percentage of all MOOC courses offered by each of the major platforms in 2013, according to data compiled by MOOC-tracking website Class Central.

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[3] Adamopoulos, P. "What Makes a Great MOOC? An Interdisciplinary Analysis of Student Retention in Online Courses." *Thirty Fourth International Conference on Information Systems,* 2013. p. 2. http://www.phd-in-progress.com/wp-content/uploads/2014/02/08.pdf

[4] Hollands, F. and D. Tirthali. "MOOCs: Expectations and Reality." Center for Benefit-Cost Studies of Education, Teachers College, Columbia University, May, 2014. pp. 30-33.
http://contactnorth.ca/sites/default/files/moocs/moocs_expectations_and_reality.pdf

[5] Ng, A. and J. Widom. "Origins of the Modern MOOC (xMOOC)." In Hollands and Tirthali, Op. Cit., pp. 34-41.
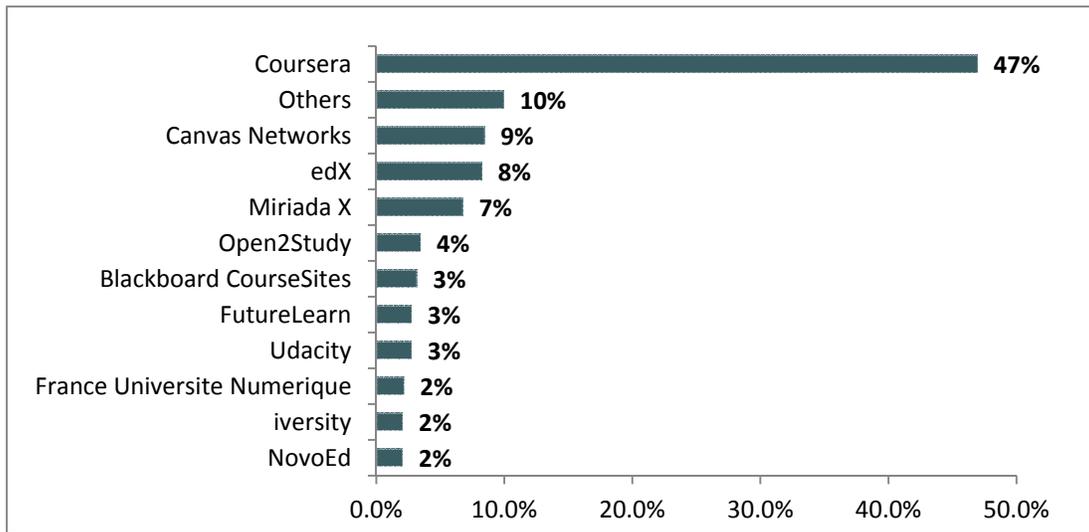
[6] Pappano, Op. Cit.

[7] Ibid.

[8] "The Big Three, At a Glance." *The New York Times*, November, 2012.
http://www.nytimes.com/2012/11/04/education/edlife/the-big-three-mooc-providers.html?_r=0

Figure 1.1: Percentage of MOOC Offerings by Platform, 2013

Platform	Percentage
Coursera	47%
Others	10%
Canvas Networks	9%
edX	8%
Miriada X	7%
Open2Study	4%
Blackboard CourseSites	3%
FutureLearn	3%
Udacity	3%
France Universite Numerique	2%
iversity	2%
NovoEd	2%

Source: Shah, 2013[9]

As shown in Figure 1.2, the number of MOOCs available has grown significantly since 2011, with almost 1,700 MOOCs already set to begin in December 2014. While computer science courses initially dominated the MOOC landscape,[10] MOOC topics have expanded to cover the entire academic spectrum. According to Class Central, MOOCs in the humanities now outnumber all other topics, though computer science, business management, and science remain popular (Figure 1.3).

Figure 1.2: Number of MOOC Scheduled Start Dates, 2011 - 2014
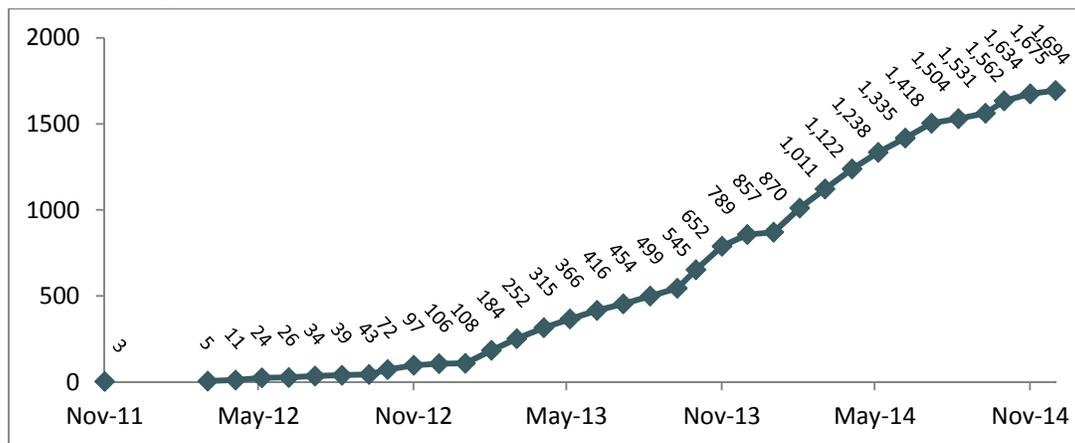
Source: Class Central[11]

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[9] Shah, D. "MOOCs in 2013: Breaking Down the Numbers." EdSurge News, December 2013. https://www.edsurge.com/n/2013-12-22-moocs-in-2013-breaking-down-the-numbers

[10] According to statistics compiled in 2013 by the National Institute for Technology in Liberal Education, 27 percent of MOOCs were in computer science, while 13 percent were in the humanities and social studies combined. See King and Nanfito, Op. Cit., p. 8. See also Shah, Op. Cit.

[11] "MOOC Tracker." Class Central. https://www.class-central.com/report/mooc-tracker/

Figure 1.3: Cumulative Number of MOOCs by Subject as of 2014
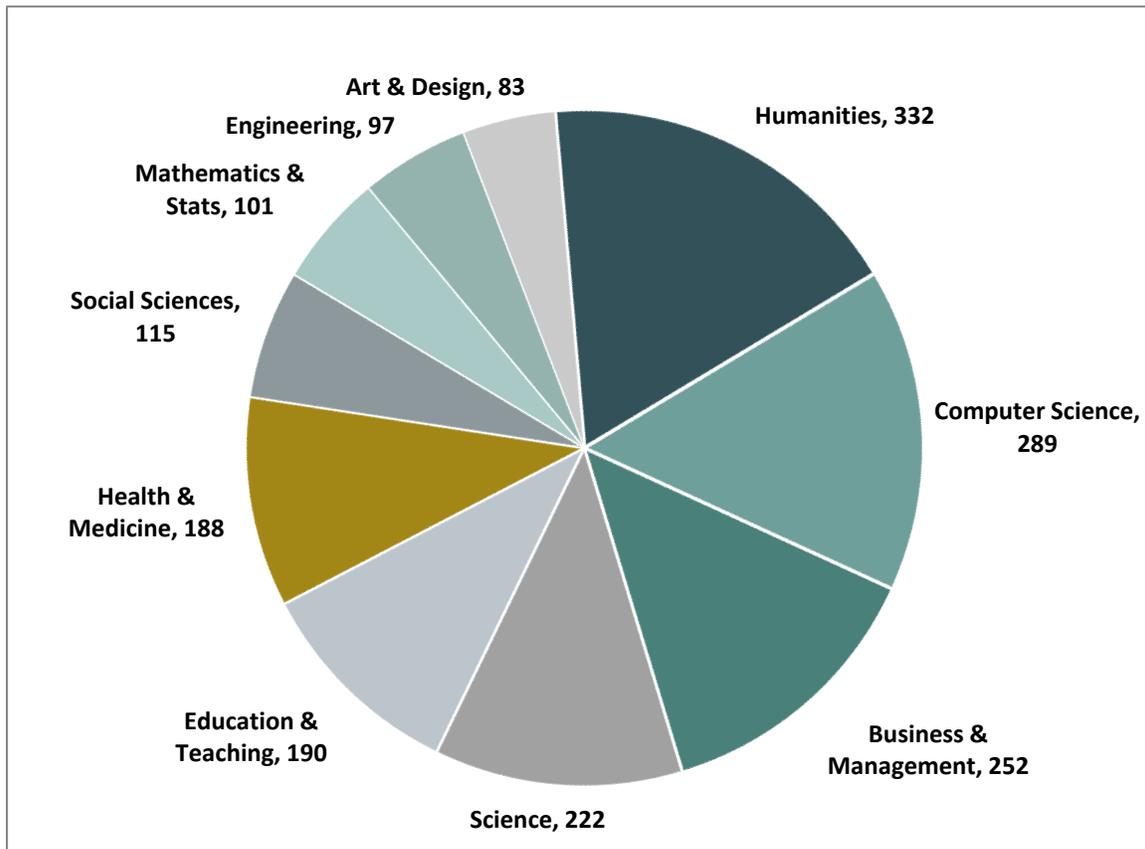
Source: Class Central[12]

BENEFITS AND DRAWBACKS OF MOOCS

In the following subsection, Hanover Research offers a brief summary of the major benefits and drawbacks of MOOCs that serve various purposes and various institution types.

MOOCs — and online education generally — offer both promise and peril for higher education. MOOCs provide access to higher education resources — including faculty at elite institutions — for free and allow for self-paced, feedback-guided learning.[13] **Yet many core aspects of postsecondary education — such as feedback from instructors and face-to-face interaction with peers — are absent from MOOCs. Moreover, completion rates among those who sign up for MOOCs are notoriously low.**[14] Figure 1.4 identifies some of the major benefits and challenges of MOOCs in their present format, as identified by Joseph King and Michael Nanfito of the National Institute for Technology in Liberal Education.

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[12] These data were compiled by summing course offerings for completed, in-progress, and planned MOOCs in each subject (as of July 30, 2014) listed at: "Subjects." Class Central. https://www.class-central.com/subjects

[13] Pappano, Op. Cit.

[14] [1] Adamopoulos, Op. Cit. [2] Belanger, Y. and J. Thornton. "Bioelectricity: A Quantitative Approach, Duke University's First MOOC." Duke University. February 5, 2013. http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/6216/Duke_Bioelectricity_MOOC_Fall2012.pdf

Figure 1.4: Benefits and Challenges of the MOOC Model

Benefits	Structure	Challenges
Most MOOCs are free, unless a form of accreditation is involved, and open to anyone who is interested.		MOOC providers can currently offer courses for free, but not indefinitely.
Learning occurs in an informal manner that is at the participant's own pace.		Students are not able to engage in real-world socializing or experiences.
All that is required is a computer and an internet connection.		Technical difficulties with a participant's computer or internet connection can impede learning.
Participants do not need to be enrolled in the MOOC's host institution, which may have a costly tuition.		Students may be used to or prefer the structure a traditional college course offers.
Work can be shared, viewed and critiqued by all participants.	*Experience*	Academic dishonestly may become an issue due to lack of supervision.
Outstanding professors and industry leaders can reach more students all over the world.		Students need to become responsible for their own learning.

Source: King and Nanfito[15]

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[15] King, W. J., and Nanfito, M. "MOOCs for the Rest of Us: An Inside Higher Ed Webinar." National Institute for Technology in Liberal Education. p. 11.

For community colleges in particular, online education holds enormous potential for helping colleges to meet one of their core institutional missions: to increase access to higher education.[16] But there are significant concerns in regards to other central aspects of most community colleges' missions, such as remedial education. J. Noah Brown of *Inside Higher Ed* observes that "MOOCs with their high-powered instruction and fast-paced delivery, but devoid of real-time faculty-student interaction, appear to offer little if any promise in helping students with the greatest needs overcome their academic deficits."[17]

MOOC scholars have emphasized the importance of tailoring MOOCs to different goals, and evaluating the success of MOOCs with respect to those goals. One of these scholars is Justin Reich, Richard L. Menschel HarvardX Research Fellow at Harvard University and a member of the team assessing the edX MOOC project. In a February 2014 blog post at the Hechinger Report, Reich notes a fundamental distinction between MOOC initiatives at elite institutions and at community colleges in terms of their likely audiences. This distinction is between "online media available to anyone for learning and personal growth," (e.g., HarvardX and MITx materials, or video lectures posted to YouTube) and "structured learning experiences offered by institutions of higher education" (e.g., courses offered by community colleges for credit).[18] Reich therefore emphasizes the need to adopt the right "frame of reference" for assessing the effectiveness of MOOCs: "faculty intent should play an important role in deciding the right frame of reference, the right yardstick, for judging open online courses."[19]

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http://www.insidehighered.com/sites/default/server_files/files/MOOCs%20for%20the%20rest%20of%20us%20January%2022%202013.pdf

[16] "Not Yet Sold: What Employers and Community College Students Think About Online Education." Public Agenda, September 2013. http://www.publicagenda.org/files/notyetsold_publicagenda_2013.pdf

[17] Brown, J. N. "MOOCs and Community Colleges." *Inside Higher Ed,* May, 2013. http://www.insidehighered.com/views/2013/05/13/essay-community-colleges-and-moocs#sthash.I36XE6a6.ukn3UUAj.dpbs

[18] Reich, Justin. "The Latest MOOC Research." Digital/Edu, The Hechinger Report, February, 2014. http://digital.hechingerreport.org/content/guest-post-the-latest-mooc-research_1270/

[19] Ibid.

SECTION II: BEST PRACTICES IN ONLINE LEARNING

Since MOOCs are a new phenomenon relative to online learning in general, there is considerably more evidence regarding best practices in online learning than regarding MOOCs in particular. This is especially true of initiatives at the community college level: efforts to adapt the MOOC approach to the community college setting are very much in their infancy. Thus, systematic assessments of what works with regard to MOOCs in community colleges are not yet available. There is, however, an established body of work on the best practices in online education, including practices in the community college setting. Below, Hanover Research reviews this literature, with a special emphasis on meeting the needs of community college students in online environments. Educators at the community college level should be aware of these principles as they seek to expand their efforts from traditional online courses to online classes that are open and massive.

In 2010, the U.S. Department of Education conducted a meta-analysis of published studies comparing online learning to face-to-face courses in postsecondary contexts. The results of the analysis suggest that, when well-implemented, online learning is a promising alternative to traditional course formats; key findings of the analysis included:

- Students in online conditions performed modestly better, on average, than those learning the same material through traditional face-to-face instruction
- Instruction combining online and face-to-face elements had a larger advantage relative to purely face-to-face instruction than did purely online instruction
- Effect sizes were larger for studies in which the online instruction was collaborative or instructor-directed than in those studies where online learners worked independently
- The effectiveness of online learning approaches appears quite broad across different content and learner types[20]
- Online learning can be enhanced by giving learners control of their interactions with media and prompting learner reflection[21]

Despite the overall promise of online learning, **the online medium appears to be significantly less effective among community college populations**, as reviewed below. In addition, much of the evidence regarding online learning appears troubling for the MOOC movement. **Many of the features of effective online instruction are absent from MOOCs.** For instance, online learning seems to work best when there is extensive student-instructor

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[20] Notably, the Department of Education's meta-analysis did not include studies of community college students; thus this statement is somewhat at odds with the information reviewed below about special challenges facing online learners in the community college setting.

[21] Bulleted points taken verbatim from: Means et al. "Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies." U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, September, 2010. pp. xiv-xvi http://files.eric.ed.gov/fulltext/ED505824.pdf

interaction[22] or when online and face-to-face components are combined to create a "blended" course.[23] Given that MOOCs are, by definition, both entirely online and "massive" in terms of enrollment, some features of effective online learning environments will be difficult to achieve using the traditional MOOC format.

ONLINE LEARNING AT COMMUNITY COLLEGES

Recent work has explored the experiences and performance of community college students in online learning environments. Researchers at the Community College Research Center at Teachers College, Columbia University (CCRC) have conducted several large-scale studies of online learning in the community college context. These studies have examined outcomes of over 40,000 community college students in almost 500,000 online and face-to-face courses at 57 institutions in Virginia and Washington State.[24] **This research has uncovered a number of challenges for online learners at community colleges, and outcomes for these learners tend to be worse across the board than in face-to-face settings.**

In terms of student attitudes towards online learning, surveys with online course-takers at community colleges have revealed that **community college students feel they learn less online than in face-to-face courses, and would prefer to take *fewer* online courses rather than *more*.**[25] With regard to more direct measures of student success, the findings emphasized in a 2013 summary of CCRC's research offer a sobering impression of the effectiveness of online learning in community college settings:

- Students are more likely to withdraw from or fail online courses, including introductory "gatekeeper" courses in math and English
- Course completers perform worse in online courses
- Developmental students are particularly challenged in online courses, with higher withdrawal/failure rates and lower grades in subsequent gatekeeper courses

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[22] Jaggars, S., and D. Xu. "Predicting Online Student Outcomes From a Measure of Course Quality." Community College Research Center, April, 2013. http://academiccommons.columbia.edu/download/fedora_content/download/ac:170360/CONTENT/predicting-online-student-outcomes.pdf

[23] Means et al., Op. Cit., p. xv.

[24] [1] Xu, D., and S. S. Jaggars. "The Effectiveness of Distance Education Across Virginia's Community Colleges: Evidence from Introductory College-Level Math and English Courses." *Educational Evaluation and Policy Analysis,* 33, 2011.
  [2] Xu, D., and S. S. Jaggars. "Online and Hybrid Course Enrollment and Performance in Washington State Community and Technical Colleges." Community College Research Center, March, 2011. http://files.eric.ed.gov/fulltext/ED517746.pdf
    [3] Xu, D., and S. S. Jaggars. "Adaptability to Online Learning: Differences Across Types of Students and Academic Subject Areas. Community College Research Center, Teachers College, Columbia University, February, 2013. http://ccrc.tc.columbia.edu/media/k2/attachments/adaptability-to-online-learning.pdf

[25] [1] Jaggars, S.S.. "Choosing Between Online and Face-to-Face Courses: Community College Student Voices." *Journal of Distance Education,* 28:1, March 2014. http://academiccommons.columbia.edu/download/fedora_content/download/ac:173468/CONTENT/Jaggars_-_AJDE_-_AAM_version_-_for_posting.pdf
  [2] "Not Yet Sold: What Employers and Community College Students Think About Online Education." Public Agenda, September 2013. http://www.publicagenda.org/files/notyetsold_publicagenda_2013.pdf

- Students who take a higher proportion of online classes are less likely to persist in their studies and earn a degree
- Achievement gaps are widened in online courses — groups of students from underperforming groups (male students, African-American students, and students with lower prior GPAs) lag behind their peers in online courses more than in face-to-face courses.[26]

These differences appear even when comparing the performance of students in online courses with the performance of the same students in face-to-face courses; therefore, these challenges appear to stem from the course format itself, rather than from the characteristics of the students who choose to enroll in online courses.[27]

Providing a nationwide perspective of online learning trends in community colleges, a 2013 survey of 142 community college administrators around the country conducted by the Instructional Technology Council gathered the following information about completion rates:

- Thirty-five percent of respondents reported that their retention is comparable for online and face-to-face instruction at their college
- Fifty-three percent said retention is lower for online classes than for face-to-face instruction at their college
- Two percent said retention is higher for online classes than for face-to-face instruction at their college[28]

The research reviewed above has clear implications for implementing MOOCs in the community college setting: the MOOC model may need to be adapted in order to effectively encourage learning among community college students. In particular, **"blended" and "flipped" course models offer a promising way of using MOOC content in two-year college settings.**[29] "Blended" courses combine both face-to-face and online components, and "flipped" courses use online resources to invert the traditional classroom model of students attending face-to-face lectures and completing assignments outside of class. Instead, students watch prepared video lectures outside the classroom, with class time dedicated to peer discussion and collaborative problem-solving.[30]

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[26] "Research Overview: What We Know About Online Course Outcomes." Community College Research Center, Teachers College, Columbia University, April, 2013. http://ccrc.tc.columbia.edu/media/k2/attachments/what-we-know-about-online-course-outcomes.pdf

[27] Ibid.

[28] Bullet points taken verbatim from: Lokken, F. and C. Mullins. "2013 Distance Education Survey Results: Trends in eLearning: Tracking the Impact of eLearning at Community Colleges." Instructional Technology Council, March, 2014. p. 29. http://www.itcnetwork.org/attachments/article/66/AnnualSurvey2013PublishedApril2014.pdf

[29] [1] Bednar, N. "MOOCs and Community College Distance Education." *2013 APSA Teaching and Learning Conference Paper*, January, 2013. p. 6. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2207216
     [2] Mangan, "MOOCs Could Help 2-Year Colleges," Op. Cit.

[30] Mangan, K. "Inside the Flipped Classroom." *The Chronicle of Higher Education,* September, 2013. http://chronicle.com/article/Inside-the-Flipped-Classroom/141891/

In the community college setting, flipped courses offer the possibility of relying on externally-created MOOC materials for lectures, while maintaining an in-class component dedicated to problem-solving and peer discussions — a model currently being explored at two community colleges in Massachusetts (profiled below). **The "flipped" model could enable community colleges to allow students to access high-quality online course materials while still receiving the personal interaction with instructors that is crucial for academic success.**

SECTION III: TRENDS IN MOOCS ACROSS THE ACADEMY

This section reviews general trends in the MOOC movement across all institutions, and presents the latest developments with regard to MOOC completion rates, for-credit MOOC models, and the costs associated with MOOC development and delivery.

COMPLETION RATES

One of the most consistent concerns regarding MOOCs has been their notoriously low completion rates. According to data for 39 MOOCs compiled by Katy Jordan, a doctoral student at The Open University, "completion rates range from 0.9% to 36.1%, with a median value of 6.5% [and] completion rates of 5% being typical."[31] However, as proponents of the MOOC movement have pointed out, **it can be misleading to compare MOOC completion rates with those of traditional college classes, given the wide variety of motivations and intentions exhibited by students who register for MOOCs.**[32]

Indeed, a more nuanced look at MOOC completion rates provides a somewhat more optimistic outlook. For example, one Stanford professor distributed a survey to measure student intent at the outset of her "Writing in the Sciences" MOOC. Of the 63 percent who indicated that they intended to complete all course assignments and earn a certificate of completion, 24 percent successfully completed the course. While this completion rate is lower than one expects in a traditional college course, it is much higher than the overall completion rate for the vast majority of MOOCs.[33]

Researchers have begun to look at some of the factors that affect student retention in MOOCs. A large-scale analysis of students' course evaluations across numerous MOOC topics, institutions, and platforms found that **students' attitude towards the course instructor is the largest determinant of whether students are likely to complete the course.** Other aspects of student attitudes that affect retention rates are students' assessments of the course material and the assignments, and self-paced MOOCs have lower retention rates than MOOCs with an established start date and schedule. However, the platform on which a MOOC is provided does not appear to affect the likelihood that students will complete the course.[34]

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[31] Jordan, K. "Initial Trends in Enrolment and Completion of Massive Open Online Courses." *The International Review of Research in Open and Distance Learning*, February, 2014. p. 147.

[32] [1] Koller, et al., "Retention and Intention in Massive Open Online Courses: In Depth." *Educause Review,* May/June, 2013. http://net.educause.edu/ir/library/pdf/ERM1337.pdf
　　[2] Clow, D. "MOOCs and the Funnel of Participation." *Third Conference on Learning Analytics and Knowledge*, April, 2013. http://oro.open.ac.uk/36657/1/DougClow-LAK13-revised-submitted.pdf

[33] Koller et al., Op. Cit., p. 62.

[34] Adamopoulos, Op. Cit.

Some MOOC providers have experimented with alternative formats designed to increase completion rates among motivated students, with some success. Coursera's *Signature Track* program allows students to pay a small fee of $30 - $90 to cover identity verification measures for submitted assessments, and can earn a "Verified Certificate" upon completing the course.[35] Seventy-four percent of students who signed up for Signature Track in the first MOOC to offer the service completed the course, and this number rose to 96 percent among students who "indicated a strong intent to finish" on a survey near the start of the course.[36]

In general, research on student retention/completion rates in MOOCs suggests that retention may not be an appropriate metric for many MOOCs (though as Justin Reich of edX notes, retention is likely to be a more significant concern at community colleges[37]), but **MOOCs with engaging instructors and formalized incentive structures will be most effective in encouraging student completion.**

MOOCS AND COURSE CREDIT

The first MOOCs were offered without the possibility of earning academic credit, and most MOOCs still offer only certificates of completion for students who fulfill all course requirements. **But a number of institutions and third-party providers are exploring options for turning MOOCs into opportunities for students to earn credit towards a degree.**[38]

One of the primary barriers to granting academic credit for MOOCs is the difficulty of ensuring academic integrity among participants. The challenge of enforcing academic integrity varies with the subject matter and structure of the course. In STEM-related courses, where assessments can be easily automated, MOOC providers have used identity-verification procedures along the lines of Coursera's Signature Track. An alternative approach, currently being explored in math MOOCs at the University of California, Irvine, is to create a massive bank of thousands of test questions, and issue each student a unique set of these questions for formal assessment.[39] Ensuring academic integrity presents an even greater challenge in writing-intensive MOOCs, where peer assessment models are more common.

These worries about academic integrity stem largely from the nature of MOOCs themselves, as Doug Lederman of *Inside Higher Ed* observes: "online proctoring alone is insufficient to

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[35] [1] "Signature Track Guidebook." Coursera Inc. https://www.coursera.org/signature/guidebook
    [2] "Coursera Help: How Much Does Signature Track Cost?" Coursera Inc.
    http://help.coursera.org/customer/portal/articles/936607-how-much-does-signature-track-cost-
[36] Koller et al., Op. Cit., p. 62.
[37] Reich, Op. Cit.
[38] Lederman, D. "Expanding Pathways to MOOC Credit." *Inside Higher Ed,* February, 2013.
    http://www.insidehighered.com/news/2013/02/07/ace-deems-5-massive-open-courses-worthy-
    credit#sthash.G7xE9nox.dpbs
[39] Ibid.

ensure the integrity of tests in a MOOC environment in which the content is freely shared and most students are not taking the courses for credit."[40]

Despite the size of MOOCs and concerns about academic integrity, efforts to provide credit for MOOCs have made progress. In February, 2014, the College Credit Recommendation Service of the American Council on Education (ACE) recommended five Coursera MOOCs for college credit — that is, the ACE recommended that member institutions grant academic credit to students who successfully complete these MOOCs (though the decision to grant credit is at the discretion of the home institution). **In a development of particular interest to community colleges, one of these courses, an algebra class from the University of California, Irvine, was approved for "developmental math vocational credit" by the ACE.**[41]

Among MOOC providers, Coursera has demonstrated a particularly strong interest in laying the groundwork for credit-granting. Coursera co-founder Andrew Ng has stated that interest in for-credit options drives many of the company's MOOC development practices: "a lot of our thinking about academic integrity and digital webcam proctoring was arrived at through discussions with ACE [about course credit]."[42]

Some institutions, such as Colorado State University-Global Campus and the University of Maryland, University College (a public university that offers admission to all applicants with a high school diploma or GED),[43] have been proactive in approving credit for MOOCs offered at other institutions, usually with a small fee ($90 - $150) to cover the cost of online exam proctoring. However, as of now, these programs have attracted little attention from students.[44]

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[40] Ibid.

[41] "Five Courses Receive College Credit Recommendations." Coursera Blog, February, 2013.
http://blog.coursera.org/post/42486198362/five-courses-receive-college-credit-recommendations

[42] Ng quoted in: Lederman, Op. Cit.

[43] "Undergraduate Admission Requirements." University of Maryland, University College.
http://www.umuc.edu/students/admissions/undergraduate-requirements.cfm

[44] [1] Kolowich, S. "A University's Offer of Credit for a MOOC Gets No Takers." *The Chronicle of Higher Education*, July, 2013. http://chronicle.com/article/A-Universitys-Offer-of-Credit/140131/
[2] Bishop, T. "Colleges Offer Credit for Massive Open Online Courses." *MSN News*, September, 2013.
http://chronicle.com/article/A-Universitys-Offer-of-Credit/140131/

COSTS OF DEVELOPING AND DELIVERING MOOCS

Given the youth of the MOOC phenomenon, it is unclear how MOOC development and delivery will affect institutional budgets, though there are some initial assessments available. There appears to be considerable variation in the financial investment required to produce and deliver MOOCs, both in terms of total costs and in terms of the price tag per student who completes the course.[45] Figure 3.1 shows the estimated costs of MOOC production and delivery at four institutions.

Figure 3.1: Estimated Costs of MOOC Production and Delivery at Four Institutions

INSTITUTION	LENGTH OF MOOC (WEEKS)	TOTAL ESTIMATED COSTS PER MOOC	COSTS PER COMPLETER
Teacher's College, Columbia University	8	$38,980	$74
University of Manitoba	12	$65,8000 - $71,800	*
American Museum of Natural History	4	$104,620	$272
Large Midwestern University	5 – 8	$203,770 - $323,330	*

* indicates no completion data available. Source: Hollands and Tirthali[46]

Because MOOCs are relatively young, much of the data regarding the costs of MOOC development reflect initial startup costs. While there is hope that costs for MOOC re-runs will be significantly lower — as many resources can be re-used and certain day-to-day operations (e.g., monitoring discussion boards) can be delegated to non-faculty staff — systematic data on the costs of re-runs is not yet available.[47]

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[45] Hollands and Tirthali, Op. Cit., p. 12.
[46] Ibid., p. 12.
[47] Ibid., p. 12.

SECTION IV: TRENDS IN MOOCS AT COMMUNITY COLLEGES

In this section, Hanover Research surveys recent trends in the use of MOOCs and MOOC-like materials at community colleges. The section begins with a summary of research on the current practices and plans for MOOC projects at community colleges and the concerns that have been raised about MOOCs in diverse educational environments. The section concludes with an in-depth analysis of the prospects for using MOOCs to address a pressing need at community colleges: the provision of remedial or developmental education to prepare students for college-level coursework.
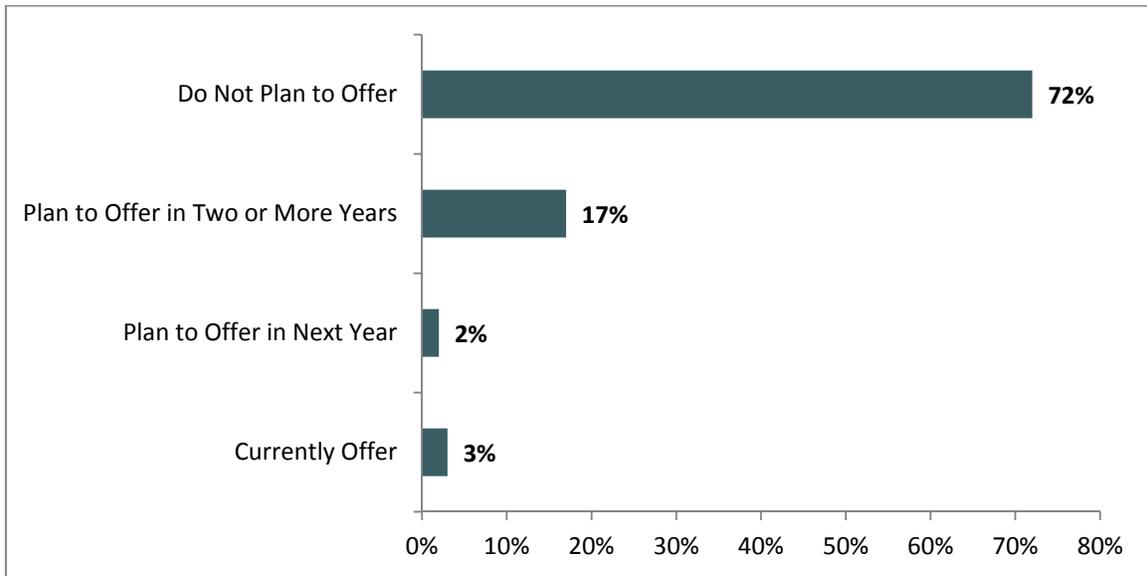
MOOC PLANS: COMMUNITY COLLEGES

To help track emerging trends in the use of educational technology at the community college level, the Instructional Technology Council (ITC) conducts an annual survey of distance education coordinators at community colleges around the country. Beginning in 2012, ITC asked these educators about MOOC plans at their institutions. The 2012 survey explored the extent to which community colleges have shown interest in incorporating MOOC content into their course offerings, while the 2013 survey looked at community colleges' plans to offer MOOCs themselves. Both surveys received responses from a nationally representative sample of 142 administrators.

Results from ITC's 2012 survey indicate significant interest among community college administrators in using MOOC content in their classrooms. **Forty-four percent of those surveyed said their institutions are "beginning to explore options for incorporating MOOC content into their online courses," while 42 percent responded that they had no plans to do so.[48] Despite this interest, it appears that relatively few community colleges plan to offer their own MOOCs**: in the 2013 survey, 72 percent of respondents had no plans to offer MOOCs at their institutions (Figure 4.1).

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[48] Mullins, C. "2012 Distance Education Survey Results: Trends in eLearning: Tracking the Impact of eLearning at Community Colleges." Instructional Technology Council, April, 2013. p. 18.
http://www.itcnetwork.org/attachments/article/87/AnnualSurveyApril2013.pdf

Figure 4.1: MOOC Plans of Community Colleges, 2013

One reason for the mixed reception of MOOCs at community colleges, as well as other institutions with diverse student populations, is concern that MOOCs developed at elite institutions will not be relevant to their student bodies. A related concern is that the existence of such MOOCs will exert pressure on faculty to standardize their courses in line with those at elite institutions. In a 2013 open letter from the philosophy faculty at San José State University to Michael Sandel, a Harvard professor with a political philosophy MOOC, voiced these concerns: "our very diverse students gain far more when their own experience is central to the course and when they are learning from our own very diverse faculty, who bring their varied perspectives to the content of courses."[50]

USE OF MOOCS FOR DEVELOPMENTAL EDUCATION

A number of higher education experts have noted the promise of MOOCs for providing low- or no-cost developmental/remedial education to help students prepare for college-level work, a role traditionally fulfilled by community colleges.[51] MOOCs could therefore replace the system currently employed at many community colleges, which requires students to pay for remedial courses that do not count towards a degree. **Nevertheless,**

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[49] Lokken and Mullins, Op. Cit., p. 21.
[50] "An Open Letter to Professor Michael Sandel from the Philosophy Department at San José State University." Department of Philosophy, San José State University, April, 2013. p. 2.
    http://s3.documentcloud.org/documents/695716/an-open-letter-to-professor-michael-sandel-from.pdf
[51] [1] Reed, R. "MOOCs and Remediation." *Inside Higher Ed,* May, 2013.
    http://www.insidehighered.com/blogs/confessions-community-college-dean/moocs-and-remediation
        [2] Fain, P. "Free Courses for a Big Problem." *Inside Higher Ed*, July, 2013.
    http://www.insidehighered.com/news/2013/07/19/two-year-colleges-go-open-source-seek-fix-remediation
        [3] Mangan, "MOOCs Could Help 2-Year Colleges." Op. Cit.

there is still significant concern that MOOCs may be ill-suited to the needs of remedial students. As Joanne Jacobs of The Hechinger Report observes: "typically, online courses work best for mature, disciplined, competent students, which suggests that MOOCs aren't likely to work well for high school kids and remedial students."[52]

Again, these considerations suggest MOOCs will need to be adapted if they are to benefit remedial students. As reviewed below and in the profiles presented later in this section, **community colleges have experimented with a variety of models for using MOOCs and MOOC-like materials for developmental purposes, including blended and online-only, free and fee-based, and scheduled and self-paced courses.**

A number of community colleges have used one MOOC-like resource in particular for developmental math education: the Khan Academy. The Khan Academy is a nonprofit that develops open-access tutorial videos and interactive activities and assessments.[53] In the summer of 2013, the New England Board of Higher Education began incorporating Khan Academy resources into developmental math — or "math boot camp" — programs at area community colleges. Khan Academy materials were used to supplement face-to-face instruction in these programs.[54]

Students at these colleges can enroll in developmental math programs in the hope of earning higher scores on a math placement test, thus placing directly into college-level math and eliminating the need for costly noncredit remedial courses.[55] The New England project quickly expanded from two to 14 colleges.[56] A similar use of Khan Academy materials was implemented in a developmental math program at Hawai'i Community College.[57]

The use of Khan Academy materials at community colleges has shown promise,[58] and efforts are underway to conduct more rigorous evaluations. In July 2014, nonprofit education think-tank WestEd received a $3 million grant from the U.S. Department of Education to study the effectiveness of Khan Academy's online videos for improving community college students' performance in algebra courses.[59]

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[52] Jacobs, J. "San José State, Udacity Rethink MOOC Pilot." Community College Spotlight, The Hechinger Report, July, 2013. http://communitycollegespotlight.org/content/san-jose-state-udacity-rethink-mooc-pilot_14076/

[53] Dembicki, M. "AACC, Khan Academy Discuss Developmental Math." *Community College Daily*, July, 2013. http://www.ccdaily.com/Pages/Academic-Programs/AACC-Khan-Academy-discuss-developmental-math.aspx

[54] "Developmental Math Demonstration Project." New England Board of Higher Education. http://www.nebhe.org/programs-overview/nebhe-developmental-math-demonstration-project/devmath/

[55] Curtis, D. "Nashua Community College to Host Math 'Boot Camp.'" *Nashua Telegraph*, July, 2013. http://www.nashuatelegraph.com/news/1011301-469/nashua-community-college-to-host-math-boot.html

[56] "Developmental Math Demonstration Project," Op. Cit.

[57] "Higher Education Case Studies: Hawai'i Community College Math Refresher." The Khan Academy. https://www.khanacademy.org/coach-res/reference-for-coaches/case-studies-hied/a/hawaii-community-college-math-refresher

[58] Ibid.

[59] Montoya, C. "WestEd Awarded U.S. Department of Education Grant to Study the Effectiveness of Khan Academy on Community College Students' Algebra Achievement." WestEd, July, 2014. http://www.wested.org/study-khan-academy-on-community-college-students-algebra-achievement/

Another organization with interest in developing online material specifically for the community college setting is Carnegie Mellon University (CMU). While CMU has yet to offer a traditional, instructor-led MOOC,[60] the university's Open Learning Initiative (OLI) develops free self-paced courses and pre-packed digital course materials for teachers.[61] In partnership with several private funders, OLI is conducting a pilot study of the use of five of its course packages at community colleges (these courses are Introduction to Statistics, Anatomy & Physiology I & II, Introduction to Biology, and Introduction to Psychology). OLI's website provides the following description of the project:

> Carnegie Mellon University, in collaboration with state agencies and national affinity groups, will establish a consortium of community colleges that will enact a large scale, systems-change process that increases efficiency in the way instruction is developed, delivered, evaluated, and continuously improved. **The overarching goal is to demonstrate a 25% higher rate of course completion for students from vulnerable populations, with a focus on gatekeeper courses critical to graduation success.** Within three years, the Community College Opening Learning Initiative (CC-OLI) will scale to 40 community college partners and will reach an additional 50-100 classrooms.[62]

As of the writing of this report, OLI is actively seeking community college faculty to participate in the study, offering free course materials and honorariums for participants.[63]

The experience of San José State University in using the MOOC model for developmental education provides a cautionary tale, however, especially with regard to fee-based, for-credit models. In January 2013, San José State announced an agreement with Udacity[64] to offer three online courses (capped at 100 students, smaller than traditional MOOCs) at the remedial and introductory levels: remedial math, college-level algebra, and introductory statistics.[65] The program was suspended six months later due to high failure rates in the initial run of the courses. **Only 29 percent of students passed the remedial math course, compared with 80 percent in the face-to-face version of the course.**[66]

Officials at Udacity and San José State cited students' inadequate access to technology[67] and insufficient time to absorb course material[68] as reasons for the high failure rate. San José

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[60] Rivard, R. "The MOOC-Averse Technology U." *Inside Higher Ed*, February, 2013. http://m.insidehighered.com/news/2013/02/28/carnegie-mellons-online-efforts-include-spinoffs-and-subsidiaries-not-moocs

[61] "Open Learning Initiative." Open Learning Initiative, Carnegie Mellon University. http://oli.cmu.edu/

[62] "CC-OLI: Community College Courses." Open Learning Initiative, Carnegie Mellon University. Emphasis added. http://oli.cmu.edu/get-to-know-oli/get-involved/see-our-current-projects/community-college-oli/

[63] Ibid.

[64] Fain, P. "As California Goes?" *Inside Higher Ed*, January, 2013. http://www.insidehighered.com/news/2013/01/16/california-looks-moocs-online-push

[65] Rivera, C. "San José State Suspends Collaboration with Online Provider." *The Los Angeles Times*, July, 2013. http://www.latimes.com/local/la-me-0719-san-jose-online-20130719-story.html

[66] Fujimoto, K. and E. Cara. "MOOC Mashup: San José State University-Udacity Experiment with Online-Only Courses Fizzles." *San José Mercury News*, July, 2013. http://www.mercurynews.com/opinion/ci_23688069/mooc-mashup-san-jose-state-university-udacity-experiment

[67] Rivera, Op. Cit.

State Provost Ellen Junn emphasized the need for careful planning and attention to students' level of preparedness: "we learned that we could have prepared them better about what it means to take an online course and that this is a university course with real faculty teaching for university credit."[69]

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[68] Metz, R. "Sebastian Thrun on the Future of Learning." *MIT Technology Review*, July, 2013.
http://www.technologyreview.com/news/517181/sebastian-thrun-on-the-future-of-learning/
[69] Junn quoted in: Rivera, Op. Cit.

SECTION V: PROFILES OF MOOC PROGRAMS

Hanover Research conducted a scan of community colleges with MOOC and MOOC-like programs, and identified several institutions with informative program structures. The profiles below portray a wide range of existing models and practices in the development and delivery of MOOCs in community college settings.

Not all of these programs incorporate MOOCs as traditionally defined, but instead use a variety of online initiatives informed and influenced by the MOOC movement, but adapted to the community college setting. Figure 5.1 provides a summary of major features of the MOOC-like programs at the institutions profiled. Hanover Research begins with profiles of the three community colleges (among nine postsecondary institutions), which received Gates Foundation grants in November 2012, to support MOOC development and implementation (see Appendix A for complete list of grant recipients and future research and funding priorities of the Gates Foundation MOOC initiative).

Figure 5.1: MOOC-Like Programs at Community Colleges

INSTITUTION	COURSE(S) OFFERED	PLATFORM	TUITION/CREDIT?
Cuyahoga Community College	▪ Developmental Math	Blackboard CourseSites	No, but certificate of completion awarded
Wake Technical Community College	▪ Introductory Algebra Review	Udacity	No, but certificate of completion awarded
Mt. San Jacinto College	▪ Crafting an Effective Writer: Tools of the Trade	Coursera	No, no certificate of completion awarded
Bossier Parish Community College	▪ Basic Mathematics ▪ Beginning Algebra ▪ Intermediate Algebra ▪ College Algebra ▪ Fundamentals of Grammar ▪ Fundamentals of Writing ▪ Developmental Reading ▪ College Success Skills	Blackboard CourseSites	No
Ivy Tech Community College	▪ Forty-six courses available	Pearson Propero	$299 fee per course, credit granted through College Level Examination Program (CLEP)
Bunker Hill Community College/Massachusetts Bay Community College	▪ Introduction to Computer Science and Programming (MIT version)	edX	Yes

CUYAHOGA COMMUNITY COLLEGE, OHIO

Cuyahoga Community College (Tri-C) serves Northeast Ohio in the area near Cleveland. Tri-C enrolls over 52,000 students annually, with more than 130 face-to-face courses and over 800 distance-learning courses.[70]

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[70] "Facts About Tri-C." Cuyahoga Community College. http://www.tri-c.edu/about/Pages/default.aspx

With help from a Gates Foundation grant, Tri-C began offering a four-week developmental math MOOC in the summer of 2013. The course is designed to help students refresh their math skills in order to prepare them for college-level work without the need for a tuition-based remedial course.[71] Preparing students for college-level math is a pressing need for Tri-C, where 93 percent of students take at least one remedial math course. The content of Tri-C's MOOC was selected by faculty and staff at Tri-C from among a variety of online resources, including the Khan Academy,[72] and was offered monthly in March through June 2013.[73]

The format of the course has evolved into a variation on the self-paced model: **students may begin the course at any time and move through the material at their preferred pace, but must correctly answer 80 percent of the test questions for a unit before moving to the next one.** The course's completion rate for the first four offerings was 18 percent, which is well above that for most MOOCs (see Section III), as Tri-C's Sasha Thackaberry, director of eLearning technologies, observed in an interview.[74]

Thackaberry has also emphasized that although students could be prevented from advancing in the course by low scores on assessments, **Tri-C sought to create a "low-risk failure environment,"**[75] in which students could collaborate with peers to help improve their scores.[76] The succeed-to-advance model exemplifies a common approach in MOOCs, game-style learning. Administrators at Tri-C interviewed by *Inside Higher Ed* suggest this approach may be particularly effective for community college students: **"college officials said nontraditional students in particular thrive on the positive feedback of progressing from level to level, rather than just receiving a grade when they complete a course."**[77]

MT. SAN JACINTO COLLEGE, CALIFORNIA

Mt. San Jacinto College (MSJC), located in southern California, operates four campuses and enrolls over 19,000 students in its for-credit, non-credit, and community-services classes.[78] After receiving a Gates Foundation grant, MSJC assembled a team of three English professors, two multimedia specialists, and a member of the California @ONE Professional Development project to create a developmental English course, "Crafting an Effective Writer: Tools of the Trade."[79]

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[71] "MOOC." Cuyahoga Community College. http://www.tri-c.edu/onlinelearning/Pages/mooc.aspx

[72] Fain, "Free Courses for a Big Problem," Op. Cit.

[73] Farkas, K. "Cuyahoga Community College's Free Online Developmental Math Course Open to All." Cleveland.com, July, 2013. http://www.cleveland.com/metro/index.ssf/2013/07/cuyahoga_community_colleges_fr.html

[74] Ibid.

[75] Thackaberry quoted in: Fain, "Free Courses for a Big Problem." Op. Cit.

[76] Farkas, Op. Cit.

[77] Fain, "Free Courses for a Big Problem." Op. Cit.

[78] [1] "Welcome to Mt. San Jacinto College." Mt. San Jacinto College. http://www.msjc.edu/CollegeInformation/Pages/default.aspx
[2] "Location." Mt. San Jacinto College. http://www.msjc.edu/CollegeInformation/Pages/Location.aspx

[79] "MSJC To Offer Free Online Writing Course." Mt. San Jacinto Community College. http://www.msjc.edu/PublicInformationOffice/Pages/MSJC-to-Offer-Free-Online-Writing-Course.aspx

According to Patricia James Hanz, MSJC's dean of instruction (library and technology), MSJC's MOOC was developed in part to address a pressing issue in the state of California, namely the lack of seats in community college courses, particularly at the developmental/remedial level.[80] Of the 40,000 enrollees in the first run of the course in May 2013, about 30,000 became "active" users. In order to count as having completed the course, students were required to complete a peer review assignment. Interestingly, MSJC's developmental English course has attracted a high percentage of English language learners: 65 percent of students in the first iteration of the course identified as ESL students.[81]

Hanz's description of MSJC's MOOC initiative reveals that the course aligns well with the best practices for online learning reviewed above. The structure of the course included several features designed to help students succeed in an online environment. The first unit of the course was dedicated to being a successful online student, and MSJC recruited additional staff, including seven writing center tutors, to help monitor and respond to student questions and comments on the course discussion boards. **According to Hanz, the commitment to engaging with participants proved popular with students: "with 14 people able to participate in the discussions, students felt tended to."[82]**

Hanz's summary of lessons learned from implementing a MOOC project in a community college is provided in Appendix B.

WAKE TECHNICAL COMMUNITY COLLEGE, NORTH CAROLINA

Wake Technical Community College (WTCC) in Raleigh, North Carolina, is the largest community college in North Carolina, with 69,000 annual enrollees at "five campuses, two training centers, multiple community sites, and a comprehensive array of online learning options."[83]

Also a Gates Foundation grantee, WTCC designed its free, non-credit Introductory Algebra Review (IAR) MOOC to give developmental students a firm background in the first five modules of the North Carolina Community College System's developmental math curriculum:

- Operations with integers
- Fractions and decimals
- Proportions/ratios/rates/percents
- Expressions, linear equations, linear inequality
- Graphs and equations of lines[84]

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[80] Hanz, P. J. "Crafting an Effective MOOC: One Community College's Experience." WCNET Frontiers, August, 2013.
   http://wcetblog.wordpress.com/2013/08/06/creating-an-effective-mooc/
[81] Ibid.
[82] Ibid.
[83] "About Wake Tech." Wake Technical Community College. http://www.waketech.edu/about-wake-tech
[84] "M+O+O+C = Success." Wake Technical Community College.
   http://waketech.mycareerfocus.org/2013/06/13/1095/

WTCC's approach to developing the MOOC combined the college's expertise in the needs of its students with the skills of Udacity staff members in delivering online content: although Udacity staff presented the content, the course was designed by staff at WTCC.[85] WTCC's IAR includes interactive quizzes and practice exercises, but no traditional homework.[86]

The first run of the IAR MOOC at WTCC enrolled 17,500 students, of whom about 1,000 completed the course. Despite the low completion rate, WTCC "was so pleased with the results that it's offering a chemistry MOOC [in summer 2014] and plans to develop one in computer literacy."[87]

BOSSIER PARISH COMMUNITY COLLEGE, LOUISIANA

Bossier Parish Community College (BPCC) is located in Bossier City near Shreveport, Louisiana BPCC enrolled 8,512 students in 2013 and awarded 1,176 degrees, primarily Associate of Applied Science degrees and Certificates of Technical Studies. BPCC employs 339 full-time staff, including 131 faculty members, and offers 284 online courses.[88]

In 2012 BPCC launched its "Open Campus" initiative, which is "the first developmental-level, cross-curricular series of open-source courses."[89] The Open Campus program offers free, non-credit online courses that are self-paced, start-anytime, and open to anyone. These courses are designed to provide remedial instruction to underprepared students in order to lay the foundation for college success. BPCC's MOOCs do not provide any interaction between the student and instructor, but course modules include optional quizzes that students may use to assess their learning.[90]

BPCC's Open Campus is unique in two ways: administrators developed the program without outside seed money, and BPCC has developed all of its MOOCs in-house. Explaining why BPCC utilized its own faculty to develop the courses offered through Open Campus, rather than partnering with an established MOOC provider, director of institutional effectiveness Allison Martin said, "we think we have a better understanding about our own developmental education population."[91] Martin and other project leaders also "felt students

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[85] Fain, P. "Ed Tech and the Establishment." *Inside Higher Ed,* April, 2013.
http://www.insidehighered.com/news/2013/04/22/community-colleges-warm-free-self-paced-course-content

[86] "Frequently Asked Questions for MOOC." Wake Technical Community College.
http://www.waketech.edu/introductory-algebra-review-mooc/mooc-faq

[87] Quillin, M. "Wake Tech's Free Online Algebra Course Gets Powerful Response." *News & Observer,* May, 2014.
http://www.newsobserver.com/2014/05/25/3887767/wake-techs-free-online-algrebra.html

[88] "Quick Facts." Bossier Parish Community College. http://www.bpcc.edu/factbook/quickfacts.html

[89] "2012 – 2013 Annual Report." Bossier Parish Community College. p. 2.
http://www.bpcc.edu/research/documents/2012-2013annualreport.pdf

[90] [1] "Open Campus." Bossier Parish Community College. http://www.bpcc.edu/opencampus/index.html
[2] "Frequently Asked Questions: Open Campus." Bossier Parish Community College.
http://www.bpcc.edu/opencampus/faq.html

[91] Jacobs, J. "Remediation Goes Online—and Free." *Community College Spotlight,* July, 2013.
http://communitycollegespotlight.org/content/remediation-goes-online-and-free_14070/

at the college would react better to learning from online instructors they were likely to see on campus and in classrooms."[92]

BPCC's Open Campus has expanded its initial slate of five MOOCs and now offers the following eight open online courses:

- Basic Mathematics
- Beginning Algebra
- Intermediate Algebra
- College Algebra
- Fundamentals of Grammar
- Fundamentals of Writing
- Developmental Reading
- College Success Skills[93]

BUNKER HILL AND MASSACHUSETTS BAY COMMUNITY COLLEGES, MASSACHUSETTS

Bunker Hill Community College (BHCC) and Massachusetts Bay Community College (MassBay) both operate campuses in and around Boston. Each institution operates three campuses, with BHCC enrolling 14,000 students,[94] and MassBay enrolling 8,000.[95]

In 2012, edX established a partnership with BHCC and MassBay to adapt an MITx MOOC, Introduction to Computer Science and Programming, for the student populations at the two community colleges. **This multi-dimensional MOOC partnership among several institutions provides an illustrative example of how four-year research institutions and community colleges can collaborate to deliver content to community college students.**

The program combines the MOOC format with established practices in technology-facilitated learning and the community college versions of the edX MIT course supplement, including online lectures, exercises, and assessments, with face-to-face class sessions twice per week. These courses, therefore, implement the "blended" and "flipped" models.[96] This blended model allows both community colleges to award credit to students who complete the course (students pay tuition as well).[97]

The partnership also highlights the benefits of adapting the blended MOOC model for different community college populations, rather than relying on a one-size-fits-all approach: Massachusetts Bay students typically have a more substantial computer

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[92] Ibid.

[93] "Open Campus." Op. Cit.

[94] "About BHCC." Bunker Hill Community College. http://www.bhcc.mass.edu/about/aboutbhcc/

[95] "Fast Facts." Massachusetts Bay Community College." http://www.massbay.edu/fastfacts/

[96] "First Blended MOOC Course Slated for Bunker Hill Community College (GHCC) and MassBay Community College." edX, November, 2012. https://www.edx.org/press/edx-massachusetts-community-colleges

[97] Lewin, T. "Adapting to Blended Courses, and Finding Early Benefits." *The New York Times*, April, 2013. http://www.nytimes.com/2013/04/30/education/adapting-to-blended-courses-and-finding-early-benefits.html?ref=education&_r=2&

background, and so the MassBay version of the course moves at the same pace as the original MIT class; Bunker Hill's version, however, spends two weeks for each week of MIT material.[98]

Assessment of the edX/community college initiative is ongoing, with an external evaluation being conducted by the Center for the Study of Testing, Evaluation, and Educational Policy at Boston College. According to the Center's website, early results of the evaluation indicate that:

- The overall process of using edX resources in the community college setting was successful
- Participating students valued the blended model
- Students achieved high completion rates and assessment scores[99]

IVY TECH COMMUNITY COLLEGE, INDIANA

Ivy Tech is Indiana's statewide two-year college system, which operates 31 degree-granting campuses and numerous education centers throughout the state.[100] Ivy Tech has faced a number of challenges in recent years, with inadequate state funding and an inability to meet student demand for introductory courses.[101] In April 2012, Ivy Tech announced a partnership with educational firm Pearson to offer courses through Pearson's online course service, Propero.

Although it utilizes externally-developed online content, the Ivy Tech-Propero program is unlike traditional MOOCs, in that it is fee-based and only open to students enrolled at the college. Ivy Tech students have the option of registering for Propero's online courses, and for a fee of $299 per course, students are provided with access to an e-textbook and 10 hours of online tutoring from Pearson. These courses are self-paced, with most requiring about 12 weeks to complete.[102] There are currently 46 courses available through Propero in General Education, Business, and Criminal Justice.[103]

While Propero courses include embedded assessments and have been recommended for credit by the American Council on Education,[104] Ivy Tech does not automatically grant credit

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[98] Ibid.

[99] Bulleted points taken verbatim from "edX Evaluation Study." Center for the Study of Testing, Evaluation, and Educational Policy, Boston College. http://www.bc.edu/content/bc/research/csteep/edx.html

[100] "About Ivy Tech Community College." Ivy Tech Community College. http://www.ivytech.edu/about/

[101] [1] Fain, P. "Young College, Familiar Problem." *Inside Higher Ed*, June, 2013.
http://www.insidehighered.com/news/2013/06/28/ivy-tech-mulls-closures-amid-wide-funding-gap
[2] Kolowich, S. "Pacing Themselves." *Inside Higher Ed*, April, 2012.
http://www.insidehighered.com/news/2012/04/19/pearson-partners-ivy-tech-self-paced-online-gen-ed-courses

[102] Fain, "Ed Tech and the Establishment." Op. Cit.

[103] "Courses: Propero." Pearson Education, Inc.
http://www.pearsonlearningsolutions.com/assets/downloads/pdfs/Propero%20Course%20Listing%20-%20Academic.pdf

[104] "Propero Student Guide to Earning Credit." Pearson Education, Inc.
http://www.propero.org/styles/default/images/student_guide_earning_credit.pdf

for completion of Propero courses. Rather, students must pass College Level Examination Program (CLEP) exams in order to demonstrate competence in material covered in a Propero course and earn academic credit at Ivy Tech.[105]

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[105] Kolowich, "Pacing Themselves," Op. Cit.

Appendix A: Gates Foundation 2012 MOOC Initiative Grant Recipients

On November 13, 2012, the Gates Foundation issued a press release announcing 12 grant awards to academic institutions and associations supporting the development, delivery, and assessment of MOOCs in higher education. The Gates Foundation's descriptions of these grants, along with plans for future research and funding priorities, are provided below.[106]

- $895,484 to the American Council on Education to test the viability of MOOCs for college transfer credit and to establish a Presidents Innovation Lab to explore new business models in higher education
- $268,920 to the Association of Public and Land-grant Universities to explore the viability of a consortium of two- and four-year colleges to collaborate on digital courseware development and usage, including MOOCs
- $1,440,900 to Ithaka S+R to monitor, assess, and document lessons learned from the implementations of a range of MOOCs and MOOC platforms in partnership with the University of Maryland System
- $550,000 in total to the following institutions ($50,000 per MOOC) to develop introductory and remedial level MOOCs. These institutions are winners selected from a Request for Proposals released in September (technology platform partner noted in parentheses):
  - Cuyahoga Community College to develop a Developmental Math MOOC (Blackboard)
  - Duke University to develop an English Composition I MOOC (Coursera)
  - Georgia Institute of Technology to develop three MOOCs: Psychology, English Composition I, and Physics (Coursera)
  - Michigan State University to develop a Foundations of Science MOOC (Desire2Learn)
  - Mt. San Jacinto College to develop a Developmental Writing MOOC (Coursera)
  - The Ohio State University to develop an English Composition II MOOC (Coursera)
  - University of Washington to develop a Political Science MOOC (Coursera)
  - University of Wisconsin – La Crosse [www.uwlax.edu] to develop an Algebra MOOC (Desire2Learn)
  - Wake Technical Community College to develop a Developmental Math MOOC (Udacity)

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[106] Taken verbatim from "Massive Open Online Courses (MOOCs)." Bill & Melinda Gates Foundation, November, 2012. Accessed via:
http://web.archive.org/web/20121119010353/http://www.gatesfoundation.org/postsecondaryeducation/Pages/massive-open-online-courses.aspx

The foundation also announced a pool of approximately $250,000 in research funds on November 12th that will be allocated in the coming months. Among the questions that will be addressed are:

- For which students, disciplines, types of knowledge, and contexts are MOOCs more/less effective?
- Which components drive impact for non-self-directed learners and what additional supports need to be added online or face-to-face?
- What data captured from MOOCs is most informative and how might such data be best used for the advancement of learning?

Our goal is to help talented, committed faculty members improve their practice and reach more students while enabling a broader range of learners to potentially benefit from MOOCs. With these grants we aim to: Expand MOOC content to include more introductory courses, and to make such content available and accessible to a broader range of learners. Presently, MOOC content is aimed at upper division content and, for the most part, learners with more advanced academic proficiency. The only way to understand the potential impact and benefit of MOOCs for low-income young adults is to make sure they can access and utilize the courses;

- Better understand different "use cases" for MOOCs, including how they might be integrated into classroom practice in order to support completion and lower costs; and
- Conduct research to understand the student-level impact of such courses and to understand how these types of tools are most effectively implemented.

APPENDIX B: LESSONS LEARNED AT MT. SAN JACINTO COLLEGE

Patricia James Hanz, a leader of Mt. San Jacinto's MOOC project, offers the following insights based on MSJC's experience in the first year of offering its developmental English MOOC:

- You have to be thick-skinned. The three students who like to complain about everything in a small class, are magnified by thousands in a huge class. Let the other students shut down the complainers. You don't have to do anything!

- It is good to have online teaching experience before you start this kind of course, but designing one of these is different in many ways. What's the same? Organization is EVERYTHING.

- Many of the professors from major institutions who are now teaching in MOOCs, have little or no prior online teaching experience. We think the MOOCs, with their huge public relations potential, appeal to the university administration, but the joyful and exciting experience of teaching thousands of students from all over the world grabs the imagination of the teachers.

- Grading is impossible so you have to rely on machine grading and you have to have detailed rubrics developed for the peer reviewed assignments. The Coursera platform randomizes and creates the groups, the highest and lowest scores are dropped out of the final grade.

- Even if a course is not for credit, students are crazy about points.

- Being available and human is a must.

- Be prepared for a life changing experience.[107]

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[107] Bulleted points taken verbatim from: Hanz, Op. Cit.

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