ANNUAL REPORT ON DUKE'S ONLINE EDUCATION INITIATIVES, 2013-14

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EXECUTIVE OVERVIEW

The past 18 months have been a period of intense experimentation in online education, nationally and internationally, and Duke has been an active player in those experiments.

Our faculty are engaged in a wide range of online education initiatives, including massive open online courses (MOOCs[1]) that reach thousands of students worldwide, for-credit campus courses that mix online and in-person teaching activities, and small classes using videoconferencing to bring students at different universities into collaboratively taught courses. Faculty have used their online education activities to improve campus education by:

- Flipping courses;
- Increasing student engagement and active learning in courses;
- Adding project work to courses;
- Gathering feedback for course improvement;
- Trying new tools and teaching techniques;
- Extending curricular offerings;
- Carrying out research on teaching and learning;
- Training graduate students; and
- Engaging with colleagues in discussions about teaching and learning.

Duke's online education activities this year have been influenced by trends in the overall higher education environment. Those trends as well as lessons learned from our recent online education experiments are shaping our plans for the year ahead.

TRENDS IN ONLINE EDUCATION AND THE HIGHER EDUCATION ENVIRONMENT

- Rapidly evolving and increasingly diverse educational models
- Growing competition across online education providers
- Experimentation with business models and credentialing

[1] Massive open online courses (MOOCs) are non-credit-bearing online courses with free and open enrollment to anyone.

- Interest and inquiry into how online education fits into higher education's traditional goals and future plans

DUKE'S GOALS AND KEY ACCOMPLISHMENTS FOR ACADEMIC YEAR 2013-2014

GOAL 1: PROMOTE INNOVATION IN TEACHING

- Faculty developed and taught a variety of fully or partly online courses.
- Our online education activities have benefitted campus education.
- We increased our capacity for assessment and carried out nine studies of online education activities.

GOAL 2: SHARE KNOWLEDGE IN SERVICE TO SOCIETY

- Duke faculty reached over 1.2 million students in 200 countries through open, online courses.
- Duke has participated in Coursera's Translation Partners and Learning Hubs initiatives to make our courses more accessible in other countries.
- We are planning online elements of Duke courses that connect with Duke initiatives in Africa and China.

GOAL 3: SHOWCASE DUKE'S ACADEMIC EXCELLENCE

- Feedback from participants in Duke online courses has been very positive.
- Duke's online education experiments have been featured in the national press.
- Duke faculty and staff have been invited to share their innovative work in online education at national and international conferences and in publications.
- Students from outside the U.S. have inquired about graduate and postdoctoral opportunities at Duke after participating in Duke online courses.

DUKE ONLINE EDUCATION PRIORITIES FOR THE 2014-15 ACADEMIC YEAR

- Support online education projects that reflect school priorities and university strategic planning in addition to individual faculty interests.
- Focus on ways online education experiments can bring value to the campus experience.
- Connect online education activities to other University global initiatives.

See the full report, below, for details.

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TRENDS IN ONLINE EDUCATION AND THE HIGHER EDUCATION ENVIRONMENT

The past 18 months have been a period of intense experimentation in online education, nationally and internationally, and Duke has been an active player in those experiments. The following trends have influenced our planning and assessment efforts in online education.

1. RAPIDLY EVOLVING AND INCREASINGLY DIVERSE EDUCATIONAL MODELS

Colleges and universities have tried a wide variety of new online and hybrid course models: short versus long, self-paced versus cohort-based, brief videos versus long lectures, modular versus fixed curricular paths, and so on.

Students and faculty now have direct access to course models and course materials from hundreds of other schools and organizations.

Courses that are shorter than a regular semester (e.g., around 6 weeks long) have higher completion rates and are easier to reuse for self-paced learning or mixing in different curricular sequences. ***The rapid proliferation of open access online lectures and free online exercises is creating a growing sense that campus time should be maximized for high-value interpersonal experiences rather than lectures and content transmission.***

Data collected from online courses and learning analytics can provide students with extended practice opportunities, customized feedback, and recommendations for future educational paths, and can help faculty design more effective learning experiences.

2. GROWING COMPETITION ACROSS ONLINE EDUCATION PROVIDERS

Universities, government agencies, non-profit organizations, and industry have produced over 1,000 new open-access online course offerings in the last 18 months, and many more are under development. There are now dozens of online education platforms and providers, with a growing number outside the U.S. Course development and student enrollment in MOOCs is growing faster outside the U.S. than within. For example:

- **edX** now has 150+ courses, 47 partner institutions (with 22 of them outside the U.S.) and over 400 instructors teaching MOOC courses. The top four edX course providers are: Harvard (29 courses), MIT (27 courses), Berkeley (16 courses), and the University of Texas system (8 courses).
- **Coursera** now has 630+ courses, 108 partner institutions (with more than half outside the US) and over 1,000 instructors teaching MOOCs. The top four Coursera course providers are: Johns Hopkins (32 courses), University of Pennsylvania (30 courses), Stanford (26 courses), and Duke (20 courses). Other schools are scaling up quickly. For example, Peking University is training 500 faculty to develop 100 MOOCs within five years.

The educational technology company 2U discontinued its Semester Online program but is continuing its online master's degree programs and recently added an online doctoral program

in education at the University of Southern California and an undergraduate nursing degree program at Simmons College.

3. Experimentation with business models and credentialing

Universities, the World Economic Forum and World Bank, Google, and other organizations are experimenting with different prices and different credentials for online education offerings. Many of these experiments target professional master's degree and executive education audiences, but some are focused on undergraduates and alumni.

In less than a year, Georgia Tech launched their $7,000 online master's degree program in Computer Science and attracted over 2,000 applications in the first month.

Harvard is offering *CS150--Introductory Computer Science* in different lengths, with varied amounts of instructor support, for different types of credentials and at prices ranging from free to a few hundred dollars to regular Harvard tuition.

In 2014, Coursera launched Specializations, which are sets of courses plus a capstone project with a series certificate. They currently have ten Specializations (http://bit.ly/1rtspva)—including Duke's *Reasoning, Data Analysis and Writing*— with the total cost to enrolling students ranging from $166 to $490 for an entire Specialization. The first course in a Specialization to launch, *Programming Mobile Applications for Android Handheld Systems*, reportedly has over 200,000 students enrolled, with 8,000 signing up for the paid certificate track.

edX announced the launch of their XSeries in September 2013, sequences of courses with credentialing integrated into the completion of each sequence (http://bit.ly/1nu05Jv). They currently have four series with total cost ranging from $275 to $425.

4. Intense discussion of how online education offerings fits into higher education's goals and plans

The national news has featured both hyperbole about and backlash against online education. After a year of discussion sessions at Duke, we are moving toward a more nuanced understanding of ways we can take advantage of the best of in-person and online education, such as:

- Offering non-credit online courses or modules as preparation for, or supplement to, in-person, campus-based courses;
- Combining online and in-person course activities for credit-bearing courses;
- Using free, non-credit online courses to identify potential students for regular University courses and programs, to raise awareness of Duke faculty and programs around the world, and to connect Duke alumni with the wealth of learning at their alma mater; and
- Allowing students more curricular flexibility through a mix of online and in-person course work.

DUKE'S GOALS AND KEY ACCOMPLISHMENTS FOR ACADEMIC YEAR 2013-2014

Our faculty are engaged in online education initiatives ranging from massive open online courses (MOOCs[2]) that reach thousands of students worldwide, to for-credit campus courses that mix online and in-person teaching activities to small classes using videoconferencing to bring students at different universities into collaboratively taught courses. Faculty have used their online education activities to improve campus education by flipping courses, increasing student engagement and active learning in courses, adding project work to courses, gathering feedback for course improvement, trying new tools and teaching techniques, extending curricular offerings, carrying out research on teaching and learning, training graduate students, and engaging with colleagues in discussions about teaching and learning.

The Advisory Committee for Online Education (http://bit.ly/1nlsLSS) discussed Duke's goals for the year, advised on activities throughout the year and reviewed progress toward these goals.

GOAL 1: PROMOTE INNOVATION IN TEACHING

1. DUKE FACULTY DEVELOPED AND TAUGHT A VARIETY OF FULLY OR PARTLY ONLINE COURSES.

- Faculty from Economics and Law taught hybrid, for-credit, undergraduate courses to Duke students using the 2U platform. The faculty who experimented with the 2U platform found it useful for flipping courses and trying synchronous video discussion and will continue to use their 2U-produced course materials at Duke.
- Faculty from Duke and the University of Virginia collaboratively taught Haitian Creole and Tibetan using online materials and video conferencing to connect students at both schools.
- A few summer courses are taught online either synchronously using video teleconferencing or asynchronously to allow students to take advantage of summer opportunities and continue to make progress (http://bit.ly/1kL3JwU).
- Duke faculty from 8 schools have developed and taught 18 MOOCs at least once. One more is in progress. Eleven courses have been revised and re-taught for 2nd or 3rd times.
- Duke's Center for Instructional Technology helped 12 faculty members from five schools flip their courses, partly with online materials.
- A Duke Coursera Specialization is underway with a sequence of courses and a capstone project featuring Duke's strengths in interdisciplinary teaching and focusing on reasoning, data analysis, and writing skills (http://bit.ly/MmROqM).
- Many campus courses include online course materials or online learning activities.

See Appendix A for descriptions of these courses.

2. OUR ONLINE EDUCATION ACTIVITIES HAVE BENEFITTED CAMPUS EDUCATION.

[2] Massive open online courses (MOOCs) are non-credit-bearing online courses with free and open enrollment to anyone.

Online teaching and learning activities have led to substantive, positive changes in the types of courses students can take, where they can take them, and how they can access them. Collectively, our new online initiatives have prompted Duke faculty to make the following changes in their approaches to teaching and learning:

- Flipping classes by having students use online materials to prepare before class and spending face-to-face class time for problem solving, discussion and other active learning;
- Adding new student projects or additional content to campus courses by having students do more basic work online;
- Devoting more attention to identifying clear learning objectives and aligning course activities and student assessment to those objectives;
- Using feedback from thousands of participants (in open online courses) with all types of backgrounds, including other faculty and subject matter experts, to improve course materials and teaching strategies;
- Experimenting with peer assessment, machine grading, and other pedagogical approaches in online courses and applied successful techniques to campus courses;
- Adding supplementary materials for things that could not be replicated in a face–to-face course, such as self-paced preparatory materials or recorded video discussions with guest experts and students in other countries;
- Enabling Duke students to take courses that would usually not be offered because of low enrollment by using videoconferencing to teach students in multiple locations;
- Conducting research on their areas of expertise or on pedagogy and learning through their online courses;
- Supplementing summer internships as learning opportunities
- Ensuring that graduate students at Duke have the opportunity to become experts in online teaching through the Bass Undergraduate Instructional Program for PhD students;
- Engaging with their colleagues in campus-wide discussions about teaching strategies, assessment of student learning, curriculum planning and use of physical classroom spaces.
- Having Duke students synthesize their learning by creating online course materials and participating in the delivery of online courses;
- Experimenting with non-traditional approaches to course lengths, modular curricula and student learning assessment.

3. We increased our capacity for assessment and carried out studies of online education activities.

- Since Duke hired Kim Manturuk (Manager for Program Assessment, Center for Instructional Technology) and Chris Mankoff (Online Data Coordinator, Office of the Vice Provost for Academic Affairs) this year, Kim and Chris have worked to make data available to faculty for the improvement of their courses and for research on online learning.
- Keith Whitfield partnered with researchers from the Research Triangle Institute International (RTI) on a Gates Foundation-funded study of employer perceptions of MOOCs for employee hiring and training (http://bit.ly/1iSsWE1).

- Students' feedback in surveys and focus groups for the two Duke 2U pilot courses taught by Tom Metzloff (Law) and Emma Rasiel (Economics) was overall very positive about the learning experience and quality of the courses.
- Denise Comer received a grant from the Gates Foundation to develop and evaluate the effectiveness of an introductory writing MOOC. She found that grades assigned by her MOOC students were consistent with grades assigned by instructors of English composition, providing validation that online peer assessment is as effective as traditional peer assessment methods.
- Denise Comer and Dorian Canelas are conducting a Gates-funded study to analyze peer-to-peer interactions in their writing and chemistry MOOCs and are now analyzing their results.
- Dorian Canelas, with funding from the Duke Endowment, is conducting research on the effectiveness of her flipped Duke chemistry course using online course materials, comparing her hybrid class with a traditional version of the same course.
- Mine Çetinkaya-Rundel and Dorian Canelas are using their two MOOCs on data analysis and chemistry to jointly study student learning in introductory-level MOOCs.
- Jennifer Carbrey and Mimi Jakoi are studying the relationship between student demographics and student performance in their human physiology MOOC.
- Dave Johnston is studying his MOOC students' attitudes toward environmental conservation and whether these attitudes change after the students take his MOOC in marine science and conservation.
- Len White is using data from his medical neuroscience MOOC to study the relationship between student participation in the MOOC and prior training in the course subject area.

GOAL 2: SHARE KNOWLEDGE IN SERVICE TO SOCIETY

Over 1.2 million students (out of a total of 7 million Coursera students) from 200 countries have signed up for an open-access online Duke course. Students taking Duke MOOCs earned 50,000 Statements of Accomplishment or Verified Certificates for course completion.

Duke is a leading university in providing open online course content for Brazil, India and China via Coursera. Most Duke Coursera courses are available in China via a China-based mirror site and featured on the China Coursera Zone web portal (http://bit.ly/1crxO1a). Duke has four Coursera courses translated into Chinese, more than any other non-Chinese language Coursera partner. Two of the seven Coursera courses translated into Portuguese are from Duke.

Duke was one of the first participants in Coursera's Learning Hubs initiative, where organizations in over 30 locations worldwide provide Internet access and in-person instruction support to MOOC students (http://bit.ly/1bH8rEt). Duke's *21st Century American Foreign Policy* course was the second most popular MOOC in the first Learning Hub program run by the Education and Cultural Affairs division of the U.S. Department of State.

An online course under development on *Tropical Parasitology: Protozoa, Worms, Vectors and Human Disease* will build on Duke's ongoing research and teaching site in Tanzania (at the Kilimanjaro Christian Medical Centre), model collaborative course development with an African institution, and result in materials being used in on-campus classes at both institutions.

GOAL 3: SHOWCASE DUKE'S ACADEMIC EXCELLENCE

Feedback from students in Duke's online courses has been very positive. Students give high overall ratings to the courses and a large majority say they would recommend the course to others. The following quotes are typical of end-of-course survey responses:

> *"My background is in health services administration and research. I want to express my appreciation to Bob [Barnes] and Marilyn [Lombardi] for such an informative course. The course exceeded my expectations and I look forward to applying the concepts learned."* – Healthcare Innovation and Entrepreneurship

> *"I would like to explore the possibility to study with Duke University on a paid, credit, degree course."* – Introduction to Astronomy

> *"Thanks, I had a great experience learning the course. That was a lot better than my expectations. Hope to see you in Duke University as a graduate student."* – Image and Video Processing: From Mars to Hollywood with a Stop at the Hospital

> *"Thank you for a wonderful job Walter [Sinnott-Armstrong], your dedication is greatly appreciated. If Walter is an example of the quality of the Duke faculty, it does make me want to be a student there*." – Think Again: How to Reason and Argue

> *"Outstanding professor, I enjoyed watching his videos and reading the required material. Mr. [Orin] Starn has been the best college professor I've ever had*." – Sports and Society

> *"Before enrolling to this course I thought neuroscience is an interesting field. Now I think it's fascinating. I plan to pursue a research career in this field and I hope one day I'll meet Dr. [Len] White to say thank you*." – Medical Neuroscience

> *"My compliments to Dr. [Dorian] Canelas and everyone associated with the course. I thought it was well organized and interesting. The inclusion of demonstrations was a great idea! I gleaned a few ideas to improve my own teaching - Thank you*!*"* – Introduction to Chemistry

> *"The course material exceeded my expectations, there is a lot of information to keep one busy for a long time. I appreciate professor [Laurence] Helfer's engagement in the discussions and the frequent feedback on posts was very useful."* – International Human Rights Law: Prospects and Challenges

Duke has been invited to apply for a number of external grant opportunities around online education and has been successful in obtaining funding.

Duke faculty and staff have been invited to share their innovative work in online education at national and international conferences and in publications. Duke's online education initiatives have been featured positively in the national press. (See Appendix C for examples.)

Duke continues to be one of Coursera's premier partners, piloting new programs such as Signature Track, Coursera Translation Partners program, Learning Hubs, and Specializations. Coursera regularly turns to Duke for advice on technology, pedagogy and policy development.

Students from outside the U.S. taking Duke MOOCs have inquired about graduate student and postdoctoral opportunities.

DUKE ONLINE EDUCATION PRIORITIES FOR ACADEMIC YEAR 2014-15

Trends in the higher education environment and lessons learned from Duke's online education activities last year are shaping our plans for the year ahead.

1. SUPPORT PROJECTS THAT REFLECT SCHOOL PRIORITIES AND UNIVERSITY STRATEGIC PLANNING

In the year ahead, we will seek projects that not only have a faculty champion but also reflect departmental and school priorities. Possibilities include:

- Developing open access courses to increase interest in a major or a program;
- Having multiple faculty collaborate on course development or sequences of courses to reflect the interdisciplinary approaches of certificates and centers;
- Developing Specializations that showcase a particular school or university strength; and
- Creating materials that better prepare students to be successful in a course or degree.

2. FOCUS ON WAYS ONLINE EDUCATION EXPERIMENTS CAN BRING VALUE TO THE CAMPUS EXPERIENCE

We will be looking for ways to build on successful experiences from the first round of online courses, including support for hybrid approaches that combine online and in-person activities, reuse of materials developed for online courses in on-campus courses, and creating courses in modular formats to allow for curricular recombination. We will continue discussions with the Advisory Committee for Online Education and other faculty groups about the potential implications of hybrid and modular course formats (e.g., half-semester courses), both for student learning outcomes and for structural features of the Duke curriculum (e.g., credit as courses vs. credit as hours).

Some of next year's planned projects will build on existing research and teaching partnerships between Duke and others, as faculty develop online courses together with these collaborators (see Appendix B).

Our assessment team will work with faculty who want to use their online courses to collect data in their areas of research or conduct studies of pedagogy and learning.

3. CONNECT ONLINE EDUCATION ACTIVITIES WITH DUKE GLOBAL INITIATIVES

We will work with the Global Priorities Committee and Office of Global Strategies and Programs to identify online projects that support Duke global initiatives. For example, as courses get underway at Duke Kunshan University (China), we will add online strategies where appropriate and also develop online content from China that can enhance courses at the Duke campus.

Faculty will complete development and teaching of several courses that have an international partner or focus on international issues.

APPENDIX A: COMPLETED AND IN-PROGRESS ONLINE EDUCATION PROJECTS, SEPTEMBER 2012 – JUNE 2014 (ALPHABETICAL)

21ST CENTURY AMERICAN FOREIGN POLICY, BRUCE JENTLESON, PUBLIC POLICY
NON-CREDIT MOOC

- One of the first courses featured in in Coursera's Learning Hubs initiative, where organizations around the world provide Internet access and in-person instruction support to MOOC students (http://bit.ly/1bH8rEt).

9/11 AND ITS AFTERMATH -- PART I, DAVID SCHANZER, PUBLIC POLICY
NON-CREDIT MOOC

- Incorporated video discussions with content experts including Duke Muslim Chaplain and Adjunct Professor of Islamic Studies Abdullah Antepli, CNN Journalist Peter Bergen, and foreign policy consultant and author Jessica Stern; recordings available for future use at Duke.
- Course videos used to supplement readings in Duke campus course.

A BEGINNER'S GUIDE TO IRRATIONAL BEHAVIOR, DAN ARIELY, BUSINESS AND ECONOMICS
NON-CREDIT MOOC

- Experimented with a crowd-sourced essay assignment where students collaborated online to select a topic and then outline, write, and edit a paper that drew upon course concepts.
- With over 217,000 total enrollments, the first offering of this course was Duke's second largest MOOC session and one of Coursera's largest courses.
- Translated into Portuguese and Chinese.
- Course videos will be used in a future hybrid version of Ariely's Duke MBA course.

BEHAVIORAL FINANCE: A TAXONOMY OF MONEY MISTAKES, EMMA RASIEL, ECONOMICS
DUKE FOR-CREDIT, HYBRID COURSE

- Seminar-style hybrid course where Duke undergraduates used the 2U platform for pre-class work and synchronous video discussions.
- Assessment project compared student reactions to synchronous video discussions with in-person course discussions (analysis underway).

BIOELECTRICITY: A QUANTITATIVE APPROACH, ROGER BARR, BIOMEDICAL ENGINEERING
NON-CREDIT MOOC; DUKE FOR-CREDIT, HYBRID COURSE

- First Duke MOOC offered online; subsequently offered a second time and now under revision for a 3rd teaching in more modular format.
- One of five MOOCs on Coursera recommended for credit equivalency by the American Council on Education (http://bit.ly/1l4oPWg).

DATA ANALYSIS AND STATISTICAL INFERENCE, MINE ÇETINKAYA-RUNDEL, STATISTICAL SCIENCE
NON-CREDIT MOOC

- Focused on free, open-access resources including instructor-authored textbook, data sets, and statistical analysis software.
- Part of a series of Duke courses on *Reasoning, Data Analysis and Writing*, one of Coursera's first ten Specializations (http://bit.ly/1mJg7iC).
- Part of a study on student learning in introductory-level MOOCs (with Dorian Canelas).

English Composition I: Achieving Expertise, Denise Comer, Thompson Writing Program
Non-credit MOOC

- Received two grants from the Gates Foundation, one to determine whether a MOOC could effectively help students learn to write and one to analyze peer-to-peer interactions in MOOCs (in collaboration with Dorian Canelas).
- Comer is now planning a Duke, for-credit, online summer seminar on social media writing that Duke students can take while doing internships in locations away from campus (*WRITING 270: Composing the Internship Experience: Digital Rhetoric and Social Media Discourse*).
- Duke Continuing Studies plans to use some of Comer's MOOC videos.
- Part of a series of Duke courses on *Reasoning, Data Analysis and Writing*, one of Coursera's ten first Specializations (http://bit.ly/1mJg7iC).

Healthcare Innovation and Entrepreneurship, Bob Barnes, Biomedical Engineering, and Marilyn Lombardi, Nursing
Non-credit MOOC; Duke for-credit, hybrid course

- Students worked to identify real-world problems in healthcare systems and conduct stakeholder and market analyses to identify possible solutions; they then peer-assessed each other's analyses.
- Course videos are being used in the Duke on-campus version of this course, taken by graduate students in the School of Nursing, Pratt, and Fuqua.

History and Future of (Mostly) Higher Education, Cathy Davidson, Franklin Humanities Institute
Non-credit MOOC; Duke for-credit, hybrid course

- Partnered with 30+ universities and institutions around the world offering parallel courses, webinars, group video discussions, and conferences on the MOOC's topic.
- Taught synchronously with on-campus courses at Duke, UC Santa Barbara, and Stanford, with on-campus and online students interacting through discussion forums, Google+ Hangouts, collaborative research projects, and in-person meetings.
- Experimented with a tool for online, collective annotation of writing.

Image and Video Processing: From Mars to Hollywood with a Stop at the Hospital, Guillermo Sapiro, Electrical and Computer Engineering
Non-credit MOOC; Duke for-credit, hybrid course

- Partnered with MathWorks, to offer free use of their technical computing software (MATLAB) for course assignments; MathWorks also provided a TA to help students learn how to use MATLAB.
- Used online course materials to develop a hybrid version of his on-campus Duke course.

International Human Rights Law: Prospects and Challenges, Laurence Helfer, Law
Non-credit MOOC

- Law librarian provided detailed law research video and quiz to equip students to complete course assignments.
- Included an interview with the director of Duke Law's new human rights clinic that highlighted the clinic's accomplishments.
- With many students being working professionals from other fields, the first run of the course had a higher than usual percentage of students signed up for Signature Track, suggesting a demand for specialized credentialing in international human rights law.

Introduction to Astronomy, Ronen Plesser, Physics
Non-credit MOOC; Duke for-credit, hybrid course

- Created high quality videos of physics lab demos that can be used by other instructors.
- Used feedback from students and content experts taking the course to revise course content and assignments.

Introduction to Chemistry, Dorian Canelas, Chemistry
Non-credit MOOC; Duke for-credit, hybrid course

- Recorded chemistry experiments in Duke lab to demonstrate concepts (http://bit.ly/1jH63QF).
- Conducting a Gates-funded study to analyze peer-to-peer interactions in her MOOC (with Denise Comer).
- Using online course videos to develop a hybrid version of Duke on-campus course; with funding from the Duke Endowment, will compare hybrid and traditional sections of the course.
- Studying student learning in introductory-level MOOCs (with Mine Çetinkaya-Rundel).

Introduction to Genetics and Evolution, Mohamed Noor, Biology
Non-credit MOOC; Duke for-credit, hybrid course

- One of the MOOC students developed an iOS app designed to help students master concepts in the course. Professor Noor and this student co-authored a paper on the design and use of this app (http://bit.ly/1lH7OA5).
- Translated into Chinese.
- Using online course materials in his on-campus Duke course (http://bit.ly/1f8tKVW).
- One of five MOOCs on Coursera recommended for credit equivalency by the American Council on Education (http://bit.ly/1l4oPWg).

Introductory Human Physiology, Emma Jakoi and Jennifer Carbrey, Cell Biology
Non-credit MOOC

- Instructors are studying the relationship between student demographics and student performance in their MOOC.
- Translated into Portuguese and Chinese.
- In discussion with the School of Medicine to integrate course videos into learning modules for the new Master's of Medicine program slated to begin in 2015.

Less Commonly Taught Languages Collaboration, Duke University (Trinity College of Arts & Sciences) and the University of Virginia
Synchronous video, for-credit online course

- Used video conferencing and online materials to collaboratively teach students at both Duke and UVa the less commonly taught languages of Haitian Creole and Tibetan. Additional universities may join this online collaboration.

Marine Megafauna: Introduction to Marine Science and Conservation, David Johnston, Marine Science & Conservation and Environment
Non-credit MOOC; Duke for-credit, hybrid course

- Included extensive video of marine fauna from instructor's field research.
- Worked with the Public Library of Science (PLoS) to curate and make available peer-reviewed research articles for students in the course (http://bit.ly/RP0Tw2).
- Conducting a study of whether MOOC students change their attitudes toward environmental conservation after the course.

Medical Neuroscience, Leonard White, School of Medicine and Duke Institute for Brain Sciences

Non-credit MOOC; Duke for-credit, hybrid course

- Experimented with offering a very rigorous, 12-week health sciences course; over two offerings of the course, 1,112 students completed all the work for the Statement of Accomplishment.
- Made the online materials available as supplementary materials for students at both Duke University and the Duke-National University of Singapore (Duke-NUS) Graduate Medical School.
- Using data from his MOOC to study the relationship between student participation in the MOOC and prior training in the course subject area.

Public Policy, Constitutional Values and the Supreme Court, Tom Metzloff, Law

Duke for-credit, hybrid course

- Seminar-style hybrid course where Duke undergraduates used the 2U platform for pre-class work and met weekly in-person for discussion sessions.

Sports and Society, Orin Starn, Cultural Anthropology

Non-credit MOOC

- Used video chat sessions to connect students with renowned athletics, sports writers and sports analysts (for example: http://bit.ly/1iiFZdi).

Statistics 104: Data Analysis and Statistical Inference, Mine Çetinkaya-Rundel, Statistical Science

Synchronous video, for-credit online course

- Used WebEx, Duke's online conferencing service, for live online classroom sessions.
- Flipped the online classroom, with students using class time to collectively work through assignments via video chat.

The Brain and Space, Jennifer Groh, Psychology and Neuroscience

Non-credit MOOC

- Course will use an open online version of Jennifer Groh's forthcoming book *Making Space: How the Brain Knows Where Things Are*.
- A PhD candidate in Neuroscience from the Bass Undergraduate Instructional Program will serve as an online TA for the course.

Think Again: How to Reason and Argue, Walter Sinnott-Armstrong, Philosophy, and Ram Neta (UNC), Philosophy

Non-credit MOOC; Duke for-credit, hybrid course

- The first run of this course had the highest enrollment (226,000 total enrollments) of any Duke MOOC session to date; one of the top 10 overall highest enrollments out of the 600+ courses offered on Coursera.
- Experimented with incorporating student-produced videos as final course assignment.
- Translated into Chinese.
- Online materials used to develop a hybrid version of on-campus course.
- Part of a series of Duke courses on *Reasoning, Data Analysis and Writing*, one of Coursera's first ten Specializations (http://bit.ly/1mJg7iC).

SNAPSHOT OF DUKE ONLINE INITIATIVES

NEW DUKE MOOCS DEVELOPED BY SCHOOL

Excludes Repeat Offerings

School	2012-13	2013-14	2014-15*	Grand Total
Arts & Sciences				
Natural Sciences	2	3	2	7
Humanities	2	1		3
Social Sciences	1		1	2
Medicine	2		2	4
Sanford		2	1	3
Pratt	2			2
Fuqua	1			1
Law		1		1
Nicholas		1		1
Nursing	1			1
University Libraries			1	1
Grand Total	**11**	**8**	**7**	**26**

**Planned to date*

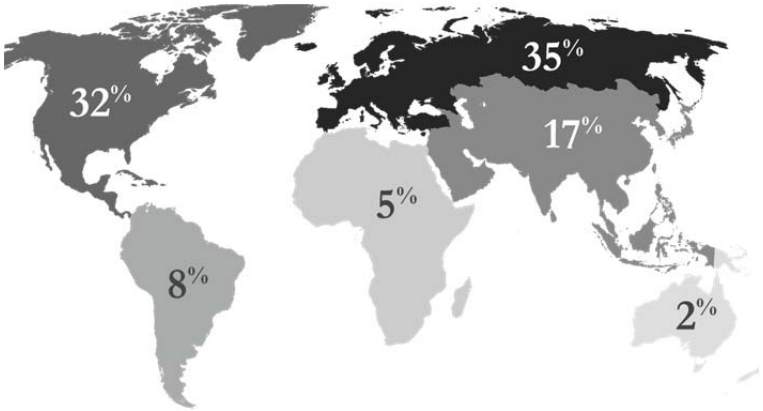
DUKE MOOC STUDENT ENROLLMENTS AND ACTIVITY

1.2 million of Coursera's 7 million students have signed up for at least one Duke MOOCs, generating:

- **1.9 million** course registrations across all Duke Coursera course sessions
- **20.1 million** unique video views
- **500,000** posts/comments in discussion forums
- **50,000** Statements of Accomplishment
- **10,000** Signature Track enrollments (for identity verification

DUKE MOOC STUDENT BREAKDOWN

By Geographic Region



EMERGING ECONOMIES

International Interest in Duke MOOCs

- After the U.S., India has the second highest enrollment for Duke Coursera courses (6.5% of total Duke MOOC enrollments).
- Half of Duke's MOOC students from Brazil are currently in college, versus one-third of students from the rest of the world.
- Duke MOOC completion rates for Brazil and India are significantly higher than completion rates in the rest of the world.
- Most Duke Coursera courses are available in China via a China-based mirror site and featured on the China Coursera Zone web portal.

ONLINE INITIATIVES' IMPACT

On Teaching and Learning at Duke

- Sharpening course design / learning objectives
- Gathering feedback for course improvement
- Conducting research on teaching and learning
- Trying out new tools and teaching techniques
- Extending curricular offerings
- Providing online materials for on-campus courses
- Creating flipped courses
- Adding project work to courses
- Training graduate students to teach online
- Starting conversations about pedagogy
- Experimenting with flexible course lengths and modular curricula

APPENDIX B: ONLINE EDUCATION PROJECTS IN DEVELOPMENT FOR ACADEMIC YEAR 2014-15 (AS OF JUNE 6, 2014)

ADVERTISING AND SOCIETY, WILLIAM O'BARR, CULTURAL ANTHROPOLOGY
NON-CREDIT MOOC; FLIPPED COURSE AT DUKE

- Funding for course development provided by the Advertising Educational Foundation.
- Will showcase Duke Libraries' Hartman Center extensive digital collection on advertising.

COPYRIGHT FOR EDUCATORS, KEVIN SMITH, DUKE UNIVERSITY LIBRARIES
NON-CREDIT MOOC

- Will be collaboratively developed and taught with UNC and Emory in modular format.
- Potential for professional development credits for teachers and librarians.

RESPONDING TO 9/11, DAVID SCHANZER, PUBLIC POLICY
NON-CREDIT MOOC

- Second course in a series; converts a semester-length Duke course into shorter, modular format.

STATISTICS FOR EDUCATORS (MODULE 1), DALENE STANGL, STATISTICAL SCIENCE
NON-CREDIT MOOC

- Will create a 4-week long MOOC with online course modules to train high school teachers to teach the probability and statistics common core educational standards, and offer resources teachers can use to engage students.
- Draws on collaborations with the Duke Program in Education, Duke Master's of Arts in Teaching (MAT) Alumni, Bass Connections, the North Carolina School of Science and Math, the SAS Institute, and the American Statistical Association.
- Potential for professional development credits for teachers.
- Duke students and alumni will contribute to course content creation and course design.

DOG EMOTION AND COGNITION, BRIAN HARE, EVOLUTIONARY ANTHROPOLOGY
NON-CREDIT MOOC

- Will provide students the opportunity to contribute data for a dog cognition research project.

TOWARDS A HEALTHY WORLD: THE CHALLENGE OF GLOBAL HEALTH, DAVID BOYD, DUKE GLOBAL HEALTH INSTITUTE
NON-CREDIT MOOC

- Includes course videos recorded at international locations related to topics covered in the course.
- Plans to have Duke students from on-campus course interact with MOOC students via weekly Google+ Hangouts.

TROPICAL PARASITOLOGY: PROTOZOA, WORMS, VECTORS AND HUMAN DISEASE, JOHN BARTLETT, DUKE GLOBAL HEALTH INSTITUTE
NON-CREDIT MOOC

- Duke's first MOOC developed with an international partner, the Kilimanjaro Christian Medical Centre (KCMC) in Tanzania.
- Will produce an 8-week MOOC plus materials for use in regular courses at Duke and KCMC.

APPENDIX C: DUKE ONLINE EDUCATION INITIATIVES FEATURED IN THE PRESS, PUBLICATIONS, OR PROFESSIONAL MEETINGS

Duke faculty and staff have been invited to share their innovative work in online education at national and international conferences and in publications. Duke's online education initiatives have been featured positively in the national press. A few examples are listed here.

Flipping the Switch (http://bit.ly/1tK8byj). Len White was interviewed for a featured article in EdTech Magazine on how video tutorials for his MOOC are facilitating the flipped classroom experience on campus (August 2012).

The Inside Story: Campus Decision-Making in the Wake of the Latest MOOC Tsunami (http://bit.ly/1gnKqtM). In the *MERLOT Journal of Online Learning and Teaching*, Marilyn Lombardi explores strategic questions facing academic institutions given recent developments in online education (Volume 9, Issue 2, June 2013).

How Online Learning is Re-inventing College (http://bit.ly/1diPv1Y): Highlights Duke's exploration of new online education models in *The Christian Science Monitor Magazine* (June 2, 2013).

Students Say Online Courses Enrich On-Campus Learning (http://bit.ly/1eCWiE4): Features Walter Sinnott-Armstrong's *Think Again* course in *Scientific American* (Volume 309, Issue 2, July 17, 2013).

Nature: A Look at MOOCs (http://bit.ly/1m2RW9O): Features Len White's *Medical Neuroscience* course in a podcast from the journal *Nature* (July 18, 2013, segment: "A Look at MOOCs").

Before You Jump on MOOC Bandwagon, Some Questions (http://bit.ly/1v4viFr). In an invited column for Toronto's *The Global and Mail*, Marilyn Lombardi outlines important factors that higher education institutions should consider before deciding whether to develop MOOCs (October 2, 2013).

Education Evolving: Teaching Biology Online (http://bit.ly/1ajl8UV): Highlights Mohamed Noor's *Introduction to Genetics and Evolution* course in the journal *Cell* (Volume 155, Issue 7, December 19, 2013).

Genetics and Evolution: An iOS Application To Supplement Introductory Courses in Transmission and Evolutionary Genetics (http://bit.ly/1lH7OA5). Mohamed Noor has co-authored an article with one of his MOOC students who wrote an iOS app to supplement Mohamed's course, published in the journal *G3: Genes, Genomes, Genetics* (doi: 10.1534/g3.114.010215, April 11, 2014).

#FutureEd Blog (http://bit.ly/1kPlrxK). Published on *The Chronicle of Higher Education* website, this blog features posts from Cathy Davidson and others related to her MOOC, *The History and Future of (Mostly) Higher Education*.

An Inside Look at Duke University's MOOC Initiative (http://bit.ly/1juZq7T). CIT Academic Technology Consultant Randy Riddle shared with *EdTech* Magazine Duke's first year of experience with MOOCs (June 25, 2013).

The MOOC Case Book: Case Studies in MOOC Design, Development and Implementation. Elizabeth A. Evans and Mich Donovan from the Duke Digital Initiative are co-authoring a chapter on providing faculty video production support for this forth-coming book on creating and teaching MOOCs.

Duke's Massive Open Online Courses (http://bit.ly/1axItpu): Presentation by Walter Sinnott-Armstrong and Lynne O'Brien on Duke's MOOCs at the Duke Forward event in Washington, DC (June 2013).

Open Knowledge: Working for Development (http://bit.ly/1mdWO1B)*:* Lynne O'Brien presented on Duke's experience in making online education available in globally at the Demand Solutions conference hosted by the U.S. Agency for International Development and the Inter-American Bank (November 2013).

Are MOOCs Tomorrow's Textbooks? (http://bit.ly/1tiu9Gz). Len White was invited to present in the Professional Development Workshops on Teaching Neuroscience at the annual meeting of the Society for Neuroscience (November 2013).

My MOOC Experience: Potential and Pratfalls. David Schanzer gave an invited presentation on MOOCs to the UNC history department in November 2013. He also wrote a guest article about his MOOC for the Huffington Post website on September 2, 2013 (http://huff.to/1ktNgvl).

Forging Digital Connections: Course Community Building (http://conference.coursera.org/agenda-2/). Denise Comer spoke at Coursera Partners' Conference (March 2014) in London on encouraging open discussion, maintaining academic standards and safe learning environments in online courses.

Duke Alumni Association Talk on MOOCs. Walter Sinnott-Armstrong gave an invited talk about his experience teaching a MOOC at a Duke Alumni Association event in Charlotte (May 2014).

UNC MOOC Seminar. Mohamed Noor spoke at a seminar on MOOCs at UNC, sharing about his experience in developing his open online course and teaching MOOC students online.

Developing a Recommended Course Design Process for Faculty Teaching MOOCs (http://bit.ly/1ngXj71). At the EDUCAUSE Learning Initiative Annual Meeting in 2013, CIT Academic Technology Consultants Seth Anderson and Haiyan Zhou gave a presentation on Duke's course design process for MOOCs and examined the ways in which the process has changed as Duke faculty members have developed and implemented their MOOCs (February 5, 2013).

Debate Club: What Are the Roles of the MOOC in Higher Education? (http://bit.ly/1pacm3H). Also at the EDUCAUSE Learning Initiative Annual Meeting in 2013, CIT Academic Technology Consultants Seth Anderson and Haiyan Zhou joined in a panel discussion on MOOCs' potential value in higher education (February 5, 2013).

Video Support for MOOCs: A Case Study (http://bit.ly/1o3ILZt). Elizabeth A. Evans, Lead Producer for the Duke Digital Initiative, spoke at Appalachian State University about Duke's video support model for faculty development MOOCs (July 26, 2013).

Writing in Coursera: The Challenges of Peer Assessment (http://bit.ly/1l96N5f). Presentation by CIT Academic Technology Consultant Elise Mueller at the EDUCAUSE Learning Initiative Annual Meeting (ELI 2014) on a panel titled "New Directions in Learning: Badges and Peer Assessment." Based on Duke's *English Composition I: Achieving Expertise* MOOC, student reactions to this learning tool, and lessons learned from this pedagogical experiment (February 5, 2014).

Transforming the Student Experience and Beyond with MOOCs and Open Learning Platforms (http://bit.ly/QCkn68). Presentation by CIT Academic Technology Consultant Seth Anderson at EDUCAUSE Connect Chicago 2014 on Duke's exploration in MOOCs and how online materials and tools have been leveraged to effectively scale teaching and learning in these courses (March 18, 2014).

APPENDIX D: SUMMARY TABLE OF ONLINE EDUCATION PROJECTS

Course (Session) Title	Year Developed	Instructor(s)	Department	School	Campus use or planned use	Research study	External funding
A Beginner's Guide to Irrational Behavior	2012-13	Dan Ariely	Business; Economics	Fuqua	x	x	
Bioelectricity: A Quantitative Approach	2012-13	Roger Coke-Barr	Biomedical Engineering	Pratt	x		
English Composition I: Achieving Expertise	2012-13	Denise Comer	Thompson Writing Program	Trinity (Humanities)	x	x	x
Healthcare Innovation and Entrepreneurship	2012-13	Marilyn Lombardi; Bob Barnes	Nursing; Biomedical Engineering	Nursing	x		
Image and Video Processing: From Mars to Hollywood with a Stop at the Hospital	2012-13	Guillermo Sapiro	Electrical and Materials Engineering	Pratt	x		
Introduction to Astronomy	2012-13	Ronen Plesser	Physics	Trinity (Natural Sciences)	x		
Introduction to Genetics and Evolution	2012-13	Mohamed Noor	Biology	Trinity (Natural Sciences)	x		
Introductory Human Physiology	2012-13	Emma Jakoi; Jennifer Carbrey	Cell Biology	Medicine	x	x	
Medical Neuroscience	2012-13	Len White	Community and Family Medicine	Medicine	x	x	
Sports and Society	2012-13	Orin Starn	Cultural Anthropology	Trinity (Social Sciences)	x		
Think Again: How to Reason and Argue	2012-13	Walter Sinnott-Armstrong; Ram Neta	Philosophy	Trinity (Humanities)	x		
21st Century American Foreign Policy	2013-14	Bruce Jentleson	Public Policy	Sanford			
9/11 and Its Aftermath -- Part I	2013-14	David Schanzer	Public Policy	Sanford	x		
Data Analysis and Statistical Inference	2013-14	Mine Çetinkaya-Rundel	Statistical Science	Trinity (Natural Sciences)	x	x	x

Course (Session) Title	Year Developed	Instructor(s)	Department	School	Campus use or planned use	Research study	External funding
History and Future of (Mostly) Higher Education	2013-14	Cathy Davidson	Franklin Humanities Institute	Trinity (Humanities)	x	x	
International Human Rights Law: Prospects and Challenges	2013-14	Laurence Helfer	Law	Law	x	x	
Introduction to Chemistry	2013-14	Dorian Canelas	Chemistry	Trinity (Natural Sciences)	x	x	x
Marine Megafauna: Introduction to Marine Science and Conservation	2013-14	David Johnston	Marine Science and Conservation; Environment	Nicholas		x	
The Brain and Space	2013-14	Jennifer Groh	Psychology and Neuroscience	Trinity (Natural Sciences)			
Advertising and Society*	2014-15	William O'Barr	Cultural Anthropology	Trinity (Social Sciences)	x		x
Copyright for Educators*	2014-15	Kevin Smith	Duke University Libraries	Duke University Libraries			
Responding to 9/11*	2014-15	David Schanzer	Public Policy	Sanford			
Statistics for Educators (Module 1)*	2014-15	Dalene Stangl	Statistical Science	Trinity (Natural Sciences)	x		
The Genius of Dogs*	2014-15	Brian Hare	Evolutionary Anthropology	Trinity (Natural Sciences)		x	
Towards a Healthy World: The Challenge of Global Health*	2014-15	David Boyd	Global Health	Medicine	x	x	
Tropical Parasitology: Protozoa, Worms, Vectors and Human Disease*	2014-15	John Bartlett	Global Health	Medicine	x		