MIT Open Learning

MIT Open Learning reports to Sanjay Sarma, the vice president for open learning and the Fred Fort Flowers (1941) and Daniel Fort Flowers (1941) Professor of Mechanical Engineering. It includes the following units:

- The Office of Digital Learning (ODL), which encompasses Residential Education, MITx, OpenCourseWare (OCW), MicroMasters, and the Digital Learning Lab (DLL), as well as MIT xPRO and Bootcamps
- The MIT Integrated Learning Initiative (MITili), a cross-disciplinary, Institute-wide effort that fosters quantitative and rigorous research on teaching, learning, and education systems
- The Abdul Latif Jameel World Education Lab (J-WEL), which funds applied research on learning and convenes a global community of collaborators for sustainable, high-impact transformation in education
- Open Learning Research and Projects, which conducts applied research on learning via the Teaching Systems Lab (TSL) and other projects
- MIT Open Learning Services, which provides functional support throughout MIT Open Learning

The mission of MIT Open Learning is to transform teaching and learning at MIT and around the globe through innovative use of digital technologies. It fulfills this mission by:

- Supporting MIT faculty and students in bold experiments to enhance our residential education
- Promoting and enabling quantitative, rigorous, interdisciplinary research on teaching and learning
- Providing platforms for digital education
- Sharing research and best practices by convening and partnering with schools, universities, companies, nongovernmental organizations, and governments
- Extending MIT's knowledge and perspectives to the world

MIT Open Learning's goals are as follows:

- Enhance support for faculty, making it easier for them to experiment and succeed in online learning
- Continue to promote financial sustainability
- Continue innovation and agile operations while attracting, retaining, developing, and motivating staff and building community
- Support strategic initiatives, new research on teaching and learning, and innovation
- Enhance our ability to measure impact as a means of ensuring continual learning

Highlights

In AY2018, ongoing operations continued progress toward effectiveness and efficiency, new initiatives gained traction, and change continued apace. Specific highlights are listed below.

Strategic Projects and Programs

- Krishna Rajagopal was appointed dean for digital learning. This new position expands leadership roles for faculty in MIT Open Learning and allows a further focus on synergies among Open Learning's offerings. Residential Education, MITx, OpenCourseWare, and the Digital Learning Lab report to Dean Rajagopal.
- Shigeru Miyagawa was appointed senior associate dean for open learning. In this newly created position, Professor Miyagawa will be closely involved with Open Learning's international work, including Research and Projects, international bootcamps, and J-WEL.
- The MITx course 6.00.1x Introduction to Computer Science and Programming Using Python, taught by Professor John Guttag, Professor Eric Grimson, and Ana Bell, reached 1 million enrollees.
- The first MicroMasters cohort graduated from MIT's blended master's program, which combines a year of online learning with one semester on campus to earn a full MIT master's degree. The 39 students in the blended cohort performed at least as well as traditional students. In addition to the 39 students at MIT's Cambridge campus, there were 17 in Zaragoza, 12 in Malaysia, two at the Rochester Institute of Technology, and one at the University of Queensland.
- MITili awarded its first seven research grants, totaling $957,000. Also, MITili signed a new major agreement with the Chan-Zuckerberg Initiative (CZI) in collaboration with Harvard: Reach Every Reader brings MITili, Harvard Graduate School of Education, and Florida State University researchers together to work on rigorous scientific approaches to personalized learning for literacy, to develop diagnostic tools and interventions to help young children at risk for illiteracy, and to build capacity among educators, caregivers, and policymakers to advance ongoing conversations and instructional strategies around personalized learning.
- J-WEL, officially launched on July 1, 2017, began operations. The lab hosted two member gatherings on the MIT campus, as well as nine webinars. In FY2018, J-WEL generated 16 members and awarded $700,000 to fund 18 faculty projects on learning and curriculum development.

Business Units

- Residential Education continued to expand use of the Residential MITx course platform, creating 83 course sites with 9,921 active MIT student enrollments. A total of 110 faculty taught these courses, and 99% of current MIT undergraduates have taken a class that used the platform. Also, Residential Education successfully expanded participation in its Festival of Learning, drawing more than 300 community members.

- MITx launched 106 online courses (25 new courses and 81 reruns) on edX. Approximately 1.1 million learners participated in these courses, which enrolled 1,136,729 learners from more than 200 countries and generated $3 million in external revenues. MITx also awarded grants for 26 funded projects.
- OpenCourseWare published 62 courses (31 new courses and 31 updates), of which 19 had OCW Educator Instructor Insights pages; 10 of the courses had complete video lecture series. OCW ended its 17-year relationship with Sapient for contracted course site authoring and technology support, transitioning to internal course authoring responsibilities.
- MicroMasters launched two new programs: Principles of Manufacturing, run by the Department of Mechanical Engineering, and Statistics and Data Science, run by the Institute for Data, Systems, and Society (IDSS). More than 500 MicroMasters credentials were awarded in the Supply Chain Management and Data, Economics, and Development Policy programs.
- The Digital Learning Lab worked with faculty to develop and run 37 MOOCs, 11 of which were new, and added four new DLL fellow positions. Seven DLL members presented their work at national and international conferences.
- MIT xPRO launched six new online courses, reran five existing online courses, and generated $8 million in total gross revenue in its third year of operation, a 200% increase from FY2017.
- Bootcamps delivered 10 learning events, including two bootcamps with open enrollments, two corporate bootcamps, and two workshops. Also, the group prepared for two additional open enrollment bootcamps to be held in summer 2018. Bootcamp revenue was $3 million, generating a surplus in FY2018.
- In addition to the launch of the five-year Reach Every Reader program and the awarding of seven faculty learning effectiveness research grants, MITili began a five-year research program funded by an anonymous donor to continue study on school choice and the neuroscience of learning. Additionally, MITili expanded outreach efforts via its website, social media, newsletters, and conference participation.
- In addition to signing new members and awarding faculty grants, J-WEL filled five new positions, hosted events for more than 200 participants from 27 countries and 74 organizations, launched the J-WEL website, and generally developed its operations.
- The Teaching Systems Lab continued to grow its research on teaching and learning, with a particular focus on pre-kindergarten through grade 12. Also, work continued on developing curricula for the Woodrow Wilson Academy of Teaching and Learning, which launched this year. Additionally, TSL ran four teacher training MOOCs, researched bias and equity teaching practices and maker education environments, and hosted six lab play-test events.
- The Projects team continued design and curriculum development for the Connected Learning Initiative (CLIx), which aims to reach 33,000 students in India. CLIx supported SRM University faculty in using course materials from

three sub-licensed MITx courses; also, it supported the efforts of the American University in Cairo and the American University of Beirut to blend MITx course materials into local courses for more than 240 students. CLIx was awarded the UNESCO (United Nations Educational, Scientific and Cultural Organization) 2017 King Hamad bin Isa Al-Khalifa Prize for the Use of Information and Communication Technologies in Education.

Supporting Units

- MIT Video Productions (MVP) continued to grow its story-telling business and archive the MVP analog videotape library. *Imagination Off the Charts: Jacob Collier Comes to MIT*, an MVP documentary produced in collaboration with Music and Theatre Arts, was recognized with a 2018 New England Emmy Award.
- Engineering and Technical Operations added private discussion forums to support the MicroMasters community and used this as a basis to initiate the design and development of MIT Open, a site designed to bring MIT learning and research resources to the world and create a community around them. The group also contributed code to Open edX to improve functionality and fix bugs and updated the Bootcamps e-commerce site.
- The Business Operations group continued to support Open Learning with strategic planning, marketing, finance, human resources, community-building experiments, administration, and space. Marketing expanded operations to help deliver revenue targets for MIT xPRO, MicroMasters, and Bootcamps. Financial reporting was expanded and upgraded to include project self-reporting.
- Resource Development brought in $6.8 million in gift revenue in FY2018. The group also secured an eight-figure gift from an anonymous donor supporting faculty research and programs in MITili and the pK-12 Action Group, helped secure the CZI-sponsored grant, and led Campaign for a Better World efforts for Open Learning.

The sections on MIT Open Learning constituent units below provide further details on the year's accomplishments.

Finances and Funding

In FY2018, MIT Open Learning's revenues increased to $25.1 million, up from $23.6 million in FY2017. The increase was attributable to a $4.4 million (52%) rise in external fees and non-degree tuition, which increased from $8.4 million in FY2017 to $12.8 million in FY2018 as a result of the expansion of Bootcamps and MIT xPRO. This growth was countered by a $3 million decrease in gift revenues, from $9.8 million in FY2017 to $6.8 million in FY2018. Sponsored revenues and internal fees were broadly flat. Provost funding decreased from $20.1 million to $12.7 million as time-limited funding expired.

Total expenses increased from $30.6 million in FY2017 to $35.4 million in FY2018. MIT Open Learning continued to invest, especially in MIT xPRO, Bootcamps, MicroMasters, marketing, and MITili. In addition, as products became revenue positive, revenue distribution to faculty members, departments, and the Office of the Provost increased

from $1.9 million to $3.2 million and departmental support increased from $6.4 million to $6.8 million.

MIT Open Learning ended FY2018 with a net surplus of $2.4 million, as compared with $13.1 million in FY2017. Table below summarizes financial results for the year.

MIT Open Learning Income and Expenses, FY2018

Revenue	Total (in millions)
Sponsored revenues	$3.4
External revenues	$4.2
Non-degree tuition revenues	$8.6
Internal fees	$1.6
Gifts and investment income	$6.8
Transfers	$0.5
Total revenue	**$25.1**
Total provost funding	**$12.7**
Expenses	
Salaries and benefits	$15.7
Department support	$6.8
Revenue distribution	$3.2
Other expenses	$7.7
Total direct expenses	**$33.4**
Total indirect expenses	**$2.0**
Total expenses	**$35.4**
Net surplus (deficit)	**$2.4**

Staffing

Overall Organizational Structure of MIT Open Learning, June 30, 2018

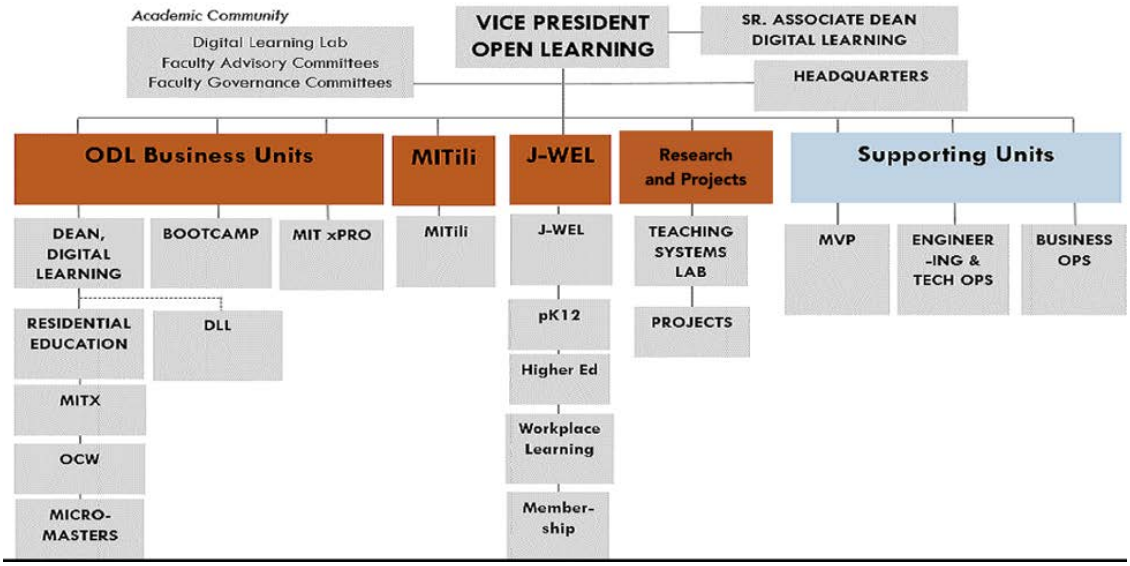

Figure 1. MIT Open Learning organizational structure.

MIT Open Learning Position and Staff Changes, AY2018

Headquarters

- Senior director, special projects—William Bonvillian (internal MIT hire, new position)

Residential

- Senior learning scientist—Aaron Kessler (outside hire, replaces Lourdes Aleman)

MITx

- Senior media specialist—Harry Bechkes (outside hire, replaces Robert MacBain)
- Intellectual property coordinator—Carlos Gutierrez (outside hire, replaces Colleen Cressman)
- Media specialist—Robert MacBain (departure, replaced by Harry Bechkes)

OpenCourseWare

- Digital publication specialist—Karmen Chong (departure, replaced by Cathleen Nalezyty)
- Digital publication specialist—Cathleen Nalezyty (internal MIT hire, replaces Karmen Chong)
- Web production specialist—Erik Mallinson (departure, position not filled)

MicroMasters

- Project manager—Kayli Maffei (departure, replaced by Lu Zhang)
- Program administrator—Lu Zhang (outside hire, replaces Kayli Maffei)

Bootcamps

- Program coordinator—Thomas Bazerghi (conversion from temporary hire, new position)
- Administrative assistant II—Travis Hill (departure, to be replaced)

J-WEL

- Associate director—Steve Carson (rehire/outside hire, new position)
- Coordinator for communication and information—Danielle Pagano (outside hire, new position)
- Senior manager, Higher Education Collaborative—Julia Reynolds-Cuellar (internal MIT hire, new position)
- Postdoctoral associate—Andres Salazar Gomez (outside hire, new position)
- Program/events coordinator—Nina Wu (internal MIT hire, replaces Sucharita Sahu)

Teaching Systems Lab

- Design researcher for teacher education—Matthew Gaydos (outside hire, new position)
- Project-based learning coach and designer—Alex Hargroder (outside hire, new position)
- Learning designer—Peter Kirschmann (outside hire, new position)
- Research scientist—Joshua Littenberg-Tobias (outside hire, new position)
- Teacher professional learning community coordinator—Emily Martin (internal MIT hire, new position)
- Learning designer—Raha Moussavi-Aghdam (outside hire, new position)
- Product owner, educational initiatives and teaching—Kevin Robinson (departure, replaced by Amanda Aparicio)
- Research scientist—Rachel Slama (outside hire, new position)

Research and Projects

- UI/UX engineer—Kathleen McMahon (departure, not replaced)
- Senior project manager—Sucharita Sahu (departure, replaced by Nina Wu)
- Education research scientist—Glenda Stump (conversion from contractor, new position)

MIT Video Productions

- Associate director—Clayton Hainsworth (internal MIT hire, new position)
- Financial coordinator—Brigitte Tersek (internal MIT hire, replaces Jennifer Amaya and Anna Dement who held the position together)
- Media work flow and archive specialist—Rick Parastatides (internal MIT hire, replaces Ian Jordan)
- Post-production media specialist—Gregory Eaton (conversion from contractor, new position)
- Business manager—Anna Dement (departure, replaced by Brigitte Tersek)

Engineering

- Data scientist—Xinyu Liu (outside hire, new position)
- Senior software engineer—Giovanni Di Milia (departure, to be replaced)

Business Operations

- Accounting coordinator—Bryan Adkison (internal MIT hire, new position)

- Office assistant—Cherrah Barclay (conversion from temporary hire, replaces Peter Janetos)
- Content marketing manager—Laura Howells (conversion from temporary hire, new position)
- Office assistant—Pete Janetos (departure, replaced by Cherrah Barclay)
- Financial coordinator—Peter Kearns (internal MIT hire, replaces Murad Wornum)
- Administrative assistant II—Meagan Riley (departure, replaced by Cindy Sambataro)
- Senior administrative assistant—Jessica Rondon (conversion from temporary hire, replaces Cindy Sambataro)
- Administrative assistant II—Katherine Stringer (conversion from temporary hire, new position)
- Digital communications and community engagement coordinator—Julie Swanson (internal MIT hire, new position)

Office of Digital Learning

Residential Education

The mission of the Residential Education team is to empower MIT faculty to use digital technologies to augment and transform how they teach, making their teaching more effective and efficient. We do this by collaborating with MIT faculty to instigate, explore, test, and institutionalize pedagogical models that enhance on-campus education through the use of digital technology. Our key strategies are to:

- Support digital learning experiments at MIT by providing technical expertise, consultation, facilities, funding collaboration, training, and support for such experiments
- Encourage wider institutional adoption of pedagogical approaches enabled by digital learning tools by proactively supporting faculty and the MIT community in leveraging digital tools to improve teaching at MIT
- Collaborate with faculty, departments, the Office of the Vice Chancellor, and others to encourage and enable faculty to use digital teaching and learning tools, to help departments grow their course production capacity, and to support mechanisms that leverage existing Institute resources and synergies with other initiatives across MIT

In pursuit of these strategies, Residential Education provides the following services:

- Science of learning, learning analytics, and blended course design consulting for instructors to promote more effective and efficient teaching and learning at MIT
- Support of experimental/innovative learning spaces
- Technical and pedagogical support for the Residential MITx course platform
- Outreach and events (e.g., xTalks, Festival of Learning, Teaching with Digital Technology Awards, newsletter) to promote innovative teaching and learning

Summary and Highlights

This was the third full year of operation for the Residential Education group. The group had sustained success in supporting faculty use of the Residential MITx course platform, creating sites for 83 courses with 9,921 active MIT student enrollments. More than 100 faculty members taught these courses, and 99% of current MIT undergraduates have taken a class that used the platform. Residential Education successfully expanded participation in its Institute-wide Festival of Learning, drawing more than 300 community members, including more than 50 faculty members. It also filled a key senior learning scientist position to help faculty transform teaching and learning at MIT. Finally, it created the new "Residential Digital Innovations" section on the Open Learning website, highlighting approximately 50 cases of innovative teaching practices at MIT.

Goals and Objectives

As noted, the Residential Education unit strives to help make MIT on-campus education more effective and efficient by supporting digital learning experiments at MIT and encouraging wider institutional adoption of pedagogical approaches enabled by digital learning tools.

Accomplishments

During AY2018, key accomplishments in support of residential education included the following:

- Hosted 12 xTalks during AY2018 with more than 368 attendees, including 79 faculty members.

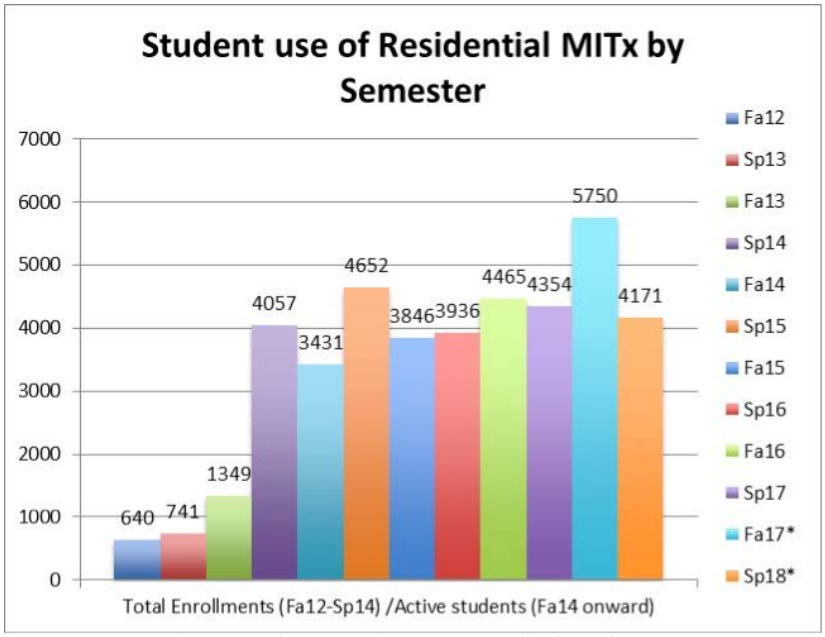

Figure 2. Growth in use of the Residential MITx platform for MIT courses.

- Managed Open Learning's Teaching with Digital Technology Awards (co-sponsored by the Office of the Vice Chancellor) for the third year, produced a montage video of the award winners, and hosted a luncheon for the winners and nominees.

- Contributed learning sciences, instructional design, and learning analytics expertise to foster teaching innovation throughout the MITx grant process.
- Re-launched the science of learning journal club in collaboration with MITili.
- Assisted course and project teams with the development of online/blended courses.
- Developed learning analytics projects with DLL and other groups.
- Supported a student-led hackathon.
- Developed a functional student dashboard prototype with Jupiter notebooks.
- Gave many presentations highlighting Open Learning and Residential Education work/accomplishments for colleagues and visiting delegations.
- Presented a poster on data analytics at Learning @ Scale 2018.
- Supported three innovative technology-enabled learning spaces and their infrastructure along with two lightboard studios, providing primary teaching space for 10 classes and supplemental teaching space for an additional four classes throughout the fall and spring semesters. These courses included 11.520/11.205, 4.500, 2.086, 11.188, 4.512, EC.305, EC.310, 21A.550J, and CMS.335J. Additional support was provided for more than 20 ad hoc events and workshops. Lightboard studios were used by five Residential classes (2.001, 6.004, 8.01, 8.02, and 10.40) and two MicroMasters programs (Supply Chain Management and Principles of Manufacturing).

MITx

MITx on edX is the Institute's interactive learning initiative that offers online versions of MIT courses on the edX platform, a collaboration in online education between MIT and Harvard University. MIT instructors teach MITx courses to learners around the world. With support from the Residential Education team, and using the resources, platform, and pedagogical innovations of MITx, faculty also develop digital learning courses and modules for use in on-campus education.

Many people refer to MITx courses as MOOCs (massive open online courses). The learning experience features multimedia and video content, embedded quizzes with immediate feedback, online laboratories, and peer-to-peer communications. It is also common for courses to use third-party tools as course enhancements. Courses are offered in two formats: self-paced and time-bound. Self-paced courses offer all material at once, and learners can move through at their own pace. Time-bound courses have deadlines and tend to make content accessible only on a weekly basis. Learners who demonstrate their mastery of subjects can earn certificates of completion for a fee. MITx on edX operates on a cost-free, open-source, scalable software infrastructure. MITx and edX are building a global community of online learners.

The MITx platform is also used in a growing number of on-campus MIT courses to bring advanced digital learning technologies to residential education. MITx residential modules support online assessments with rapid feedback, active learning classrooms, flexibility in course delivery, and other emerging digital teaching and learning innovations. A digital learning ecosystem has developed whereby a faculty member

can develop a course on the MITx platform to support teaching and learning in the classroom. Building on the experience, and benefiting from student feedback, the faculty member can then decide to transform the course for use on edX by global learners.

The vast array of data gathered through MITx global and residential use is helping educational researchers better understand how learners learn and how technology can facilitate effective teaching both on campus and online. Research findings are then introduced into new generations of learning tools, creating a continuous loop of educational innovation.

Summary and Highlights

During the 2017–2018 academic year, MITx on edX continued building more courses, supported new Open Learning initiatives such as MicroMasters, and refined its course production processes both internally and externally. Specifically:

- We offered 25 new MOOCs and 81 MOOCS that had been offered in prior semesters. We enrolled approximately 1.18 million learners from more than 200 countries across these 106 MOOCs, among whom roughly 93,500 explored more than 50% of their courses.
- We provided additional support for several CCX (Custom Courses on edX) and Digital Learning Solutions courses.
- We generated $2.8 million in gross revenue in FY2018 through ID-verified certificates and licensing arrangements.
- We piloted a new faculty support model in conjunction with the Residential Education team.

Table below shows the cumulative impact of MITx on edX since its inception in 2012.

Cumulative Worldwide Impact of MITx

Metric	Total
Cumulative total enrollment	7.2 million*
Cumulative total participation	4.1 million
Certificates of completion	178 thousand
ID-verified certificates	71 thousand

*3.4 million unique enrollments.

Goals and Objectives

The mission of MITx is to support the development of free, openly licensed, scalable, MIT-quality courses for academically talented learners worldwide; support the use of digital learning tools and techniques in the delivery of MIT residential programs; and further the understanding of best practices in emerging digital and scalable learning environments via data collected from MITx learners. MITx goals are as follows.

- Reach: Expand access to education worldwide
- Residential: Improve teaching and learning across campus

- Research: Advance teaching and learning through educational research
- Revenue: Generate revenue to help sustain MITx and other Open Learning units

MITx major operational priorities during FY2018 were:

- Design and pilot a new method for supporting faculty centered around teaching and learning (with support from the Residential Education team)
- Implement new course rerun policies and start to plan 18-month run schedules with faculty
- Develop synergies, improved efficiencies, and communications with other Open Learning units, the MIT community, and external resources

Accomplishments

During academic year 2018, MITx:

- Held two successful calls for proposals for the MITx Grant Program, resulting in 26 funded projects from 40 proposals submitted by 22 academic departments and programs.
- Established the MITx Prize for Teaching and Learning in MOOCs, an award given to faculty and course teams that have made learner-focused innovations within their courses, contributed toward general best practices in the rapidly expanding realm of digital learning, and had an impact on the MOOC experience of global learners. Two prizes were awarded at the MITx Significant Interest Group event in May 2018, one to Chris Caplice (executive director of the Center for Transportation and Logistics) for his work on the MITx MicroMasters Supply Chain Management program and the other to Justin Reich (executive director of the MIT Teaching Systems Lab) for his efforts in the MOOC 11.154x Launching Innovation in Schools.
- Participated in outreach events such as the MIT open house, Careers Across MIT, Family Weekend, and the Festival of Learning; collaborated with the MIT Libraries, The MIT Press, and the Media Laboratory; and met with several international guests to discuss MIT's views on digital learning.

MITx Courses on edX, AY2018

Course	Title	Instructor	Registrations	Participants	ID-verified certificates
2.008x	Fundamentals of Manufacturing Processes	A. J. Hart	9,998	5491	93
2.01x	Elements of Structure	A. M. Kolpak	3,228	1,457	19
3.032.1x	Mechanical Behavior of Materials, Part 1: Linear Elastic Behavior	L. Gibson	5,888	3,038	53
3.032.2x	Mechanical Behavior of Materials, Part 2: Stress Transformations, Beams, Columns, and Cellular Solids	L. Gibson	3,042	1,014	38
3.032.3x	Mechanical Behavior of Materials, Part 3: Time Dependent Behavior and Failure	L. Gibson	2,877	908	25

Note: In September 2015, edX eliminated the honor code (free) certificate. Courses that were open for enrollment prior to the announcement of this change still awarded honor code certificates. Courses opened for enrollment after the announcement offered only ID-verified (paid) certificates.

Course	Title	Instructor	Registrations	Participants	ID-verified certificates
3.091x	Introduction to Solid State Chemistry	M. J. Cima	5,594	2,724	15
4.605x	A Global History of Architecture	M. Jarzombek	9,732	5,224	66
6.00.1x	Introduction to Computer Science and Programming Using Python	J. V. Guttag	341,249	223,240	9,541
6.00.2x	Introduction to Computational Thinking and Data Science	J. V. Guttag	26,969	15,708	319
6.041.1x	Introduction to Probability: Part 1—The Fundamentals	J. N. Tsitsiklis	15,809	9,549	111
7.00x	Introduction to Biology: Secret of Life	E. S. Lander	15,892	10,763	19
7.QBWx	Quantitative Biology	J. Gore	5,483	3,083	14
8.01.1x	Mechanics: Kinematics and Dynamics	D. Chakrabarty	10,215	5,792	73
8.01.2x	Mechanics: Momentum and Energy	D. Chakrabarty	4,162	1,411	65
8.04.1x	Quantum Mechanics: Wavefunctions, Operators, and Expectation Values	B. Zwiebach	9,970	6,156	135
8.04.2x	Quantum Mechanics: Quantum Physics in 1D Potentials	B. Zwiebach	5,346	2,040	83
8.04.3x	Quantum Mechanics: 1D Scattering and Central Potentials	B. Zwiebach	3,727	1,297	72
11.154x	Launching Innovation in Schools	J. Reich	4,948	2,198	82
14.100x	Microeconomics	E. Duflo	9,960	3,880	0
14.310x	Data Analysis for Social Scientists	E. Duflo	13,135	4,763	0
14.73x	Challenges of Global Poverty	E. Duflo	7,555	2,497	0
14.740x	Foundations of Development Policy: Advanced Development Economics	E. Duflo	3,271	1,282	0
15.671.1x	u.lab: Leading From the Emerging Future		16,310	9,873	250
16.00x	Introduction to Aerospace Engineering: Astronautics and Human Spaceflight	J. A. Hoffman	10,254	5,619	254
17.571x	Democracy and Development: Perspectives from Africa	E. S. Lieberman	4,163	1,743	32
18.01.2x	Calculus 1B: Integration	D. Jerison	12,868	4,372	137
18.032x	Differential Equations: 2x2 Systems	D. Jerison	6,306	2,649	91
24.09x	Minds and Machines	A. Byrne	7,405	3,119	42
Bootcamp0	You Can Innovate: User Innovation & Entrepreneurship	E. A. von Hippel	2,195	298	3
Bootcamp1	Entrepreneurship 101: Who Is Your Customer?		3,498	736	6
Bootcamp2	Entrepreneurship 102: Do You Have a Product?		2,817	544	3
Bootcamp3	Entrepreneurship 103: Show Me the Money		1,860	297	0
CTL.SC0x	Supply Chain Analytics		29,840	12,428	823
CTL.SC1x	Supply Chain Fundamentals		21,030	9,287	880
CTL.SC2x	Supply Chain Design	Y. Sheffi	11,467	4,899	379
CTL.SC4x	Supply Chain Technology and Systems		12,802	3,517	789
JPAL 101x	Evaluating Social Programs		4,465	2,128	44
JPAL 102x	Evaluating Social Programs and Data Collection and Management	J. J. Doyle	2,325	917	0
JPAL 350x	Measuring Health Outcomes in Field Surveys	E. Duflo	1,952	919	36
LaunchX	Becoming an Entrepreneur		39,602	21,476	319
STL.161x	Entrepreneurial Land Redevelopment Approach: Land Readjustment		2,371	883	7
0.501x	Envisioning the Graduate of the Future	J. Reich	2,350	924	96
2.02.1x	Mechanics of Deformable Structures: Part 1	D. M. Parks	7,843	2,631	16
2.830.1x	Manufacturing Process Control I: Modeling and Control of Variation	D. E. Hardt	13,133	6,000	162

Note: In September 2015, edX eliminated the honor code (free) certificate. Courses that were open for enrollment prior to the announcement of this change still awarded honor code certificates. Courses opened for enrollment after the announcement offered only ID-verified (paid) certificates.

Course	Title	Instructor	Registrations	Participants	ID-verified certificates
2.854.1x	Introduction to Manufacturing Systems		9,439	4,087	66
3.024x	Electronic, Optical, and Magnetic Properties of Materials	P. O. Anikeeva	4,946	2,126	4
3.MatSelx	Structural Materials: Selection and Economics	T. W. Eagar	4,325	2,012	241
6.041.2x	Introduction to Probability: Part 2—Inference & Processes	J. N. Tsitsiklis	6,210	2,587	49
7.00x	Introduction to Biology: Secret of Life	E. S. Lander	4,881	3,283	20
7.28.1x	Molecular Biology: DNA Replication and Repair	S. P. Bell	4,174	2,365	41
7.28.2x	Molecular Biology: DNA Transcription and Transposition	S. P. Bell	1,749	869	25
8.01.3x	Mechanics: Rotational Dynamics	D. Chakrabarty	4,145	1,265	44
8.02.1x	Electricity and Magnetism: Electrostatics	R. P. Redwine	6,164	2,930	80
8.05.1x	Mastering Quantum Mechanics Part I: Wave Mechanics	B. Zwiebach	8,944	5,153	30
8.05.2x	Mastering Quantum Mechanics Part II: Quantum Dynamics	B. Zwiebach	2,728	603	15
8.370.1x	Quantum Information Science I, Part 1	I. Chuang	10,712	8,011	110
8.370.2x	Quantum Information Science I, Part 2	I. Chuang	3,186	1,235	77
8.370.3x	Quantum Information Science I, Part 3	I. Chuang	2,390	536	58
11.155x	Design Thinking for Leading & Learning	J. Reich	6,272	2,077	118
11.405x	Just Money: Banking as if Society Mattered	J. P. Thompson	6,361	2,703	134
14.100x	Microeconomics	E. Duflo	11,518	4,664	0
14.310x	Data Analysis for Social Scientists	E. Duflo	8,480	3,726	0
14.73x	Challenges of Global Poverty	E. Duflo	8,521	3,145	0
14.740x	Foundations of Development Policy: Advanced Development Economics	E. Duflo	3,855	1,477	0
15.390.1x_SPA	Entrepreneurship 101: ¿Quién es tu cliente? (Entrepreneurship 101: Who Is Your Customer?)	B. Aulet	8,766	4,896	17
15.390.2x_SPA	Entrepreneurship 102: ¿Qué puedes hacer por tu cliente?	B. Aulet	1,230	586	0
15.662x	Shaping the Future of Work	T. A. Kochan	2,504	1,157	45
18.01.3x	Calculus 1C: Coordinate Systems & Infinite Series	D. Jerison	8,025	1,404	41
18.033x	Linear Algebra and NxN Systems of Differential Equations	D. Jerison	6,891	2,554	83
CTL.CFx	Supply Chain Comprehensive Exam (Virtual)		1,309	751	397
CTL.SC0x	Supply Chain Analytics		20,062	8,354	438
CTL.SC2x	Supply Chain Design	Y. Sheffi	9,035	3,518	527
CTL.SC3x	Supply Chain Dynamics	Y. Sheffi	7,496	2,534	430
CTL.SC4x	Supply Chain Technology and Systems		6,598	1,856	0
EC.745x	Lean Research Skills for Conducting Interviews	D. Frey	1,168	491	8
HST.936x	Global Health Informatics to Improve Quality of Care		2,512	1,226	63
JPAL 102x	Evaluating Social Programs and Data Collection and Management	J. J. Doyle	2,999	1,203	0
LaunchX	Becoming an Entrepreneur	M. L. Culpepper	21,448	10,870	92
2.961.1x	Topics in Engineering Management	J. Chun	6,603	2,134	122
7.28.3x	Molecular Biology Part 3: RNA Processing and Translation	S. P. Bell	1,173	259	0
8.02.2x	Electricity and Magnetism: Magnetostatics	R. P. Redwine	3,704	1,249	65
8.05.3x	Mastering Quantum Mechanics Part III: Entanglement and Angular Momentum	B. Zwiebach	2,251	439	6

Note: In September 2015, edX eliminated the honor code (free) certificate. Courses that were open for enrollment prior to the announcement of this change still awarded honor code certificates. Courses opened for enrollment after the announcement offered only ID-verified (paid) certificates.

Course	Title	Instructor	Registrations	Participants	ID-verified certificates
8.371.1x	Quantum Information Science II, Part 1	I. Chuang	1,305	519	21
8.371.2x	Quantum Information Science II, Part 2	I. Chuang	1,034	214	2
8.371.3x	Quantum Information Science II, Part 3	I. Chuang	863	116	0
14.100x	Microeconomics	E. Duflo	6,510	2,542	0
14.310x	Data Analysis for Social Scientists	E. Duflo	6,343	2,537	0
14.73x	Challenges of Global Poverty	E. Duflo	4,501	1,572	0
14.740x	Foundations of Development Policy: Advanced Development Economics	E. Duflo	3,044	1,012	0
15.762x	Supply Chains and Manufacturing Systems: Planning	S. C. Graves	5,823	1,719	0
24.00x	Introduction to Philosophy: God, Knowledge and Consciousness	C. Hare	5,116	1,762	0
24.118x	Paradox and Infinity	A. Rayo	7,128	3,768	0
CTL.SC1x	Supply Chain Fundamentals		13,081	1,870	0
CTL.SC3x	Supply Chain Dynamics	Y. Sheffi	6,326	1,413	0
JPAL 101x	Evaluating Social Programs		1,508	1	0
JPAL 102x	Designing and Running Randomized Evaluations	J. J. Doyle	2,493	939	0
STL.161x	Entrepreneurial Land Redevelopment Approach: Land Readjustment	E. Ben-Joseph	1,097	353	5

Note: In September 2015, edX eliminated the honor code (free) certificate. Courses that were open for enrollment prior to the announcement of this change still awarded honor code certificates. Courses opened for enrollment after the announcement offered only ID-verified (paid) certificates.

Administrative Accomplishments

In AY2018, we focused on stabilizing our structure with good management practices. Accomplishments are detailed below.

- Organization: Created a new junior educational technologist position on the Educational Technology team, promoted Lisa Eichel to assistant director of the MITx Program, and shifted selected MicroMasters responsibilities to the MicroMasters team.
- Services and support: Implemented a web-based intellectual property application for use by course teams, streamlined the MITx MicroMasters support process for fielding learner disability accommodation requests, completed technical and unique course feature audits for all MITx MOOC runs from 2013 to the present, and set up and implemented a site where the MITx team can store internal process documentation in a central location, which will save time and ensure consistency.
- Professional development: Lana Scott gave a keynote presentation on video best practices in MOOCs at the Media and Learning 2018 conference in Brussels, Belgium. MITx helped organize and participated in the Fair Use Week Gameshow, hosted by MIT and Harvard Libraries. Lindsey Weeramuni presented a paper about fair use and open educational resources to a conference of scholarly communication librarians. Lisa Eichel presented at Confab Higher Ed and the edX Global Forum. Dana Doyle presented at the MOOC Maker Conference.
- Community building: Held two faculty special interest group events to bring the digital community together to share best practices and innovations.

- Open Learning support: MITx team members contributed to a variety of Open Learning–wide projects and committees, including the capital campaign and the Open Learning Scholars project.
- edX: Maintained the edX/MITx partnership through weekly touch-base calls, monthly pipeline review meetings, custom reports for edX program managers, and monthly marketing/communication team meetings.

MITx Faculty Advisory Committee

Purpose

The purpose of the MITx Faculty Advisory Committee (FAC) is to provide oversight and guidance for MITx courses. The committee:

- Offers clear guidelines on topics related to MITx and is responsive to the MIT faculty with regard to MITx governance.
- Provides oversight on subjects or modules produced for MITx: The residential benefit of each MITx proposal is considered; the budget, timing, and sustainability of each module (learning unit), subject, or subject sequence proposed are assessed based on the strategy described by each department; and each proposal is assessed for whether it adequately reflects the diverse "face of MIT," especially with regard to equity in the demographics of faculty teaching each subject.
- Promotes innovative approaches to an MIT education: FAC evaluates and facilitates innovative new approaches proposed for MITx courses and experiments in digital learning. Also, it guides MITx in seeking to bring innovative new approaches to digital learning and education for MIT students. Such new approaches for developing, employing, and maintaining online materials will emerge over the years ahead, in blended classrooms, modular content, novel approaches to video, animations, simulations, or production tools.

Membership

The committee's chair is Hazel L. Sive, professor of biology. Members are as follows:

- Bill Aulet, professor, Sloan School of Management
- W. Craig Carter, professor, Department of Materials Science and Engineering
- Isaac Chuang, professor, Department of Electrical Engineering and Computer Science, and senior associate dean of digital learning
- Michael Cuthbert, associate professor, Music and Theater Arts
- Woodie Flowers, professor emeritus, Department of Mechanical Engineering
- Lorna Gibson, professor, Department of Materials Science and Engineering

- Krishna Rajagopal, professor, Department of Physics, and dean for digital learning (ex officio)
- Albert Saiz, associate professor, Department of Urban Studies and Planning
- Sanjay Sarma, professor, Department of Mechanical Engineering, and vice president for open learning (ex officio)
- Susan Silbey, professor, Anthropology
- Pawan Sinha, professor, Department of Brain and Cognitive Sciences
- Iain Stewart, professor, Department of Physics
- Ian Waitz, professor, Department of Aeronautics and Astronautics, and vice chancellor for undergraduate and graduate education
- Mary Ellen Wiltrout, digital learning scientist, Department of Biology (ex officio)

OpenCourseWare

MIT OpenCourseWare provides free open-licensed educational materials from across the MIT curriculum, reflecting undergraduate- and graduate-level teaching in all five MIT schools and 33 academic units. OCW now has material from over 2,400 courses. Its depth and breadth of coverage in all disciplines make OCW unique among open education offerings around the world.

Through OCW, MIT faculty members share their teaching materials with a global audience of teachers and learners. Educators use these resources for teaching and curriculum development, while students and self-learners draw upon the materials for self-study or supplementary use.

Summary and Highlights

OCW continued reducing staff in FY2018, after dropping three digital publication specialist positions the prior year. At the start of FY2018, Cecilia d'Oliveira, long-standing leader of OCW, retired. Publication director Joseph Pickett assumed full leadership responsibilities for an interim period. In mid-year, two digital publication specialists departed; one was replaced near the end of the year. In addition, a web production specialist left at the beginning of the year and was not replaced. The volume of publication was correspondingly lower, and, for a temporary period that will end in FY2019, there are a number of departments not receiving the attention of a digital publication specialist.

OCW is funded in part through the Office of the Provost and in part through a reserve fund of grants and gifts. This latter fund has been declining gradually, and FY2018 operating expenses were reduced accordingly.

At the end of FY2018, OCW ended its 17-year relationship with Sapient for contracted course site authoring and technology support. All course-authoring responsibilities have

transitioned to the OCW publication team staff, increasing their workload for each course publication. Technology support has transitioned to the Open Learning Engineering team, with one new hire in progress and a second planned. During FY2018, Open Learning Engineering prepared to take over responsibility for the OCW Content Management System (CMS), in which websites are built and staged. The Engineering team worked with Sapient to extract the entire corpus of OCW content in a format that can be adapted for use with a variety of future CMS platforms. Open Learning engineers also migrated the CMS and its related infrastructure to virtual servers in the cloud, thereby reducing the risk of failure and enabling more modern and efficient tools for maintenance.

OCW realized a number of significant accomplishments and reached several new milestones in FY2018. The team published 62 courses (31 new, 31 updated) and six supplemental resources (five new, one updated). Ten of the courses had full video lectures, 19 included OCW Educator Instructor Insights, and four are foundational OCW Scholar courses with extensive materials. Also, OCW published its 100th course with full video and 200th course with Educator content.

OpenCourseWare Publication Metrics as of June 30, 2018

Metric	Total
Courses published on OCW website	2,432
Courses archived on DSpace	1,084
Full video lecture series*	128
Exemplary (partial) video lecture series	64
Total sites with audio or video resources	209
Total openly published textbooks	67
Courses with OCW Educator content**	201

*101 courses and 27 supplemental resources.

**163 with Instructor Insights and 25 with video interviews.

The team continued to develop and roll out numerous OCW website enhancements, especially in terms of improving content discoverability. For example, the Educator portal's features and structure were substantially revised based on user feedback, all course lists now have filters for content type and sorting by age to make them easier to use, site search has been improved through a migration to Google Custom Search, and site navigation menus and landing pages now feature OCW Educator and supplemental resources content more effectively.

According to Google Analytics, 119 million users in 221 countries across 23 subcontinents have visited the OCW website over the past 10 years (with an overall total of approximately 222 million visits). The average time spent per site visit is five minutes.

As video is increasingly important for online learning, OCW's YouTube channel has grown to surpass 5,000 videos, with new subscribers joining at a rate of 30,000 each month and overall subscribers surpassing 1.6 million. The total number of video views (since November 2007) has topped 150 million, with overall viewing time exceeding 840 million minutes.

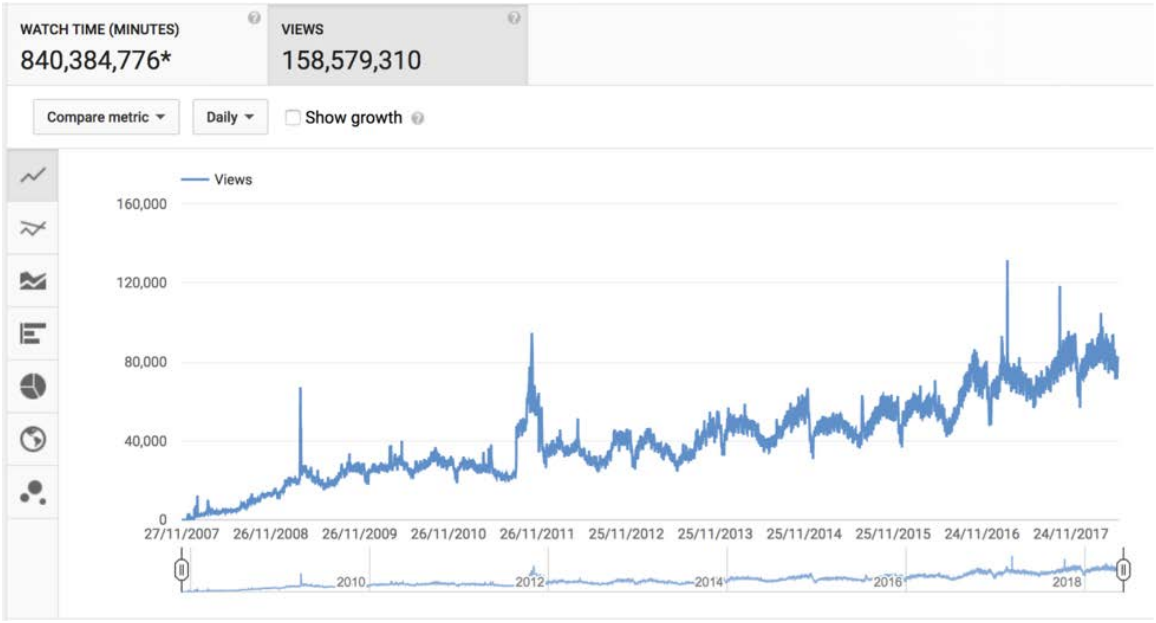

Figure 3. Total views of OCW videos on YouTube.

Goals and Objectives

OCW's formal goals for FY2018 were as follows.

- Publish high-quality, up-to-date MIT course materials: Expand the OCW publication with new MIT course materials in step with the MIT curriculum, maintain the currency of published content, continually improve the depth and quality of materials, continually improve user features and site structure to optimize the user experience, maintain and enhance an effective technology infrastructure, and continually refine effective and efficient work processes
- Increase use of OCW for teaching and learning: Increase awareness of OCW, increase traffic to OCW content via multiple distribution channels, tailor OCW content to the needs of key external audiences, foster the development of communities of learning around OCW content, and support the use of OCW content by educators and educational systems globally
- Maximize the benefits of OCW for the MIT community: Support MIT initiatives, create lifelong connections between MIT and our students and alumni, catalyze improvements in teaching and learning at MIT, and showcase MIT's curriculum, strengthen its reputation, and promote international engagement
- Support worldwide open educational resources (OER) and the OCW movement: Support the Open Education Consortium (formerly the OCW Consortium) and engage with other OER programs to increase the collective benefits of open resources
- Sustain the MIT OCW program: Continually develop the OCW team as a responsive, professional organization; maintain communications to keep stakeholders informed; evaluate and report on OCW programs; manage OCW finances responsibly; ensure the long-term financial viability of OCW; and ensure a vibrant future for OCW through effective planning

Accomplishments

Course Publication

Course publication is the heart of the OCW mission. In FY2018, the team:

- Published 62 courses with the following distribution across MIT schools: Architecture and Planning, 4; Engineering, 5; Science, 17; Humanities, Arts, and Social Sciences, 33; and Sloan School of Management, 3. Four of these offerings are foundational OCW Scholar courses: 5.07SC Biological Chemistry I, 5.111SC Principles of Chemical Science, 8.01SC Classical Mechanics, and 8.03SC Physics III: Vibrations and Waves.
- Published six supplemental resources, many with substantial assets. For instance, the RES.9-003 Brains, Minds and Machines summer course has 46 hours of video from leading researchers in brain science, human intelligence, and artificial intelligence.
- Published 10 courses/supplemental resources with complete video lectures.
- Processed or cleared 2,190 intellectual property objects.
- Published OCW's first video course using auto-capture technology (18.650 Statistics for Applications) and an OCW version of the MITx on edX course 6.041x Introduction to Probability.

In preparation for Sapient course authoring support ending at the close of the fiscal year, many of these courses were built in house.

OCW Educator

OCW Educator enhances the value of OCW for educators at MIT and around the world. Its two main goals are to help educators efficiently identify open educational resources to reuse and remix in their own classrooms and enhance users' ability to take best advantage of these by helping them understand the context and manner in which the materials are used here on campus.

The primary component of OCW Educator is an OCW course section called Instructor Insights. This section provides interviews with faculty about how the course was taught at MIT along with information about prerequisites, the kinds of students taking the class, assessments, and student time investments. These pages and other teaching-related resources are featured through the OCW Educator portal, a landing page that guides users toward OCW materials that employ or illustrate different teaching approaches.

Significant OCW Educator accomplishments during FY2018 are described below.

- Publication: Published 19 Instructor Insights sections, seven of which had video insights and four of which also included student insights. In addition, we published our 200th Instructor Insights section, for 24.912J Black Matters.
- Educator portal: Collaborated with the MIT Teaching Systems Lab to playtest the Educator portal with teachers. Based on their feedback, we made a number

of changes to the site that have resulted in the portal being easier for teachers to find and use. Also, we changed the name of OCW Educator pages from "This Course at MIT" to "Instructor Insights." This iteration was suggested by teachers; they felt that Instructor Insights more clearly conveyed the content contained within these section pages.

- Educator outreach: Increased visits to the Educator portal from 252,000 in FY2017 to 300,000 in FY2018. In addition, we used monthly Facebook posts about OCW Educator to keep instructors informed about the portal.
- Project assessment: Used a Google Analytics educator dashboard to track visits to the Educator portal and used an online database to dynamically track publications and workflow.

Site Curation

Site curation is an ongoing effort to continually improve the usefulness of OCW and to highlight the breadth, depth, and vitality of the OCW collection. Site curation includes identifying and promoting featured content, enhancing course browsing and searching, and guiding efforts to improve OCW's currency and relevance in relation to the MIT curriculum.

Site curation accomplishments in FY2018 included the following:

- Defined features for adding sorting and filtering tools to all course lists and prepared course metadata
- Completed a site-wide rollout and retrofit of detailed tagging options for assignment types
- Adjusted the mega-menu to improve discoverability of Educator content
- Implemented featured course rotators on course list pages
- Migrated Engineering Systems Division courses to a new IDSS department and course numbering scheme
- Added linked references on department pages to their associated supplemental resources
- Created and promoted lists of related OCW courses for MITx on edX offerings
- Regularly updated featured courses on the OCW home page and key pages throughout the site

Highlights for High School

OCW's Highlights for High School (HFHS) program is a collection of courses and resources tailored to high school educators, students, and parents. It combines selected OCW assets and specially produced original content and averages about 30,000 visits per month.

During FY2018, we added three new introductory OCW courses to the HFHS site, updated one other course, and completed captioning for all original HFHS videos.

Technology

The OCW website and publishing infrastructure rely on a highly technical backend and engineering team. This technology and team not only support learners and educators across the globe but also support internal OCW needs in areas including publication, outreach, site curation, and user feedback.

This year, the OCW publication infrastructure has been undergoing a major transition in terms of systems and support. As noted, the in-house Open Learning Engineering team is taking over the system support role that Sapient has held for 17 years and will be providing system maintenance, site and system improvements, and support for the development of future publication and distribution architectures.

As the hardware on which the OCW publication system runs continues to age and its failure is increasingly likely, we have made an effort to break our dependency on physical hardware and are virtualizing the application on Amazon Web Services. This change gives us much greater reliability and flexibility along with the ability to easily update many critical core components as needed.

In addition, we have made significant efforts to increase the usability, reliability, and functionality of both our website and infrastructure. To do so, we:

- Completed 47 production code releases in support of 145 site enhancements/fixes
- Transitioned technical support of the OCW publication infrastructure from Sapient to the Open Learning Engineering team
- Transitioned the existing Plone application from aging hardware to a virtual environment on Amazon Web Services
- Developed a toolkit to export OCW course content as JSON (JavaScript Object Notation), freeing OCW content from the bounds of the website and allowing for easier ingestion into other systems
- Switched all site search functionality to Google Custom Search due to Google's decision to end support of its Search Appliance
- Implemented multiple user interface changes to improve the user experience and enhance content discoverability (e.g., all course lists now include filtering by resource type and sorting to show the most recent courses first)
- Implemented several backend code changes to improve site performance and streamline work flows

Accessibility

Accessibility features broaden the reach of OCW to learners with disabilities and also assist others, including users lacking fluency in English. OCW now has access to the MITx accessibility manager for advice and review. During FY2018, we:

- Published new media assets with captions
- Reviewed new site features and functionality
- Added captions for all uncaptioned videos on Highlights for High School

Communications

OCW pursues a substantial external communications program involving much of the publication team in various ways. In FY2018, we:

- Maintained the OCW blog and monthly newsletter.
- Increased the average open rate of e-newsletters from 17.7% to 21.8% and the average click-through rate from 1.9% to 2.2%. More than half a million unique users opened our newsletters.
- Processed more than 5,000 user feedback emails.
- Continued to enhance our reach and impact on social media. For example, we increased our Facebook followers by more than 61,000, bringing the total to nearly a half million, and added 11,800 Twitter followers, bringing the total to more than 184,000.

Administrative Initiatives

Transition from Sapient

Since shortly after OCW's initial launch 17 years ago, technical systems support and detailed course site-building tasks ("authoring") have been outsourced to Sapient in India. That relationship has been key to OCW's rapid scale-up and ongoing progress. The growth of Open Learning (and in particular the availability of support for some of these processes from the Open Learning Engineering group), shifting priorities, and the cost of the Sapient contract have (as noted above) led us to end this relationship at the close of FY2018, with Sapient's responsibilities being transferred to in-house teams.

An FY2017 pilot project showed that in-house course site building by OCW publication staff, with training and support from OCW's production group, was feasible. During FY2018, in-house course site building became the rule as the team prepared for the end of the Sapient contract.

Meanwhile, the Engineering group prepared to assume responsibility for the OCW Content Management System. CMS is an aging technology that has been in need of an upgrade or replacement for some time. As noted, the Engineering team worked with Sapient to extract the entire corpus of OCW content from CMS in the form of JSON files that could be adapted for use with a variety of future CMS platforms. Also, with the help of the Sapient group, Open Learning engineers migrated CMS and its related infrastructure from an aging, unstable physical disc array housed at MIT to virtual servers in the cloud.

In-House Video Editing

OCW produces a considerable volume of video each year in a variety of formats, requiring substantial investments in labor and capital for recording, editing, and captioning. In the past, OCW has used external editors almost exclusively, but this model has proven to be inefficient and slow and to result in quality problems. External editors often misinterpret editing instructions or fail to explain the decisions they make. They often get distracted with other projects, are late to respond to communications, and lose track of the project's requirements and eccentricities.

This year we conducted a trial using an in-house video editor, splitting costs with MITx. This model greatly improved the efficiency and quality of the editing process, saved the OCW staff many hours of work and frustration, and resulted in videos of higher quality. As a result, we are continuing with an in-house video editor for FY2019.

Engagement with Open Learning Engineering on Technical Infrastructure

Beyond working together to prepare for the end of the Sapient contract, OCW staff worked throughout the year with Open Learning Engineering to address the urgency of the CMS upgrade, extraction of OCW content files, the requirements for a new CMS, improvements in search capabilities, a mobile redesign of the OCW site, and more. Also, technical production manager Joe Martis met numerous times with Associate Director of Engineering Peter Pinch and the engineers to address hardware failures, identification and elimination of corruptions in the OCW database caused by hardware failures, and the transition of the OCW infrastructure to the cloud.

OCW and MITx Shared Workflows

In an effort to realize more possible efficiencies between the OCW and MITx programs, Joseph Pickett (OCW publication director), Dana Doyle (director of MITx), Lisa Schwallie (executive director of Open Learning business and operations), and others considered ways in which OCW and MITx workflows could become better aligned. An initial summary of results was presented to Sanjay Sarma and Krishna Rajagopal, who will work with Doyle, Schwallie, and Curt Newton (Open Learning's acting publication director) to develop future directions.

Faculty Advisory Committee

The OCW Faculty Advisory Committee provides advice on policy, sustainability, and relations with the MIT faculty and with academic departments. The committee underwent some significant changes this year with the additions of Vice President for Open Learning Sanjay Sarma and Dean for Digital Learning Krishna Rajagopal (after being appointed to his new role in September 2017), the departures of Associate Dean of Digital Learning Cecilia d'Oliveira (at the beginning of the fiscal year) and committee chair Karen Willcox (at the end of the fiscal year), and the arrival of Eric Grimson as acting chair (late in the fiscal year).

Committee members in FY2018 were as follows:

- Hal Abelson, Class of 1922 Professor, Electrical Engineering and Computer Science
- Ayesha Bajwa, undergraduate, Electrical Engineering and Computer Science
- Noam Buckman, graduate student, Mechanical Engineering
- Eric Grimson (acting chair), professor of computer science and engineering and chancellor for academic advancement
- Eric Klopfer, professor, Comparative Media Studies/Writing, and director of the Scheller Teacher Education Program
- Vijay Kumar, associate dean of digital learning and executive director, J-WEL
- Stuart Madnick, J.N. Maguire Professor of Information Technology, Sloan School

- Haynes Miller, professor, Mathematics
- Shigeru Miyagawa, professor, Foreign Languages and Literatures, and senior associate dean
- Krishna Rajagopal, William A.M. Burden Professor of Physics and dean for digital learning
- Sanjay Sarma, Fred Fort Flowers (1941) and Daniel Fort Flowers (1941) Professor of Mechanical Engineering and vice president for open learning
- Hazel Sive, professor, Biology
- Karen Willcox (departing chair), professor, Aeronautics and Astronautics
- Dick Yue, Philip J. Solondz Professor of Engineering and professor of mechanical and ocean engineering

MicroMasters

Summary of Accomplishments

- Continued to run our existing two programs, Supply Chain Management and Data, Economics, and Development Policy. Enrollments in these programs exceeded 400,000 learners from 196 countries. More than 23,000 individual course certificates were awarded, along with 516 MicroMasters credentials.
- Launched the new Principles of Manufacturing program.
- Announced the new Statistics and Data Science program.
- Built 54 credit pathways with 17 schools from 10 countries.
- Collaborated with the Data, Economics, and Development Policy (DEDP) MicroMasters team and the Refugee Action Hub to bring DEDP courses to world refugees.

Goals, Objective, and Priorities

- Support academic departments in developing and gaining approval for new MicroMasters programs
- Create interdepartmental synergy on sharing best practices in running MicroMasters programs
- Create a healthy ecosystem for MicroMasters global pathways
- Collaborate with colleagues to leverage resources for pathway building and B2B opportunities
- Continue to coordinate key conversations within Open Learning units (e.g., MITx, Engineering and Technical Operations, Resource Development) with respect to program launches and post-launch coordination
- Strengthen and be a steward of the MITx MicroMasters brand globally
- Make good use of intelligence collected

Administrative Initiatives

- Created new administrative procedures for course and program bulk purchases and Al Ghurair Foundation scholarships
- Collaborated with the Office of the General Counsel to standardize the letter of agreement for credit pathways
- Created new materials and processes for program briefings, pathway building procedures, and reporting and tracking

Digital Learning Lab

Summary

The MITx Digital Learning Lab is a joint program between MIT Open Learning and MIT's academic departments. The lab is composed of scientists and fellows who play a critical role in advancing digital learning initiatives across MIT by working closely with faculty and departments. Lab members are experienced subject-matter experts in their various fields who are also well versed in the latest teaching and learning theories and technologies.

DLL scientists generally hold lecturer appointments and serve as leaders within their departments in developing a digital learning strategy alongside faculty. They manage a team, often including one or more DLL fellows (who are typically postdoctoral scholars), that seeks to develop and deliver innovative digital content as MOOCs for a global audience and in residential courses. Digital Learning Lab members also facilitate general advancements in online learning through tool development, educational research, and other projects. The lab currently has two PhD candidates under Professor Isaac Chuang; they hold the title of digital learning research fellow.

Members of the Digital Learning Lab work together as a community to support and share innovations across MIT as well as externally. The DLL community meets bimonthly to share updates, best practices, and trends and to hear from guest speakers from MIT and beyond. They also support each other in developing tools and techniques for course development. The community includes a number of others at MIT whose work intersects with digital learning and who value taking part in the bimonthly meetings.

Current Membership Roster

- Scientists: Jennifer French (Mathematics), Jessica Sandland (Materials Science and Engineering), Simona Socrate (Mechanical Engineering), and Mary Ellen Wiltrout (Biology)
- Fellows: Ana Bell (Electrical Engineering and Computer Science), Jolyon Bloomfield (Physics), Sergio Caballero (Center for Transportation and Logistics), Karene Chu (Institute for Data, Systems, and Society), Darcy Gordon (Biology), Elizabeth Huttner-Loan (Teaching Systems Lab/Comparative Media Studies), John Liu (Mechanical Engineering), Meghan Perdue (School of Humanities, Arts, and Social Sciences), Alejandra Quintanilla Terminel (Earth, Atmospheric and Planetary Sciences), and Michelle Tomasik (Physics)

- Research fellows: Curtis Northcutt (Electrical Engineering and Computer Science) and Martin Segado (Mechanical Engineering)

Goals and Objectives

The mission of the Digital Learning Lab is to partner with MIT academic departments to learn, collaborate, and innovate with digital learning on campus and beyond.

Overall DLL goals are as follows:

- Support academic departments in developing and deploying digital learning strategies that include both residential and global initiatives
- Lead the development of innovative course content and tools that faculty can use on campus and in MOOCs
- Enhance MIT's mission of advancing education through technology by conducting and publishing educational research
- Create a robust MIT digital learning community by conducting bimonthly meetings, hosting and participating in talks and presentations around campus, and sharing best practices and innovations

DLL's major objectives and priorities during FY2018 were:

- Add new Digital Learning Lab positions in key departments around MIT
- Build DLL's reputation as an organization
- Support professional development for fellows and scientists
- Focus community meetings on the topics and tasks of most interest and use to the group
- Continue to create and deliver innovative digital course content both on campus and for global learners

Accomplishments

- We worked with faculty to develop and run 37 MOOCs, 11 of which were new.
- We added four new fellow positions, filled by Meghan Perdue, John Liu, Alejandra Quintanilla Terminel, and Karene Chu.
- We supported 11 DLL members (Mary Ellen Wiltrout, Elizabeth Huttner-Loan, Saif Rayyan, Curtis Northcutt, Jennifer French, Karene Chu, Jessica Sandland, Meghan Perdue, Jolyon Bloomfield, Darcy Gordon, and Michelle Tomasik) in attending nine national and international conferences, with several of them presenting their work while attending. In addition, we supported three members (Swati Carr, Alejandra Quintanilla Terminel, and Meghan Perdue) in attending special training programs to enhance their career development and job skills.

- DLL scientist Mary Ellen Wiltrout co-chaired the HybridEd 2018 seminar at MIT.
- We established a rotating, ex-officio membership for DLL on the MITx Faculty Advisory Committee (held this year by Mary Ellen Wiltrout), which allows the lab to have more voice in the direction and strategy of MITx.
- We successfully moved to a self-management model for community meetings, establishing one member as meeting lead for a year, resulting in a more member-centered agenda.
- We tested an individual career coaching model with two fellows.
- Jennifer French and Karene Chu were part of a calculus MOOC team (18.01x) that was one of the top 10 finalists for the edX Prize for Teaching and Learning.
- Sergio Caballero and Elizabeth Huttner-Loan were both members of teams recognized with the MITx Prize for Teaching and Learning in MOOCs, awarded in May 2018.

MIT xPRO

MIT xPRO develops and delivers online, fee-based programs targeted to adult learners who wish to expand their knowledge and build their skills, primarily in the context of professional education. MIT xPRO was formed in spring 2015 in response to market demand for MIT professional education, especially in rapidly changing technology and business disciplines, where MIT is recognized as a leader.

Summary and Highlights

In its third year of operations, MIT xPRO launched six new online courses and reran five existing courses. In addition, it generated $8 million in total gross revenue (a 200% increase from FY2017), becoming a profitable business unit.

Goals and Objectives

Goals for FY2018 were as follows:

- Double the product portfolio from FY2017, developing and launching seven new online courses
- Double B2C and B2B revenues, generating $7.8 million in gross revenues
- Partner with third-party vendors, separate from edX, to develop and launch new online courses
- Adopt a proactive (versus reactive) content acquisition strategy
- Grow the marketing and sales functions
- Serve as a knowledge aggregator for all digital paid offerings across campus and partner with departments, labs, and centers (DLCs) to kick start new efforts

Accomplishments

Accomplishments over the past year include the following.

- Launched six new online courses: Additive Manufacturing for Innovative Design and Production (developed in partnership with Boeing); Data Science and Big Data Analytics: Making Data-Driven Decisions; Entrepreneurial Online Bootcamp; Principles of Biomanufacturing: Using Biotechnology to Manufacture Medicines; Introduction to Quantum Computing (developed in partnership with IBM); and Quantum Algorithms for Cybersecurity, Chemistry, and Optimization (also developed in partnership with IBM). These courses generated approximately 4,200 enrollees and around $4.7 million in gross revenue.
- Reran five existing online courses: Architecture and Complex Systems; Models in Engineering; Model-Based Systems Engineering: Documentation and Analysis; Quantitative Methods in Systems Engineering; and Entrepreneurial Negotiations. These courses generated approximately 6,900 enrollees and about $3.3 million in gross revenue.
- Produced $8.0 million in total gross revenue (a 200% increase from FY2017), with a profit of $706,000. We had 11,000 enrollments and a 94% certificate completion rate.

Administrative Initiatives and Accomplishments

- Continued to convene a group of cross-functional leaders from MIT who are spearheading digital initiatives within their respective groups. The group meets three times a year to share knowledge, update each other on projects, and collaborate on work going forward.
- Continued to support the Online Professional Education Governance Committee in overseeing and monitoring all online professional education activities across the Institute.

Bootcamps

MIT Bootcamps programs educate future entrepreneurs worldwide on new technology, innovation, and entrepreneurship techniques. A combination of online and in-person programs are used to connect students globally, and these students have created more than a hundred ventures that have raised over $70 million.

Summary and Highlights

In 2017–2018, MIT Bootcamps ran a record-breaking eight in-person programs, including the trek program, designed to expand knowledge of start-up communities in cities worldwide. The success of its bootcamps and the trek program have made MIT Bootcamps desirable to a number of new corporate and educational partners, with demand quickly spreading and the scalability of Bootcamps processes becoming an exciting added element to the team's work.

In addition, this year we completed a pilot run of the Entrepreneurship Online Bootcamp to spread the Bootcamps learning experience worldwide and further

supplement the entrepreneurship MOOCs (Entrepreneurship 101, 102, and 103 and User Innovation). The pilot run was followed by two official runs, with each adding new curricula and options for students to customize their learning experience.

Goals and Objectives

The goals of the Bootcamps team during FY2018 included the following:

- Fine-tune the marketing system of the open enrollment bootcamps to increase qualified applications
- Streamline the admissions process to create a scalable model and increase the number of open enrollment bootcamps
- Create the Entrepreneurship Online Bootcamp program to expand outreach to students who are not able to participate in person
- Further develop relationships with corporate partners in order to spread innovation beyond the start-up world
- Increase gender representation among Bootcamps coaches and program participants
- Create the MIT Bootcamps trek program to expand awareness of global start-up efforts and communities

Accomplishments

MIT Bootcamps accomplishments during FY2018 are detailed below.

- In-person programs: We conducted eight programs (four public, four with private partners).
- Open enrollment programs: We ran the Business of Culture trek in Vienna, Austria (six participants); the MIT Beyond Food bootcamp in Hsin Chu, Taiwan (44 participants); the Sustainability in Context trek in Queensland, Australia (38 participants); and the MIT Innovation and Entrepreneurship bootcamp in Brisbane, Australia (130 participants).
- Private programs: Private programs included Innovation in Education –in Cambridge (55 participants); MIT Turkcell New Frontiers in Cambridge (15 participants); the MIT Turkcell Corporate Innovation & Leadership bootcamp in Tuzla, Turkey (217 participants); and the MIT Turkcell IoT bootcamp in Cambridge (25 participants).
- Entrepreneurship Online Bootcamp: The program's pilot run (October 2017), offered to students as a beta test of a more scalable version of the in-person bootcamp, included 44 participants. The first run (January–March 2018), with 424 participants, included all of the elements of a traditional bootcamp (e.g., lectures from MIT faculty and work with MIT Bootcamps coaches) spread over the course of eight weeks. Students were tasked with forming global teams and creating and presenting a business plan by program end. The program's second run, which includes a solo track for students who wish to work on individual projects with the help of MIT Bootcamps coaches/mentors, will finish at the end of summer 2018.

MIT Integrated Learning Initiative

The MIT Integrated Learning Initiative (MITili) funds, connects, and shares research on learning effectiveness. This research ranges from scanning the brains of individual learners to drive assessment and instruction (Department of Brain and Cognitive Sciences) to applying large-scale data analytics to understand education policy decisions (Department of Economics). Studies address questions at the learner, instruction, or policy level across one or more of three broad demographics: birth through pre-K–12, higher education, and workplace learning.

Summary and Highlights

Three highlights of the year are as follows (more details are provided below):

- Launched Reach Every Reader to address deficits in reading skills among pre-K–3 learners
- Received 23 proposals in response to its first annual learning effectiveness research grant program
- Expanded its outreach footprint through conference presentations, membership in industry affiliations, and website/social media communications

Goals and Objectives

- Drive and support corporate, foundation, and government fundraising for MITili and J-WEL
- Participate in the Consortium for Advancing Adult Learning and Development
- Participate in the Digital Learning Consortium
- Attend and present at relevant conferences
- Publish frequently on the MITili website, social media, and email lists
- Launch the CZI-supported Reach Every Reader program
- Release version 3.0 of the MITili website
- Award learning effectiveness research grants in response to requests for proposals

Accomplishments

- Reached out to large companies (directly), foundations (via Resource Development), and government agencies (directly) to raise research funds. MITili transitioned its corporate outreach to focus on J-WEL memberships (several resulted) rather than directly on MITili; in FY2019, MITili will react to corporate opportunities but not proactively seek them out. Work with Resource Development to procure large foundation grants yielded funds from the Chan-Zuckerberg Initiative, the Arnold Foundation, and a large foundation that prefers anonymity. A direct MITili proposal to the National Science Foundation (NSF)

was not funded; MITili began a structured effort to share government funding opportunities around learning with a growing list of more than 25 faculty and other researchers.

- Participated in the Consortium for Advancing Adult Learning and Development, a McKinsey-convened network of leading thinkers and doers drawn together by the possibility of reimagining the ways in which businesses and society approach adult learning and growth.
- Participated in the IBM-convened Digital Learning Consortium, including taking part in the consortium's New York City kickoff meeting in July 2017 and hosting a meeting of the group in Cambridge in January 2018.
- Attended and/or presented at learning conferences including Masie Learning (October 2017), LearnLaunch Across Boundaries (February 2018), SXSW EDU (March 2018), the MPI (Meeting Professionals International) World Education Conference (June 2018), and CultureCon (June 2018).
- Published to the MITili website, social media, and the email newsletter list. We published 77 news articles on the website, along with 26 blog posts. The site had 5,892 unique visitors and 17,275 page views. Also, we had 404 Twitter followers and 185 Facebook followers. We distributed 12 newsletter issues to 354 list members.
- Launched the five-year Reach Every Reader program as a joint venture with Harvard's Graduate School of Education. The overall objective of the program is to work with schools to improve their ability to deliver personalized pre-K–3 literacy instruction. The proposal process began in FY2017 and continued into FY2018. CZI approved the proposal in March 2017. Program work will begin in July 2018 (the start of the 2018–2019 fiscal year).
- Released version 3.0 of the MITili website. The home page now shows separate feeds for news, blog posts, and social media, and the plan for the next version is to add full community features via the MIT Open platform.
- Prepared to award learning effectiveness research grants in response to requests for proposals. Faculty directors approved the grant process, including the request for proposals document, during the second half of the fiscal year, and staff members released requests for proposals to all faculty and answered questions from prospective proposers. MITili received 23 proposals from 21 teams and funded seven of these proposals.

Abdul Latif Jameel World Education Lab

Established in May 2017, the Abdul Latif Jameel World Education Lab works with member organizations to promote excellence and transformation in education at MIT and worldwide. The lab engages educators, technologists, policymakers, societal leaders, employers, and employees through online and in-person collaborations, workshops, research, and information-sharing events. J-WEL member organizations work with MIT faculty and staff to address global opportunities for scalable change in education through collaboratives at the pre-K–12, higher education, and workplace learning levels.

In its first full year of operation, J-WEL has built core organizational and programmatic capabilities necessary to address its mission; recruited an initial group of members that includes pre-K–12 systems, universities, nongovernmental organizations, and companies; and conducted events supporting members' efforts to transform their educational programs. J-WEL also awarded the first set of education innovation grants to members of the MIT community.

Organizational and Programmatic Capabilities

In FY2018, J-WEL appointed a senior manager for its Higher Education Collaborative, an associate director for membership management, a coordinator for communication and information resources, a program/events coordinator, and an administrative assistant. These appointments complemented the existing leadership and staff roster, which included pre-K–12 faculty co-directors Angela Belcher and Eric Klopfer, higher education faculty director Hazel Sive, workplace learning faculty director George Westerman, and J-WEL executive director M.S. Vijay Kumar. The staff also included associate directors for the pK-12 and Workplace Learning Collaboratives and a number of temporary or part-time support members.

During the first half of the fiscal year, this growing group of leadership and staff developed and refined the organizational mission and goals, a financial model and business processes, and membership engagement strategies, including an initial portfolio of programs and events.

In 2017–2018, J-WEL also established the financial, administrative, and technical infrastructure and services required to support the organization. A key element of this process was a website through which the lab could host a library of public and member-only resources and also disseminate information related to J-WEL events. Internally, J-WEL also developed membership data tracking systems and administrative systems in support of its activities.

Events and Member Recruitment

As an initial step aimed at member recruitment, the lab hosted its first J-WEL Week in October 2017, one of two annual gatherings for members. This event brought together 105 attendees from 27 countries and 74 organizations. Thirty-five MIT faculty and staff participants provided insight into MIT's work in a range of educational topics, including pre-K–12 education and the Institute's approach to higher education.

Near the point of the inaugural J-WEL Week, participation agreements were signed with an initial group of members in each of the three collaboratives. By the end of the fiscal year, J-WEL had 18 active members, including leading nongovernmental organizations such as Save the Children, universities such as the University of São Paulo (Brazil), and companies including UBS.

The second J-WEL Week was held in March 2018. The 113 attendees, a mix of recruited members and prospective members, hailed from 24 countries including Armenia, Australia, the Bahamas, Brazil, Chile, China, Ghana, India, Japan, Jordan, Mexico, Nigeria, Saudi Arabia, and Spain.

In addition to J-WEL Weeks, the lab held its first exchange program, a one-week in-depth exploration of science, technology, engineering, and math (STEM) education for pre-K–12 instructors.

J-WEL also held nine webinars with speakers including J-PAL (Abdul Latif Jameel Poverty Action Lab) policy manager Radhika Bhula, Professor Eric Klopfer, and Sloan senior lecturer Peter Senge. Each webinar drew between 20 and 40 participants. The webinars have been recorded and archived to the J-WEL website.

MIT Community Involvement

J-WEL has involved the MIT community in its activities in two primary ways: as presenters at J-WEL events, including J-WEL Weeks and workshops, and through education innovation grant programs. More than 60 members of the MIT community participated in the October 2017 J-WEL Week, including Professor Woodie Flowers, Chancellor for Academic Advancement Eric Grimson, and Professor Christine Ortiz. A similar number of MIT community members participated in the March 2018 event, including Professor Azra Aksamija, Professor Anette Hosoi, and Vice Chancellor Ian Waitz. Also, during the J-WEL Week events, external participants visited programs across the campus such as BioBuilder and AppInventor.

Education Innovation Grant Program

In FY2018, J-WEL began providing grants to support MIT educational innovation and research initiatives. To date, J-WEL's three collaboratives have funded 18 projects, awarding $704,639 in grants to MIT faculty. The pK-12 Collaborative awarded $250,390 to six projects during the spring 2018 grant round, funding projects such as Teacher Practice Spaces for Equity Teaching Practices and XRoads: Building Educator Capacity in XR. The Higher Education Collaborative provided funding for eight projects in total: three in the fall 2017 round ($95,250) and five in the spring 2018 round ($168,260). These projects included Culturally Sensitive Design: Art and Innovation in the Refugee Camp and Fundamentals of Experimentation in the Physics Sciences Using an Arduino. The Workplace Learning Collaborative provided $190,739 in funding for four projects including Analyzing Skill Acquisition and Career Trajectories Using LinkedIn Data and InnovationX: A Platform for Fostering Team Building Around Innovation.

As J-WEL moves into its second full year of operations, the lab will focus on continuing to build members, refining the programs of offerings and value proposition for each collaborative, and developing a sustainable business model.

Research and Projects

Teaching Systems Lab

The MIT Teaching Systems Lab, established in 2015 by Assistant Professor Justin Reich, focuses on the future of teacher learning. All around the world, education stakeholders are calling for more ambitious teaching and learning in classrooms: less rote recitation and more active, engaged learning. The only way that will be possible is if we can dramatically increase the quantity and quality of teacher learning available to educators throughout their careers. At TSL, we work on this urgent, global challenge through three

lines of work: (1) designing and researching the future of online and blended learning for educators, (2) developing a series of teacher practice spaces that allow educators to rehearse for and reflect upon important decisions in teaching, and (3) exploring new opportunities for playful assessment in schools. Along with Professor Reich, the lab has two principal investigators (Eric Klopfer and Vijay Kumar), four research scientists, three postdoctoral researchers, six instructional design staff, three graduate students (from Comparative Media Studies and Electrical Engineering and Computer Science), and more than 20 undergraduates who work with the lab during the year.

Goals and Objectives

Specific aims for 2017–2018 included the following:

- Develop new sources of support for our online learning, practice space, and playful assessment work
- Revise and rerun existing MOOCs and develop one new MOOC with support from the Emerson Collective
- Develop, pilot, and assess new teacher practice spaces, with a special focus on helping teachers address bias and equity issues
- Regularly test innovations with pre-service teachers, in-service teachers, and teacher educators and present our work widely at conferences and other scholarly venues
- Develop new partnerships with schools, systems, and networks to deploy more of our innovations in the field
- Provide continued support to the development of the Woodrow Wilson Academy of Teaching and Learning
- Support online learners across Harvard, MIT, and Stanford by developing and delivering targeted psychological supports based on social psychology and behavioral economics
- Conduct an evaluation of the new Supply Chain Management blended master's program for the dean for digital learning

Accomplishments

- With Eric Klopfer's Education Arcade, and with support from Resource Development staff throughout the Institute, we raised $7.25 million from the Emerson Collective to support work with educators. We created a private online course, Launching Innovation in Schools, and a new MOOC, Envisioning the Graduate of the Future.
- We reran two additional MOOCs funded by Microsoft, Launching Innovation in Schools (3,419 registered learners, 82 certified) and Design Thinking for Leading and Learning (5,597 registered learners, 118 certified). Justin Reich and colleagues won the 2018 MITx Teaching and Learning Award.

- We raised $150,000 from Google, $100,000 from the Woodrow Wilson National Fellowship Foundation, and $50,000 from the Jameel World Education Lab to fund work helping teachers address issues related to bias and equity teaching practices. Through online practice spaces, in-person workshops, and workshop materials, this project has served over 4,000 educators from 45 states through partnerships with Code.org, Exploring Computer Science, the College of St. Scholastica, and other organizations.
- We won a $300,000 EAGER (Early-concept Grants for Exploratory Research) grant from NSF to support research on formative assessments in maker education environments in partnership with MakerEd and school districts in California and Virginia. We are working with two schools that have implemented maker-centered curricula to develop and incorporate embedded tools that can be used to assess middle school students' maker mindsets and skills, as well as domain-specific standards.
- We hosted six lab play-test events at which teachers and teacher educators offered feedback on our prototypes and learned more about games and simulations in teacher education. These events drew nearly 170 attendees in 2017–2018. We also supported other research groups in testing new projects, including groups from the Scheller Teacher Education Program, the Media Laboratory, and the Harvard Graduate School of Education. Over the past year, play tests have helped four master's students and 13 undergraduates gather data for theses and class projects.
- Justin Reich taught a new class, Learning, Media, and Technology, to 20 MIT undergraduates and to graduate students from MIT and Harvard.
- We presented our research at venues including Learning @ Scale, the International Conference of the Learning Sciences, the annual meeting of the American Educational Research Association, the American Academy of Colleges of Teacher Education conference, the Learning with MOOCs conference, and the Computer Supported Collaborative Learning Conference.
- We presented invited talks at Harvard University, Carnegie Mellon University, the Hasso Plattner Institut MOOC Symposium, the Northeast Big Data Spoke meeting, the LearnLaunch/MIT Across Boundaries Conference, BETT Asia, the QS Edudata Summit, and the Innovation in Education Conference.
- We published papers in *AERA Open* and the *International Journal of Artificial Intelligence in Education*.
- We continued our design and development support for the Woodrow Wilson Academy of Teaching and Learning.
- As noted, at the request of the dean for digital learning, we are conducting an evaluation of the Supply Chain Management MicroMasters program. In our research, we have examined log data from 116,850 students who participated in one of the Supply Chain Management MOOCs and 14,355 pre-course survey responses. We have also conducted in-person interviews with students about their on-campus experiences and collected end-of-semester survey data. Additionally, we have analyzed student course grades.

- We deployed targeted interventions to support plan making and a sense of belonging among students in all publicly available MOOCs published through MITx, HarvardX, and Stanford OpenEdX, reaching tens of thousands of learners in one of the largest MOOC-related experimental studies ever conducted.

Projects

The Projects team supports initiatives between MIT and other universities, foundations and trusts, nongovernmental organizations, and national governments in their efforts to advance and transform educational opportunities through digital learning. Through these initiatives, MIT is furthering its mission to advance learning worldwide.

Summary and Highlights

In FY2018, the Projects group focused on four international initiatives that shared MIT's expertise and approach to teaching and learning with K–12 and university students and faculty. Projects promoted MIT's unique approaches to digital learning with the following international audiences:

- For CLIx in India, Projects supported the design and development of curriculum modules in English, math, and science; delivered final versions of an assessment platform, interactive tools, and a standalone curriculum delivery platform; and co-designed and participated in ongoing learning outcomes and adoption research.
- For SRM University in India, Projects supported faculty in using materials from three sub-licensed MITx courses (6.00x, 8.01x, and 18.01x) with their inaugural class of 240 students. The sub-licensing agreement includes a total of eight MITx courses for use by approximately 2,500 students over the next two years. Also, Projects provided training sessions for faculty members that incorporated key findings from the science of learning as well as principles of instruction advocated by MIT Open Learning.
- Projects supported the efforts of the Al-Ghurair Foundation for Education to increase the use of online and digital learning in the Arab world. Along with faculty from the American University in Cairo and the American University of Beirut, Projects supported MITx digital learning scientists and instructors in blending MITx course materials (from 7.00x and 18.03x) into local courses for more than 240 students.
- At the China International School in Hong Kong, Projects hosted a STEAM (science, technology, engineering, arts, and mathematics) camp for 200 students and 24 teachers to learn STEAM through active and hands-on learning approaches.

Goals and Objectives

During FY2018, the broad goals of the Projects team were to:

- Execute on existing projects (Connected Learning Initiative, Open Learning Scholars, SRM University, China International School STEAM camps)
- Identify new digital learning projects in support of the Abdul Latif Jameel World Education Lab, MIT Open Learning, and the Institute
- Integrate science of learning findings into project activities

Open Learning Scholars

OLS is a collaboration between MIT and the Abdulla Al Ghurair Foundation for Education aimed at expanding access to and use of STEM digital learning environments among learners worldwide. The goal is to make some of the best STEM education in the world available to Arab youth through innovative online and blended learning offerings. OLS leverages digital (online) learning in the Arab world, especially for displaced populations, and supports educational transformation and capacity building through blended learning using curricula from MITx courses. FY2018 key accomplishments included:

- Hosted a design camp at the American University in Cairo for 18 faculty and staff from that university and the American University of Beirut. MIT Digital Learning Lab scientists and instructors worked with faculty to integrate course materials from 7.00x, 6.00x, and 18.03x into local courses.
- Supported the American University in Cairo in using course materials from 18.03x (with 175 students) and 7.00x (with 44 students) and supported the American University of Beirut in using materials from 7.00x (with 23 students).
- Brokered the adoption of the MITx MicroMasters Data, Economics, and Development Policy program, which partially fulfills the requirements of a master's degree at the American University in Cairo.
- Supported the Al Ghurair Foundation's efforts to provide scholarships for MicroMasters Supply Chain Management and Data, Economics, and Development Policy learners from the Arab world.

Connected Learning Initiative

CLIx is a bold and innovative collaboration between MIT and the Tata Trusts and Tata Institute of Social Sciences (TISS) Center for Education Innovation and Action Research. Its goal is to improve the professional and academic prospects of high school students in underserved communities in India. CLIx aims to reach approximately 480 schools, 33,000 students, and 2,400 teachers in four states (Rajasthan, Telangana, Chhattisgarh, and Mizoram) through 2019.

At MIT, the Projects group is collaborating with Professor Eric Klopfer and his team in the Education Arcade to support curriculum teams in India in designing and developing English, science, and mathematics modules for grades 8 and 9.

Key CLIx accomplishments FY2018 are outlined below.

Technology

MIT's CLIx activities focused on the design and development of platform technologies and interactive digital tools. The MIT team delivered and open-sourced Run Kitty Run (a physics velocity game in which the player trains a mechanical cat to be a better mouse catcher), the physics video player, the open story tool, the MITibot chatbot, and StarLogo Nova for use in CLIx curriculum modules. The MIT team also delivered and open-sourced the final version of the Unplatform and content player, used for providing CLIx curricula on stand-alone computers to rural schools. The team transitioned responsibility for web hosting and support of assessment authoring to TISS.

Research

MIT's CLIx research activities focused on the evaluation of the overall project, as well as providing support for the research of the domain and teacher professional development teams. The MIT team participated in research design, data collection and analysis, instrument development, and preparation of publications. Also, the team played a significant role in the development of learning outcomes studies to understand the efficacy of selected CLIx modules and a broad adoption study to understand CLIx adoption.

Curriculum and Teacher Professional Development

The MIT team continued to work with partners in India on the design and development of an inquiry-based, technology-rich curriculum. FY2018 efforts focused particularly on the development of physics, biology, and astronomy modules. The MIT team led an accessibility review of all CLIx curriculum modules. Also, the team supported the development of curriculum materials for Indian school teachers.

MIT pK-12 Action Group

The pK-12 Action Group was formed to bring MIT's unique "mind and hand" learning approach beyond the campus to pre-kindergarten through grade 12 learners and teachers around the world, building upon existing efforts and developing new ones. Key FY2018 accomplishments included:

- Hosted a summer 2017 STEAM camp at the China International School in Hong Kong for 200 students and 24 teachers (as noted above).
- Awarded five grants totaling almost $50,000 to MIT teams for K–12 education projects focused on activities surrounding the theme of energy; these projects will be showcased at the 2018 STEAM camp.

Supporting Units

MIT Video Productions

MIT Video Productions provides video support for academic programs, departments, and Institute initiatives. MVP offers a variety of services on a cost-recovery basis, including video production, distance education support, and post-production.

Summary and Highlights

In FY2018, MVP continued to expand on the suite of services it provides to the MIT community, particularly the custom video production and event support/lecture capture business lines.

- We continued to grow our story-telling business line. Highlights include a brief documentary about MIT and the Legacy of Slavery class; multiple projects for Open Learning, the MIT Energy Initiative, and the Office of Minority Education; and a moving video tribute to Paul Gray, MIT's 14th president.
- We continued to digitize, catalog, and archive selections from the MVP analog videotape library. We captioned and published a subset of these selections to the Infinite History website.

- A documentary MVP produced in collaboration with Music and Theatre Arts (*Imagination Off the Charts: Jacob Collier Comes to MIT*) was recognized with a 2018 New England Emmy Award in the Arts/Entertainment category.
- We expanded our technology-assisted lecture capture base by installing a system in Room 32-123.

Goals and Objectives

MVP provides media production and publication services to the MIT community in support of education, research, and outreach. These services include:

- Lecture capture
- Event support, including video production, video capture/delivery, and lighting
- Custom video production
- Video editing
- Video publication
- Duplication services
- Video conferencing
- Webcasting
- Connection to media outlets

Goals include the following:

- Continue to grow the story-telling business line in support of MIT and Open Learning mission objectives
- Develop an agile and efficient team of producer/editors (working with MVP field production staff) to produce content of interest on a timely and ongoing basis
- Strengthen relationships and collaborations with communication staff throughout MIT toward a common objective of having our collective work reach desired audiences, including alumni, potential applicants, funders, faculty members, the Institute community, peer institutions, and the greater global community
- Implement a cost-recovery business model to support our tech-enabled lecture and event capture system
- Continue to identify and manage improvements in the event support systems in the Samberg Conference Center

Accomplishments

MVP continued to provide reliable, valued, and high-quality video production services to clients throughout the Institute. In many cases, we are also called upon to produce content serving as a programmatic contribution to Institute events. We continue to work with departments in crafting custom video programs in support of their communication objectives. Examples include a tribute video that was featured in a memorial gathering for former MIT president and Corporation chairman Paul Gray and a video describing

an MIT history class that explored the Institute's connections to slavery. MVP also continues to provide robust and cost-effective "media link" services enabling electronic news organizations to interview MIT faculty subject experts from the comfort of our Building 24 studio.

Administrative Accomplishments

MVP continues to evolve its management structure to best meet the needs of staff and clients. In the past year, we created a financial coordinator position and an associate director position. We also continue to streamline and implement improvements in our work order/scheduling/invoicing application.

Finances and Funding

MVP is charged by the provost with providing its products and services on a cost-recovery basis to fully cover costs. During FY2018, MVP met this goal. We are becoming more diversified in our client base, and our ongoing objective is to apply our talents and resources in as wide a spectrum as possible in support of education, research, and outreach. Measured against any number of metrics—mission-centric support of key MIT initiatives, quality and quantity of content produced, client satisfaction with our products and services, overall revenue generated—FY2018 was very successful.

We continued to judiciously apply gift funds generously provided by Jane and A. Neil Pappalardo '64 in support of lecture capture, high-profile productions, and ongoing digitization and archiving. The 2018 Emmy Award–winning *Imagination Off the Charts* was funded by gift funds. During this past year, we began production on a documentary about the biotech enterprise at MIT, again with gift support. We are enormously grateful to the Pappalardos for their continuing generosity and commitment to supporting our work.

Engineering and Technical Operations

The Engineering and Technical Operations group develops and maintains the technology infrastructure that supports the development and delivery of digital learning content and tools. The group also consults internally with other Open Learning units on technical matters.

Part of the old Distance Education and Streaming Operations group remained in Engineering to support the shutdown of the distance education infrastructure in Building 9, as well as to assist in managing the transfer of content from the older TechTV platform to the new hosting service within Open Learning. This group also retained support for DLCs on campus via a service-level agreement.

Summary and Highlights

During AY2018, the Engineering and Technical Operations team:

- Initiated the design and development of MIT Open, a site intended to bring MIT learning and research resources to the world.
- Added two new programs to the MITx MicroMasters portal, along with private discussion forums to support the community of MicroMasters learners who have earned certificates.

- Contributed code to Open edX to improve functionality and fix bugs. For the year ending May 2017, MIT was the largest open-source contributor to the project.
- Updated the Bootcamps e-commerce website to integrate the site with FluidReview, the course team's application service.
- Maintained and upgraded bi.odl.mit.edu, greatly expanding the number of dashboards, reports, and internal users.
- Created a self-service video hosting service (the ODL Video Service [OVS]) for lecture capture content and for the transition of TechTV content to a more stable platform.
- Presented work at the September 2017 DevOps Days conference and the May 2018 Open edX conference.

Goals and Objectives

During AY2018, the goals of Engineering and Technical Operations were to:

- Support experiments with online assessments for Residential MITx and provide systems support for automated lecture capture via OVS
- Develop social features for the MicroMasters portal and support the Bootcamps e-commerce web application
- Continue to develop the bi.odl.mit.edu service in collaboration with data scientists
- Support the launch of new MicroMasters programs and develop social features for the MicroMasters portal that can be scaled up

Accomplishments

MITx MicroMasters

We helped launch two new MicroMasters programs and introduced discussion forums for MicroMasters learners.

Bootcamp e-Commerce

We updated the Bootcamps e-commerce site to work with the course team's new application vendor, FluidReview.

Residential MITx Support

We upgraded the edX systems to the Ginkgo release in January 2018 and then again to Hawthorn in June 2018. As part of that process, we made several code contributions to Open edX. We also enhanced the Staff Graded Assignment (SGA) XBlock and developed the new Rapid Response XBlock, which offers instructors a low-cost and more efficient alternative to student response systems.

Business Intelligence

We hired a data scientist to support this area. He has created several marketing dashboards for MicroMasters and MITx Pro courses. He now also runs the cheating detection algorithms originally developed by PhD student Curtis Northcutt.

New Code Libraries

Engineering developed several open-source tools to help accelerate the process of building new web applications. One of these tools, mdl-react-components, is a library of reusable components that provides a consistent user interface across many of our websites. We also created several more repositories of our infrastructure management code.

Video Conferencing

Support for DLC systems on campus continued through FY2018 before staff members were transitioned in June to the MIT/Woods Hole Joint Program in Oceanography and Applied Ocean Science and Engineering in support of the Woods Hole Oceanographic Institute's distance education courses.

MIT TechTV

Content was migrated from TechTV to the ODL Video Service. This successful transfer of content allowed for redirects from the old TechTV video collections and links to OVS. Engineering worked with key clients to ensure that all content was available and functioning as expected (the Blossoms program and the Shakespeare Project in particular). The project was completed in the spring semester, allowing for the decommissioning of the older TechTV platform by the end of the fiscal year.

Administrative Accomplishments

We engaged in a number of activities in AY2018 to consolidate and strengthen the Engineering and Technical Operations team, including hiring a data scientist and transferring the amps.ms.mit.edu domain to a web server for inquiries regarding content, allowing for the shutdown of the old distance education infrastructure in Building 9.

Also, we completed the transfer of all TechTV content to OVS, allowing for the consolidation of video content into one repository, the shutdown of the virtual TechTV servers hosted by Information Systems and Technology, and the shutdown of Amazon hosting. All videos were transferred to OVS, with public content also being moved to YouTube to minimize costs.

The Distance Education and Streaming Operations AMPS (Academic Media Production Services) domain was shut down on June 30, 2018. Server content has been migrated to OVS or is on backup for retrieval as needed.

Building 9 classroom control was transferred internally to MIT Video Productions, and Scott Greenwald has used the room for MITx sessions and experimental course work.

Business Operations

Business Operations includes finance and accounting, human resources, marketing and communications, space, media strategy, learner experience, and general administration. It provides support for the other sections of MIT Open Learning with respect to defining and implementing strategic, operational, and organizational improvements and facilitating ongoing operations. It also collaborates across the Institute to ensure that MIT Open Learning's work is in accord with MIT's best practices and policies and that it aligns with MIT's broader purpose.

Summary and Highlights

- Expanded and scaled the marketing team to help deliver $12.8 million in external fees and non-degree tuition. Also, we developed processes and systems to track marketing leads and enrollments, plan new campaigns, and review past campaigns to capture learning for future offerings.
- Developed Tableau reports to greatly automate quarterly financial reporting and deliver self-service reports to managers of sponsored and other specially funded projects so that they can track spending in real time.
- Launched ClimateX, a precursor to MIT Open. The site has more than 11,000 visitors per month, nearly 1,900 members, and over 200 cumulative posts. ClimateX experimented with podcasts as a lower-cost vehicle to deliver content and engage the community and achieved a top Google "climate change podcast" ranking, with 22,000 listeners.
- Organized and delivered the fifth annual Online Learning Summit, an invitation-only event for institutional senior officers and academic leaders in online education. The keynote speaker was Governor Charlie Baker.
- Began work on updating the Open Learning website and developing an Institute-wide website for all professional and executive education offerings.
- Continued strong delivery of services, including budgeting and finance, human resources, marketing, and administration.
- Supported emerging initiatives, including MIT Open and xMinor (a series of undergraduate courses taken for a certificate).

Goals and Objectives

During AY2018, consistent with MIT Open Learning goals, the priorities of Business Operations were to enhance faculty support, making it easier for them to experiment and succeed in online learning; continue to promote financial sustainability; continue innovation and agile operations while attracting, retaining, developing, and motivating staff and building community; support strategic initiatives, new research on teaching and learning, and innovation; and enhance our ability to measure impact as a means of ensuring continual learning.

Accomplishments

Business Operations had key achievements in these five goal areas during AY2018.

Enhancing support for faculty

- Maintained financial reporting, including by course and by department, to track real-time spending on courses; enhanced reporting through development of new self-service reports to track spending on sponsored and other specially funded projects; and continued use of Tableau to automate a substantial amount of quarterly reporting
- Managed the revenue distribution process and reports for MITx and MIT xPRO courses

- Marketed MIT xPRO and MicroMasters courses, working with faculty to define and deliver target audiences
- Supported faculty who were considering or already offering a MicroMasters credential and provided data and insight to help better understand learners
- Supported MITili faculty in developing strategies and budgets and managing the grant process

Promoting financial sustainability

- Led an Open Learning–wide annual strategic planning process that resulted in an increased focus on marketing, Digital Learning Solutions, Business Development, and Resource Development
- Continued cross-organization processes to establish clear goals, including Open Learning–wide goals and supporting business unit goals, and conducted semiannual goal reviews and individual project reviews to monitor progress
- Developed the MIT Open Learning budget for FY2019; continued quarterly financial reporting on budgets, actual expenditures, and projections; and enhanced reporting by including more details and updating the hierarchy to reflect the new Open Learning organization
- Generated financial reporting for large, ongoing projects (e.g., Woodrow Wilson Academy, Connected Learning Initiative) and supported faculty in amending strategies and budgets to reflect evolving priorities and technologies
- Developed budgets for numerous potential new projects
- Supported the execution of all contracts, including those for Bootcamps, CCX, and other products, by reviewing business terms and liaising with the Office of the General Counsel for review and Institute approval
- Enhanced self-serve financial reporting, creating more—and more useful—reports that managers can download in real time
- Developed and enacted external marketing plans for MIT xPRO and MicroMasters courses and supported communications for selected MITx courses
- Continued support of the Capital Campaign by developing ad hoc budgets
- Supported coordination across MIT for all groups serving executive and professional audiences with digital learning

Continuing innovation and agile operations

- Developed and delivered financial, administrative, marketing, media, and other training across MIT Open Learning and better publicized MIT training, leading to more staff use of this resource.
- Continued performance reviews, discussing performance versus individual FY2018 goals and developing FY2019 goals for each member of MIT Open Learning

- Began a project to update the Open Learning website, delivering new pages to search for MITx and for Residential projects
- Created video and media documentation and processes for MIT xPRO professional education offerings
- Executed an MIT Open Learning internal communications program comprising town halls, an innovation market, and routine sharing of work among business units through brown bag lunches and launched the Lunch and Learn program
- Supported Open Learning's participation in MIT-wide communications and human resources initiatives, including the MIT open house and the job fair
- Maintained and continued to develop human resources policies to improve clarity of expectations and enhance equity across MIT Open Learning
- Supported planning and coordination of conference participation across MIT Open Learning

Supporting strategic initiatives

- Launched ClimateX, an initiative to create a vibrant, enduring, self-perpetuating digital community of MITx learners
- Supported the conceptualization and early documentation of MIT Open, intended to become a scalable site to open MIT to the world
- Supported the development and launch of the MicroMasters Principles of Manufacturing and Statistics and Data Science programs
- Supported the development of new initiatives across MIT Open Learning, including bootcamps in Taiwan, Australia, Turkey, and Mexico and projects with CZI, Emerson, NSF, SRM University, and Google
- Supported contracts and legal agreements for Bootcamps, course sales agreements, and customized courses on edX
- Supported Institute-wide collaboration on education for corporations, professionals, and executives, including regular meetings of key stakeholders, and began work on a website that will include all of MIT's professional offerings
- Investigated new possibilities in the area of virtual reality, including technologies, vendors, and options

Enhancing measurement of impact

- Conducted marketing analytics research to enhance understanding of effective marketing tools and shared best practices across MIT Open Learning
- Analyzed learner interactions via Hive and conducted user testing to increase understanding of learners' desires and priorities

Administrative Accomplishments

- Expanded the administrative staff to meet growing organizational needs, hiring Kate Stringer (J-WEL) and Jessica Rondon (TSL)
- Developed Tableau reports to track marketing enrollments and payments and hired Julie Swanson to help with outbound emails and community management
- Continued to train the finance and administrative team, to develop processes and policies, and to document workflows for cross training

Resource Development

Resource Development provides leadership in and complete operation of gift and revenue generation as well as donor relations. We work closely with the vice president for open learning, colleagues across Open Learning, and key faculty to develop and execute plans to secure support from individuals, foundations, corporations, and other organizations. The unit serves as a central coordinator and information source on all development activities.

Summary and Highlights

- Supported a new CZI sponsored project in collaboration with Harvard
- Brought in $6.8 million in gift revenue in FY2018, along with additional funds in gift revenue transfers
- Secured an eight-figure gift from an anonymous donor supporting faculty research and programs in MITili and the pK-12 Action Group
- Led Campaign for a Better World efforts for Open Learning

Accomplishments

- Strengthened the participation of the vice president for open learning in the capital campaign, working on numerous high-impact gift solicitations in close collaboration with colleagues across the Institute.
- Convened more than 10 faculty and staff from across the Institute to write and submit a coordinated response to the Gates Foundation/CZI joint request for information to fund innovative education programs.
- Hosted scores of campus visits and launched the Open Learning Salon, a series of donor engagement events that bring major donors, faculty members, and program innovators together to discuss emerging work in education.
- Supported the organization and launch of J-WEL Weeks, hosting several VIP guests during the October 2017 and March 2018 events. Also, we developed several successful J-WEL membership proposals, provided strategic support to faculty and the executive director, and leveraged donor relationships to solicit memberships.

- Developed and executed a plan to incorporate i2 Learning, an innovative STEM-focused curriculum and teacher training program for pre-K–12 educators, into MIT Open Learning.
- Helped facilitate faculty strategic discussions on a number of new initiatives, including workforce STEM education, pre-K–12 implementation strategies, the Refugee Action Hub, and the MIT Prison Initiative.
- Continued to drive the OCW and MITx annual funds. The programs brought in $625,798, with more than 4,419 individual gifts. Both programs participated in the Institute's second annual Pi Giving Day, garnering a total of 682 individual gifts.

Administrative Accomplishments

- Continued to improve reporting of gifts and revenue projections with the Business Operations finance team.
- Improved stewardship efforts with individuals, foundations, corporations, and alumni through timely gift acknowledgments and the first digital annual impact reports and custom impact reports.
- Delivered three presentations to central Resource Development staff on MIT Open Learning and further raised awareness by distributing quarterly newsletters to leadership giving officers and staff.
- Continued to work with key liaisons across Open Learning to advise and mentor colleagues on development communications.

Sanjay Sarma
Vice President for Open Learning