

MIT Faculty Newsletter

<http://web.mit.edu/fnl>

in this issue we explore MIT's two online offerings: MITx (below) and OpenCourseWare (page 9); our two-part Editorial both hails our graduating class and applauds the faculty for the new Campus Planning Committee (below and page 3); and Catherine Chvany offers "What's Old is New: Learning from the Past" (page 12).



From The Faculty Chair **Governance Highlights: Year in Review**

Steven Hall

IN THIS LAST NEWSLETTER column of the year, I would like to summarize some of the activities of the faculty governance system this academic year.

Our faculty governance system depends critically on faculty willing to serve on committees and as committee chairs. I'm grateful to all those who served this year. For the 2013-14 academic year, more than 100 faculty from 26 departments in all five Schools participated in faculty governance. Faculty served on 11 standing committees, two standing subcommittees, and two award committees.

Around the Institute

This past year has brought several important transitions in administrative leadership. With a new Provost and Chancellor, and an ongoing search for a Director of Libraries, faculty committees have had

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Remarks Occasioned by the Draft Report of the MITx Subcommittee of the FPC

Larry Bucciarelli

THE DRAFT REPORT OF THE MITx Subcommittee of the Faculty Policy Committee (FPC) considered the current ambiguities and uncertainties in assigning credit and ensuring academic integrity when relying on online content delivered and engaged via the edX platform. It sanctions the "... award of transfer credit for edX study within the framework of the current transfer credit system ..." and recommends examination or other means appropriate to the discipline, to "test student proficiency as currently used for advanced standing subjects." But there are issues:

"We anticipate the most likely early candidates for credit are subjects that might serve to fulfill Science GIRs and/or general engineering subjects. This would require careful consideration, however, because many of

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Editorial **A Letter to the Class of 2014**

GREETINGS TO YOU, THE GRADUATES!
– and to your families.

Together with the thousands of family members and friends gathered for Commencement, we share the excitement of this passage, and pride in your accomplishments as MIT's new 2014 graduates. In teaching and mentoring you, we on the faculty have also learned and grown and received new insights. As you launch your own careers, your contributions to your communities and to humanity will be among the most gratifying products of our academic labors.

We hope you will look back on your years at the Institute with a positive feeling, and the sense that you have contributed to enhancing the MIT environment and experience for the coming classes. As you transition to other opportunities and challenges, MIT and other

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Photo credit: Page 1: Dominick Rueter.

Correction: The photo on page one of the March/April FNL was incorrectly captioned “Ashdown House.” It was a photo of “Fariborz Maseeh Hall.”

Address

MIT Faculty Newsletter
Bldg. 11-268
Cambridge, MA 02139

Website

<http://web.mit.edu/fnl>

Telephone 617-253-7303

Fax 617-253-0458

E-mail fnl@mit.edu

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A Letter to the Class of 2014
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universities are in the midst of a vigorous and healthy reexamination of how and what and when we teach. You will be entering a world where digital distance learning, new forms of academic and social communication, and global interactions are the norm. Issues such as climate change, once in the distance, have now established themselves as requiring the

urgent attention of us all. Instabilities in nations that may have once seemed very far away now emerge as problems that the world – and this nation – cannot ignore.

During your years with us, we on the faculty have directly encountered your awe-inspiring talents, your grand ambitions, your resilience in the face of setbacks, your thoughtful and quirky self-expression, your creative and entrepreneurial energy, and your myriad achievements. We hope that as your

various individual paths unfold, you will put your powers to work on solving some of the problems that confront us, and making our society more responsibly productive and more supportive to those in need. On behalf of the entire faculty, we wish you vision, strength, commitment, and success in the challenges you take on. ■

The Editorial Board
of the MIT Faculty Newsletter

Editorial

Faculty Establish Campus Planning Committee

AT THE WELL-ATTENDED last faculty meeting of the semester, the MIT faculty present voted unanimously to establish a Campus Planning Committee as a standing committee of the faculty. This was the outcome of a process that unfolded over the 2013-2014 year.

The new committee will have much important work to do. All leading U.S. research universities are based on residential campuses. Though we often take it for granted, MIT's campus between the Charles River and urban Cambridge is a key component of our rich intellectual environment. The interaction among talented students, faculty, and research staff is critical for productivity and innovation. Face-to-face networks of interaction cannot be matched on commuter campuses, and distance learning does not substitute for direct cooperation and collaboration in conducting of laboratory-based experiments or instruction.

From this perspective, it is unfortunate that MIT's current plans call for the con-

struction of three large commercial office towers in the Kendall Square/East Campus area, but have made no provision for building graduate student housing on these campus sites. More than 4,000 graduate students live off campus, in an increasingly difficult housing market, with one of the lowest vacancy rates and highest rents of any community in the country. Many graduate students need to live close to their laboratories, and being pushed further and further away from the campus has become a major source of distress.

Responding to graduate student and faculty calls for more urgent attention to these pressures, the Provost in March 2013 established a Working Group on Graduate Student Housing. This committee recently released its draft report [orgchart.mit.edu/sites/default/files/reports/20140116_Provost_FinalGradHousing.pdf], which called for the immediate construction of 500-600 additional on-campus units, with 400 more to follow, after renovating some existing space.

To ensure that such priorities have a permanent champion, a group of senior faculty acted to introduce a motion establishing a faculty-based Campus Planning Committee as a standing committee of the faculty. The Faculty Policy Committee subsequently worked with the proposers and the administration to develop an improved substitute motion, which was the motion passed on May 21.

The establishment of this new standing committee does not of course ensure that all pending and future campus planning decisions will be in MIT's best long-term interests. But it does create a forum in which faculty, students, and staff can bring their concerns to a deliberative committee and debate them without prejudice, thereby providing MIT's decision-makers with an understanding of how their decisions play on the central functions of the Institute, as viewed by the broader Institute community. ■

Editorial Subcommittee

Governance Highlights: Year in Review
Hall, from page 1

important opportunities to share their perspectives on the future needs of the Institute. Both Provost Marty Schmidt and Chancellor Cynthia Barnhart have engaged actively with the faculty. Chancellor Barnhart serves on the Faculty Policy Committee as the President's designated representative.

MITx – and digital learning more broadly – continues to be a central topic of discussion. With ongoing changes, many faculty have expressed a desire to innovate while preserving what is excellent about our current residential programs. Consequently, the faculty committees are thinking carefully about how new approaches intersect with existing practices.

Managing Educational Change

Inspired by *MITx*-related innovation, faculty governance has engaged with the Office of Digital Learning and individual faculty to introduce new opportunities. The Committee on Curricula (CoC), in particular, has taken the lead in thinking about the impact of digital experiments. As more and more subject proposals incorporate *MITx* tools, the Committee has sought to understand the educational rationale for changing existing subjects and to develop assessment criteria for subjects proposed as experiments. The Committee on Graduate Programs (CGP) has also been called upon to discuss proposals for experimental subjects.

At the same time, an *ad hoc* subcommittee established last spring reported back with recommendations for ensuring oversight, assigning credit, and preserving academic quality as we increasingly integrate online tools into the residential program. In addition to recommending that we apply the credit transfer framework for online coursework, members emphasized the importance of in-person faculty-student interaction. Specifically, they expressed caution that online activities not be used as a substitute for faculty face-time. The full report is available on

the faculty Website, and we will ask the faculty committees to consider the subcommittee's findings next fall.

Noting concerns that came to the attention of the CoC in its review of cur-

riculum Requirement has engaged with both instructors and administrative staff in an effort to revise the description and criteria for CI-M (Communication Intensive in the Major) subjects.

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ricular proposals, the Committee on the Undergraduate Program (CUP) recently began discussing modularity and the growth in half-term subjects in undergraduate majors and the GIRs. Many of the proposals that have been put forward carry a strong educational rationale; however, the committees are sensitive to ancillary effects. For example, in recent years, the faculty has reaffirmed its commitment to controlling academic pace and pressure, but half-term subjects could have a significant impact on how final exams are managed, as well as on student workload and the academic calendar. Exam regulations, credit limits, and Registrar processes will all need to keep pace with pedagogical innovation.

In a non-*MITx*-related experiment, the CUP Subcommittee on the HASS Requirement completed a review of the HASS Exploration (HEX) Program, concluding that this set of subjects should remain a recommended option within the HASS Requirement.

Bringing Clarity to the Curriculum

At both the undergraduate and graduate level, faculty committees have been looking at ways to better communicate with faculty proposing new subjects and students reviewing catalog offerings. The array of complex proposals submitted to the CoC prompted the Committee to examine relationships between subjects. Meanwhile, the CUP Subcommittee on the Communi-

In April, the faculty approved a proposal brought by the Committee on Graduate Programs to eliminate the longstanding distinction between G- and H-level subjects. Many found the distinction to be arbitrary and confusing, with little agreement about how to distinguish between G- and H-level subjects. Going forward, all graduate subjects will simply carry graduate (G) credit, meaning that faculty and departments will no longer have to decide what type of credit to seek for different subjects. The CGP has worked for two years to help programs prepare for this transition. Although the vast majority of programs expressed strong support, the Registrar's office has committed to assisting with any questions. Preparations will begin next year, and the change will go into effect in fall 2015.

Strengthening the Student Experience

The Committee on Undergraduate Admissions and Financial Aid (CUAFA), the Committee on Student Life (CSL), and others have worked closely with the administration to ensure that MIT admits the best students and provides an exceptional experience for those who choose to attend. Several committees have introduced specific resources and policies to provide better support for students.

This spring, the Committee on Academic Performance (CAP) launched a new Website targeted to students and advisors (web.mit.edu/acadinfo/cap/). It

provides information on credit limits and petition processes, as well as helpful advice for meeting MIT's academic standards. Along similar lines, the Committee on the Undergraduate Program has renewed its support for freshman advising. Noting a significant increase in the number of faculty advisors, the Committee invited the administration to partner with the faculty in developing a plan to ensure that every freshman will have a faculty member serving as a mentor or advisor. Late this spring, it also launched discussion on best practices for faculty-student interaction.

In terms of managing credit loads and subject selection, there have been several changes of note. The CoC spent the early part of the year implementing recommendations from last year's report on IAP, with the aim of preserving and strengthening IAP's "unique pedagogical opportunities." For IAP 2014, students and advisors received confirmation of student registrations, and UAAP collected data regarding student participation in non-academic activities. With regard to academic enrollment, the CoC noted that the first drop-off in enrollment in recent years occurred in 2014, but it is too early to draw conclusions. The Committee will continue to monitor the overall situation. For incoming students, multiple committees are working with departments to evaluate how AP scores are used in math and history.

For graduate students, the CGP undertook a review of the thesis hold policy to address concerns raised by students in specific fields seeking publication of a thesis in book form. Such publication can be critical to the career of a young scholar, but some publishers are reluctant to publish a manuscript based on a thesis if the thesis is publically available. In exceptional circumstances, the Office of the Dean for Graduate Education may now approve requests to limit public access outside of the MIT community to theses for a fixed period.

Finally, the Committee on Discipline (CoD) has continued to review its procedures. In July 2013, the Committee

updated its internal guidelines to strengthen its handling of sexual misconduct cases. The faculty also approved changes to the Committee's charge to expand access, clarify jurisdiction over student living groups, and provide for administrative resolutions. The Committee has found particular success with the introduction of sanctioning panels as a means of responding to certain types of cases where students accept responsibility.

In terms of managing credit loads and subject selection, there have been several changes of note. The CoC [Committee on Curricula] spent the early part of the year implementing recommendations from last year's report on IAP, with the aim of preserving and strengthening IAP's "unique pedagogical opportunities."

Planning a New Committee

In the January/February issue of the *Newsletter*, I described the ongoing effort to establish a standing committee on campus planning. At the December faculty meeting, a resolution establishing such a committee was presented by several faculty. After a lively discussion, the matter was referred to the Faculty Policy Committee (FPC) for further consideration. The FPC has been working diligently on this issue since then, consulting with stakeholders around the Institute, the administration, and the original proposers. We expect to have a revised proposal to be voted on at the May faculty meeting. If the faculty decides to move forward at the May faculty meeting, we will work to stand up the new committee and ensure its successful integration in planning discussions.

Fall Preview

Both the Faculty Policy Committee and the Committee on the Undergraduate Program have begun preliminary engagement with the Task Force on the Future of MIT Education. Given the spectrum of possibilities suggested in the interim report last fall, I expect that their final recommendations will be an important focus of discussion.

At the April faculty meeting, I presented a report on the MIT open access policy, instituted five years ago. The policy has been fairly successful at increasing open access to publications by MIT authors; however, it's clear that the landscape of open access publishing has changed significantly over the last five years, and many aspects of our policy need to be revisited. For example, the policy covers only publication by MIT

faculty, but not publication by other MIT researchers such as postdoctoral scholars and research scientists. Further, the original faculty resolution assigned responsibility for the open access policy with the Provost and the Faculty Committee on the Library System (FCLS). Because the policy implications reach well beyond the libraries, it's not clear that the FCLS is the right body to be responsible for the policy. To consider these and other issues around open access, Provost Marty Schmidt and I intend to stand up an *ad hoc* task force in the fall to make recommendations on modifications to the open access policy.

I'd like to conclude by thanking the chairs of the 11 standing faculty committees: Professors Yet-Ming Chiang, Janet Conrad, Munther Dahleh, Stephen Graves, Nicolas Hadjiconstantinou, Leslie Kaelbling, Dennis Kim, Gareth McKinley, Shankar Raman, Gunther Roland, and Charles Stewart. Special thanks also goes to Professor Susan Silbey, who is stepping down as Secretary of the Faculty. I look forward to working with Professor JoAnne Yates, who will succeed Professor Silbey as Secretary of the Faculty next year. ■

Steven Hall is a Professor in the Department of Aeronautics and Astronautics and Faculty Chair (srhall@mit.edu).

MITx Subcommittee Report

Bucciarelli, from page 1

the online subjects may not cover as much material as the on-campus MIT Science GIRs, or cover the material with equally demanding difficulty, or require additional hands-on skills that come with class demonstrations or laboratory modules. We are also conscious that certain curricula must meet external criteria, such as those determined by the Accreditation Board for Engineering and Technology (ABET), and the Association of American Medical Colleges (AAMC)."

There are two different ways in which online subject content, available via the edX platform, might be used and, if done so successfully, might be a source of transfer credit: One way is by an individual with no opportunity for exchange with a teacher. The other way is by members of a group of like-minded students guided by a teacher. The former might be called "edX in isolation"; the latter, "edX in community."

As a vehicle for illustration of use of edX in community, consider how the subject matter of MIT's math and science GIRs, usually taken the first year, if made available online to high school teachers of Advanced Placement courses in these subjects, as modules or as MOOC, might enhance their teaching and bring the level of these courses up to MIT standards.

MIT could take a leading role in such an effort – one that, to ensure quality in the definition and development of content at the appropriate level and effective use of this content, would include the participation of those who teach the Advanced Placement courses. Evidently, this is already underway: edX has partnered with Davidson College to develop "lessons," "modules" – the latter "... on the trickiest concepts in each subject" – in Advanced Placement courses in calculus, physics, and macroeconomics. Faculty at Davidson are working with teachers from the nearby Charlotte-Mecklenburg schools in this effort.

But MIT could do more using resources only available here. Faculty

responsible for the relevant GIR first-year subjects, together with edX staff, could conduct summer workshops to prepare teachers of the AP courses in the nuances of content, show how they can adapt modes of delivery as well as specific material, e.g., exercises, texts, to their local needs – all the while maintaining stan-

As a vehicle for illustration of use of edX in community, consider how the subject matter of MIT's math and science GIRs, usually taken the first year, if made available online to high school teachers of Advanced Placement courses in these subjects, as modules or as MOOC, might enhance their teaching and bring the level of these courses up to MIT standards.

dards that would enable the award of MIT credit.

Means would need to be developed to assess the credit-worthiness of these edX, online enhanced AP/GIR courses. This should not be difficult if a sufficient number of high schools with a sufficient number of students relied on the online content developed specifically for their use in their Advanced Placement courses in mathematics and science. If proven their worth, MIT might eventually consider granting transfer credit to all students who successfully complete the subject prior to arriving on campus; further examination may not be required. Given this picture, how might such online enhanced Advanced Placement courses stand up to the subcommittee's critique and recommendations for granting transfer credit to students who successfully complete such subjects?

"... the online subjects may not cover as much material as the on-campus MIT Science GIRs, or cover the material with equally demanding difficulty, or require additional hands-on skills that come with class demonstrations or laboratory modules. We are also conscious that certain curricula must meet external criteria, such as those determined by the Accreditation Board for Engineering and Technology (ABET), and the Association of American Medical Colleges (AAMC)."

Concerning *may not cover as much material as the on-campus MIT Science GIRs*: More needs to be said here. If definition of coverage is based solely on the reading of a syllabus, that will not suffice. It is not enough to look at a list of topics of an AP course to see what is "covered" and compare that with what is similarly

covered in the corresponding MIT subject. The important thing to compare is what the students actually learn, whether what they have learned will suffice as preparation for subsequent studies, and whether what they have not learned will seriously hamper their advancement. This cannot be deduced from what's printed on a syllabus; an evaluation of students subsequent to their completion of the online enhanced, high school Advanced Placement courses would need to be conducted.

In general, the idea of judging the worth of a subject in terms of quantity, e.g., number and scope of topics appearing on a syllabus, as if knowledge were some kind of material substance, is suspect and should be avoided. Talk of "what can we leave out, what of this to put in" usually brings any thoughtful attempts at curriculum reform to a premature end. Consider, too, that an online subject may include material not covered in the GIR – an option that ought to remain open to the teacher of the AP course. Such may prove just as, or more, important to the student when viewed as a prerequisite for subsequent subjects in his or her major.

Concerning *equally demanding difficulty*: Again, this requires elaboration. "Difficulty" in itself is no measure of the quality of a course or equivalence for granting transfer credit. What ought to be of concern is whether the AP course

measures up to the level of sophistication, depth, and fundamental understanding of the corresponding MIT subject. The importance of deducing explanation of phenomena from root concepts and principles via mathematically empowered analysis appropriate to the task and of the power of such understanding in problem solving is a hallmark of the GIRs. Internalizing this way of thinking presents a challenge to students who come to the Institute having learned the math and science as a collection of formulae to be applied through pattern matching and/or textbook lookup. But there is no reason why an online enhanced AP course can't prepare the student otherwise if the online content is designed to prepare students in the MIT way and teachers likewise are schooled in the fundamental nature of the material as well as in the use of the edX platform.

Concerning *additional hands-on skills that come with class demonstrations or laboratory modules*: This concern is more difficult to address. Clearly, online content can't be considered "hands on," at least if we require the manipulation of material stuff for a task to be considered such. Much can be done with digital simulations and laboratory preparatory videos, but building and instrumenting and getting the bugs out of a laboratory experiment or a design studio prototype before testing requires students to get up from the couch and confront hardware. A video of a class demonstration might serve as well as being there and observing from 10 rows back in a lecture hall, but laboratory modules need students up close and active. In a summer session devoted to AP teacher training, desktop experiments, of the sort used for the past 12 years in 8.01 and 8.02 (TEAL) – where students work together in small groups – would be made available for use and replication.

Finally, *regarding certain curricula must meet external criteria, such as those determined by the Accreditation Board for Engineering and Technology*: The possibility of awarding credit for MIT's first-year, GIRs in math and science if students have successfully completed the online

enhanced Advanced Placement courses as described herein should not present a problem for ABET. The accrediting agency's criteria are expressed in terms of a list of 11 ("a through k") student outcomes and three general statements concerning curriculum content. The first of the three curriculum requirements states that:

"(a) one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences."

Whether a student advance places the first-year GIRs prior to arriving at MIT or completes these subjects in residence is not an issue if ABET, as it is the case now, allows MIT to grant advanced placement credit for a course taken in high school. I see no reason why this would restrict the Institute from continuing to do so.

The first of the "a through k" student outcomes appears relevant:

"(a) an ability to apply knowledge of mathematics, science, and engineering."

But note that this says nothing about where the student must learn the mathematics and science (and engineering) or what courses he or she must complete in these areas. Rather it requires that the student upon graduation must show the ability to apply knowledge learned in these domains. Where the student, for example in engineering, develops this competence will most likely be in the requirements of the major.

All in all, if the enhancement of high school Advanced Placement courses in mathematics and science were to be pursued as recommended herein, it's likely that students would be just as well, if not better, prepared for their subsequent studies once in residence at MIT.

There are, however, features of the first-year GIR experience that we have overlooked – features noted in the sub-committee's report:

"Importantly, the classroom experience constitutes a shared experience and thus serves as a community building process. In this sense, the GIRs are not just for subject matter mastery but also play a fundamental role in community building and developing a variety of social, listening, and observational skills. In addition, the GIRs serve as a common ground of student engagement, through which they build a shared sense of participation and experience. How do we replace these common experiences?"

The first-year experience does, for most, mean community – a space for developing social, listening, and observational skills where students do indeed build a shared sense of participation and experience. But what is the nature of this experience, what skills are developed?

For many students, first year at MIT is like a "boot camp" – two semesters of intermittent stress, of problem sets that are impossible to complete in the time allowed, quizzes written to challenge the brightest in the class and classmates who, at least at first, all seem to be smarter than you are. So students do learn but what they learn, outside of what's listed on the syllabus, is which assignments can be neglected or put off beyond their due date, when one can safely skip lecture, or how to appeal for a change in recitation section assignment, etc. This is not to devalue this kind of learning; it is essential that students learn to set priorities, that they can't possibly do all that faculty "require," and these skills will prove valuable at work, after graduation, as well as in their subsequent course work at MIT.

So this boot camp aura does have a certain value in introducing students to the ethos of the place. But is it a good thing, a good introduction, the way we want to lead our students on? It sustains most all, enables their survival under pressure, but it remains an open question whether it is a necessary experience, prerequisite to engaging the subjects of study in one's chosen major, e.g., engineering.

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MITx Subcommittee Report
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Turning to the possibility of awarding transfer credit for the online edX in isolation experience: In addressing this concern, we need to distinguish between a course in the humanities and a technical subject with wholly instrumental objectives, taught in a traditional way. William Bowen, former president of Princeton, found the latter well suited for online delivery:

“Our study used one sophisticated method of teaching a beginning course in a field, statistics, extremely well-suited to adaptive learning (machine guided learning). . . .”

But for a humanities subject . . .

“It is far from obvious that the same pedagogy will work anything like as well in teaching subjects such as literature and international affairs. Face-to-face learning in many subjects and many settings will continue to persist for two very good reasons.

“First, such teaching makes a great deal of educational sense, a priori, when we are trying to teach not only well-known concepts . . . but also nuanced notions such as: how to frame questions in value-laden subjects, how to distinguish evidence from opinion, how to take account of different points of view, how to formulate one’s own position on complex questions, how to express one’s self verbally and in writing, how to engage with others as a member of an intellectual community, and even how to approach an understanding of ‘life lessons.’ Most fundamentally, we want to engender in students the excitement associated with encountering a new idea.”

A statistic course may be well suited for study in isolation but this depends upon the conduct of the course and the objectives of faculty. If student outcomes are restricted to those that speak of mastery of the instrumental content alone, the desired student outcomes might be achieved, indeed might best be achieved, via working with edX in isolation. The

medium, the venue for learning of a course where tight logic and its symbolic expression is key to learning is the computing and information technology itself. Exercises are worked out online; search

Whether edX in isolation is as good (or even better) a way to learn a technical subject compared to taking the same subject in a traditional residential setting is a question that, again, can be tested.

for help done online; solutions to exercises posted and evaluated online.

What is absent from the student experience is any need to consult, talk, or negotiate face-to-face with staff and/or one’s peers. This is not to say that face-to-face discussion and exchange is not valued by faculty and students in the actual conduct of the residential course. It does strongly suggest that such may not be considered an essential condition for learning. It all depends on the objectives of faculty in charge, e.g. if teamwork is an objective, then edX in isolation may not suffice.

Whether edX in isolation is as good (or even better) a way to learn a technical subject compared to taking the same subject in a traditional residential setting is a question that, again, can be tested. But it’s not inconceivable that edX in isolation would prove its worth, even superiority – especially if the residential course discounts the value of face-to-face interaction. Here lies what might be called a fatal attraction of the MOOC.

“This subcommittee feels very strongly that there is incomparable value in student-faculty engagement and is concerned that MITx will be used as a substitute for physical co-presence, active intellectual and critical discourse together among students and faculty.”

The subcommittee’s articulation of (some of) the values of face-to-face engagement is spot on. Although the discussion forum of a MOOC tries to replicate classroom discussion, it is, at best, but an impoverished imitation. Echoing

the report: The residential student’s learning experiences may include project-based learning, collaborative design tasks, public service, research in the lab of a professor. Residential students, at least at

a place like MIT, are offered substantial advising, And we should not ignore the connections students make with their peers, social as well as intellectual, as members of a community, communities of different scale and scope – the whole university at an athletic event; one’s immediate classmates surviving the boot camp of first-year physics; denizens of a dorm or independent living group collectively complaining about the food. All of these experiences – experiences that contribute to student social and intellectual advancement – are missing from online learning, engaging edX in isolation.

I endorse the subcommittee’s encouragement of faculty.

“. . . to adapt the MITx platform to be incorporated in residential subjects, enhancing the value of co-present time. . . . the interactions with faculty should be of high quality, . . . smaller classes promote better faculty-student interaction. To this end, we are interested in the possibility of online technology to enable faculty to restructure the delivery of materials, and to reconceive and coordinate faculty-student, face-to-face interactions.”

. . . and conclude with a question:

If lectures, texts, exercises and their grading, and discussion can all be done online, and the students do take on the responsibility to really dig in and engage the materials online, what’s left to do in the classroom? How to “. . . reconceive and coordinate faculty-student, face-to-face interactions?” ■

Larry Bucciarelli is a Professor Emeritus in the School of Engineering and STS (llbjr@mit.edu).

OCW Educator: Sharing the “How” as well as the “What” of MIT Education

Eric Klopfer
Haynes Miller
Karen Willcox

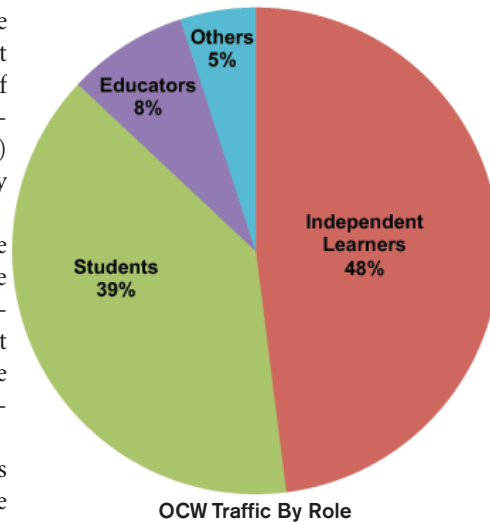
WHAT REALLY GOES ON behind the scenes in designing a course at MIT? What considerations underlie the multitude of decisions leading to the material presented on OCW (OpenCourseWare) course pages? What do MIT faculty say about what worked and what didn't?

OCW has initiated a new venture designed to pull back the curtain on these issues. Named *OCW Educator*, it is explicitly addressed to educators, reaching out to our colleagues at MIT and across the world to share what we can about teaching the courses we teach.

When MIT OpenCourseWare was launched back in 2001, most people expected its audience to consist primarily of educators. Educators were considered key to the success of the site because they were seen as multipliers, adapting the MIT course material as published by OCW for their own purposes. OCW course sites were structured to be convenient for educators to use, with the course materials organized by content type rather than chronologically so instructors could quickly survey all the readings, lecture notes, or assignments, and download them at will.

But it turned out that independent learners, widely distributed around the globe, quickly became OCW's principal audience. This audience has grown steadily over the years, and today some 48% of the three million visitors per month received by OCW are independent learners. Another 39% are students. Only eight percent are teachers.

OCW has welcomed this unanticipated global recognition, and has addressed the self learner population directly through



enhancements such as OCW Scholar, a family of OCW offerings that have been organized into sequential courses and augmented with much new material. But there has been a residual sense that more could be done to serve the originally envisioned audience of educators.

The new OCW Educator sets about enhancing the value of OCW's holdings by supplementing the course material with explanation, annotation, and insight. The goal is to share the “How and Why” as well as the “What” of instruction at MIT. The spirit of this project is like that of OCW in general – open sharing: MIT instructors share their personal experiences and reflections in the belief that these might prove useful to others.

Project Origins

The idea of improving the value of material already on OCW for teachers was originally put forward by Professor Hazel Sive several years ago at a meeting of

OCW's Faculty Advisory Committee, and the three of us were tasked with coming up with a proposal. Key to our proposal was the benefit to MIT's own faculty in making it easier for instructors to learn about educational innovations going on around campus:

... using OCW to showcase how we teach will help spread new pedagogical ideas being generated here at MIT across MIT itself. The problem of dissemination of novel pedagogy is well-known, and OCW can very likely make this much easier.

Under the guidance of a Faculty Steering Committee and OCW Executive Director Cecilia d'Oliveira, the initial OCW Educator publication launched in 2013, and after some fine-tuning, Educator components have now begun to appear regularly in OCW courses. The Educator project manager (the person mainly responsible for getting this project off the ground) is Kathy Lin, an MIT graduate who majored in mathematics.

The Course in Context

So what is OCW Educator? Its main component is a new page on OCW course sites called *This Course at MIT*, which assembles background information about the teaching of the course, including:

- the instructor's course goals
- curriculum information (prerequisites, requirements satisfied, how often the course is offered)

continued on next page

OCW Educator

Klopfers, et al. from preceding page

- classroom photos (which venues are used)
- student information (enrollment breakdown by year, major, and previous experience in the subject)
- a graphic calendar (showing what happened in each class, e.g., lecture, lab, discussion)
- how student time was spent (in and out of class)
- class assessment
- course team roles (who did what)

The page has a standard template for ease of use. *This Course at MIT* pages that have been published to date have been collected on a landing page on the OCW site.

Instructor Insights

Many *This Course at MIT* pages also include a section called Instructor Insights in which the instructor shares his or her reflections on the teaching of the course – the pedagogic approach, the rationale for this approach, the evolution of the course since its inception, what’s worked best and what hasn’t. Instructors of courses now being published on OCW are invited to fill out a survey that solicits these reflections, and many have obliged, some quite expansively, providing pages of information. For some courses, OCW conducts in-person interviews with the instructor and uses the responses to create pages describing insights and practices revealed by the questionnaire and interview. Instructor Insights may contain text, photos, representative examples of classroom activities, and even embedded video in which the instructor explains how the course works.

OCW has already published *Instructor Insights* from a number of different MIT Schools and disciplines. Here are a few highlights:

- **7.013 Introductory Biology** Professor Hazel Sive discusses her approach to teaching problem-solving in intro-

OCW by the Numbers

Voluntary contributions from:

- > 66% of MIT faculty
- > 4,600 members of the MIT community
- > More than 8,100 individuals and organizations in total

Used by:

- > 90% of MIT students
- > 84% of MIT faculty
- > 50% of MIT alumni and staff

> 35% of MIT freshmen say OCW influenced their decision to attend

Openly shared assets published on the site:

- > 2,200+ courses
- > 2,200+ syllabi and reading lists
- > 18,000+ lecture notes
- > 10,000+ assignments
- > 1,000+ exams
- > 700+ projects
- > 140 courses or resources with video assets
- > 48 textbooks

ductory biology, interacting with students in a large class, and interfacing with 7.00x, MITx’s online course.

- **16.06 Principles of Automatic Control** Professor Steve Hall explains the benefits of getting students up on their feet actively engaged in working out problems during recitation sessions and how this method of teaching promotes deeper conceptual understanding.
- **15.S07 Global Health Lab** Professor Anjali Sastry describes how she plans, teaches, and runs an intensive “action learning” course in the Sloan School of Management, in which student teams take on projects with health care delivery organizations in sub-Saharan Africa and South Asia.
- **21H.1324J Medieval Economic History in Comparative Perspective** Professor Anne McCants presents her views on how she gets students to make connections and problem-solve and how she interweaves current events into her course to make the

course more relevant to students’ lives.

- **4.241J Theory of City Form** Professor Julian Beinart describes what it’s like to teach a legacy course taught at MIT since 1956, how the course has changed under his auspices, and how the course uses case studies of cities to generalize and create theory.

Experiential Courses

The Educator project has made it possible for OCW to serve educators in other ways. Certain courses taught at MIT do not lend themselves very well to publication on OCW in the traditional format. These may be project-based or experiential courses that do not have traditional components such as a set syllabus, lecture notes, and a textbook.

A prime example of this is **18.821 Project Laboratory in Mathematics**, a course created by Professors Michael Artin and Haynes Miller. In this course, students are offered the opportunity to experience the frustration and excitement of doing mathematical research. They

work in teams on projects that are open-ended and may change every time the course is offered. They write papers in a style appropriate to journals in the field, and give an oral presentation of their findings to the class.

OCW Educator afforded a way for OCW to publish this course. Instead of showing the syllabus, readings, and assignments in the manner of a standard OCW course, the course publication includes:

- Staffing the Course (how many instructors are involved, what are their roles)
- Mathematical Work (choosing productive projects for students)
- Teamwork (fostering teamwork, forming student teams)

- Writing (helping students learn to write at a professional level)
- Presentations (teaching students to be effective presenters)

The site also includes an introductory video in which the instructors explain how the course works and how they address the trickiness of guiding students in their research projects without over-directing them, and students comment on their experience in the class. OCW hopes to represent other experiential courses in this way in the future.

Future Promise

The future holds great promise for OCW Educator as it looks to document the changes happening from the further incorporation of both active learning and digital technology into residential instruction at MIT. OCW plans to create landing

pages for courses sharing a similar structure or theme, such as lab courses, capstone courses, and communication-intensive courses. The goal will be to enhance these course collections with instructor reflections and advice. OCW will soon create a Web portal that will provide resources for educators in search of materials on instruction at MIT.

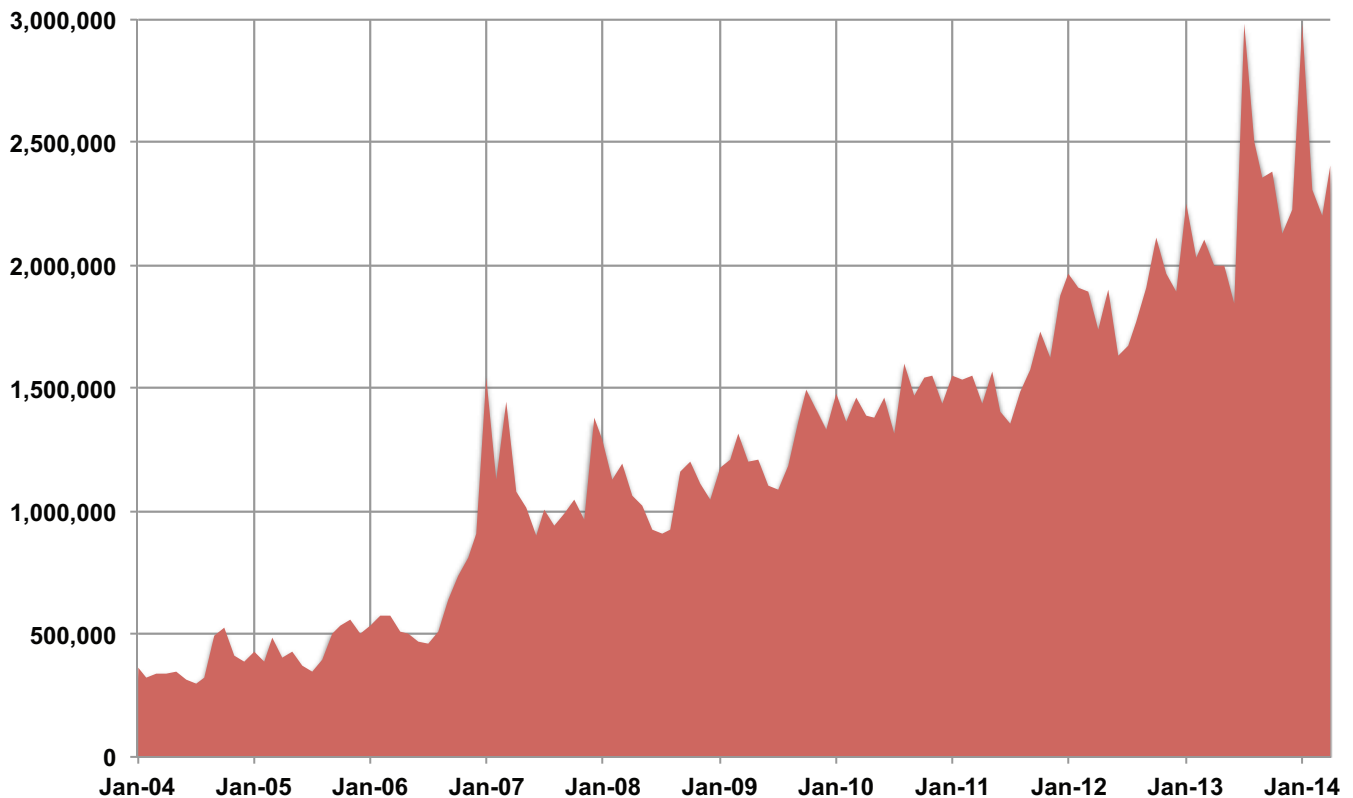
Part of the intent of the OCW Educator project is to encourage discussion of pedagogical issues. Please contribute to this conversation through the project survey, which is linked at the top of every *This Course at MIT* page. ■

Eric Klopfer is a Professor in the Department of Urban Studies and Planning (klopfer@mit.edu);

Haynes Miller is a Professor in the Department of Mathematics and a MacVicar Faculty Fellow (hrm@math.mit.edu);

Karen Willcox is a Professor in the Department of Aeronautics and Astronautics (kwillcox@mit.edu).

Monthly Visits to OCW Website (January 2004 – April 2014)



What's Old Is New: Learning from the Past

Catherine V. Chvany

THE MAY 2014 FACULTY NEWSLETTER was especially interesting, even if it addressed only narrowly local problems. The issue of student housing cannot be looked at only in terms of MIT's Cambridge neighborhoods, as is obvious from the *Globe's* Spotlight series that ran in three issues of early May 2014. Greater Boston has over 30 expanding institutions whose students compete for a shrinking number of often unsafe apartments. The present market has made most of those apartments unaffordable.

I'm probably not the only reader shocked at the news that MIT had not purchased 100 Memorial Drive long ago!

Student housing has been a problem since I first came to MIT in 1967. Even then a few homeless undergraduates slept on all-night-library couches, with a small package of notebook and toothbrush on the floor. Dorm spaces (including the new Tang Hall) were even then more expensive than sharing an off-campus apartment. Why were (or are) dorms so expensive, when they are on donated land, built with donated money, and not taxed as are rental apartments? Living outside the dorm system with responsibility for shared expenses was a valuable experience. Should MIT have a few cooperative or "co-living" houses to encourage such learning?

Today, the affordable options for off-campus rentals have nearly vanished. Most graduate students and postdocs come to MIT with debts, perhaps with debt-ridden spouses who are also students or postdocs. To rent a two-bedroom apartment at over \$2000 a month, they must have enough capital to pay first and

last month's rent, plus a security deposit, perhaps also a commission for the real estate agent who found the apartment, plus smaller deposits for those utilities that are not included in the rent, plus moving costs. Only a few come from families who can help them buy an apartment that can be resold after Commencement.

True, many students come to college today who have never had to share a bathroom, let alone a bedroom. Many expect excellent facilities for the high price. But there are plenty of others who would prefer fewer amenities in exchange for smaller debt. Normally an off-campus two-bedroom apartment actually rents four or five rooms to four or five students, who use only the kitchen and bathroom as common spaces. But such an apartment is very hard to find today.

One of the FNL authors remarked on the absence of Urban Studies faculty from the recent study groups. The housing crisis is as much of a world problem as the energy crisis, or climate change. *We need to involve not only the faculty of Course IV, but encourage prize competitions among students and alumni.* What if present and past occupants of Westgate submitted plans for a temporary village for Westgate occupants while a new Westgate (another design contest) is being constructed? Who knows, the temporary village might well lead to a new and better version of today's Syrian refugee camp or Arkansas disaster shelter. Remember the Montreal Expo of 1967 and its innovative apartment house? What's happened to it? Can we do better this time?

Teams of researchers should also reexamine obsolete zoning conventions that

encourage sprawl, with acreage requirements and prohibitions against in-law apartments that could be rented to students. Instead, we have large houses in nearby suburbs inhabited by a lone senior citizen, for whom converting former au pair rooms to "legal" is too daunting and too expensive. Could a university or other institution help screen possible tenants for former au pair or in-law suites? Are some codes too unrealistic (few 3rd floor suites have a second exit staircase), but unenforced codes still allow landlords who own hundreds of substandard units to profit from illegal conditions. Some middle-aged homeowners might also build an apartment that could be rented to pay for the rehab, to be later occupied by a home health aide as the owners age.

The *Globe* pointed out that Northeastern rents several apartment houses from neighboring slumlords, maintaining them better than do the owners. *Perhaps the cities should condemn such houses and use them for teaching students and local teens how to bring them to code, how to use new materials, with some cooperation from various trade unions.* Such a project could involve not only Urban Studies, Architecture, and Materials Science, but also Management, Political Science, law, and finance, as well as the urban communities.

Jonathan King mentioned the need to accommodate temporary visiting staff. Such colleagues can rarely sign a September-to-September lease. In 1999, when I was a visiting professor for a quarter at the University of Oregon, I was provided with a nicely furnished one-bedroom apartment in the same building

as a big cafeteria and laundry, within a short walk to my office and classes. MIT should have several such facilities. While on a visiting appointment in Paris (1991) I had a room in a large apartment shared with the landlady and another visiting fellow.

In the 1970s, when I had a big old house in Watertown, with two rooms and a bath on the third floor, I'd get a call from MIT or Harvard, asking if those rooms were available, e.g., for a visiting professor staying only for 7 months, with a visit from his wife for one of those months. Since we were not in the business of renting rooms, i.e., we were not dependent on the rental income, we were happy to oblige. We charged only a share of the taxes and heat. The visiting professor used a small fridge and electric teaket-

tle, ate a midday dinner out. For supper, he was often invited out, or he ate sandwiches or take-out. Before leaving, our guest had a big party in our house for those who had entertained him. Another time we had a man who was finishing a Brandeis thesis. He had his meals at a nursing home where he worked part-time as a cook.

One time we got a call from MIT's Sloan School. A French grad student had been mistaken for an advanced executive, and housed in a pricey hotel. We took him into one of our rooms and told him he could share the rent with a roommate in the second room, if he could find one he could live with, which he did. So for a year or two we had two MBA students from France.

In the old days, pricey suburbs like

Weston or Lincoln didn't worry about housing their employees, for their young teachers or police recruits could find affordable housing in Waltham or Maynard. But now the industrial suburbs have also gentrified, and rents and home prices in Arlington, Belmont, Waltham, Watertown, or Somerville are no longer affordable for younger workers, including graduate students or postdocs. Those pricey suburbs should suspend their NIMBY rules to provide enough affordable housing to accommodate a number of tenants equal to the number of their necessary employees. Their "streetcar suburb" neighbors can no longer subsidize the Westons or Lincolns. ■

Catherine V. Chvany is a Professor Emerita in the Department of Foreign Languages and Literature (cvchvany@mit.edu).

In Memoriam Frank P. Davidson

FRANK DAVIDSON SPENT NEARLY 40 years at MIT. As a Senior Research Associate he worked on macro or large-scale problems with Jay Forrester and others, and was Chairman of the System Dynamics Steering Committee, Sloan School of Management, and Coordinator of the Macro-Engineering Research Group in the School of Engineering.

Though a lawyer by profession, Frank had a unique talent for bringing people together and was interested in significant issues. He worked with President Franklin Roosevelt in organizing the Civil Conservation Corps (CCC), which not only reduced unemployment but trained people for meaningful jobs. He was also a leader in advancing the English Channel tunnel. Frank similarly developed and publicized the concept of macro-engineering as a new discipline designed to address large-scale problems.

But perhaps most importantly, Frank

had a unique knack for bringing people and ideas together. Frank's meetings and lunches not only attracted people with diverse interests, but also generated vivid discussions of important issues and problems. Macro-engineering became a global concept under Frank's guidance with branches in Japan, the UK, the U.S., and elsewhere. Frank's knack for both getting interesting people together and also getting them to identify and address important global problems became increasingly popular, and Frank's meetings were magnets for exciting people interested in addressing and discussing global issues and problems. These meetings generated not only fascinating ideas, concepts, and issues, but also served to identify real problems and their causes.

The meetings, combined with Frank's charm, brought many important issues and problems into the limelight, which in turn identified opportunities for new

technological approaches and cooperation among people with a wide variety of backgrounds, cultures, and disciplines.

Frank always led in identifying opportunities for the betterment of mankind. One, among the many ideas Frank advanced and promoted, was evacuated tube transport. This began with the laying of a half-mile tube across MIT's playing fields, evacuating the tube, and shooting ping pong balls and toy trains through it. The concept was later developed into a Boston-NY evacuated tube train concept, with a 20-ft. diameter tube laid along a coastal trench in shallow water to serve as a train track for maglev trains travelling at speeds of over 300 mph, thus traversing the distance in less than 40 minutes – fully half the time of air travel!

Frank will be sorely missed. ■

Ernst G. Frankel is a Professor Emeritus in the Department of Mechanical Engineering (efrankel@mit.edu).



DEPARTMENT OF MECHANICAL
Engineering Professor Emeritus David Gordon Wilson has written an extensive and highly entertaining memoir, *The*

Mens' Kick Line. This wide-ranging and copiously illustrated volume (photographs and black and white drawings abound) traces his life from his childhood in Britain through World War II and on to America and MIT.

The memoir is filled with personal family as well as professional anecdotes, serious conflicts, and moral stands that have often defined his entire life. Wilson, perhaps best known around the Institute for his pedaling of a recumbent bicycle, helped design the self-same Avatar-2000, which won the world speed record in 1982 and 1983. He is also the author of the best-selling *Bicycling Science*, among the additional eight books he has written or edited.

Prof. Wilson pulls no punches when describing some of the serious circumstances with which he has been involved while teaching at the Institute. Some of his chapter titles include: “Battling the Hoodlums: Crime on Brattle Street,”

“Politics and Wilsonomics,” and “The Death of Democracy in Massachusetts.”

At the beginning of the chapter specifically about experiences at MIT, “The Men’s Kick-Line at MIT, 1994–?” Wilson writes, “Some of this book has been about battles that I have had, mainly with men. In some of them I emerged victorious. In the following accounts, of a long campaign to help a young and totally blameless person who was targeted for virtual elimination by MIT tyranny, and of my most serious and by far the longest battle, rather like the Thirty Years War, are of times when I lost repeatedly and decisively.”

History, politics, and science intertwined with Wilson’s abundant personal experiences make this a fascinating life story.

The memoir is offered free by download at: <https://www.dropbox.com/sh/p11ew9sy04de1mc/xHqKJMHQ-A>. ■

letters

Part of MIT Strong!

To The Faculty Newsletter:

March 24, 2014

I WAS PROUD TO BE a member of the MIT Strong team that ran the Boston Marathon on Monday. When I exercise I often let my mind run free to think of whatever is rattling around. This marathon was a solemn event and it was also a 26.2 mile party for Boston to proclaim that our city only grows stronger no matter what happens to it!

And so I started thinking so must it be with our great school! Our biggest challenge (opportunity) is not the hard problems of research; our biggest oppor-

tunity is the high energy mix of super talented and not-too-shy people particles which sometimes do not always interact in an optimal to-be-expected manner.

Applying FUNdaMENTAL principles to the issue of personal personnel interactions we see that Newton’s Laws do not always apply. For example, sometimes the Second Law of Thermodynamics transcends Newton’s 3rd law, and causes what might otherwise be a normal people particle mix to boil over. Unfortunately the application of an enthalpy (H) enhancing reactant (R) can lead to even more entropy (S) hastily instigating total unhappiness.

Fortunately, we are humans and have the potential to apply imagination (i) to damp down the flames and bring us all back to happy reality. How? In honor of the Bard’s 450th birthday (celebrated this week) I propose that when we have potential problematic people particle interactions, we call out the theatre writers to create skits about what happened so we all can learn and be entertained by the interaction. By laughing, crying, learning, and partying together, we truly become MIT Strong!

Alex Slocum
Pappalardo Professor of Mechanical Engineering

M.I.T. Numbers from the 2014 Senior Survey

“MIT is looking for best practices to improve student-faculty interactions. Please describe an interaction you have had with faculty during your time at MIT that you would rate as a positive, meaningful interaction.”

More than 650 students completed this survey (70% Response Rate), and roughly half took time to write a response to this question. Several key themes emerged:

- Students prized interactions that allowed them to see a more personal side of faculty. Of these, faculty dinners were the most common.
- Within the context of a class, students recounted three types of interactions that had a positive impact – when a faculty member went out of his/her way to help a struggling student, when a student had a particularly inspiring discussion that went beyond the scope of the class, and when a student connected with a faculty member and continued to work/interact with them after the class ended.
- More than a third of comments dealt with formal or informal advising.
- A significant fraction of responses discussed experiences that were part of a UROP or other research opportunity.

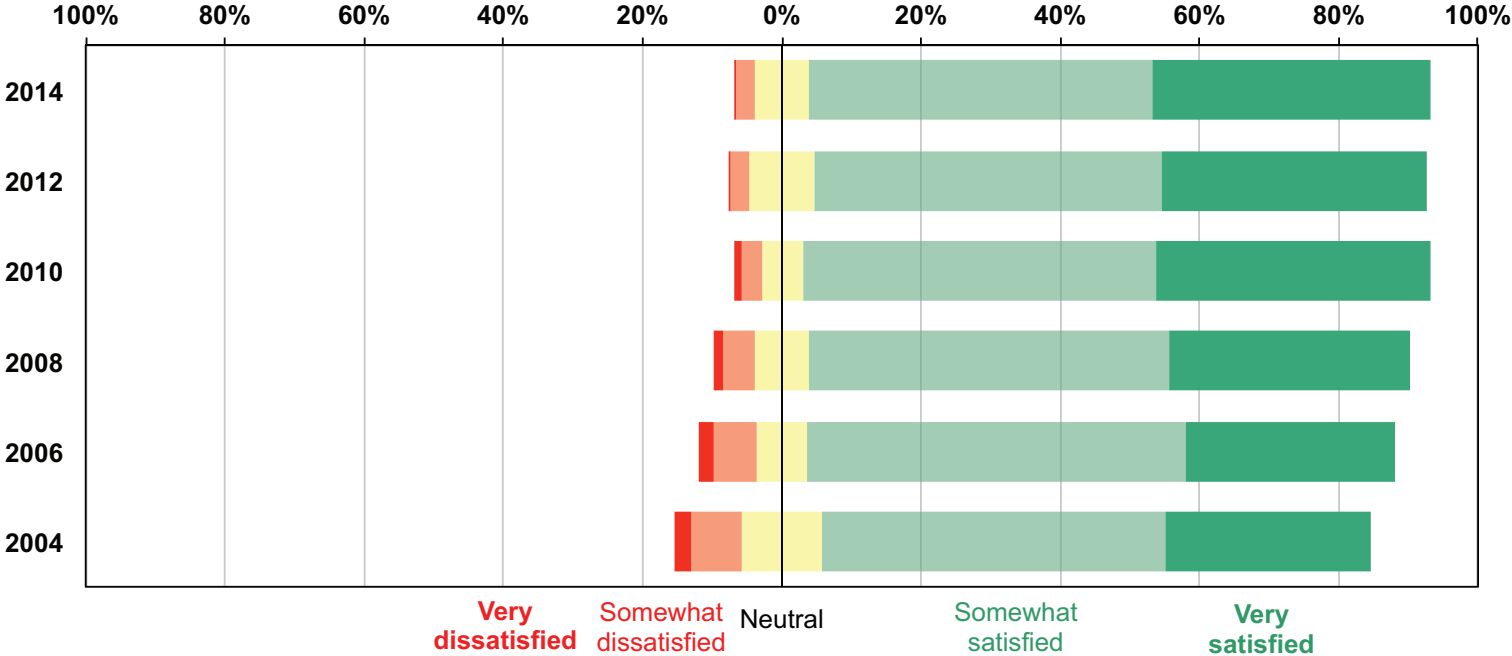
Responses were sorted into categories by theme:

Formal or Informal Social Contact	20%
Academic Interaction: Student in Class	18%
Advising: Postgrad Plans	14%
Research/UROP	13%
Advising: General	12%
Advising: Personal Issues	7%
Traveling with Faculty	4%
Extracurricular/Student Life	2%
Academic Interaction: TA in a Class	2%
Thesis	1%
(Other/None)	7%

Source: Office of the Provost/Institutional Research

M.I.T. Numbers from the 2014 Senior Survey

“Overall, how satisfied have you been with your undergraduate education?”



Source: Office of the Provost/Institutional Research