The MIT Faculty Newsletter

Vol. XII No. 4 **April/May 2000**

Communication Given High Priority

Planning in the MIT Community

Lang Keyes

In April 1997 the MIT faculty approved "by unanimous voice vote" the view that

". . .the ability to communicate clearly is fundamental; that students should receive instruction and feedback in writing and speaking during each undergraduate year; and that responsibility for teaching these abilities should be distributed across the entire MIT undergraduate curriculum."

Having affirmed the importance of communication, the faculty went on to direct the Committee on the Undergraduate Program (CUP)

". . .to conduct a series of experiments and pilot programs to help in the design of the new Communication Requirement. These experiments should be evaluated by a subcommittee [which] should report back to the Faculty with its recommendation for a new Communication Requirement not later than the Spring of 2000."

(Continued on Page 10)

The Engineer of the Future

Alan Lightman

Cassandra, daughter of King Priam of Troy, was granted the gift to foretell the future and then stricken with the curse that no one would believe her. Our world today faces a related conundrum. More than any other group in our technological society, it is our scientists and engineers who best know the future. Yet most of them lack the ability to tell what they know. In our technical schools across America, students are flooded with training in aerodynamics, the design of computers, and the manipulations of genes but receive only a few drops of instruction in writing and speaking. Indeed, in many technical universities it is possible for students to march to the graduation stage, often with medals and ribbons, having written only two or three papers in their entire four-year career. Here at MIT a 1995 study found that, despite our writing requirement, three-quarters of our students were graduating with fair to

(Continued on Page 13)

Redefining Ourselves

Rosalind Williams

On June 30, 2000, Rosalind Williams will be stepping down as Dean of Students and Undergraduate Education. The following reflection was written at the request of the Faculty Newsletter.

In one of my favorite scenes in *L.A. Story*, Steve Martin shows his English girlfriend around some Los Angeles neighborhoods, bragging, "Some of the houses here are over *thirty years old*!" Because our national history is so short and our pace of change so rapid, we Americans suffer from historical conceit – a tendency to inflate the significance of short intervals.

So I feel some hesitation in reflecting back on my five (!) years of service as Dean of Students and Undergraduate Education. Most of us would agree, however, that these have been five particularly eventful years in student life and learning at MIT: reengineering of student services, the consolidation of the dean's office, the Task Force on Student Life and Learning, the

(Continued on Page 8)

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Contents

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From The Faculty Chair

The Intellectual Property Dilemma

Steven R. Lerman

In the past century, MIT and other major universities have evolved a set of policies and procedures for managing intellectual property created by the faculty. These policies were relatively stable for three simple reasons. First, the vast majority of intellectual property was easily divided between traditional inventions governed by patents and written works governed by copyrights. Second, despite the occasional invention that was licensed broadly or rare, spectacularly successful textbooks, the most patented and copyrighted works produced little or no revenue. Finally, while research itself is expensive, the creation of scholarly papers and books required very little in the way of university resources beyond the faculty member's time and the use of the library and office space.

Much has changed since that simpler time. Computer algorithms and business processes are now patentable inventions. There is a growing number of sophisticated, multimedia Websites to support teaching and learning that require teams of specialists to create and maintain. New companies with significant economic value are being created to provide for-profit educational services. These organizations are seeking alliances with individual faculty members and the top-tier universities to provide educational content and brand name recognition. In addition, venture capital companies are routinely contacting faculty and students seeking new ideas upon which companies might be founded and are on occasion actively recruiting our students to leave MIT before graduating.

All of these changes have combined to undermine the usefulness of our traditional policies regarding intellectual property. There is widespread recognition among faculty and administration that we need to develop better ways to govern issues of ownership, faculty rights, faculty responsibilities, our relationship with our staff and students, the use of our university's good name, and the sharing of revenues in this area.

It should come as no surprise that we are not the only university exploring new policies in the arena of intellectual property ownership. Both the American Association of Universities and the American Association of University Professors have studied some of these issues and developed policy proposals for their respective constituencies. Not surprisingly, these organizations have come to very different conclusions about whether the faculty should retain ownership of intellectual property such as courseware or educational Websites. The potential for conflict between universities and their faculties may well prove to be a key divisive issue on some campuses.

The good news in all of this is that, at least in my view, we have some important principles already established upon which we should draw in formulating sensible policies. None of these principles is more important than the dictum that we must continuously keep our mission as a university in mind. MIT and similar institutions do not exist for the purpose of generating royalties, licensing fees, stock options and similar remunerations for either the faculty or the institution itself. Rather, we exist to educate the next generation and to create new knowledge of value to society at large. To the extent that what we do creates financial gains, we should organize our policies to use such resources to further our long-term mission. For example, the financial gains from distributing courseware created by MIT faculty might support the continued evolution of those products, the development of new multimedia materials in different fields, or for that matter, the subsidization of other activities at MIT that are meritorious but not financially supportable without new revenues. Any restrictions placed on the distribution of new ideas in order to create licensing revenues must be carefully balanced against the effects of those restrictions on our long-term mission.

A second key principle is what is often referred to as "conflict of commitment." Being an MIT faculty member has always been seen as a full-time job in which our primary employment commitment is to the Institute. Our energies at creating new courses or developing new knowledge should, with some exceptions, be focused on our work here at MIT rather than in new companies or other universities. To the extent we serve as consultants to companies, it should be because these activities either enhance our effectiveness as researchers and teachers or enable us to migrate new ideas into actual use for beneficial ends. Similarly, if we are involved in creating new companies, it should be because that is the most effective way for us to translate our research into actual products and services.

(Continued on next page)

The Intellectual Property Dilemma

Lerman, from preceding page

It is notable that our universities have often interpreted conflicts of commitment quite differently. Princeton, for example, has generally placed significant restrictions on its faculty in applying the conflict of commitment principle; MIT has generally interpreted the principle far more loosely. As new opportunities arise for our faculty to teach and undertake research outside of MIT, we may choose to draw more heavily on the foundations of conflicts of commitment in limiting the faculty's options. For example, we may decide that it is inappropriate for a full-time faculty member to develop new teaching materials for exclusive use of a for-profit distance education company, particularly if the materials draw heavily on lecture notes and other materials developed for his or her MIT courses.

Another central principle is the "use of significant Institute resources." Briefly stated, this idea has served as the basis for determining whether intellectual property created by a faculty member belongs to the individual or the university. As with most universities, MIT has asserted its own ownership rights for any intellectual property that was created using one or more resources of the Institute to some significant degree. Some of these resources, such as the faculty member's office space or the use of the libraries, are by policy exempted from this criterion. Textbooks are considered the property of the author unless they were developed using MIT's funds allocated specifically to support the writing of those books.

The critical problem MIT and its peers face in applying the significant use policy in today's more complex environment is determining how resources such as computers, network servers, and support services for creating electronic media should be judged. Does it really matter if a textbook is in digital rather than printed form? Are Web-based lecture notes logically an extension of the idea of textbooks, particularly if these notes were created by a professor without the significant use of students or staff? How are ownership rights of such materials affected if funding from sources such as the d'Arbeloff Fund or the Microsoft-MIT I-Campus project is used in creating them? If MIT does retain ownership of such materials, does this imply that faculty members can no longer use these electronic resources if they leave the Institute for other universities? And, who shares in any revenues generated from the sale or licensing of such intellectual property?

In formulating any new policy, we should be careful not to confound the distinct issues of ownership, control of use, recognition for creative contributions, and sharing of revenues. Each is a distinct aspect of intellectual policy. For example, MIT's current patent policy provides MIT with ownership rights in most cases but requires sharing of revenues. Similarly, one can be the recognized author of a work without owning the copyright. In fact, most faculty members routinely assign copyrights to publishers as part of standard agreements. In doing so, we still retain the recognition as the author of those works.

All of these questions reflect realistic concerns of both the faculty and administration. There are an infinite number of situations one can reasonably envision that make it difficult to determine the ownership of new types of intellectual property, and no written policy can eliminate the need for case-by-case judgment. However, we should expect MIT to develop concrete policies that meet the following tests.

1. Our policies must clearly be supportive of our mission as a university. We should be able to clearly articulate how any proposed policy works to further our long-term goals.

2. The processes for determining how intellectual property policies are applied to specific cases should reflect a reasonable balance between the faculty's and administration's rights.

3. The policies must be applied uniformly across MIT, reflecting the notion that we are one faculty rather than a collection of different faculties. This has always been a central characteristic of MIT's governance, and has served us well.

4. Any new policies must continue to encourage the MIT traditions of leadership and excellence in all we do. Policies that create disincentives for innovation are sure to do damage to what makes us special.

5. Our policies should recognize that most intellectual property today and in the future does not and will not generate large revenues for anyone. The time and energy we devote towards resolving intellectual property issues needs to remain proportionate in some sense to the likely rewards. In many cases, the most sensible thing to do is to let the creators or MIT distribute intellectual property widely. In many if not most cases, this will mean distributing it free of charge, with the hope that MIT's reputation will be enhanced, and that this will in turn lead to continued philanthropic and sponsored research support. We must remember that gifts and sponsored research are vastly larger sources of funding than intellectual property revenues both now and in the foreseeable future.

I expect that there will be substantial discussion in the near future about intellectual property policies. The issues surrounding this area are complex and will require substantial involvement of both the senior administration and the faculty governance system. To be effective, any policy must evolve from a significant consensus that decisions derived from the policies will be fair to all involved and serve MIT's long-term interests.✣

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TEACH TALK

Active Learning, Part III
What Do the Students Think?

Donna M. Qualters

The last two *Teach Talk* columns have discussed "active learning" in the context both of the literature and its application at MIT. As you have already seen, active learning is fairly easy to implement and has proven to be beneficial in learning retention. But what do students think? Do they enjoy coming in and "engaging" with material, or would they rather sit quietly and take notes (and maybe sleep)? In Course 16 (Aeronautics and Astronautics) we decided to find out! Course 16 is piloting a new model which will provide the context for developing engineering education called CDIO (conceive – design – implement – operate) which is closely connected to the theory of active learning. In the fall of 1999, 113 students were surveyed from five pilot classes using active learning. We used a qualitative methodology, asking students to respond to the following four open-ended questions:

(1) Compared to traditional blackboard/lecture format, what are the relative strengths and weaknesses of the active learning teaching techniques (including muddy point, cold calling, turn to your partner, self-assessment, reading quiz, concept quiz, prepared notes, and hands-on activities)?

(2) Relative to teaching this class solely in a blackboard/lecture format, is the inclusion of these other teaching techniques improving your ability to learn the material?

(3) Relative to teaching this class solely in a blackboard/lecture format, is the inclusion of these other teaching techniques making the class more enjoyable?

(4) Reflecting on your experience as a learner, describe how you best learn new material, and how your learning style relates to the teaching methods you have experienced.

This kind of qualitative methodology is designed to describe different perspectives of the same event and facilitates an understanding of how individuals interpret their social context (Bogdan & Biklen, 1992, Galser and Stauss, 1967). Since the classroom can be viewed in a social context where there are potentially different perspectives of what occurs, applying qualitative methods to the data best allowed us to assess students' responses to active learning in the classroom.

Their candid replies were enlightening, dismaying, helpful, and hopeful at the same time. Four important ideas emerged from the analysis:

(1) the students generally had a positive attitude toward active learning techniques,

(2) these techniques were perceived to improve the learning environment,

(3) these techniques were perceived to improve their learning, and

(4) these techniques promoted thinking about how they learn and thus helped them to articulate their individual learning styles.

The negative perceptions centered on three areas: they reported concern about the in-class time these activities took, they feared they would not cover all the material in the course, and they were anxious about changes in classroom expectations.

Below are the students' voices as they wrote about how they felt regarding the experience of active learning in their classes. In responding to the strengths and weaknesses of active learning, some students were overwhelmingly positive.

*"Three words – **real world experience**! I cannot emphasize the value of learning through doing, and the CDIO experience capitalizes on every possible facet of this concept. The CDIO idea is very strong, very very strong. I've learned to deal with many real-world problems and issues that are inconceivable in a traditional lecture/ blackboard environment. This class has been the single most educational experience I've undergone at MIT. Furthermore, this class has been the most exciting class I've had at MIT."*

"Very good. Stronger than other classes in the fact that it is hands-on experience which is very important. You can compare it to [this class in the past] and you get to do hands-on work and that makes this class better, you have integration of material."

"The in-class exercises and concept quizzes help a lot because they let me know how much I learned and the professor knows what we didn't understand."

Others were more pragmatic about the activities.

"The active learning exercises are very helpful, forcing me to internalize concepts to such a degree that I am able to use them. It also helps break a kind of notetaking zombie mode and prevents me from falling asleep in class."

(Continued on next page)

What Do the Students Think?

Qualters, from preceding page

"The [new techniques] break up the monotony, changes the focus, which helps keep us awake, lets us see whether or not we're processing information correctly and lets us have it explained differently by peers."

For some, active learning was a connecting technique. It helped connect and integrate the material in a more coherent fashion and allowed students to establish a personal connection with the faculty.

"[Active learning] helps me see the relationship between what we're doing [in class] and real life. It cements what we do."

"In-class exercises are good because you put the material into practice right away. I like the self-assessment because I feel a better relationship with the professors."

"The in-class exercises are helpful, I think. It gives a good indication of whether or not I've ***really*** *understood the concepts."*

"The strengths of these techniques are that they make the class interesting and it allows for a new way to absorb the materials for it allows the student to argue their point (and) in order to make a successful point, you have to have understood the material."

However, as in all changing environments, there was some resistance and concern about the new techniques. The biggest drawback from a student perspective was the time element. Many felt that doing these activities took away from class time. Some feared they would not cover all the subject matter in the syllabus. Interestingly, no one mentioned the amount of material they might retain would be different, only the amount covered.

"Fun and helps me learn but TOO TIME CONSUMING."

"Less material covered, less theory, less class time!"

There was also a degree of anxiety about some of the techniques like cold calling (calling on a student who does not have his/her hand raised) and reading quizzes.

"I don't like cold calling. The lectures are fast enough that sometimes it's hard to keep up at the simplest level, and then if you get called on it's frustrating to have to try and answer a question."

"The active learning exercises are very helpful, forcing me to internalize concepts to such a degree that I am able to use them. It also helps break a kind of notetaking zombie mode and prevents me from falling asleep in class."

"I don't like cold calling. The lectures are fast enough that sometimes it's hard to keep up at the simplest level, and then if you get called on it's frustrating to have to try and answer a question."

Lastly, I guess it is a matter of perspective. After reading this student's comment I was not sure if this was a positive or a negative…. .

"New techniques are sometimes stressful, you actually have to think actively in a class!"

In assessing if active learning improved their ability to learn the material, students were overwhelmingly positive.

As they described it, the new techniques led to active engagement with the material that gave instant feedback on knowledge and skills. This in turn allowed them to better assess their knowledge and skills which led to more efficient studying which allowed more effective learning.

"This is a good way to check my understanding of the material."

"Generally all students are confused about similar topics in the lecture. With the new techniques we can stop the progression before it's too late to clean up the muddy parts!"

"Examples and working them in class are improving my ability to absorb and learn the material in class instead of taking notes and having to go over them in detail later (when I can't ask questions). Stopping to work an example gives me time to ponder the material and formulate questions. Most of my time in the traditional method is spent copying notes on the board."

For a few students though, it appears to be a matter of coping with change in the classroom or being flexible in their learning style. Some students felt these techniques did not match their learning style, or the different feel of the classroom made them uncomfortable.

"No (not enjoyable), but I think I'm being reluctant to change."

"I'm a big fan of blackboard use because it actually puts the student through the thinking process, rather than just putting up pages of equations on the overhead."

(Continued on next page)

What Do the Students Think?

Qualters, from preceding page

"No, they're not helping. Usually even if I get lots of sleep, I simply don't feel like actively participating in class because it requires too much effort."

Remembering that there are many dimensions to learning, we asked students a question about the affective domain and whether these techniques made learning more enjoyable. Most agreed that learning was either less boring, more enjoyable, or for some, actually fun! The students described a less pressured classroom atmosphere, and the enjoyment of learning and working with peers.

"Absolutely! While I sometimes fear being called on if I'm lost on a concept, [cold calling] keeps me alert. I also derive immense satisfaction and learning out of figuring out a problem in class and explaining it to my partner next to me."

"As I said, I enjoy the class a lot. Problem sets are actually fun and I feel less pressure in this class because we're all working together."

"Yes, working with other students promotes a healthy social atmosphere in the classroom. Also being able to work on projects is a lot of fun. It makes the work seem more like play time since we are doing something we enjoy but still learning."

The surprisingly few negative responses in this category were around the anxiety of cold calling and reading quizzes. Even students who were ambivalent still had positive things to say.

"The method [active learning] makes it frustrating at times since you're not sure where to go next, but ultimately the sense of accomplishment achieved is greater."

"Reading quizzes are a subject of dread, but other than that the added elements make the class more interesting"

"No, if anything class is less enjoyable. This may not be a bad thing, but these techniques do force us to pay closer attention which is not more enjoyable."

Lastly, there is literature that tells us that the more students know about how they learn the more effective learners they will be. We asked Course 16 students to reflect on what had occurred this semester, and to tell us how they learn and how these new methods relate to their learning style. Almost to the person, these students described themselves as concrete, hands-on learners. This is not surprising, as David Kolb has shown through his learning inventory, engineers are concrete/experiential learners. But the active learning techniques made students more aware of how they learn. This was best summarized by a student who told us:

"I best learn in an environment where I am asked to think for myself and come up with solutions. When I feel encouraged to think a lot and be creative and work the problems out, I learn far more than when I am asked to memorize solutions. I like how [with this method] we're given credit if we come up with some weird idea and fail to succeed in the task. You really encourage us to think for ourselves in addition to remembering formulas and such."

The results would indicate that students feel that active learning has value to them not only in the cognitive domain (what they learn), but in the affective domain (how they feel about the learning environment) as well. Course 16 is cautiously optimistic about the success of these experiments.

The data also tells us there are a number of challenges ahead. First, we have to institute a more effective assessment system to document quantitatively, as well as qualitatively, that active learning actually increases learning. Second, this data makes us realize that we must help students in the process of change. Many students come with expectations of very passive classroom experiences, and that expectation needs to be changed by continually apprising students of what we are doing, and more importantly, why we are doing it. We need to let them know that learning is about more than "covering material" or "gathering facts"; learning is about integrating and using information in a meaningful way. As one student so eloquently put it: *"They [active learning techniques] ask me to embrace the knowledge such that I can begin to work with it which makes me much more careful about understanding!"*✣

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> ***"New techniques are sometimes stressful, you actually have to think actively in a class!"***
>
> ***"I like how [with this method] we're given credit if we come up with some weird idea and fail to succeed in the task. You really encourage us to think for ourselves in addition to remembering formulas and such."***

Redefining Ourselves

Williams, from Page 1

campaign, the communication requirement, large-scale investment in educational technology, and above all the transformation of residential life (alcohol citation policy, graduate residents in FSILGs [Fraternities, Sororities, and Independent Living Groups], freshmen on campus, plans for a new undergraduate residence, revamped rush and orientation).

Did these events just happen, or were they destined in some way? Are they connected? We can easily feel buffeted by the waves of change, but I would like to focus here on the deeper tides flowing at MIT. One such current is moving MIT towards a new definition of itself as a university. A second is moving MIT toward a new social contract as a learning community.

It should be no surprise that MIT is redefining itself. Every university in the country is undergoing an identity crisis. The advent of information technology, it is often said, challenges the *raison d'etre* of the residential university. Why go to the expense of gathering people in one place at one time when information can be transported more easily and cheaply? Such arguments are flawed by a careless technological determinism (new IT inevitably produces new social organizations). They also confuse education with information dissemination. Education is a comprehensive process of human development; different forms are appropriate for different stages of life. For young adults who are ready to move away from their parents, but not ready to form families of their own, the intense social interactions of campus life are as essential to educational development as the classroom interactions. At an older stage of life, scholars continue to enjoy daily social interactions with other scholars who may not share their disciplinary specialty, but who do share a love of learning and commitment to teaching.

MIT is redefining itself as a university, not so much because IT compels it to do so, but because we are a "university polarized around science, engineering, and the arts," in President Killian's famous formulation. As the phrase has been handed down through the decades, "the arts" has tended to drop out – and in the more recent past, the meanings of "science" and especially of "engineering" have been mutating. In a talk this past fall, former provost John Deutch told MIT's Technology and Culture Forum that the distinction between science and engineering is rapidly disappearing. "Today we are faced not with disciplines but with situations…..The world is dominated by applications, not by technology generation."

In confronting any "situation," an individual needs to apply a mix of science, technology, and management skills. Our students understand this: a recent survey of 1991-99 EECS graduates showed that 30% aspire to be an "entrepreneur" while only 21% aspire to be a "technical leader." This is the deeper current that has motivated curricular innovations such as the communication requirement, as well as many recent initiatives in team-based and project-based learning. It also underlies some of the changes in residential life. If technical skills alone are increasingly inadequate for dealing with "situations," we owe our students a living environment as well as a classroom environment that will develop a full range of their abilities.

This realization has contributed to the second current of change – the rewriting of the social contract at MIT, or rather the first steps in rewriting it. In the mid-nineteenth century, also a time of rapid and confusing change, Matthew Arnold wrote poignantly of his sense of "Wandering between two worlds, one dead,/ The other powerless to be born...." The old world of MIT student life was overwhelmingly masculine, defiant and even resentful of the Institute, and jealously protective of choice outside the classroom (in large part, I am convinced, because choice within the academic realm was and is so constrained). The Institute, in turn, kept its distance from campus life, and for better or for worse students often took things into their own hands. For example, when I became dean, the office budget for freshman orientation was under $50,000, while the collective fraternity rush budget was in the high six digits.

The social contract had some real strengths, and for a long time it was stable. In the last five years, however, destabilization has become evident and irreversible. A low institutional rent structure has put severe financial pressures on the FSILGs. A dramatically higher percentage of women in the undergraduate student body caused multiple changes in residential organization and campus culture. Beyond MIT, there is a much higher level of expectation on the part of formal regulatory agencies (such as the Cambridge Fire Department or the Boston Licensing Board) as well as more informal sources (Back Bay neighbors, parents). But it is not fair to blame outside forces alone for higher expectations. They also come from

(Continued on next page)

Redefining Ourselves

Williams, from preceding page

within MIT. If education is (in the words of the Lewis Report) "preparation for life," then MIT has to prepare students for a world where community rights and individual rights must be balanced. If our students are to work successfully as scientists and engineers, they need to understand that in society as well as in nature, actions have consequences.

A compelling example is provided by the little publicized but important investigation undertaken by MIT in response to the death of Scott Krueger in September 1997. Following the September 1998 release of the report of the Suffolk County District Attorney, MIT initiated its own disciplinary investigation, as we had always said we would do once criminal proceedings were over. As a result, the dean's office brought disciplinary charges against individual students, which were heard by the Committee on Discipline (COD). In addition, the dean's office brought charges against the Phi Gamma Delta fraternity as a whole, which were heard by a dean's office hearing panel. The fact that the chapter voluntarily dissolved itself just before the grand jury reported was irrelevant: MIT still had a responsibility to investigate and if necessary to discipline the chapter.

While disciplinary action involving individual students is usually confidential, one student whose case was heard by the COD has revealed (in the process of suing MIT) that his diploma was revoked for a period of five years. What has not been publicized, but can be revealed because individual students are not involved, is the outcome of the dean's panel hearing of the charges against the fraternity. After deliberating the case, the panel decided that the Phi Gamma Delta fraternity should never again be allowed to have a chapter at MIT. The severity and finality of this decision indicate the emergence of a new social contract at MIT, where individual and collective accountability is valued along with individual and collective liberty.

To bring a new world of student life into being, MIT must continue to bolster support for residential and campus activities and to stabilize our still-too-vulnerable housing system. We are asking all residences – the dorms as much as FSILGs – to consider the campus-wide effects of their actions as well as the effects on the individual living unit. While I deeply believe that overall campus life will improve with a less Balkanized housing system, to the extent that this is still a belief rather than a reality – a world still struggling to be born – many students still feel keenly the loss of the old world and have their doubts about a new one. But at the Millennium Ball this January, we glimpsed the new world in the vision of a student center vibrant with music, art, sociability, and joy. Since then, it has seemed a long, cold spring, with evidence of frustration, lack of communication, and, worst of all, two student deaths. I hope that at the time of Commencement, we will gather at Killian Court to glimpse again the revitalized MIT community still struggling to emerge.

Another eminent Victorian, John Stuart Mill, asserted that he would rather be Socrates dissatisfied than a pig satisfied. MIT is full of dissatisfied people (even if we are not all as wise as Socrates) and this is generally to our credit. I myself am not satisfied with change. I want progress: positive change. MIT is a terrific place in many ways, but we could do better in giving our students a more integrated, more motivating educational experience.

In accomplishing this, the dean's office has a special role, for two reasons. First, it has the responsibility of connecting the residential and campus lives of our students, both graduate and undergraduate, with their research and academic lives. Second, the dean's office has the responsibility of taking a broad, comprehensive view of undergraduate education. Any model for significant, sustainable progress in MIT undergraduate education requires leveraging common resources and exploring boundary opportunities. The dean's office will inevitably play a leadership role in MIT education because the really exciting possibilities here involve the intersection of campus and academic life, the boundary opportunities, or both.

We may soon speak of "the deans offices" – one under the Dean for Undergraduate Education, one under the Dean for Student Life. I have no doubt that the two will work together closely. If there has been progress in MIT education in the past five years, it is above all in MIT's collective articulation of the principle that student life and learning are inseparable and interdependent. The two-dean structure will help us explore the implications of this fundamental advance in our educational philosophy. The next five years may not be as dramatic as the last five: frankly, I hope they're not. I do hope that in quieter ways, we will continue to integrate student life and learning, so that at the end of the decade we can look back and see real progress.✣

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Planning in the MIT Community

Keyes, from Page 1

Three years later at the March 2000 faculty meeting, the Final Report of the CUP Subcommittee on the Communications Requirement was presented – on schedule. After some intense negotiation, the proposal was approved by a strong majority voice at the April faculty meeting.

While no one should minimize the challenging issues of implementation that remain on the table, the die is cast and the Rubicon crossed. After three years of negotiation, discussion, argument, exhortation, experimentation, evaluation, bargaining, and consensus-building, one can state as fact that yearly requirements for communication-intensive courses will be a part of the MIT undergraduate curriculum.

During the three years between the initial motion to conduct "a series of experiments" and the final faculty vote this April, I served with Professor Gene Brown as co-chair of the CUP Subcommittee on the Communication Requirement. As a member of the Department of Urban Studies and Planning, what I often described during the three-year process as a department "on the far edges of the MIT Empire," I found the experience a fascinating opportunity by which to come to know the heartland of MIT – the Schools of Science and Engineering – and to witness the parallels between my experience in the community planning process in urban neighborhoods with that of planning in the MIT community.

The following narrative is *not* a blow-by-blow account of each move made in our journey to the April 2000 faculty meeting. That exercise would represent a sufficiently long and Byzantine account to end the engagement of those of you who have managed to read this far. Rather think of the following as constituting, in Don Schon's term, "reflections on the practice" of what Gene and I, our committee and a host of other members of the MIT "community" experienced during the past 36 months as we moved from the initial faculty resolution in the spring of 1997 to the affirmative vote three years later.

When our committee began meeting in the fall of 1977, there was unanimous agreement that we faced a steep uphill battle. Several of us had participated in a day-long event in January of 1997. At that time, a roomful of articulate people from both the academic and administrative sides of the Institute had reeled off a spool of reasons against a tentative proposal for a mandatory yearly communication course for all undergraduates. Hostility to the idea was the order of the day as professors from the Schools of Science and Engineering argued that MIT undergraduates had no time in their schedules for more requirements; that the demands of the professional fields were already overtaxing; and if MIT undergraduates were to learn how to communicate in writing, such lessons should be taught by the School of Humanities and Social Science. Representatives from HASS were not thrilled with the prospect of doing "remedial work" for the rest of the Institute and responded accordingly. Our committee and its exploratory, experimental charge was the outcome of that grim day in January when the voices of opposition to the idea of a communication requirement rang out with precision.

Searching for advice, we thought we might learn from the experience of past MIT committees that had addressed undergraduate education. Fortunately, there was a summary of such initiatives.

In December 1994, the Ad Hoc Working Group to Review Past Reports on Undergraduate Life and Learning, chaired by then Professor now Chancellor Bacow, submitted its report. That Committee had been set up to ". . .review a number of past reports of committees charged with evaluating different aspects of undergraduate life at MIT." The committee concluded that while it was

". . .impressed by the capacity of our colleagues to ***diagnose problems*** *and prescribe reasoned solutions. . . all too often the* ***process*** *by which we move the Institute from status quo to reasoned solution has been ignored. Our review of past reports leads us to believe that the committee process* ***frequently undervalues problems of implementation*** *as well as the reality* ***of resource constraints****. Furthermore, committees sometimes fail to look beyond their own membership in determining* ***whether broader support*** *exists for their recommendations."*

The Bacow Report's advice to any new effort to change undergraduate life was to focus on "a consensus building effort not just another report to be defended."

MIT as Institutional Ecology

As we began the 1997 Fall Offensive, process and participation issues were at the center of our agenda. The complexity of the institutional ecology in which we were operating was outlined in CUP's charge constituting the subcommittee:

"The CUP subcommittee is part of a complex network of individuals, committees, and academic units, each

(Continued on next page)

Planning in the MIT Community

Keyes, from preceding page

of which has responsibilities for moving along the Communication Requirement initiative."

In addition to the CUP itself that list included:

• The **academic departments** in all five schools;

• The **HASS Overview Committee** which supervises the writing component imbedded in the HASS-D requirement;

• The **Committee on the Writing Requirement** which is responsible for overseeing MIT's current writing requirement;

• The **Office of the Dean of Students and Undergraduate Education** which handles not only undergraduates but also the National Science Foundation grant with which we anticipated funding many of the experiments;

• The **Program in Writing and Humanistic Studies**: the academic unit that sponsors the majority of writing subjects at MIT.

To this list one has to add **the undergraduates** themselves and the **Chancellor**.

The "process" of conducting and evaluating experiments was to be negotiated through and with the "participation" of the institutional players in the MIT organizational ecology, any one of whom, if not engaged and supportive, could jeopardize the outcome of the faculty meeting in the spring of 2000. We needed a majority of the voting individuals at that event. While the substantive elements of our experiment were multiple and in many cases yet to be discovered, the "process goal" of our exercise was straightforward: get a positive vote at the faculty meeting two-and-a-half years down the road.

With this overarching political reality in mind, the Committee began to frame a strategy which, in retrospect and reflection, had the following components.

• Build "grassroots support" among the leadership in every department in the Institute to take part in the Communication Intensive experiment.

- Recognize the different communication culture among departments and delegate the responsibility for defining, developing, supervising communication-intensive pilot programs to the academic departments including the evaluation of their experiments.

- Let the HASS Overview Committee have primary responsibility for identifying existing communication-intensive subjects in its school and establish its own guidelines.

- Look for existing courses and activities in departments that could be tweaked into communication intensives.

• Make sure of a few early successful pilot programs in key departments in the Schools of Science and Engineering.

- Ensure that funding was available to support experiments and pilot projects and that help from the Committee on the Writing Requirement would encourage department-generated experiments.

- Keep the MIT administration informed, engaged, and supportive at all times.

In retrospect, our strategy seems to have been the right one for getting the kind of participation we needed for sufficient "buy in" at a full faculty meeting. Again, were this a case study, I would take you through the endless steps by which that strategy was advanced over the two and a half year period. Again, don't worry, I don't intend to do so.

I do, however, want to mention several "but for. . ." factors without which the best-laid strategy in the world would have ground to a halt in the institutional maze that is the Institute. I think there are at least eight such elements.

Access to the Heartland

Access and a positive reception was critical to our grass roots strategy. As a long-time member and former head of the Biology Department as well as former dean of the School of Science, Gene Brown is a highly respected veteran of MIT's Heartland. As we made the rounds of the various departments, it became obvious how often Gene had a "special relationship" with department heads or their key spokesperson. Gene got us in the door, got us the attention of those in power in the individual departments, and with his courtly and compelling manner got us their serious consideration.

"There is a tide. . ."

It became apparent as we made the rounds of the departments pitching our message about the need for communication – writing and speaking – that our message was *not* falling on deaf ears. Gradually it dawned on us that there was a "paradigm shift" in how scientists and engineers at MIT viewed the written and spoken word. Perhaps it was that graduates of the departments were letting their old professors know how important these concepts were given the new technology of dot/com and Power Point. Perhaps it was the fact that we were not asking departments to change radically the way they were doing business or telling them that we would impose requirements and standards

(Continued on next page)

Planning in the MIT Community

Keyes, from preceding page

from outside. We never quite figured out what caused the "supportive environment." But we certainly knew it was there. We were not fighting uphill against entrenched departmental opposition. Quite the contrary. People were interested, often enthusiastic and primarily concerned that they not be asked to deliver an unfunded mandate. Resources were the issue not the concept itself. Fortunately we could deliver on the resource issue when we asked for pilot efforts on their part.

The overall attitude among undergraduates, both those on our committee and others with whom we spoke at length, was supportive. Students expressed enthusiasm for efforts to improve writing and speaking skills as long as we were not increasing the number of required courses or dictating what courses had to be taken. What we thought might be viewed by the recipients as spinach – eat it, it's good for you – was seen rather as a necessary and desirable competence for the world of science and engineering beyond MIT.

Money Matter

It was the Committee's job to encourage experiments. But experiments cost money in terms of teaching time and course assistance. We could not convince departments to undertake innovative activity if we were only advocating "unfunded mandates." The NSF-funded project to "develop an integrated communication-intensive curriculum at MIT" along with other grants, such as resources from the chancellor and the William R. Hewlett Presidential Leadership Fund, provided greatly needed support for the first two years.

Building Trust

Our exercise in process and participation was imposed on an existing set of organizational relationships, many with long histories of interaction. Unsurprisingly, these relationships were a mixture of positive and negative. History matters. We were fortunate to be able to take advantage of the positive ones and repair damage where it existed. While we were viewed with considerable distrust in some quarters at the start (and in a few places at the end) trust among the players built as we moved forward. Events and decisions seemed to reinforce trust-building rather than the opposite. Dean Williams, Susanne Flynn, head of CUP, Steve Lerman, chair of the faculty, and Win Markey, head of the Committee on the Writing Requirement,were all "team players" who worked hard to move the agenda forward. They undertook the "institutional game" with the greater good of MIT in mind rather than enhancing the power of their committee or role. Their "public-regarding" behavior made an enormous difference in the outcome.

The HASS Factor

The assumption always was that HASS would play a major role in providing communication-intensive courses, particularly for the freshman and sophomore years. But it was a tough balancing act to insure HASS' involvement without its diverse departments feeling used by the rest of the Institute as simply "serving writing needs." The HASS Overview Committee did a masterful job of steering the "The Design of the HASS Component of the Communication Requirement" through the school's shifting tides and cross winds. At the HASS helm was the School's dean, Philip Khoury, who provided sustained and creative leadership and support throughout.

Super Pilots

It was clear from the beginning that early on we needed a few spectacularly successful "pilots." Among a large number of outstanding efforts, a couple are particularly worthy of mention. Professor Robert Jaffe in the Physics Department and Professor Paul Matsudaira in Biology took charge of projects that resulted in outstanding publications of student writing. The excitement and energy generated by both efforts had positive repercussions throughout their departments and beyond.

Support from Above

Larry Bacow was chair of the faculty when the motion was passed to undertake the Communication Intensive experiment. He had much to do with getting it on and through the faculty agenda. As soon as he became chancellor in the summer of 1998, it was clear the Committee had a champion at the top. The Chancellor remained one throughout the process in political, institutional, and financial terms.

Technical, Administrative and Staff Support

As our chief staff person, Les Perelman was a sign from the gods that they intended our experiment to succeed. We would not have made it without Les. His understanding of the institutional complexities of the MIT administration was that of organizational analyst. His capacity for work, for rolling out yet another memo, rivaled John Henry's abilities with that hammer. His knowledge of the actual process of academic writing in a technical institute was invaluable. He had great political judgment and an extraordinary capacity to keep his ego out of the room. Les' associate, Madeline Brown, was also a gift. Les counted on her as we counted on Les.

Jim Paradis, as head of the writing program, was the individual upon whom fell the day-to-day responsibility for providing the "writing support" to burgeoning experiments. It was his program and his "people" who had to carry the ever-expanding load of the experiments and the greater demands should we be successful. Jim bought into the experiment even when the going got rough and the issues of resource

(Continued on next page)

Planning in the MIT Community

Keyes, from preceding page

and organization were unclear. The legitimacy of our "department rounds" was underlined by the fact that Gene, Les, and I were joined by Jim. Jim's enthusiastic support at the final faculty meeting was courageous and critical.

Retrospective

In 1963, my first serious job after college was as a community organizer in Boston's South End. I was involved in trying to mobilize support from 16 neighborhood groups for an urban renewal project, part of Ed Logue's New Boston. The planning process was to culminate in a hearing at which all residents in the South End could show up and voice their opinion of the plan before the Board of the Boston Redevelopment Authority. If there was not a majority of approval at the meeting, the plan would have to go back to the drawing board. Getting the positive vote meant planning one neighborhood association at a time. Process, engagement, dialogue, and compromise were all in play in inching towards that public hearing. Almost 40 years later, the lessons of the South End were useful in the three-year effort to get approval for a communication intensive at a MIT faculty meeting. As Yogi Berra once said, it was really déjà vu all over again.✣

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The Engineer of the Future

Lightman, from Page 1

poor writing skills, and many students were no better able to express themselves as seniors than they were as entering freshmen. Similar conclusions have been reported by alumni of other technical institutions.

Inarticulate scientists and engineers will have troubles not only with the public but with their professional colleagues as well. As stated by Earl Dowell, chair of the national Engineering Deans' Council, "Too many times have I seen engineers, whose technical skills are superior, fail to communicate their ideas effectively and find that their ideas do not receive the attention they deserve." Communication skills have recently been elevated to high priority by the Accreditation Board for Engineers and Technology.

The vote by our faculty last month to implement a new communication requirement will not only address our own problems but also serve as a model for the nation as a whole. At the heart of the new program is the requirement that every undergraduate take at least one subject each year that includes significant work in writing and speaking. Our old writing requirement involved little more than a proficiency test, and the requirements at other technical institutions too often end with freshman expository writing. What is needed, and hasn't been offered in the past, is a sustained experience with writing and speaking.

Looked at another way, we and other technical institutions have failed in our responsibilities to prepare our young people for the future. The world today has become increasingly interdisciplinary. A problem in urban pollution might require the services of chemists and chemical engineers, aerodynamic engineers, economists, business leaders, and urban planners. A study of drug development and delivery might require the collaboration of molecular biologists, chemists, mechanical engineers, ethicists, and health managers. No longer is it possible for successful scientists and engineers to remain in their laboratories, talking only to fellow specialists. They must be able to discuss their results and ideas with a large range of people.

Beyond the ability to convey technical knowledge itself is the critical importance of understanding that knowledge within a broad human context. In our modern world of nanoseconds and gigabytes, it sometimes seems that technology is careening ahead, without any rider. Wireless telephones, virtual reality helmets, e-mail, gene therapy appear suddenly from nowhere and everywhere, like a Maine fog, and then stay. We are placing ourselves in danger unless we can guide our technology with human values. And that guidance ought to come from our scientists and engineers as well as from our producers and consumers, our capitalists and politicians. Who are we as people, and as a nation? Where are we going? We must deliberate the future, and we must deliberate it together. We do not have to live in a Greek tragedy. Our fate is not sealed.

The new MIT communication requirement is part of a vision of the scientist and engineer of tomorrow. Such a person understands the true needs of people as well as the needs of machines. Such a person not only knows the future but knows that the future is not fixed. Such a person helps shape the future, tells, and listens.✣

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Faculty Pass Revisions in End-of-Term Regulations

Donald R. Sadoway

On April 19, 2000, the faculty voted to amend the *Rules and Regulations of the Faculty* in accordance with the recommendations of the Faculty Policy Committee Subcommittee on Examination and Term Regulations. The new regulations will take effect in the coming academic year, 2000 – 2001, and affect only undergraduate subjects. Here are the salient features along with some of the background. [The report can be read in its entirety at <http://web.mit.edu/faculty/reports/exam-termregs/>.]

This effort was motivated to a large extent by the seemingly growing number of end-of-term violations reported by students to the chair of the faculty. As well, the increase in the number of evening tests scheduled by daytime classes was posing problems. In parallel, the existing regulations were a patchwork derived from various sources and in some instances lacking faculty approval. In short, it was time for a full review.

The committee was chaired by myself and consisted of Professor Paola Rizzoli, chair of the Committee on Academic Performance; Professor Arthur C. Smith, chair of the Committee on Curricula; Dr. Alberta G. Lipson, associate dean, Office of Academic Services; and Mr. Jeremy D. Sher, chair of the Undergraduate Association's Student Committee on Educational Policy. The report was compiled and edited by Ms. Mary Z. Enterline, associate dean, Office of Academic Services.

The central issue for the committee was how to craft a minimal set of regulations that discourage bad practice without restraining faculty creativity. In order to help us find our way we enunciated these five principles, which inform our conclusions and serve as the basis for our recommendations.

1. **The highest priority is student learning.** Examination policies must reflect the commitment of our entire community – faculty members, staff, and students – to providing an education of the highest quality. Accordingly, everyone involved in the process is expected to act in ways that make sense from the standpoint of enhancing student learning. Regulations should enable actions that serve to enhance student learning and should restrict actions that, however well intentioned, detract from the overall learning experience.

2. **Student learning as defined by the Task Force's Educational Triad encompasses academics, research, and community.** The Subcommittee reaffirms the Educational Triad concept enunciated by the Presidential Task Force on Student Life and Learning. "Academics, research, and community are all important to education; each of these areas should be conducted in ways that both contribute themselves and enable the contributions of the other areas." Examinations fall within this purview.

3. **Regulations must enable MIT's educational mission.** All regulations should be viewed in the context of the educational mission. They are not intended to micromanage faculty members as they go about the business of teaching.

4. **Regulations must be adopted by the faculty.** The regulations that govern academics at MIT, including those pertaining to examinations, are faculty regulations. Those pertaining to examinations must be published prominently and disseminated widely amongst the faculty and students, so there can be no justifiable excuse for not knowing them.

5. **Every academic activity must take into account the many demands on a student's time.** Faculty members cannot expect to be able to optimize without external constraint any individual subject they teach; students have other time commitments. Hence, assignments must be viewed in the context of the time requirements of the subject as published in the Bulletin. Problem sets, term papers, laboratory reports, and other work products during the semester must be constructed so that they can be completed within the weekly time allowance by the majority of students in the class (not by only the top students).

Here are the major changes. Text in italics is lifted directly from the revised *Rules and Regulations of the Faculty*. Remember, this affects only *undergraduate* subjects and only during the *fall* and *spring* terms.

1. **Announcement of Assignments at Beginning of Term**

The faculty member must provide to students, by the end of the first week of classes, a clear and complete description of the required work, including the number and kinds of assignments, the approximate schedule of tests and due dates for major projects, whether or not there will be a final examination, and the grading criteria and procedures to be used. The precise schedule of tests and major assignments must be provided by the end of the third week.

The intent of this regulation is to ask faculty to lay out their plans at the beginning of the semester so that students can make informed decisions about which subjects to take and how to budget their time during the semester.

2. **Testing During the Last Week of the Term**

There shall be no tests after the Friday preceding the start of the Reading Period, to be called the Last Test Date.

The Subcommittee examined the present regulations governing tests administered during the last week of the semester in subjects without finals and concluded that the distinction set forth between tests and comprehensive examinations in the current regulations are ambiguous and effectively unenforceable. Under current regulations, tests must be restricted to subject matter taught in the last part of the semester. Comprehensive examination of the entire semester, even by a test lasting only a single class period, is forbidden. The rationale for this policy is that the last week of term is very hectic, and students do not have adequate time, without the benefit of the reading period, to review the entire semester's material. Therefore, the current regulations state that comprehensive examination of the entire semester must be done by holding a final examination that is scheduled during the final examination period. The Subcommittee judged it inappropriate to attempt to regulate content. Besides, the main issue is the time pressure placed upon the student during the hectic last days of the

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Faculty Pass Revisions in End-of-Term Regulations

Sadoway, continued from preceding page

semester. In particular, this is precisely the time when cumulative projects come due. To avoid overloading, to allow students time to focus on the term projects, papers, and presentations, and to give students the benefit of time to review over the reading period, the Subcommittee concluded that it makes sense to shift all testing out of the last week of class and into the final examination period, regardless of the topical coverage of the test.

3. **One End-of-Term Assignment for a Subject without a Final**

For each subject in which there is no testing during the final examination period, at most one assignment may fall due between the Last Test Date and the end of the last scheduled class period in the subject.

The change, here, is in the interpretation of the regulation. In some subjects, an oral presentation is scheduled at the end of the term to be accompanied by the submission of a written report. The Subcommittee believes that it is in the spirit of the regulation to require *both* an oral presentation and a written report when the two derive from the same project. In other words, the assignment due the last week has two components: an oral component and a written component. Accordingly, the Subcommittee recommends that faculty members be allowed to require in the last week of semester an oral presentation and a written report when the two are parts of the same assignment, i.e., work products for the same project.

4. **Take-home Finals and the Like**

Ex camera finals may be held with the permission of the chair of the faculty. Permissions for ex camera finals shall be granted for no more than five years. The following restrictions apply: the ex camera final shall be offered over the course of a single afternoon, starting at 1:30 P.M. and ending no later than at 7:30 P.M., and students shall be permitted unrestricted use of resources.

In order to avoid the situation in which a take-home final in a single subject consumes vast quantities of students' time during the final examination period, the Subcommittee reaffirmed the current ban on take-home final examinations. At the same time, the Subcommittee supports adding more flexibility to the current testing format. The result is the *ex camera* (out-of-room) final (specification set forth above).

Ex camera examinations are intended to be a different mode of testing, used only in a limited number of subjects. The Subcommittee sees giving students access to computers and libraries as justification for *ex camera* examinations. *Ex camera* examinations can also be designed to evaluate student ability to select resources and answer questions of an integrative nature. *Ex camera* examinations are not intended to be opportunities to double the amount of material covered in conventional examinations.

5. **Testing Outside Regularly Scheduled Class Times**

The length of tests held outside scheduled class times shall not exceed two hours. Such tests must be scheduled through the Schedules Office. They may begin no earlier than 7:30 P.M. and may not be held on Monday evenings. A student who is unable to take the test owing to a conflict with a scheduled academic exercise or extracurricular activity shall be allowed to do so at another time.

The rise in frequency of evening tests poses scheduling problems. Recognizing that many students participate in athletics during the 5-7 p.m. period, the Subcommittee believes that students need some time to compose themselves between athletics and evening tests, so evening tests should start no earlier than 7:30 p.m. The Subcommittee makes this recommendation with the expectation that a student with a 7:30 test will be released from athletic practice as if he/she had a 7 p.m. class. By the same token, students who have academic exercises until 5 p.m. cannot be required by their coaches to leave class early.

6. **Governance**

Questions arising regarding interpretation of these regulations and requests for exceptions to regulations shall be referred to the chair of the faculty who will direct them to the appropriate committees. Exceptions to regulations shall be granted for no more than five years.

The regulations should not work at cross-purposes with the principles. Faculty who wish to conduct classes in a manner proscribed by the regulations can turn to the chair of the faculty for permission to do so.

7. **Violations**

The Subcommittee recommends that violations of regulations continue to be reported to the chair of the faculty. However, in a departure from current practice, the Subcommittee recommends that the chair of the faculty contact not only the faculty member whose actions are in question but also his or her department head. The hope is that it will become a matter of pride on the part of the department not to be confronted with "problems" in connection with violations of regulations.

8. **Dissemination of Information**

In the opinion of the Subcommittee, there is an acute need to raise faculty awareness of the relevant policies and regulations. Recall that when MIT became proactive on the issue of sexual harassment, an educational campaign was an integral component of the program. The Subcommittee believes that making deans and department heads more knowledgeable about the issues would help raise awareness among faculty.

It is not unusual to be asked why MIT has such an elaborate set of regulations governing term tests, final exams, and end-of-term practices; other schools are far less litigious in these matters. Indeed, at the time Lotte Bailyn asked me to chair this committee my predisposition was to reduce the number of rules to near zero. However, as I studied the files of reports of violations I came to appreciate that, in the words of Paul Gray, MIT is a special place, with the following curious mix. Faculty are judged primarily on their research, which by necessity must be conducted at the highest level. In parallel, they are also required to teach. Thus, the students are treated to this same high-intensity delivery; a huge amount of material conveyed at great speed. The faculty want their students to master the subject matter, but our unbridled enthusiasm can be so overwhelming as to have a quenching effect on learning. It is the hope of the Subcommittee that the revised regulation will provide a framework in which everyone involved in the educational process can flourish.✣

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New Initiatives To Improve Quality of Life at the Institute

Phillip L. Clay

Junior Faculty Research Leave

This winter, Academic Council approved a new Junior Faculty Research Leave Program. The Program is effective July 1, 2000.

The purpose of the Junior Faculty Research Leave Program is to assist untenured faculty in their pre-tenure years by providing a concentrated period of time during which they can engage in research to advance their careers.

The research leave is a one-semester leave with pay, taken during years two to six of the faculty member's probationary period. All tenure track faculty are eligible for the leave. This leave may not be taken during the faculty member's first year of appointment or the last year at MIT. Faculty members who have been given a terminal appointment may not be granted a research leave.

Faculty members should apply to their department head for the research leave. Faculty are expected to consult with their mentors and the department head about the timing of leaves to ensure the best use of the opportunity and to be consistent with the faculty member's teaching and other obligations.

The application should be in the form of a proposal outlining how the faculty member will use the time and how the work proposed fits into the faculty member's research agenda. Applications should be submitted to department heads based on their local schedules, keeping in mind that planning and financing are part of the annual budget process. The dean of the School and the provost must approve all applications.

Junior Faculty Leaves are intended for research and should not be confused with other types of leave, such as Personal Leave or Parental Leave, or with the various relief from teaching arrangements Schools have in place. Leaves must be taken during the second through the sixth year and are lost if not taken. These leaves should also not be confused with the traditional Faculty Sabbatical which is only available to faculty who have been awarded tenure.

The Junior Faculty Leave does not stop the tenure clock and does not affect the timing of sabbaticals that might be awarded to junior faculty if they are subsequently awarded tenure. Departments may, at their discretion and expense, extend the leave beyond one semester or provide additional considerations, including components of a faculty start-up package or teaching relief.

During the transition period (school years 2000-2001 and 2001-2002) where existing junior faculty who have not previously had this opportunity take advantage of this new program, the following schedule applies. In Year 1, 2000-2001, leaves are only available to faculty who are in the fifth and sixth years on the tenure track. In 2001-2002, the leave is available to faculty in years three through six. In the third and subsequent years, faculty in years two through six may take the leave.

Expanding Daycare at MIT

There is an increasing recognition of the importance quality child care plays in balancing work and family life among faculty and staff at universities. It is also true for graduate students and postdocs where both parents are not home during the day.

For faculty, child care is of special concern. Day care is not only scarce, but expensive. Faculty parents are sometimes new to the Boston area and cannot tap into informal family or community resources which they might have had in their communities of origin. While faculty sometimes have flexibility, they also work long hours and irregular summer schedules. Many faculty and staff share common backgrounds and interests and seek an environment where their children can share this richness.

A growing number of universities recognize that they are major employers and like other major employers, have a responsibility to develop day care opportunities and to provide other services to support parents. While there are altruistic motives at work, there are also competitive reasons to address this growing need. For example, prospective faculty may be more impressed with an offer of a faculty appointment from a university that provides child care than from one offering a faculty club.

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New Initiatives To Improve Quality of Life

Clay, from preceding page

MIT is planning a new child care center as part of the Stata Complex, scheduled to open in 2003. Based on the recommendation of a faculty committee chaired by Professor Leigh Royden that explored child care issues, and following the trend of other large, family-friendly employers and universities, MIT seeks to expand community resources in this important area. When all phases are complete, as many as 104 new slots will be added. Significantly, a large number of the slots will provide care to infants. MIT child care facilities will serve children of MIT faculty, staff, and students on a priority basis, and will include children from the wider community, if space permits.

MIT is not new to this activity. The new center will be the first on-campus facility added at MIT since 1965 when the Technology Nursery School (then at Westgate), later named Technology Children's Center (TCC), opened a second site at Eastgate. There is also a child care facility at Lincoln Laboratory in Lexington.

The new center at the Stata Complex will be a state-of-the-art facility designed by world-renowned architect Frank O. Gehry and Associates, with Gail Sullivan Associates, a local architecture firm specializing in child care facilities, serving as program architect. Members of the MIT community can view a rendering of the Stata Center at: <http://ciis.lcs.mit.edu/>.

The present attention to child care does not lessen the need to acknowledge and search for approaches to other aspects of the work-family balance. Members of the community are wrestling with managing their obligation to care for elderly parents and ill spouses and partners. Others worry about the activities of older children after school. Parents who already have dependable child care arrangements have special needs during school vacation times and when caretakers or their children are ill.

As part of the planning for the new center, the Stata Child Care Center Committee is currently surveying members of the community about their child care needs and concerns. If you currently have children under age 13 or if you expect to have children in the next 5 years, you are invited to complete the survey by going to the Web at: <http://web.mit.edu/personnel/www/frc/>.✣

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MIT Faculty
as of 10/31/99

Professors	584
Associate Professors	178
Assistant Professors	169
Senior Lecturers, Lecturers, and Professor Emeriti	423
Instructors (includes technical instructors)	102
Adjunct Faculty	6
Teaching Assistants and Graduate Instructors	706

There are 931 faculty members (professors of all ranks) including 144 women, 15 of whom are members of U.S. minority groups.* One hundred six men on the faculty are members of U.S. minority groups.**

*Five Asian Americans, 6 African Americans, 3 Hispanic Americans, and 1 Native American.
**Seventy-two Asian Americans, 19 African Americans, and 15 Hispanic Americans.

Source: *Facts 2000*

From The Libraries

The DSpace Project

Margret Lippert Branschofsky

The MIT Libraries and the Hewlett-Packard Company recently announced a $1.8 million joint project to build a digital repository at the Massachusetts Institute of Technology that could serve as a model for other universities. The purpose of the project is to build a stable and sustainable long-term digital storage repository that provides an opportunity to explore issues surrounding access control, rights management, versioning, retrieval, community feedback, and flexible publishing capabilities.

DSpace will include articles written by faculty and researchers, technical reports from MIT labs and centers, and other electronic content deemed valuable by the MIT Libraries or its partners among the schools, labs, and centers at the university. The ability to manage multimedia electronic formats will be an important aspect of this repository, which could include text, images, audio, video, and datasets.

One feature of the repository will be a simple yet controlled submission process that allows each community (i.e., department or research center) the ability to develop its own vetting system to control which publications are to be included in the repository. Similarly, there will be an access control mechanism built into the repository that allows each community to control who will have access to its documents. This will make it possible to provide open access for some documents upon submission, while limiting access to specific groups for other documents. It will also be possible to change these restrictions at a later date. For example, a document may be visible only to a select few reviewers until it is approved for broader distribution. Additional restrictions may be attached to certain documents; for instance, MIT Press or MIT Document Services may restrict printing of their DSpace documents until payments are made to them. A mechanism for associating these rights (or restrictions) with the documents and rigorously enforcing them will be an important part of the DSpace project.

DSpace also hopes to foster a dynamic scholarly community by experimenting with community services and utilities such as class groups, interest groups, and review groups. Documents in DSpace could be linked to feedback and commentary from the community at large via a set of annotation services. Automatically alerting users of new submissions in their topic areas might be another way to build a community of scholars.

Publishing capabilities that take advantage of the "print on demand" possibilities of DSpace will include local quick print capabilities and "back room" books-on-demand systems now being created within Hewlett-Packard. Printing services and finishing work will be explored to meet the needs of the university market. Other forms of "publishing" will also be tested, such as Web or screen "fulfillment." Such publishing may mean the delivery of a document, per user instructions, to a Web browser in a presentation suitable for convenient viewing.

An important measure of the success of DSpace will be the extent to which the MIT community uses this repository. Part of the initial phase of the project is to gather as much information as possible from members of the MIT community about how they would use such a repository and how they would like to see it work. We would like to talk with as many of you as possible about the kinds of digital content you would like this repository to hold, how you see your department or center contributing and reviewing submissions to the repository, what kind of interface you would like to use with it, what kinds of search and retrieval mechanisms you and your students prefer, and what value you perceive in maintaining such a repository for MIT and the research community in general. The project team plans to incorporate user suggestions and requirements into the design of DSpace.

During the development period of the project, submissions to the repository will be accepted from a small number of "lead user groups," while access to the documents will be limited to MIT and HP only. It is expected that DSpace will go live in September of 2001, accepting submissions from all of MIT with potential retrieval by users around the world.

All faculty interested in sharing thoughts and ideas about DSpace, or those interested in participating as a "lead user group," are encouraged to contact me at 3-1293 or *(lippertm@mit.edu)*.✣

Committee on Student Affairs To Reassess its Role

Candace L. Royer

The Committee on Student Affairs (CSA), a long-established faculty committee whose primary charge is in regard to "student life and the quality of the learning and living environment at MIT," is re-examining its scope and effectiveness.

In fact, CSA has suspended work on projects previously identified this year in order to look more closely at its charter and the influence of its decisions over the past several years. The need for this introspection comes as the result of a proposal submitted to Chancellor Bacow in October 1999 as part of the Unified Response to the Residence Proposal (URRP). Students who participated on the Strategic Advisory Committee (SAC), which authored the URRP, made several suggestions that appeared as overlapping responsibilities for their proposed "Student Life Council" and the current Committee on Student Affairs. Due to this potential overlap, the Chancellor suggested that the CSA both consider the SAC proposal and perform a self-assessment in the time remaining to the committee this semester. The CSA membership agreed. What follows is an overview of the suggestions of the Strategic Advisory Committee and the CSA assessment results to date.

The Student Life Council (SLC), as conceived by the SAC, would be composed of the new dean for Student Life (ex officio), faculty, administrators, and both graduate and undergraduate students. It would have standing subcommittees in three areas: strategic planning, programming, and monitoring student life at MIT. The Council would fundamentally be responsible for the following:

- Developing a unified strategic plan for the student life system;
- Serving as the Institute's main deliberative body for cross-cutting student life issues;
- Considering capital projects, including proposals for new construction and renovations;
- Overseeing major projects to redesign areas of student life;
- Monitoring the state of student life at MIT, and either making or recommending changes implied by the results of the monitoring process;
- Exercising oversight authority on new regulations of student conduct and changes to existing regulations;
- Coordinating community-wide programs, and encouraging experimental innovation in student life policy.

The CSA has taken steps to explore these recommendations with a subset of members of the SAC. In doing so, the CSA has discovered that there are two primary motivations for the establishment of a Student Life Council. First, students reported that there are few efficient conduits for affecting change when student life issues arise. Some students believe that the Institute administration has been unresponsive or indifferent to repeated requests for establishing systematic pathways that could be utilized by students to bring their issues to the attention of the administration.

Second, students wish to play a more decisive role in determining the direction that student life will take at MIT in the future. They believe that their intimacy with issues provides them with the most informed view for effective decision making.

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Some students have suggested that the CSA has not succeeded in consistently advocating for changes that are important to the vitality of student life at MIT. Therefore they propose, at a minimum, to re-charter CSA, or to supplant it with the Student Life Council.

In addressing the proposal by the SAC, the CSA has drawn on several resources. Among these are the chairs of other faculty committees, administrators at MIT, student members of CSA, and the deans of both Graduate Students, and Minority Education. The CSA has reviewed the

(Continued on next page)

Committee on Student Affairs To Reassess its Role

Royer, from preceding page

position description for the new Dean for Student Life and has spoken extensively with the existing Dean for Student Life.

After listening attentively, and we hope responsively, to all constituent groups interviewed to date, the Committee plans to submit a draft proposal to the Chancellor that is intended to address the following:

- The re-naming of the CSA to the Committee for Student Life;
- Expansion of the mission and scope of the Committee to strengthen its role as an advocate for student life issues;
- Awareness of the conduits and re-organization of the structures that will permit all students effective access to the decision-makers;
- Committee membership issues to assure that the "right" people are at the table to discuss and deliberate on issues affecting student life;
- Revitalizing the credibility of the Committee in the hope of attracting faculty members who desire to be part of a committee that will substantively address changes needed in the student life arena;
- Providing an "issues clearing house" for students who need historical background, advice on structuring, or who to contact on ideas for improving student life;
- Providing a conduit for faculty and staff who wish to be substantively involved in improving student and campus life;
- Establishing subcommittees, when necessary, to investigate and make recommendations to the Dean for Student Life on relevant issues/ concerns;
- Promoting linkages between CSL and other faculty committees whose work affects the quality of student life at MIT;
- Engaging student leaders on a regular basis to "take the pulse" of the student community;
- Working with student groups and staff administrators who assist students and promote student satisfaction through organizations, programs, and residence-based living and learning initiatives.

It is important to note that some current members of the Committee on Student Affairs believe the Student Life Council concept goes too far in attempting to manage the student life aspect of MIT through a committee. The SAC makes thoughtful arguments for more student inclusion in decision-making that affects student life. However, the role of faculty committees is to advise on matters that require administrative action, not to take on the responsibilities of strategic planning and final decision making.

The CSA membership does realize, however, that changes are needed. As outlined above, the CSA will move to expand the mission, scope, and effectiveness of this important faculty committee. We believe that the concerns promulgated by the Student Advisory Committee can be substantially addressed through this proposed restructuring of the Committee on Student Affairs.

We invite faculty responses to the issues as outlined and encourage you to direct them to me.✣

[Candace L. Royer can be reached at clroyer@mit.edu]

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Enrollment 1999-2000

Undergraduate Enrollment	**4,300**
First-year*	1,055
Undeclared Second-year*	11
Special Undergraduate Students	8
Architecture and Planning	68
Engineering	2,011
Humanities and Social Science	142
Management	220
Science	785

*MIT students do not enroll in an academic department until the start of sophomore year, and may defer the decision until the end of that year.

Graduate Enrollment			**5,672**
	Master	**Doctoral**	**Special**
Architecture and Planning	358	184	11
Engineering	1,408	1,096	50
Humanities and Social Science	21	290	4
Management	788	119	14
Science	31	935	8
Whitaker College	5	276*	10
CAES	-	-	64

*This number includes 181 students working on Harvard degrees.

Source: *Facts 2000*

Office of Corporate Relations Launches Faculty Liaison Plan

by Karl F. Koster

To better serve the MIT faculty, the Office of Corporate Relations (OCR) has developed and begun the implementation of a Faculty Liaison Plan. This plan was developed through extensive discussions with faculty members and with OCR's Faculty Advisory Committee. The objectives, benefits to the faculty, and our implementation plan are noted below.

Objectives

Through this plan, our objectives are to:

1) Communicate broadly the mission of the Office of Corporate Relations – including the Industrial Liaison Program (ILP) and Corporate Development – to the faculty.

2) Help junior faculty members make contacts with industry through the ILP and ensure that all faculty interested in exploring potential support from ILP members can connect easily with member firms.

3) Systematically understand and collect the interests and expertise of the faculty to facilitate the dissemination of that information to the corporate community, as appropriate.

4) With guidance from the Deans, support ongoing fundraising initiatives and develop new initiatives with the Schools. As possible, aid the faculty in identifying potential funding contacts for research from ILP members and other companies.

Benefits to Faculty

Enhance exposure of your research to companies.

One-on-one sessions with OCR client company representatives can provide you opportunities to obtain research support, to increase student fellowships and employment opportunities when there are matches with company interests and recruiting objectives, and to learn of consulting opportunities.

You can publicize your research through OCR's *The MIT Report,* through e-mail event announcements that OCR sends to clients, and by maintaining your listing in the KnowledgeBase, OCR's on-line directory of MIT research.

Supplement your travel funds by participating in OCR-sponsored travel to company sites.

Enhance your knowledge and perspective.

Through OCR-sponsored contacts with company representatives, you can learn about industry, including current issues and trends; obtain feedback on your research; and gain examples for teaching.

You can learn about MIT research through the OCR KnowledgeBase, at the OCR/ILP Website: <http://ilp.mit.edu/ilp>. You can also get updates there on the OCR and on ILP member companies.

Earn discretionary funds.

When you participate in ILP and other OCR activities, you earn a share of ILP revenue. When you help bring companies into the ILP, you can earn finders' fees.

Implementation

An OCR Officer is responsible for each MIT School and Department. In meetings with the Deans, the Officers identify the key fundraising initiatives on which to concentrate their efforts. With the Department Heads, the Officers explore opportunities for gaining familiarity and increasing their involvement in the department's activities. Together they develop a plan for the Officer to contact new, junior, and other faculty members who may not be familiar with the OCR.

As part of the Faculty Liaison Plan, OCR has created a *Guide for Faculty and Staff*. This guide has been mailed to all MIT faculty members. It describes the OCR, ILP, and Corporate Development, highlights the benefits to the faculty of working with OCR, and provides information on OCR staff contacts, revenue sharing, and other MIT resources for working with industry.

The former OCR faculty travel coordinator, Debra Thibodeau, is now faculty liaison coordinator. For more information on the Faculty Liaison Plan, the name of the OCR Officer who works with your Department or School, or to arrange to visit an ILP member company, contact her at 617-253-8990. If you would like an extra copy of the OCR *Guide for Faculty and Staff*, she can provide it as well.

It is our intent that this new Faculty Liaison Plan will assist the MIT faculty while furthering the mission of the Office of Corporate Relations, creating and strengthening mutually beneficial relationships between MIT and corporations worldwide.

We look forward to working more closely with you.✣

[Karl F. Koster can be reached at koster@ocr.mit.edu]

Reporting Outside Professional Activities

David Litster

At the end of every academic year faculty and research staff at MIT are asked to report to their department head or laboratory director information about their outside professional activities during the past year. This year there will be two new forms in the OPA package. The new forms are for those who are principal investigators or co-investigators on projects funded by the U.S. Public Health Service (i.e., NIH) or the National Science Foundation. Everyone else may discard them.

Since October 1995 agency regulations have required all investigators who submit a proposal to the PHS or the NSF to disclose to MIT the existence of any significant financial interest that might appear to be affected by the investigator's research. The PHS and the NSF issued the regulations in response to a few well-publicized situations in clinical medical research. The intent was to identify and avoid a conflict which might arise if the outcome of the investigator's research could materially impact his or her personal wealth. It is the responsibility of MIT to certify to the agency that there is no conflict of interest or, if there is one, that it is being managed appropriately.

The law also requires that PHS- and NSF-supported investigators update their disclosures annually. Earlier this year, federal officials were at MIT and expressed their concern that the Institute's compliance with the law was not entirely satisfactory. From colleagues with whom I have spoken, it seems that not everyone recognized the importance of this disclosure process, and that our current forms are so detailed and hard to figure out that they provide little incentive to comply. Accordingly, we have simplified the forms, and the annual updates will be done as part of the annual report to the Institute on outside professional activities. We hope this will be administratively more convenient as well as indicate that the process is important to MIT. The same forms will be used for the disclosure that is required whenever you submit a new proposal to one of these two funding agencies.

From colleagues with whom I have spoken, it seems that not everyone recognized the importance of this disclosure process, and that our current forms are so detailed and hard to figure out that they provide little incentive to comply. Accordingly, we have simplified the forms, and the annual updates will be done as part of the annual report to the Institute on outside professional activities.

If you would like to see the current draft of the two new forms, you may find them on the Web at <http://photon.mit.edu/opa/>. The disclosure level is low, $10,000, and the reach is broad, being the aggregated amounts for the investigator, investigator's spouse, and all dependent children. Consequently, almost every PHS or NSF investigator whose spouse is employed by a for-profit company or a public or non-profit organization will have to make a disclosure; almost none of these will represent any kind of conflict of interest but they will generate work for those involved. However, you will only need to disclose that the financial interest exceeds the threshold, not how much it actually is. Whatever we may think about the effort involved, the regulations do require these disclosures and we do need to comply. As we all know, even completely innocent connections can be misunderstood if not disclosed, so the disclosure will provide a measure of protection for PHS/NSF investigators and for the Institute.

These new forms were created and the disclosure process modified in order to be available in time for this year's disclosure of outside professional activities to MIT. We intend to monitor the process and to work with the Committee on Outside Professional Activities to make any changes that will make it function even better in the future. If you have comments or suggestions as you go through the process this year, please send them to me *(litster@mit.edu)* or to Bill Porter *(wlporter@mit.edu)*, who is the chairman of the Committee on Outside Professional Activities.✣

[David Litster can be reached at litster@mit.edu]

Education of Our Leaders in the Next Century

Mark Johnson

The past half-century has been a particularly good period for the Massachusetts Institute of Technology. While MIT has long been known as perhaps the world's premier technical institute, MIT has considerably expanded in reputation, becoming one of the leading international institutions of learning at both the undergraduate and graduate levels. MIT's reputation is perhaps even more exalted outside the United States as compared to that within this country, but everywhere, as the twenty-first century begins, it is viewed not only as a fine technical school but also as one of the most elite and prominent educational institutions on the planet.

Well, what has MIT been doing right? I propose that MIT has done nothing fundamentally different in 1999 than was being done in 1949. Instead, we might say that the Mountain appears to have come to Mohammed rather than Mohammed going to the Mountain. Technology has become the mantra of the last part of this century, and the educational process has necessarily put more emphasis on the technical subjects – math, physics, chemistry, biology, and especially engineering. As MIT has always been very good at teaching technical subjects, it is not at all surprising that MIT has vaulted to near the top of the rankings, as top students have increasingly chosen a more technical education.

MIT has not been alone in this success. If we consider the top 10 colleges ranked in the *U.S. New and World Report* for 1998, we see other universities that specialize in engineering and technology including Stanford, Cornell, California Tech, and Northwestern. Northwestern is notable since the University of Chicago, long viewed as the "elite" university of Chicago, was ranked lower than Northwestern in 1998. The most highly ranked undergraduate schools in the United States are no longer the exclusive territory of the Ivy League schools. They increasingly have had to share these rankings with the more technical schools. While these rankings likely have little meaning regarding the true quality of education, they tell us much about people's perceptions of the changing educational environment.

As we move into a new century, I believe that these schools, that have their strengths in technology, have an opportunity to examine this changing environment and decide what their mission should be into the next century. While it will be tempting for these schools to continue with their strength given that technology seems to be taking an ever more dominant role in society, there will be new possibilities that will arise for those schools that have, somewhat fortuitously, risen to near the top of the heap.

The top schools in the United States, particularly the top 20 or so, have as part of their mission, to train our future leaders. Technology is without question an area that our leaders will increasingly need to understand since they will, by necessity, be making an increasing number of decisions concerning technology and its application to society. However, a university that has developed excellence in technology is not necessarily one that will excel in training future leaders. Should a university decide that it would like to include training of the nation's leaders as part of its mission, it must include a well-rounded education as part of its curriculum, of the type traditionally associated with the Ivy League schools.

Now I suspect that it would be argued by members of the administration of these "upstart" universities that they need not take the route followed by Ivy League schools: Look how many national and corporate leaders have already been developed by these technical schools. And yes, they have had considerable success. MIT alone can claim recently a Secretary of State, Director of the CIA, Secretary of the Air Force, many CEOs, not to mention founders of numerous startup companies. I, however, would again claim that the universities have been fortunate due to the rising importance of technology, and that their weaknesses in providing a well-rounded education has so far been more than offset by their technical expertise, especially given the technical weakness of the traditional schools where future leaders once trained.

But new competition is developing. Ivy league schools are beginning to strengthen their technical programs and hope to reclaim what they have lost. Perhaps of even more significance is the development of a few universities with a strong technical reputation, but with an equally impressive reputation for providing a well-rounded educational experience. Foremost among these is Stanford University, which has demonstrated not only leadership in technical areas, but is also ranked as a leader in a wide variety of academic pursuits. Stanford is not unique in this regard, as other

(Continued on next page)

Education of Our Leaders in the Next Century

Johnson, from preceding page

universities, such as the University of California at Berkeley, have a similar reputation.

These universities have built well-balanced programs that leave them well-poised to be the leading universities of the next generation. Their success clearly involves a diverse faculty. I would propose that there are other important characteristics of their success. These include a well-balanced student body and a learning environment that foster well-balanced growth.

Balance is the key, and balance comes from a recognition that undergraduate education should not be focused upon optimizing how much information the students are taught. Instead, it is about teaching the student how to learn and how to become a life-long student. It is also about opening vistas and viewpoints to allow flexibility in thought. While many technical schools seem focused on long hours of work and homework sets, a balanced education requires time for other areas of learning; organized extracurricular activities, social interactions, athletics, and significant time for talk between the students, perhaps among the most important of educational experiences.

Courses that emphasize problem sets have been a mainstay of the technical universities. Problem sets teach problem-solving techniques, and this is a crucial skill taught by these universities that is valued not only in the pursuit of science and technology, but more recently by investment bankers, financial analysts, and others in areas where technical skills have found new applications. However, my impression is that recently professors at technical universities are using problem sets not only to teach how to solve problems, but are increasingly using them to introduce the students to a wide variety of technical topics. This is not to say that homework sets, tests, and hours upon hours of study are not central aspects of the educational process, but when studying begins to squeeze-out all other activities (as it does at several of the top technical universities) the educational process is not enhanced.

Students need time to be introduced to other areas, and they need time for personal growth. They need time to read the classics, to expand their communication skills, to investigate the arts, to understand history and politics, and they need time to mature and to interact with their peers. They very much need time for extracurricular activities. For most students, the college years are the first time that they are out on their own and making most of their decisions by themselves. Their growth as an individual is just as important as their growth in knowledge.

It is notable that Stanford's unique educational environment includes athletic teams that are competitive in almost all sporting areas with the very top universities in the country. Thus, while a number of East Coast universities maintain that athletics must be kept at a Division III level to prevent a diminution of the educational mission, Stanford has managed to consistently produce top athletes in a wide variety of sports (including the major sports) while also producing what is unquestionably academic excellence.

Athletics is a central part of a well-rounded education. There are the old saws about the importance of learning team-work, learning about your own potential, experiencing new activities, and health benefits of sports. However, these objectives can largely be met with a physical education program. Intercollegiate competition, especially at the highest levels, inspires a dedication and enthusiasm not seen in intramural sports or local interscholastic competition. This is not to degrade those pursuits, but leaders are exceptional individuals that excel when given exceptional challenges. Furthermore, at the young ages that these individuals prepare to attend college, these athletic dreams are frequently foremost in their thinking. Those universities wishing to recruit these future leaders must necessarily provide the challenges these student athletes seek.

Academic excellence, athletic and other extracurricular opportunities, a diverse faculty, and a balanced learning environment: These are the characteristics that talented students and potential future leaders look for when choosing a university. A university that excels in all of these characteristics is going to have a well-balanced student body. It is the interaction among these students that is perhaps the most important aspect of the university educational experience. Their discussions with one another, both relating to academics and other aspects of their formative years, are the foundation of the learning experience. For these discussions to achieve their maximum possible impact requires a well-balanced student body, of the type that will be drawn to a well-balanced university. The "nerd" label, still associated with the students of some technical universities, will continue to hamper their efforts to diversify the educational experience of their students.

While new opportunities for an expanded educational mission will likely arise for the top technical universities in the country, these universities will necessarily need to decide whether such an expanded educational mission might interfere with what has up to now been their fundamental mission, namely that of providing the finest technical education possible. Most of the universities will likely decide that continuing to provide the finest technical education need remain their fundamental focus. However, a few of these universities might find that their unique capabilities will allow them to somewhat alter their mission and aid in producing a new generation of leaders better able to address the many technical challenges they will face.✣

[Mark Johnson can be reached at m-johnson2@nwu.edu]

Student Leaders Report

Undergraduate Association

The Importance of Faculty-Student Interactions

Matt McGann

I keep hearing about "faculty-student interaction." What is this? Why do all these reports continue to talk about it?

One aspect of this is a yearning for the better pieces of the Oxbridge model. During a trip I took to Cambridge (England) last year, I was struck by the integration of each college's faculty Fellows into the overall life of the university. Our host was New Hall, one of three all-female colleges, founded in 1954. At New Hall, several nights a week the faculty and students dined together in a formal setting – a little stuffy by MIT standards, but an effective method of bringing together faculty and students. The Cambridge colleges also have a teaching-advising system which appears to bring students and faculty into closer intellectual contact, which I won't describe here. I'm not advocating for turning MIT into Cambridge, but it does seem that there are certain aspects of our English peers that are somewhat enviable.

Not too long from today, we will have a number of Cambridge undergraduates amongst us, studying here as a part of the Cambridge-MIT Institute. Will they be surprised at the relative divide between faculty and students? Perhaps. I also believe that the cry for closer faculty-student ties is a recognition of the failure of the traditional, large lecture-style teaching that we all too often employ at the Institute (see my column from the last issue). By utilizing passive learning techniques, we further increase the divide between faculty and students.

There is no one to blame here. Largely, I suspect that the "faculty-student divide" is due to our unique MIT culture. The environment is intense for faculty and students alike, we're driven by the constant need to publish, to complete the project, pass the exam, finish the lesson plan. Outside of UROP and small seminars, we don't have much time for each other.

I've heard faculty complain that students don't seem to be interested in talking to them; no one shows up during their office hours or talks after class. I've also heard students complain that faculty aren't interested in further interaction; faculty-student mixers in the living groups are often forty undergraduates and two graduate student TAs.

(Continued on next page)

Graduate Student Council

Faculty Advisors: How They Can Make a Difference

Luis Ortiz

In this month's article I hope to accomplish two things. First, I would like to continue the topic from my last article by providing some depth to the discussion of the graduate student advising issue. Additionally, I intend to focus on how faculty can be involved in making a difference on student-identified issues. This will relate both to the particular issue of graduate student advising, as well as the general case of student educational issues.

I would be remiss if I failed to point out that for graduate students, cost-of-living issues continue to be of paramount importance. This manifests itself in the need for more safe and affordable housing close to campus, as well as more competitive stipend rates (see April's *Graduate Student Newsletter* (GSN) for analysis of the stipend rates at MIT) and affordable health and dental care. This case has been made for a number of years, and its efficacy is apparent to most members of the community – including the senior administration. Cost-of-living issues, while pressing at the moment, are not the only critical need for graduate students. We are here to gain an advanced education and the academic environment is not always arranged to best meet our needs or even to recognize that graduate student needs are critical issues for MIT.

A graduate student's relationship with his/her advisor has the potential to be the strongest educational component of that student's time at MIT. I personally attribute much of my personal growth and professional maturity to the interaction I have had with my excellent thesis advisor. As a matter of fact, the Graduate Student Council has the honor of recognizing outstanding contributors in the arena of graduate student mentoring and advising by presenting the Perkins Award each spring at MIT's Awards Convocation. Unfortunately, not everyone has such a fruitful relationship with their advisor and not only is it an amazing opportunity lost, but often it develops into a counterproductive experience where everyone loses.

The three main concerns that graduate students have expressed about advising at MIT are:

1. Insufficient support structures;
2. Abusive advisor-advisee relationships often linked to the power structure based on funding;

(Continued on Page 27)

The Importance of Faculty-Student Interactions

McGann, from preceding page

Neither faculty nor students are more "responsible" for the divide. Faculty, at the end of the day, have families to return to, children to see. Students return to their "safe haven" living group to retreat from academic rigors during the day. Many students tell me they are not interested in spending more time with faculty; I hear their comments echoed by many in the faculty.

To our credit, though, MIT does have a program which brings faculty and students into frequent close intellectual contact – UROP. One indicator of UROP's success in this area is the fact that the largest proportion of student recommendation letters are written by UROP advisors. Another is the anecdotal evidence I hear from peers. The UROP program is one of MIT's premier programs, and it is my hope that all opinion leaders in the Institute community will continue to recognize its importance.

The success of UROP is proof to me that despite cultural norms, students and faculty are happy to interact, given the right settings. A potential example: everyone needs to eat. Lunch is an untapped opportunity for community gatherings. This term, the Dean's Office has sponsored monthly freshman-faculty lunches (FFLs). The FFLs have been quite a success! Using the draw of food and interesting conversation, each of the FFLs has brought together interested freshmen and motivated faculty to discuss choice of majors, academic life, MIT culture, and much more.

I'm very interested in continuing to look for ways to bring together faculty and students. I'm here because the greatest faculty and students are here, and I'd like to take advantage of that during my time at the Institute. I hope you'll all want to join me.

If you have any ideas or thoughts, please send me an e-mail at ua-president@mit.edu. Together, we can make this a great place for everyone. In closing, I'd like to say that this will be my last column as Undergraduate Association President. It's been a great experience, and I've enjoyed working with the faculty and administration to make MIT live up to its tremendous potential. On May 8th, I'll pass the reins to Peter Shulman, a junior in mathematics. Peter is very much looking forward to continuing our dialogue through this column and other means, and will be a great representative of students.✣

[Matt McGann can be reached at madmatt@mit.edu]

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Letters

E-Mail Policy Guidelines

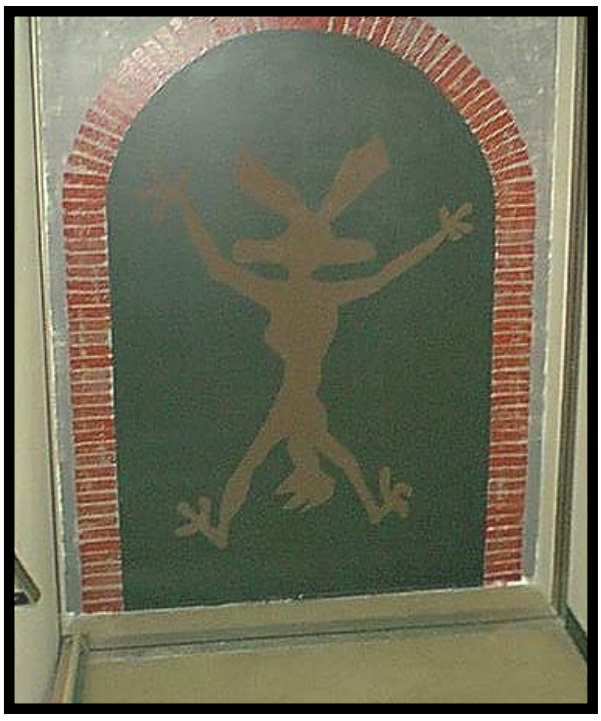
To The Faculty Newsletter:

I suggest we accept Professor Lerman's guidelines for dealing with e-mail as a policy for the whole Institute. Several of these I have used in my research group for a few years and they work very well. I would only like to add one: Don't forward e-mail without the consent of the sender. On many occasions I have seen e-mail from me show up in people's mailboxes for whom it was not intended.

Professor Gerd Ceder
Department of Materials Science and Engineering

Faculty Newsletter Contest

Where in the Institute is this located?



Faculty Advisors: How They Can Make a Difference

Ortiz, from Page 25

3. Poor career advice for students considering alternative career tracks.

This information was first presented in an article written for the February GSN entitled "Advising Misadventures." The anecdotes in that article highlight concerns about funding, work ethics, and thesis signing and are merely a segment of the numerous concerns that we receive. As the article states: "Although there is support to help students through these problems, students do not usually have the confidence to report their problems. They can eventually end up in circumstances beyond hope. There is a great need to create a better atmosphere of support and understanding...." This could happen to any student and while formal mechanisms exist, they are often either impractical or insufficient. There are large disincentives for graduate students to talking about these issues, and often they simply put their head down and trudge through hoping that they will be able to put this experience behind them once they get their degree. I hope that these are not the graduates that MIT strives to produce. We can do better and graduate students deserve better.

Now allow me to turn to the second goal of this article: how faculty can be of assistance. In the advising case, each individual faculty member can try to improve the mentoring relationship with the recognition that this is the critical part of the education that you provide to graduate students. Additionally, there is a commitment from the Graduate Student Office and the chair of the faculty to hold a seminar series in the fall for new students (roughly called "Grad School 101") intended to make students aware of what life at MIT will be like and the resources and techniques at their disposal. These are admirable measures, however I do not think they get to the core of the issue. I honestly believe that most, if not all, of the faculty actually put in their best effort on graduate student advising. Additional information is always an asset, so the seminar series is also attractive. However, the core issue lies in the situation when advisor-advisee personalities are mismatched or when the power relationship is being abused. Many times the individuals involved share much different perceptions of the situation and the extent of the problems may not be apparent to both parties. Where is the safety net in this situation? I believe one exists at MIT, however it is positioned far too low and the size of the mesh is far too coarse such that students fall a long way before finding help, and sometimes they slip right through.

So, again, how can the faculty be of assistance? In my opinion the solution lies in a simple, four-word sentence: *Participate in the dialogue!* At MIT, I believe that too much of the substantive discussion is missing when it comes time to make a decision or set policy. There is no dialogue on this campus on far too many topics, or if dialogue does exist it happens among small subsets of the faculty, students, and administration. Without a supporting dialogue, far too many of the decisions made are influenced by the personal background of the individuals involved and anecdotes (which may or may not be representative) replace the rich information that dialogue can yield.

How would I like to see this operationalized? First, when you see a topic or argument placed into the public discourse, respond. Whether you agree or disagree is not the important point. Rather, just expressing your opinion in response to an argument or statement can produce amazingly beneficial consequences. It seems that open discussion on non-research related issues at MIT is taboo – that is unhealthy. I have been president of the Graduate Student Council for the past year and I have yet to hear from a faculty member, either in a supporting manner or telling me that I am off my rocker. For exactly that reason, I approached the *Faculty Newsletter* to bring the discussion to you. Still, the silence is deafening.

I would like to believe the faculty agrees with all of the assertions I made about housing, advising, and career needs, but I am hardly so naïve. Don't go easy on student leaders. We need your thoughts and criticisms to gain a better understanding and develop a better solution. The only way that happens is if you, the faculty, actually respond when we put issues into play. When you read *The Tech*, take the time to send a letter to the editor or even write an editorial. Speak with your research group about the issues and find out what students in your department think while also expressing your opinions. The single most useful thing that the faculty can do for graduate students is to participate in the dialogue.

We eagerly look forward to your thoughts and comments!✣

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M.I.T. Numbers

Comparative Library Expenditures for Liked-Sized Institutions FY 1998/1999

	Full-time students: Total	Graduate	Total Library Expenditures	Expenditure for Serials	Total Expenditure per Student
Stanford	11,745	5,337	$52,772,788	$7,515,033	$4493.21
Yale	10,832	5,451	42,791,000	6,289,000	3950.42
Emory	9,883	3,792	23,209,335	5,053,972	2348.41
WUSTL	9,842	4,393	22,250,970	4,435,653	2260.82
Chicago	10,024	6,229	21,967,696	5,402,537	2191.51
Duke	11,137	4,833	23,807,735	5,929,558	2137.72
Vanderbilt	9,566	3,834	17,427,569	4,577,145	1821.82
Georgetown	11,077	5,056	17,610,000	4,600,075	1589.78
Northwestern	13,861	5,965	20,271,953	4,310,569	1462.52
MIT	9,642	5,538	13,718,367	3,907,607	1422.77
Miami (FL)	11,956	4,130	12,833,500	4,644,507	1073.39

Source: Association of Research Libraries