

MIT Faculty Newsletter

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in this issue we offer Faculty Chair Bish Sanyal's "Worrying About Others: Notes on the Unfolding Financial Crisis" (page 4); a piece on "... The Urgent Need for Increased Nuclear Power" (page 6); and "Can We Fix American Education During the Current Economic Crisis?" (page 8).



The Renovation of 10-250: A Case Study

Mary Callahan

FLASH BACK TO 1977. Jimmy Carter was president, "Night Fever" by the Bee Gees was the number one song, and gas was 55 cents per gallon. A six-month renovation of lecture hall 10-250 was complete and ready for the newest class of MIT freshmen. What did faculty and students encounter in the new space? To start, 450 purple-colored seats with honey oak wood trim and improved acoustics made 10-250 very popular. It was *the* meeting place at the Institute.

Flash forward to 2007. 10-250 was still *the* meeting place at the Institute, but after 30 years of oversubscribed 3,091 lectures, Nobel Prize announcements, and faculty meetings, the room looked worn and well used. Purple upholstery and oak trim, hip and smart in its day, now looked dated, the chairs were small, many chair backs were breaking and the carpeting was

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A Call for Articles for Special Edition Faculty Newsletter

A SPECIAL EDITION FACULTY Newsletter, directed toward President-elect Obama and his administration, will be devoted to providing a forum for addressing issues of science and technology and for articulating clear strategies for their development in the twenty-first century.

The FNL Editorial Board has selected a set of topics and will be recruiting authors from our faculty. We plan to set aside space for additional unsolicited short (500 words) articles capturing the diversity of expertise and creative understanding represented among our faculty and their colleagues.

If you are interested in authoring a piece for the Special Edition, please e-mail your topic and a one or two sentence summary of its content to fnl@mit.edu. We will get back to you with information on related articles. Deadline for proposed articles is December 23, and the final article must be completed by January 22. ■

Editorial The State of the Institute?

THE RECENT STATE OF THE INSTITUTE presentation by the President, Provost, and Executive Vice President and Treasurer presented a uniformly rosy outlook on all aspects of Institute life. We have not polled our colleagues, but are aware of junior and senior faculty, undergraduates, graduate students, and staff who either face – or perceive they face – difficult times ahead.

We reprint here parts of one response from an undergraduate, which although perhaps anecdotal, gives a sense of the malaise probably felt by many individuals in our community.

The following excerpts are from an opinion piece published in *The Tech* by Jennifer Nelson '09, "The Institute of Perfection." [*The Tech*, October 3, 2008, Vol. 128 No. 44.]

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The State of the Institute?
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**The Institute of Perfection
How the State of the Institute Ignored
All of the Things MIT Is Doing Wrong**

"I sat down on the end of a row just before the State of the Institute speech began, and quietly introduced myself to the woman next to me. She wanted to know what I was expecting President Hockfield to talk about. I guess I was expecting a mention of the supposed drop in student integrity, or the demise of the moral hacker, both of which were highlighted in that recent e-mail that caused such uproar among students. As I explained this, the woman next to me seemed surprised, and told me she was wondering about the status of the Stata leakage lawsuit.

So President Hockfield's cheerful speech was not exactly what we thought it would be. These are unsettling times, Hockfield began, referring to the latest problems on Wall Street. But that was about as dreary as her message ever got.

Hockfield launched into a huge list of what MIT is doing right ... and completely ignored what we're potentially doing wrong. Among the strengths that Hockfield mentioned were our balanced budget for FY2009, [...]. Professor Drennan of the Chemistry Department became the first professor in history to become both an HHMI Professor and an HHMI Investigator, five professors were accorded high honors in one week alone ... need I go on?

Most of Hockfield's speech focused on the Institute's professors, building, and finances. So where were the students? MIT students were the focus of only one short video clip. The clip showed various students talking about how they want to help people around the world with everything from energy concerns to eradicating poverty and disease. An admirable cause, to be sure. But slightly unsatisfying if you were looking for the true state of the Institute.

After hearing that inspiring clip and those incredible statistics, I thought to myself, "Is this really the same school I go to?" I mean, sure, we're amazing students, among the best and the brightest from around the world, but it's a bit hard to believe that our institution is

this amazing despite the Wall Street fiasco, the lack of funding from the NIH, and the stressful pressure to find new energy sources. Aren't we noticing the pinch at all? Even a tiny bit?

Hockfield is confident that MIT will pull through and solve the world's problems. I have my doubts. Although, I suppose that it's true that if there's anything an MIT student is good at, it's coming up with creative solutions to a problem when you have no idea what the heck is going on.

But what about that scathing integrity email that hit MIT students so hard? Hockfield never mentioned it once. In fact, Hockfield never mentioned anything at all critical about anybody.

That's a little bit of a disconnect. Am I missing something here?

Jennifer E. Nelson is a marginally dissatisfied member of the Class of 2009."

* * * * *

We have begun our editorial with Jennifer Nelson's opinion piece for several reasons. First, what students think is important, especially MIT students, who hold us to high standards, the same high standards we try to instill in them. Second, rather than an unhelpful "flame," the style of the article is serious and thoughtful. Even the signature is measured – Nelson characterizes herself as "marginally dissatisfied." Third, and most important, is the letter's message.

We understand the rationale for going with a positive "State of the Institute" address. For one thing, pointing out the Institute's strengths might make an alumnus more inclined to donate generously. But we also know there's more to be said about where the Institute is right now, and presenting only an upbeat view is not very satisfying to faculty, staff, or students.

The MIT faculty should be seriously discussing many problems currently facing us. Examples include: 1) the proposal to increase the size of the undergraduate student body with no increases in size of faculty or support staff, despite an evolving teaching philosophy at MIT that puts more and more emphasis on faculty/student

interactions, especially in the freshman year; 2) the impact of almost certain sharp cutbacks in NIH/NSF budgets on the ability of graduate students and postdoctoral staff to secure good research opportunities and challenging, well-paying jobs; 3) continuing problems in formulating and implementing diversity policies and articulating specific goals, including directly addressing the blow to MIT's reputation following the James Sherley case; 4) student unhappiness over MIT's handling of the Star Simpson '10 case; 5) the Institute's plans for financial constraint as highlighted in the November 17 e-mailed "Letter to the Community on MIT Finances" by President Hockfield and Provost Reif.

We applaud President Hockfield's recent appearance at the MIT Undergraduate Association's Senate meeting on November 4, 2008 (*The Tech* 11/4/2008, V128, N53), which concluded with a discussion of the administration's handling of the Star Simpson '10 case. This is the sort of frank exchange that gives credibility to the administration, and we wish for that sort of forthrightness in all of the administrations' communications with the broader MIT community.

With the current historic global financial crisis expected to last a year or more, usual sources of Institute funding will certainly be affected; industrial research support, government funding, financial contributions and other gifts, student tuition payments, and more will likely suffer. Serious and honest discussions between faculty and administrators regarding MIT's budget and potential areas for savings need to occur, with particular emphasis on how this can be achieved without affecting MIT's role and mission while maintaining our commitment to student support.

Perhaps the "State of the Institute" forum is inevitably going to be a public relations production, perhaps not, but in any case there should be some forum where the faculty and administration can discuss the many difficult issues facing the Institute – frankly and candidly. ■

Editorial Sub-Committee

From The Faculty Chair
**Worrying About Others: Notes on the
Unfolding Financial Crisis**

Bish Sanyal

IT IS BUT EXPECTED that faculty at all ranks will be deeply concerned about the impact of the current financial crisis on their personal finances. Likely they are also concerned about the Institute's overall financial health, and how that would affect the quality of their lives, personally as well professionally. Such concerns pervade through all ranks of faculty: senior faculty over the age of 60 are concerned about the shrinking of their retirement savings; others are concerned whether annual salary increases will be frozen. There is some anxiety over whether the increasing federal budget deficit is likely to influence the availability of federally sponsored research; and whether research support from private industry, which has been on the rise for the last five years, will decline.

I have heard concerns from junior faculty with the rank of assistant professor or associate professor without tenure who worry about the impact of the financial crisis on the prospects for tenurability. The cost of childcare remains a key concern to junior faculty; they worry that if the current financial situation does not improve funds for building new child care facilities will not be available, nor will there be funds to subsidize child care costs. Such anxieties take on a different level of intensity for non-tenure-track faculty, who are most susceptible to budget cuts at all universities. At MIT, the President, Provost, and other senior members of the administration have urged the faculty not to panic, because the Institute is now in a relatively good position vis-à-vis, say, five years ago. Still, faculty are concerned, as they should be, when they check their retirement accounts or read in the news about the

steady decline of the general economy and how other top ranking universities are responding to the fiscal crisis.

Although it is natural to be concerned about one's own financial well-being at times such as these, we must acknowledge that as faculty – particularly those on

Although it is natural to be concerned about one's own financial well-being at times such as these, we must acknowledge that as faculty – particularly those on tenure track – we are less vulnerable than many others within the larger MIT community.

tenure track – we are less vulnerable than many others within the larger MIT community. Take the students, for example, who must rely on financial assistance based on the financial status of their families. Since family incomes are likely to decline – through job loss or drops in investment income – many of our students may face financial difficulties. Even though the Offices of the Deans of Undergraduate and Graduate Education are equipped to deal with some fluctuations in financial need, if the magnitude of the problem becomes significantly large the Institute will have difficulty bridging the gap in financial aid. For international students, who rely on loans from banks, this problem may become even more acute as lenders terminate loan programs previously geared towards students attending top ranking universities, such as MIT.

These sorts of situations are likely to increase student anxiety. As Chief of MIT Mental Health Services Alan Siegel advised me recently, some students even may begin to feel guilty for creating hard-

ship for their families. As faculty, we need to be aware of such plausible outcomes as we interact with students both in the classroom and as advisors. In general, MIT faculty do not spend much time advising students; and most advising at MIT is limited to discussions of academic

performance and course choices. Still, if Alan Siegel is right, the faculty now needs to spend a little more time advising students, and inquiring – without violating the students' sense of privacy, of course – whether the students' performance is being affected by financial worries.

Some faculty may not know how to structure such a conversation, if a student shows signs of anxiety or depression; after all most of us do not know the financial situations of our students, and also may not be aware of different financial options available to them. That is why it is important to have departmental discussions where all faculty can be informed about various resources – including counseling – which are available at MIT, and a general awareness of students' financial problems must be inculcated in the faculty so they can serve as empathetic and wise advisors, and not as individuals who simply sign the students' registration forms once each semester.

A second group within the MIT community who needs the faculty's care and

concern now more than ever is the support staff – who are rightly anxious that their jobs will be first in line for cuts if the Institute is forced to restructure because of budgetary problems. At first glance, the support staff may not seem as essential to faculty as, say, their research and teaching assistants; but, as we learned, painfully, during the early 1990s when MIT tried to re-engineer itself, the support staff's contribution to faculty productivity is essential. So it is important now for faculty to ask the reverse question: What affects staff productivity; as well as how are these individuals dealing with financial uncertainties that are likely to be more severe than our own? In these lean times recognition of appreciation

for their assistance (even a simple “thank you”) can go a long way toward lifting and maintaining morale.

MIT's Human Resources office, under the leadership of Alison Alden, can serve as a resource for faculty members who have questions about assisting staff members through anxious times. The departmental administrative officers can also advise the faculty regarding organizational processes and interpersonal communications, which may be necessary to reduce uncertainties, anxieties, and misunderstandings.

In sum: We are witnessing a period of unprecedented financial problems that is likely to affect all institutions, including

the ones with large assets. Fortunately, educational institutions such as our own are likely to become more, not less, important to society even if the financial problems worsen. Since no one really knows how our economic future is likely to unfold, what we are ultimately left with is a moral choice: either we can withdraw into our self-protecting emotional and financial cocoons, or we can contribute to the strengthening of the MIT community by caring for our students and staff. This is the moment that will test how much we really do care about the MIT community. ■

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Please Vote!

Steven Leeb

DURING THE FALL OF 2008, the Committee on the Undergraduate Program (CUP) reviewed the final report of the Educational Commons Subcommittee (ECS), a subcommittee of the CUP. This final report led to a formal motion made at the November 2008 Institute faculty meeting. This motion proposes a number of changes to the General Institute Requirements.

The General Institute Requirements (GIRs) are in many ways the central statement of vision, culture, and procedure that binds our diverse community together. The GIRs are the red carpet that

greets the youngest and newest members of our community. Traditionally, the effort of bringing proposed changes in the GIRs to the faculty meeting floor has served as an affirmation of our community principles, and as a sentinel for the quality of what is arguably our single most important educational program.

Paragraph III of the motion, if adopted, would have the effect of transferring the responsibility of reviewing and approving changes to the Science and Mathematics GIRs away from the faculty as a whole, giving full authority to the CUP.

The last quarter century may not have seen a more important matter come to the faculty floor for a vote. Please do not let the December faculty meeting pass without your consideration and participation.

The full text of the motion can be found in Appendix E1, pages 28-30 of “Enclosure B” sent via e-mail to all faculty members with the agenda for the November 19 faculty meeting. This enclosure can be found online at: web.mit.edu/dept/libdata/libdepts/d/archives/facmin/081119/081119.html. ■

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A Perspective on the Future Energy Supply of the United States: The Urgent Need for Increased Nuclear Power

Ulrich Becker
Bruno Coppi
Eric Cosman
Peter Demos
Arthur Kerman
Richard Milner

The Problem We Face

THE RELIABLE AND AFFORDABLE availability of energy is the lifeblood of human civilization in the twenty-first century. It is essential to the quality and security of everyday life of the citizens in the United States. For example, the sudden loss of electrical power invariably reduces living conditions of the most technologically advanced society to a primitive state. The protracted loss of electric power would lead to chaos in the United States, with resultant instability worldwide. Recently, it has become clear that the future energy security of the United States is at serious risk from two different sources.

Most of the energy used in buildings, industry, and transportation arises from the chemical burning of fossil fuels. The waste produced in the burning process includes greenhouse gases (e.g., carbon dioxide, methane) which for the last 200 years have accumulated in the Earth's atmosphere. The present concentration of carbon dioxide in the Earth's atmosphere is estimated as 385 ppm, which substantially exceeds the estimated values over the last 500,000 years. Basic scientific arguments tell us that the increased carbon dioxide levels should result in heating of the Earth's surface. Measurements indicate that the average temperature at the Earth's surface has significantly risen over the last 100 years. If humanity wishes to preserve the planet on which human civilization developed, significant changes in the way we produce energy are urgently required. This is a global security challenge where the U.S. must play a leadership role.

Secondly, the energy supply of the United States relies to a great degree on the reliable and affordable availability of oil. For example, transportation (road, rail, sea, air) depends almost completely on oil. The world's supply of oil is limited and it is located in many regions of the world which are politically unstable and unfriendly to the United States. In addition to this, it is possible that the total world oil supply may have already

The U.S. should establish the goal to produce half of its electricity by means of nuclear power as soon as feasible. This will have the effect of reducing the greenhouse gas emissions, avoiding the risk of an "energy gap" in supply, and providing valuable time for new energy technologies to be developed.

peaked. In the last two decades, the U.S. has been involved in two wars in the Middle East where the world's major source of oil is located. Until the U.S. dependence on foreign oil is significantly reduced, there is every expectation that increasing amounts of precious U.S. blood and treasure will have to be expended in widening conflicts in the cause of energy security. It is widely accepted that the U.S. must find a way to wean itself from its addiction to oil. In ground transportation, which is a major oil consumer, significant progress is being made with batteries and fuel cells to replace gasoline with electricity, which can be generated in alternative ways.

Strongly motivated by these two considerations, the development of new technologies to increase energy efficiency and to produce reliable and affordable energy

with minimal greenhouse gas emission to the Earth's atmosphere is a high priority in the U.S. and in many other countries. It is essential that these efforts be encouraged and enhanced. However, the probability of success and the timescale for realization of these technologies is highly uncertain. The economic stability and national security of the United States over the coming decades cannot be secured by assuming optimistically that these new

technologies will succeed in time to avoid a major discontinuity in the supply of oil and gas from foreign and potentially hostile sources. Further, it is not acceptable, nor is it possible, that the U.S. continues to burn fossil fuels indefinitely at present levels, thereby putting in clear jeopardy the planet on which we have evolved.

Nuclear Power is Carbon-free, Technologically Feasible, Scalable, and Economical

The United States needs immediately to develop on a large scale an energy source which does not produce greenhouse gases, which is already known to be technologically feasible, and which is economical in view of projected costs of energy in the future. That energy source is nuclear fission.

Nuclear fission power reactor technology was developed in the U.S. and has been utilized for electricity generation on a large scale across the globe for half a century. For example, France produces about 70% of its electricity using nuclear power. In the U.S. about 20% of the electricity used is produced using nuclear power. However, there are states where it is significantly larger, e.g., in Illinois about 50% of electricity is generated by nuclear power. *The U.S. should establish the goal to produce half of its electricity by means of nuclear power as soon as feasible.* This will have the effect of reducing greenhouse gas emissions, avoiding the risk of an “energy gap” in supply, and providing valuable time for new energy technologies to be developed. This goal would fast track and increase the projected levels of nuclear power over the scenarios considered in several energy studies, including the 2003 MIT study, *The Future of Nuclear Power* (web.mit.edu/nuclearpower).

A Change in U.S. Government Policy and Leadership is Needed

The expansion of nuclear power in the U.S. requires a major change in U.S. government policy and a change in the U.S. public’s perceptions. In the past 30 years there has been criticism of nuclear fission power that has raised the American public’s concern; however, this criticism must be viewed today in the context of national energy needs and the positive experience that has been gained from the use of nuclear power. The criticism has related primarily to nuclear reactor safety, storage and environmental risks of nuclear waste, proliferation of nuclear materials that could be used in weapons, and the cost of nuclear power relative to coal, natural gas, and oil. In each of these cases, the problems are either solvable, have been exaggerated in view of decades-long experience, are insignificant compared to a national economic crisis or international hostilities caused by a gap in U.S. energy supply, or are insignificant compared to the dangers of greenhouse gas emissions. The safety record for reactors has been excellent, and safety can be further assured

by improved reactor design. There are many decades of experience of safe handling, storage, and monitoring of radioactive materials worldwide. In addition, there are now several possible strategies that would actually use the existing waste to produce energy, thereby increasing the long-term availability of nuclear energy.

The U.S. must be an example for major greenhouse gas-emitting countries possessing nuclear technology . . . in committing to considerable reduction in global emissions. The cost of nuclear power becomes less important as foreign fuel prices spiral upward . . .

The U.S. must be an example for major greenhouse gas-emitting countries possessing nuclear technology, e.g., China, India, and Russia, in committing to a considerable reduction in global emissions. The cost of nuclear power becomes less important as foreign fuel prices spiral upward, and if the carbon tax factor is included, nuclear power becomes very economically important. Further, the cost of nuclear power would be irrelevant if our economy were to collapse from a cutoff of oil supply, or worse, if we had to go to war to secure our energy supply.

A Call for Action

Today the advancement of nuclear power in the U.S. is crippled by governmental policy, regulation, and misconceptions. In the long term, it is reasonable to expect that the energy needs of the U.S. will be met from a number of different sources, only one of which will be nuclear fission. However, to ensure the energy security of the Nation in the medium term and to allow time for the development of new energy technologies which can drastically reduce greenhouse gas emissions, the U.S. needs to initiate immediately a program to implement nuclear fission reactors on a large scale.

As with the construction of the national highway system, the space program, the Manhattan Project, and the subsequent support of science, especially nuclear science, in the U.S. beginning in the late 1940s, such an ambitious goal can

be realized only if it is established as a high national priority, particularly taking into account the fact that dealing with the energy problem is considerably more complex and difficult than any of the aforementioned projects. An urgent call to action is needed by the leadership of this nation. This call to action by our leaders

would resonate strongly with the citizens of the United States, especially with the recent price of oil at record levels. Successful realization will require streamlining of the permitting process to contain costs. It will require substantial resources from the federal government to implement the most technically advanced reactor designs, and will require the full participation by the best and brightest in private industry, government laboratories, and academic institutions across the nation. A substantial investment to support a new generation of nuclear scientists and engineers must be made to make this realization possible.

We have been meeting regularly with colleagues at MIT, Harvard, and BU to consider the fast ramp-up of nuclear power in the U.S. We believe that the new U.S. President must address energy policy as a high priority and that nuclear will be an important component of U.S. energy supply in the coming decades. We would like to see MIT play a significant role in shaping this policy. ■

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Can We Fix American Education During the Current Economic Crisis?

Ernst Frankel

THE CURRENT ECONOMIC CRISIS will force American education to reevaluate and improve the way it is run or managed, for money for education and research will become increasingly scarce as other priorities advance. America spends more on education on a per capita basis than any other country, yet seems to get worse results than many countries with lower education expenditures. While the problems of low quality primary and secondary education and huge wastes of money in our schools has been discussed extensively, little has been published on the effectiveness of higher education in America, except the often self-praising reviews of the accomplishments of America's elite colleges and universities, which are not only the most expensive in the world, but have increased tuition at a multiple of the rate of inflation every year for some time.

How America Compares

America now lags behind most developed and many developing countries in the quality of primary and secondary education, particularly in math and science. Countries with the best educational systems and best performing students invest heavily in teacher education and research. Not only do they usually train teachers at government expense, but also retrain teachers throughout their teaching careers at government expense, often using summer breaks for intensive training. In addition, time is set aside for program and content development. The percentage of school or education budgets going towards direct teaching and classroom activities in countries with success-

ful educational systems, such as Singapore, Sweden, Finland, etc., is over 50% higher than in the U.S. In America, too much attention is placed on administration, public/political relations, prestige (mainly via spectator sports), and similar activities which contribute little, if anything, to the educational quality, and

latter are important subjects, the decline in educational offerings in areas such as civil, mechanical, chemical, aeronautical, and ocean engineering, as well as others, is worrisome at a time when our infrastructure, the life blood of our economy, is not only in bad shape but largely outdated and in urgent need of repair.

Teachers and other educators in America are not only underappreciated, but are also generally grossly underpaid. In 2008, an average primary or high school teacher in the U.S. had a salary of \$37,200 and \$46,800, respectively, about one-third or one-quarter of that of a school principal and barely above that of a manual unskilled worker, nurses assistant, or custodian.

often involve or affect only a small minority of students, while consuming the bulk of the budgets.

At the university level, America experienced a huge boom: in the increase in student applications (up 24% between 1995 and 2005) which stimulated a huge construction boom, with \$15 billion spent in 2006, a 260% increase since 1997. Much of this is for new prestige labs, although a great deal is spent on new student housing as well; but the recent economic crisis may well prove these expansions foolhardy.

One issue of concern is the major decline in emphasis on traditional areas of education at universities, such as engineering and basic sciences, along with extensive encouragement for the study of biology, life sciences in general, bio-engineering, and similar areas. While these

Escalating Costs

The cost of higher education in America has skyrocketed in the last 25 years, out of all proportion both to actual costs and to other sectors of the economy. While the consumer price index rose by a tame 108% and medical costs by 250%, costs for higher education went up by an astounding 439%. In other words, they more than quadrupled. While the cost of higher education may be expected to rise at a higher rate than the rate of inflation so as to allow for improvements in education quality, facilities, and equipment, the actual costs rose by a multiple of that, a fact hard to reconcile with the limited increased value of higher education. Even compared with the recent irrational escalation of energy costs, education increases are hard to justify, and in a way

are really outrageous, particularly as they are rarely paralleled by improvements in quality.

As neither academic salaries nor maintenance and service costs have increased much above the rate of inflation, the question is really how these institutions justify such an escalation. Some may argue that these prices are based on the popularity of higher education and what the market will bear; others that much of it is the result of price prestige competition, particularly among big name institutions that associate tuition cost with prestige. This is unfortunate and is actually a self-defeating premise.

Teachers and other educators in America are not only underappreciated, but are also generally grossly underpaid. In 2008, an average primary or high school teacher in the U.S. had a salary of \$37,200 and \$46,800, respectively, about one-third or one-quarter of that of a school principal and barely above that of a manual unskilled worker, nurses assistant, or custodian. While salaries at American universities are usually appreciably higher, they still do not compare to earnings of private industry professionals in the same field, and are similarly dwarfed by salaries of university executives.

Fixing the Problems

The new Democratic administration in America is expected to emphasize and significantly increase funding for primary and secondary educators, as well as provide some encouragement for higher education. Yet the current huge financial crisis, economic stalemate, and debt obligations may result in significant declines in both public and private support for research, at a time when such support is urgently needed to maintain or regain American manufacturing and service competitiveness, as well as solve many of its problems with failing infrastructure, health care systems, and energy dependence.

Many American and foreign corporations are in dire financial straits and may have to cut their internal and external research budgets – items most easily cut

without immediate social or market impact. Although this strategy is obviously shortsighted, given the current environment corporations often may be more concerned with survival than growth. We must similarly expect reductions in defense and defense-related research spending as emphasis switches from foreign to domestic interests and from strategic to socio-economic concerns. Another problem is posed by the failure of credit institutions, and particularly those traditionally providing student loans – which will pose new expensive demands on universities to find alternate sources for student financing.

All of this should encourage us to reconsider academic priorities and plans about how to match our educational and research programs with the more immediate needs of the country and the world. While high technology has contributed greatly to humankind, it has largely failed in dealing with or improving the more immediate needs of food, health, energy, and shelter. With increasingly scarce resources available and immediate economic problems rising, it appears that educational institutions should reevaluate their priorities, increase their efficiencies, and develop programs more aligned with the needs of society, both in the short- and medium-term.

Educational institutions such as MIT must review not only their priorities in terms of programs and offerings, but also in the way they do business and manage their expansion plans and investments. American universities, while benefiting from the largesse of their alumni and other donors, will have to become better guardians of their incomes and endowments – while putting less emphasis on prestige and more on efficiency. Overhead costs at many universities are unjustifiably large and the result of inefficient management, prestige investments or expenditures, and sometimes outright waste.

The time has come for American institutions of higher learning to be better guardians of the trust and resources put at their disposal in the quest for main-

taining this country's superior educational and research ability. It is particularly important for universities that are rightfully considered leaders in many areas of education and in development of relevant research, both to enhance the knowledge base and to advance solutions to meaningful problems in the interest of improving the state of humankind. Prestige is earned by accomplishment and by success of graduates, not by the building of monuments and wasteful operations.

In these times of financial crisis universities, and particularly MIT, should lead by example and show how to accomplish more with less by cutting out evident waste, eliminating inefficiencies, reducing duplication, improving facility use efficiency, energy use, and more. Opportunities abound in most areas of operations and should be taken to show that we not only identify problems but take a lead in solving them.

At MIT most of the conservation of resources appears to have been taken by the faculty and department staff directly involved in teaching and research. There appear to be many opportunities for cutting costs in the administration and the many auxiliary activities which should not only review their real needs but lead by example. MIT's overhead is nearly the highest among top universities, even after shedding many overhead costs and converting them to direct charges, such as parking, etc.

There are similarly many opportunities for added income, such as enhanced professional-level course offerings, summer sessions, etc., areas in which the Institute used to be much more active. Most importantly, to achieve greater coordination and cooperation between the faculty and the administration in meeting the increasingly difficult financial challenges, greater transparency of the Institute's budgets and financial dealings would be beneficial. ■

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

Open Access Publishing: The Future of Scholarly Journal Publishing

Hal Abelson

THERE HAS BEEN A growing perception over the past decade that the public, and the progress of scholarship in many disciplines, would be better served if peer-reviewed scholarly publications and data were distributed online so that they can be openly accessed and built upon, rather than through exclusive publishing agreements that restrict access and reuse. This perception has led to the emergence of policies that encourage or mandate open-access publishing, such as recent requirements by the National Institutes of Health, the European Research Council, and the Wellcome Trust.

At the same time, the continued shift towards an information economy has brought with it an increasing tendency to view scholarly writings through the lens of intellectual property, and there has been a concomitant heightening of concerns about copyright and licensing in academe. Alongside this has come an enormous increase in the cost of institutional subscriptions for scholarly journals in many disciplines, and an increasing imposition of licensing terms that restrict the reuse of scholarly works in teaching and research.

All this has placed significant stress on the historical system of scholarly journal publishing.

As faculty members at one of the world's premier academic institutions, we all have an enormous stake in how our scholarly contributions are published and disseminated.

In September 2008, Faculty Chair Bish Sanyal appointed an MIT Faculty Ad-hoc Committee on Open-Access Publishing to coordinate a faculty-wide discussion of how our scholarly publications are and

should be disseminated, with particular attention to the possibility of providing "open access" to those publications. The intent is for the faculty to discuss these issues in the fall and, if support for an open-access policy is established, for the Committee to draft a resolution to come before the faculty in the spring.

Committee members will be visiting departments over the coming weeks to explain the issues and receive feedback from the faculty. The Committee has also created a Website to provide background materials and to allow the faculty to submit comments. The purpose of this article is to provide a basis for a broad discussion by outlining the situation facing the MIT community.

In the Committee's view:

- MIT has a mission to further scholarship and to disseminate knowledge.
- Historically, this mission of dissemination has been accomplished through a productive symbiosis: faculty write scholarly articles and give these articles to publishers, who then handle the academic review, production of the manuscript, dissemination of the journal, and advertisement of articles. The use of the term "give" here is intentional, because we mean the literal and complete transfer of copyright. Legally, the article becomes the publisher's property, and the terms of dissemination and further use are determined solely at the publisher's discretion.
- This symbiosis has become increasingly unbalanced over the past two decades. The impact of this disequilibrium has

been different in different disciplines, but it is now apparent that the present system of scholarly publication creates serious issues for universities and for many members of the faculty.

- It's not apparent what an optimal future system would be like. A key observation, however, is that at present, publication agreements are almost always negotiated between publishers and individual faculty members who typically pay only cursory attention to the details of contracts. To publish articles in scholarly journals, authors generally must sign publication agreements whose terms are set by the publishers. To move to a better system, we need processes through which faculty can play a role as a collective body, not just as individuals.
- Last year, the Harvard Faculty of Arts and Sciences and the Harvard Law School faculty unanimously adopted a policy stating that faculty members should grant Harvard a nonexclusive right to make their scholarly articles available on open-access terms for non-commercial use. This system would allow anyone to view, download, and use these articles, as long as they don't sell them – essentially the same terms under which MIT makes OpenCourseWare available. An opt-out provision allows Harvard faculty to withhold these rights on a paper-by-paper basis.
- MIT is a different institution than Harvard, and an appropriate action for MIT's faculty might well be different from the one that Harvard chose.

Nevertheless, Harvard's policy provides a useful straw man for discussing the form an MIT policy might take. On the Committee Website, we have included links to the Harvard faculty resolution and to an accompanying FAQ from the Harvard Office of Scholarly Communication. The Open-Access Committee encourages members of the faculty to read those documents and welcomes their questions and comments.

Following is a list that briefly summarizes some aspects of the present scholarly publishing system that can pose problems for some MIT faculty.

1. As scholars, many of us would like to make our work as widely available as possible, and the Internet facilitates this distribution at low cost. But this desire conflicts with the business models of some of the publishers who control the major journals in several fields and who restrict access to those who pay fees.
2. Access restrictions and publication agreements may prohibit faculty members from distributing their own work even to students and colleagues. Authors might even be restricted from reusing figures and tables from their own articles. Legally, these writings are no longer theirs, once they have transferred copyright to a publisher.

3. Scholarly publishing has become subject to business consolidation, and monopoly pricing is becoming an increasing problem. The five largest journal publishers now account for over half of total market revenues. Over the past 15 years, the price of scholarly journals has grown roughly three times as fast as the Consumer Price Index, and library budgets, even at premier institutions, are straining under these pressures. One consequence has been a challenge to libraries' continued ability to purchase the books and monographs that are the major form of scholarly writing in some fields and to subscribe to new journals.

The figure below shows the impact at MIT since 1986: While the Consumer Price Index has risen about 85%, expenditures on serials have risen more than 350%. In contrast, expenditures on books have tracked the CPI, and the numbers of books and serials purchased have remained comparatively constant.

4. Libraries pay fees for annual access to digital serials. If a journal subscription is terminated, the university and its faculty can lose access to prior issues even though these issues were "published" when the subscription was active.

**Committee on
Open Access Publishing**

Hal Abelson, Chair (Class of 1922 Professor, Electrical Engineering and Computer Science)
Ann J. Wolpert, Co-Chair (Director of Libraries)
Craig Carter (Professor, Materials Science and Engineering)
Brian Evans (Professor, Earth, Atmospheric, and Planetary Sciences)
Kai von Fintel (Associate Dean, SHASS; Professor, Linguistics and Philosophy)
Eric Klopfer (Associate Professor, DUSP)
Pauline Maier (William R Kenan Jr. Professor, History Faculty)
Oaz Nir (Graduate Student Council President)
Robert T. Sauer (Professor, Biology)
Lisa A. Steiner (Professor, Biology)
George N. Stiny (Professor, Architecture)
Eric von Hippel (T Wilson (1953) Professor in Management, Sloan School)
JoAnne Yates (Deputy Dean, Sloan Distinguished Professor of Management, Sloan School)
Ellen Duranceau, Committee Staff (MIT Libraries Scholarly Publishing & Licensing Consultant)

5. In the digital environment, search, advanced indexing, and automated textual analysis are emerging as important tools for scholarship. Many publisher contracts with libraries explicitly prohibit these activities, with publishers beginning to offer these services as lucrative premium "extras."

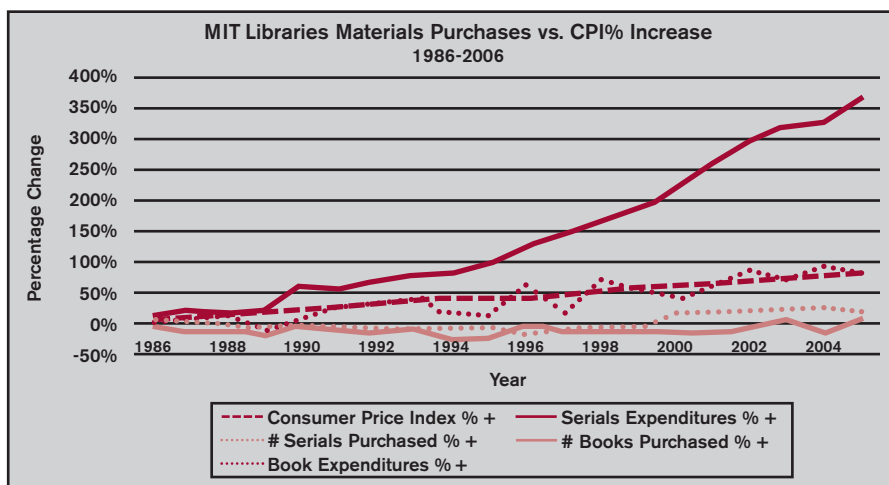
Certainly there is much here to ponder as we consider appropriate MIT Faculty responses.

Please visit the comment site (<https://web.mit.edu/libraries/www/about/scholarly/restricted/faculty-feedback.html>).

We look forward to important and stimulating discussions!

Thank you, from the members of the Committee on Open Access Publishing. ■

Hal Abelson is a Professor of Electrical Engineering and Computer Science (hal@mit.edu).



letters

MIT Takes a Lead Role in Washington

To The Faculty Newsletter:

AS DIRECTOR OF MIT'S Washington office, I was pleased to see your September-October editorial lamenting the limited public discussion of science and technology in this year's Presidential campaign. Since I help foster MIT's extensive interactions with Congress and key federal agencies, I am intensely aware of the national political forces that affect science policy, so I certainly share your concern.

With a new administration in Washington, however, the U.S. science and engineering communities have a rare opening to make the broader case for investing in basic research – and I thought you would be pleased to know that MIT has been taking a leading role. A few examples:

– Through this election season, MIT repeatedly briefed both Presidential campaigns on critical science policy issues and R&D funding needs. Many ideas we provided became part of the detailed science and technology positions posted by both campaigns. In fact, while the two candidates differ in important respects on these issues (see *Science*, Vol. 321, Sept. 26, 2008, pp. 1762-63), both have paid them more attention than have previous Presidential contenders, a development that stems in part from outreach efforts from MIT faculty, researchers, and administrators, in alliance with other universities, businesses, and science organizations. More detail on candidate

positions is available here: www.sciencedebate2008.com/www/index.php?id=42 and www.barackobama.com/pdf/issues/FactSheetScience.pdf.

– Given its profound ramifications for the economy, climate change and national security, energy must be a top U.S. priority. On the energy question alone, over the past 18 months MIT has provided 21 faculty witnesses at key Congressional hearings – far more than any other university. A number of these appearances accompanied the publication of landmark MIT studies on the future of coal and geothermal energy, reports that shaped important legislation this Congress and are framing the broader public debate. More MIT energy reports are planned this year.

– President Hockfield is becoming the most prominent university voice in Washington, using a number of different tools to bring innovation and R&D to the national agenda. For example, she co-chairs two separate efforts designed to guide the priorities of the new administration, one with the American Association of Universities (AAU) and one with the Council on Competitiveness, the country's leading joint business and university policy group. In June, she met with Senator Obama and participated in a two-hour non-partisan panel discussion on innovation policy with him (www.youtube.com/watch?v=0Z7_A-rkOjA&feature=user). And last

month, she testified before the House, led a National Press Club press conference, and wrote a *Washington Post* op-ed, all backing major increases in R&D; she will do a follow-on National Press Club press conference on Nov. 12th.

– In June, MIT invited both candidates to campus to discuss science and technology issues, including energy and the innovation economy. While neither accepted (Massachusetts, as we know, is not a battleground state), this contact helped open the door for the October 6 on-campus debate on energy policy, featuring senior campaign officials and co-sponsored by the MIT Energy Initiative (MITEI) and the MIT Energy Club.

In addition to these higher profile efforts, many faculty members have quietly advised the campaigns in a range of policy areas. While MIT's faculty and administrators certainly recognize how critical federal support will be for the future of American science and technology, you are absolutely right that these issues demand much more focus from the science and engineering communities writ large. I know that MIT leaders are focused on engaging these groups in this broader effort, and I welcome specific suggestions from your readers for additional steps we should pursue. ■

Sincerely,
William B. Bonvillian
Director, MIT Washington Office

MIT Poetry

by Ed Barrett

ON JANUARY 15, 2000 THE BOSTON GLOBE ran a front-page story about the discovery of three bodies buried near I-93 in front of a police station in Dorchester. The victims had been murdered by James “Whitey” Bulger, who ran the Irish mob, controlled drugs in South Boston and who was also a protected FBI informant. The newspaper story about the elusive and by now almost mythic figure of “Whitey” Bulger got me thinking about my 30 years living in this city, about its gangs, its ethnic and racial divisions, the Big Dig, Boston politics, and the role this city has played in science, poetry, sports, and philosophy. “Whitey” Bulger, ever present, ever absent, above or outside the law, kept morphing in my imagination into other Bostonians, including (among others) Emerson, Thoreau, Cardinal Law, former mayor Kevin White, and former Police Commissioner Kathleen O’Toole who promised to work on the plague of neighborhood gang violence killing our youth, but who quickly resigned and moved to Ireland, whose relationship with Boston is best captured by a common Irish phrase, “the next parish over.” I let myself drift with these associations and built a trilogy of verse novels (*Rub Out*, *Kevin White*, and *Bosston*), using brief prose poem chunks whose open-ended structure and looser, fragmentary style afforded me room to explore what this city has become in my imagination.

A Roxbury Annunciation was a stray bullet through a second-floor apartment window severing a child’s spine. A Dorchester Pietà found a mother, outside belief and disbelief, outside words and language, draping her child over the metal lap of a wheelchair donated by Dunkin’ Donuts to take the Orange Line to Downtown Crossing.

*

Police Commissioner Kathleen O’Toole and Whitey Butler Yeats were no flight into Egypt with a Cape Verdean child at An Garda Síochana na hÉireann headquarters in Phoenix Park, Dublin. They, each alone, vanished into Boston’s radioactive dream of Irish transcendence. He wouldn’t even put on Rubbermaid kitchen gloves to yank out “Bucky” Barrett’s teeth after he shot him in the head because no one in South Boston ever caught AIDS.

*

The new IRA was just drugs and Polish whores, ordinary organized crime hiding money from the Criminal Assets Bureau. Sinn Féin disarms, becomes the fastest growing political party, wants seats in the government North and South. How could Whitey Butler Yeats run guns to Belfast on the Valhalla out of Boston and not have known the informer on board who gives it up to the British and make money from both sides? Charlie Haughey’s dead and buried in his French shirts. Developers in the Gaeltacht pay cash and race like Vikings in ribbed inflatables with twin 200 hp Honda outboard engines. After 9/11 FBI and British MI5 share intelligence, honor their deals and informants, themselves alone in a delirious desert. Whitey Yeats ghosts his way around a transcendent west of witness protection. Yeats likes big cars. Northern Ireland has good roads.

Ed Barrett, Senior Lecturer in Writing, has taught at MIT since 1986. The excerpts above are reprinted from *Bosston* (2008), the final installment of his *Boston Trilogy*, a sequence of prose poems. He is the author of seven other books of poetry and the editor of the MIT Press series on digital communication.

The Renovation of 10-250
Callahan, from page 1

fraying. The lighting system with limited capabilities washed the room in harsh blue-white light. Tucked away in a machine room on the fourth floor, the air-conditioning system struggled to keep the room comfortable throughout the day; at times leaving students dreading their afternoon classes in a stuffy lecture hall. *The* meeting place at the Institute was failing to support the ambitions of the community.

The Prioritization Process

In 1988, the Institute set a goal (Project 2000) to update fully all 155 Registrar classrooms by the year 2000. To date, 58% of these rooms have been renovated. During the past 10 years we've made significant progress in the renovation of classrooms with a seating capacity of 25 – 50. The Registrar's Office has been in process of developing a five-year renovation plan with help from Dean for Undergraduate Education Dan Hastings and the Faculty Classroom Committee. The group prioritized the need to focus our attention on large lecture halls such as 10-250. Only two of the Registrar's 13 lecture halls that seat more than 100 students have been updated over the past 20 years. With strong support from the senior administration, the 10-250 project was funded during the annual CRSP cycle.

Why 10-250 first? 10-250 is the most requested lecture hall on campus. In an average week it is in use 90% of available time. Thirty years of heavy use created a long list of room deficiencies. Taking the room off-line to replace only the seating and carpeting and not the lighting and air conditioning was not a sound strategy. A comprehensive approach to renovate 10-250 was required.

The Challenge:

Renovate 10-250 into an exceptional facility to meet the needs of today's faculty, students, and the MIT community.

The renovation of a facility, especially a 450-seat lecture hall, possesses a unique

set of challenges for any college campus. The summer break, the most common time for classroom renovations, would not provide sufficient time to complete a complex renovation of a space such as 10-250. Taking the room off-line for a semester coupled with the summer break was the only viable option, thus allowing an

managers were all part of the team. Peter Bedrosian from the Registrar's Office, with input from faculty who've lectured in the room over the years and from Professor John Brisson, chair of the Faculty Classroom Committee, led the effort to define and direct the project's scope.



eight-month window of opportunity. Strategic planning and flexibility within the Registrar's classroom inventory allows us to reassign classes and events to other spaces when a lecture hall is under renovation during a semester.

Other challenges included: maintaining a seating capacity of 450; designing a flexible lighting system to support various teaching styles, class recordings, and audiovisual modes; preserving the current high acoustical standards; and managing a noisy construction site within the main group during an eight-month renovation.

The Design Process

A team was assembled spearheaded by the Registrar's Office. A renovation of 10-250's size requires a collaborative approach from many disciplines. Architects, mechanical, electrical and acoustical engineers, audiovisual consultant, and Department of Facilities project

Drawings were developed that reflected a modern, brightly lit aesthetic in keeping with MIT's campus. Architect for the renovation, Tommy Quirk of DAIQ Architects, noted: "Working in concert with the MIT team we chose to set our course on a design that was contemporary to 2008, but respectful of the original classical detailing of the Main Group." Raising the height of the ceiling redefined the space. The heavy, low hanging architectural boxes that lined the side stairs, reducing light levels, would be removed. The room would feel spacious and more open, but would preserve the qualities which made 10-250 an exceptional faculty-to-student learning environment. George Kocur, who teaches 1.00 in 10-250 this fall, concurs: "The room has more light, which is always a healthy thing, and the video projection and audio systems work very well. It's a pleasure to teach in the new room, which is flexible enough to

function well even for a large lab-based class such as ours.”

The Results

After the room was stripped of seats, walls, and ceiling, the renovation got underway. A new ceiling, to accommodate the various room utilities, was integrated

of space and light, as well as hiding all the various electrical, audio, and mechanical support systems.

New seating with integrated power at every seat is wider and more comfortable. Select rows, identified by blue LEDs, support hard wired data ports at each seat. Seven access points of the latest in wireless

upload their lab solutions at the end of class, because of limited wireless capacity. When that many students tried to upload simultaneously, not everyone got a connection.”

New climate controls located in the room allow the professor to control and adjust the temperature, if necessary, within minutes. Professor Donald Sadoway, who teaches 3.091 to a full house three days a week, notes the most significant improvement “is the climate control – the air supply and temperature now are reliable and conducive to learning. No more do I come to lecture finding the hall overheated. That’s a huge plus.”

Classrooms fulfill a major role in our community. In addition to being scheduled with academic classes, the rooms support lectures, movies, and a range of activities that make a difference in the lives of faculty and students. Our classrooms are used to bring people together, and serve as a true integration point of life and learning. Although significant progress has been made toward the completion of Project 2000, we have not yet reached the goal. The Registrar’s Office will continue to work with faculty and the senior administration in enhancing the teaching and learning environment. The 10-250 renovation demonstrates the impact an updated facility can have on the community. ■

Mary Callahan is the Registrar
(callahan@mit.edu).



with an angled “cloud” above the lecturer’s area. The cloud, while it may appear to be largely an aesthetic element, provides the necessary acoustical properties to project sound to the rear of the room while still allowing the redefinition

technology provide excellent coverage throughout the lecture hall. Kocur notes: “Before renovation, we had to use power bars and power cords from a very limited number of outlets for a class of 150 or 200 students. Students also had to wait to

Requests for Proposals for Teaching and Education Enhancement

Alumni Class Funds

supported by the Classes of 1951, 1955, 1972, and 1999

The Office of Faculty Support seeks proposals for innovative projects for the 2009-2010 academic year that improve the quality of teaching, enrich students’ learning experiences, and uphold the tradition of innovation at the Institute. Grants typically range from \$10,000 to \$50,000 and cover a wide variety of creative curricular and pedagogical projects.

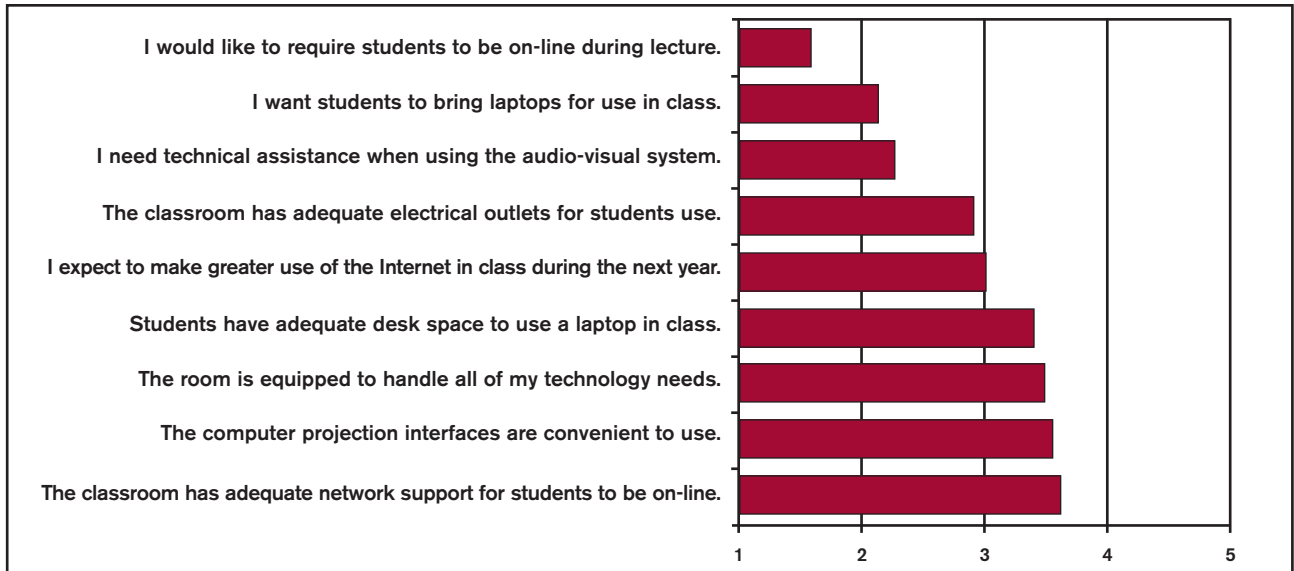
Guidelines and more information including past awards can be found at mit.edu/alumnifunds/ or by calling the Office of Faculty Support at x3-6776.

Proposals are due on Friday, January 30, 2009.

M.I.T. Numbers from the 2008 Classroom Survey

Please rate your agreement with the following statements:

mean score: 1 = strongly disagree; 5 = strongly agree



	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	N
The room is equipped to handle all of my technology needs.	10.2%	23.5%	7.2%	22.9%	36.1%	166
The computer projection system interfaces are convenient to use.	11.9%	11.2%	15.7%	29.9%	31.3%	134
I need technical assistance when using the audio-visual system.	40.6%	21.0%	16.7%	13.0%	8.7%	138
I expect to make greater use of the Internet in class during the next year.	12.9%	14.3%	41.5%	19.7%	11.6%	147
I want students to bring laptops for use in class.	37.4%	26.5%	24.5%	6.8%	4.8%	147
I would like to require students to be on-line during lecture.	62.3%	21.9%	10.3%	4.1%	1.4%	146
The classroom has adequate electrical outlets for student use.	15.7%	15.7%	42.2%	11.8%	14.7%	102
The classroom has adequate network support for students to be on-line.	3.2%	5.3%	41.5%	24.5%	25.5%	94
Students have adequate desk space to use a laptop in class.	11.4%	20.5%	14.4%	22.0%	31.8%	132

Source: Office of the Provost/Institutional Research