

# The MIT Faculty Newsletter

Vol. IV No. 4

February 1992

## The Baker House/East Campus Harassment Survey

I. Sexual Harassment  
Will Watson and Ken Oye

*A student repeatedly followed me to class and sat in the He had previously given me creepy looks of a sexual nature, introduced himself, and talked to me in the halls/street for a year (on and off). He waited for me after class and followed me across campus. During class one day, I couldn't stand him staring at me anymore. I left crying and dropped the class. I was paranoid for a while that he would threaten me – now I rarely see him (and I then ignore him). I'm not sure why I didn't complain to a dean, since I was terrified. I guess I thought he would get angry and try to hurt me.*

Not many of us have seen our women students leaving the classroom crying, and even fewer of us, we suspect, would know that the cause was some form of sexual harassment. Most of us don't see harassing conduct or its effects in the classroom or laboratory, and perhaps many of us are not quite sure what constitutes harassment

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## Preservation of Intellectual Assets

Fred Moavenzadeh

The responsibility of the administration of an institution is to preserve, upgrade, and expand its intellectual assets. Management of this asset – in order to meet the educational needs of society, and to improve the human condition – must be the principal priority of the administration in our own institution.

Certainly, the availability of adequate physical and financial resources is necessary to assure maximum utilization of our intellectual assets. But the management of financial and physical assets must be subordinated to – and used as an instrument for – the fulfillment of that primary goal. If we remain

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preoccupied solely with the management of financial and/or physical assets, we risk losing sight of our primary goal. We could win the

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## Editorial

### Wanted: A Vision for MIT's Future

An extraordinary conjunction of internal and external is forcing universities to become introspective, to focus on their own goals, to try to predict their own futures. It seems clear that the near-term will not be comfortable for us. Far more important than getting through the current storm, however, is the role that universities will play when this turbulent period is over. It is unlikely that we will be unchanged. If we are to have any impact on the university of the future, we must develop a clear vision of what we want that university to be like, and then articulate that vision to the society at large.

The changes are likely to be fundamental; we must not be too narrowly focused. The current zeitgeist is this: The overwhelming current problem is the “productivity war” and all of our current difficulties can be traced to the loss of that war. This is indeed important, but we should not be entrapped in a narrow vision when we are planning for the next century. While improving that which is “made in America” is important, far

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# Editorial

## Wanted: A Vision for MIT's Future

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more essential is defining this vision of the future and the challenges that we deem worthy of effort. We need to appreciate the dramatic changes that are taking place in our world – strategic, political, economic, demographic, and environmental.

At issue is an image for ourselves in a changing world, and of our assets, objectives, and responsibilities. We

recent history.

The world's demographic outlook is also compelling. Soon roughly one-half of the population of this world will be 15 years of age or under. For all practical purposes, future generations are already with us. This fact cannot be ignored.

What does this mean for the education program of this nation? for

More to the point, does the faculty wish to engage itself in such deliberation? Can we have a shared vision of our future? And does it matter?

Certainly the vision driving our shared intellectual course deserves some concerted attention – in real time and in real effort. We can no longer afford to be driven by 19th century visions as we enter the 21st century. Nor can we posit, or stipulate, the elements of a vision for the future. It must evolve and develop with painstaking care. To do otherwise would, in itself, threaten the integrity of our common enterprise.

We propose the following: to establish a forum for the purpose of framing visions of our future as this nation's leading institution of science and technology – in a world that is rapidly changing, where the old contentions, assumptions, principles, and priorities no longer seem too compelling. Indeed, these could well be entirely irrelevant to the new century ••• that will bring with it its own pressures and compulsions.

### Nostra Culpa

We call upon the faculty to take the initiative in framing such a forum. This issue contains articles that shape the future of Science, Engineering, and Management. There was no article from the dean. Editorial Committee Planning, Jean P. de Monchaux.

Due to the announced resignation of Dean de Monchaux and the current search in process for a new dean, the Editorial Committee felt it best to wait until a replacement had been selected before requesting an article from the school's administration. We apologize for any confusion that may have resulted.

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must go beyond the relatively obvious issues of output, production, productivity, manufacturing – a holdover from 19th century perspectives of society, economy, and education – to the creativity, innovativeness, and intellectual boldness necessary for survival in the 21st century. As an example, we now recognize the salience of environmental problems; and our educational mission is beginning to respond, slowly and cautiously to be sure, but clearly responding.

The world's strategic outlook has changed in dramatic (and unpredicted) ways. Not only is the Cold War over, but so is the Soviet Union. Our leadership in military capability is unquestioned, but our ability to innovate and drive innovations into the marketplace is being sorely tested. R&D spending is lagging relative to Japan and Germany and is actually beginning to fall for the first time in

institutions focusing on science and technology? What does it mean for us at MIT? In what forum are such issues to be discussed? Do we have a special responsibility for understanding and shaping this nation's view of its scientific and technological future? Do we have an attendant responsibility to the world as a whole – the world that is now being shaped by our knowledge, skills, science, and technology? If there is one point we all agree on, it is this: Excellence in the pursuit of knowledge is a necessity, not a luxury, and diversity in orientation, style, and scope is a necessary part of excellence. Beyond that, most bets are off.

Aside from concerns of organization, management, and bureaucracy – all crucial to the common enterprise – how much leadership in discussion and deliberation can (or should) the administration of our Institute provide?

# Preservation of Intellectual Assets

(Moavenzadeh, from Page 1)

battle, but lose the war.

It is the faculty, staff, and students that constitute the intellectual assets of an academic institution. The quality of each individual contributes to the asset base; but collectively, the intellectual asset is larger than the sum of the individual parts.

The proper mix – the interaction or the “milieu” – provides a synergy that serves to distinguish a premier institution from those that are simply the very best. The proper mix provides a reputation and a critical mass that creates a magnetic field for attraction of qualified individuals. The management of our intellectual assets should address both the basic mix and its critical mass – as well as the quality of each individual. It is only through proper intellectual leadership that institutions can exact an optimum level of output from the system. Without such leadership, the system will be underutilized; it will be misguided and its assets will be wasted.

This is certainly not a service to render either to present or to future generations.

Research is the principal avenue for growth and preservation of the Institute’s intellectual assets. Research activities provide for the maintenance of the quality of education and enhance the Institute’s role in serving humanity. The conduct of research is fundamental to the functioning of major academic institutions. It is endemic to, and deeply intertwined with, the character of the Institute, its faculty, its students, and its culture.

Traditionally, the faculty has resented any interference by the administration in his/her research interests and has jealously guarded the notion of research independence. This has changed with the growth of

big science, with the closer relationship between academic research and commercial applications, and with the recognition by politicians (and others) of the importance of research to the well being of the nation. In addition, the prestige and publicity associated with landing a major research grant or contract for an institution in the home district cast doubt on the independence of research and calls into question – even threatens – the romantic notion of “research in the pursuit of knowledge.”

The result of all this is that the management of research is no longer the sole purview of the individual faculty member, nor is the availability of funding solely dependent upon the content of the proposal and the intellectual quality of the investigator.

To a great extent, availability of funds drives the direction of research, the field of research, and the reward systems for professional recognition and financial security. So, too, the administration has now realized that a significant portion of the Institute’s physical and financial assets could be covered by research funding. This is done by direct salary charges, or by indirect cost recovery through overhead for physical plants, libraries, and laboratories.

Over the past few decades, the availability of funding for research – primarily through government agencies – encouraged academic institutions to leverage their own growth from this source of support. But there were dangers: The soft nature of research funding and the potential for exposure to political vagaries were downplayed by both the administration and the faculty. As evolving political realities encouraged the funneling of research towards areas

with high political visibility (such as problems related to the then Cold War) academic institutions regrouped and realigned their intellectual assets to receive a larger share of available research funding and to stimulate their growth. The “rise and fall” of a research field was thus decided upon by the realities of daily politics; and the academic institutions became captive to political winds and the whim of dominant politicians.

Success in receiving a significant amount of soft money – and the associated political praise and prestige bestowed upon the institution by the news media – made expanding the volume of research a primary objective of the institution. A large research volume also gives the administration the needed resources for a) expansion of physical plant, and b) creation of a large administrative bureaucracy to manage ever increasing “strings” attached to the funding of research.

As a consequence, many new areas of research were initiated with little or no attention to their intellectual integrity or sustainability. Now the handwriting is on the wall: There is both shrinking of research funding support by government agencies and dramatic increase in competitors for these funds. But many institutions still believe that the answer lies in trying to influence government or in identifying new areas of political exploitation for research.

In this process, a successful administration came to be defined as one that could *either* influence the government to direct more research funding to their institute *or* clearly capitalize on a particular political issue, assume the role of its champion, and capture coveted funds as a result. For

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From The Faculty Chair**Changing Undergraduate Education**

J. Kim Vandiver

In the last *MIT Faculty Newsletter* many authors spoke about change or the need for change in educational programs at MIT. Joel Moses, dean of engineering, spoke of a shift from an emphasis on engineering science to a post-modern engineering, and gave examples, such as the study of large-scale systems, a new Program in Technology, Management and Policy, and the introduction of design throughout the undergraduate engineering curriculum. Deans Philip Khoury and Lester Thurow wrote convincingly of the need for an "internationalization" of MIT's educational opportunities. Furthermore, the mounting Federal pressures as described by President Vest attested to the power of the external forces which will certainly contribute to shaping our future.

As we build consensus about the direction of desired changes in undergraduate education, we must find creative ways to make them happen. I advocate that we use incentives and rewards rather than regulation to the greatest extent possible. In this context regulation means specifying requirements, such as we did last spring by adding biology to the core science component of the General Institute Requirements. In contrast, incentives and rewards mean making something sufficiently attractive that students will vote for it with their feet.

Consider "internationalism" as described by Philip Khoury. He cited a need for intensive language training and international experiences for our students. He suggested innovative minors as incentives, which in my opinion are a good idea. However, if we wish to graduate students with

multi-lingual talents, why not recruit U.S. students with unusual language abilities? We could begin by rewarding students who enter MIT with competency in a second language, by waving requirements or by giving them credit, in much the same way advanced placement credit is given

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for 18.01 or 8.01. This has the additional benefit of alerting high schools in the U.S. that foreign languages are important to us at MIT. We can bring in such students without sacrificing science and engineering skills and aptitudes. In fact, there is research evidence (albeit controversial) which suggests that students with strong bilingual skills are better abstract thinkers.

What incentives might work in advancing new programs in engineering? The new initiatives described by Dean Moses have an interdisciplinary character; such as Management, Technology and Policy, or large-scale systems. One way to encourage interdisciplinary studies at the undergraduate level is through creative uses of minors. When minors in humanities and social sciences were introduced a few years ago, it was intended and expected that other schools would follow with programs of their own. Dean of Science Robert Birgeneau alluded to possible minors in science in his recent article, and Dean Khoury described new minors in regional studies as part of integrated

programs of study. The School of Engineering could also encourage students to pursue interdisciplinary courses of study by providing creative interdisciplinary minors.

Dean Moses also mentioned the NSF-funded ECSEL project and its goal of introducing design throughout

the undergraduate engineering curriculum. I enthusiastically support such efforts, which serve to bring our students into more intimate contact with real world problems, including, I would hope, both technical and social dimensions. Professor John King describes in this issue (page 10) corridor labs as a way to help satisfy the need for more experience-based educational options at MIT. Recently, I have met with him and a number of other faculty to discuss the means by which we may also bring to reality the dream of workshops and on-campus hardware stores, which would enable students to apply Doc Edgerton's maxim, "Let's try it and see," to resolving interesting questions in science and engineering.

These suggestions are offered as illustrations of the many means we have available to improve the undergraduate academic experience without reducing every new initiative to a requirement. We can accomplish a great deal through creative approaches to the satisfaction of the General Institute Requirements, in the application of admissions policies and in the way in which we make use of the time available in the regular terms, IAP, and the summer. I look forward

## A Letter From the Committee on Indirect Costs and Graduate Student Tuition

*[The following letter was sent to all faculty this past January, and is being printed here as a reminder of the importance of the issues raised and the impending release of the committee report.]*

January 3, 1992

To: Members of the Faculty and Staff

The issues surrounding the indirect costs of research funding, including the cost of graduate student tuition, have become increasingly acute over the past year. Some of the long-standing formulae for calculating indirect cost rates have come under intense scrutiny, and it now appears that these formulae may be the subject of renegotiation between cognizant federal agencies and research universities in the coming months.

Anticipating this, Mark Wrighton, our provost, has convened a committee to advise him on the opinions of the faculty and research staff concerning existing indirect cost regulations and their possible revision in the future. In doing so, he wishes to develop a position for the Institute that accurately represents the thinking of those who will be directly affected by any future changes in these regulations.

Indirect costs represent a major component of the cost of doing research at MIT, amounting to \$85 million last year (FY91). Accordingly, changes in the formulae for calculating indirect costs can have major effects on the Institute's viability as a research university. For these reasons, I am soliciting your input into these deliberations. The committee appointed by Provost Wrighton, would benefit greatly from your comments.

Most useful initially would be a letter written to me concerning your specific ideas about current and future policy. Such a letter should not preclude your discussing such ideas with any member of the committee. Please feel free to comment on any aspect of indirect costs and graduate student tuition.

The committee will be working intensively on this in the first months of 1992 in order to develop an overall position by March [31st]. For this reason, a response from you in January would be especially appreciated.

Sending my thanks for your help and best wishes for the coming year.

**Robert A. Weinberg, Ph.D.**  
Member, Whitehead Institute  
Professor of Biology, MIT  
Chairman, Committee on Indirect Costs and Graduate Student Tuition



In 1986, Professor Margaret MacVicar, then dean of Undergraduate Education in the provost's office, requested that the Planning Office conduct a comprehensive review of the Institute's classroom and lecture halls.

The study examined the demand for and scheduling of classrooms. It documented the changes in the character of course enrollments and class size. It described the patterns of use and occupancy in the existing classroom and lecture hall inventory and the quality of the environment in classrooms and lecture halls including the lighting, furnishings, and equipment in our present facilities. It described the existing and emerging teaching methods used by our faculty, the use of audio visual technology in the classroom, and the operational and financial issues that confront the

classroom and lecture hall teacher that seeks to innovate. A comprehensive physical inventory and analysis of all of the scheduled teaching spaces was conducted and representative faculty members in each discipline participated in an in-depth interview concerning their views on the teaching facilities available at MIT. Information on student experiences and preferences were gathered and all of these were published in a major report entitled "Meeting of Minds" published in 1987 and presented to the Academic Council for their review and discussion.

The key recommendations in this report included proposals for the renovation of existing classrooms and lecture halls and the development of a new lecture center on the main campus. The Academic Council endorsed these recommendations and a ten million

dollar, ten-year renovation program, entitled Project 2000, was included in the Campaign for the future. In addition, a site for a future Lecture Center was identified near the new biology building in the northeast sector of the main campus.

In the first three years of the renovation program, Boynton Hall (6-120) has been renovated, a new seminar room has been installed in 16-139, and a new lecture hall and seminar room have been completed in 2-105 and 2-103. The summer of 1992 will see the renovation of lecture hall 1-390, made possible by a gift of the S.D. Bechtel, Jr. Foundation. In the years ahead, we expect that with the participation and cooperation of the faculty, students, the Registrar's Office, Physical Plant, and with the support of the Development Office, the campaign to bring our teaching facilities up to the standard recommended in "Meeting of Minds"

# The Baker House/East Campus Harassment Survey

## I. Sexual Harassment

(Watson and Oye, from Page 1)

despite some vigorous efforts recently to educate us.

But we can assure you, after surveying the undergraduate residents in Baker House and East Campus, that the effects of sexual harassment are present in our classrooms and laboratories. They are brought there by a significant minority of both women and men – 47% of the women and 9% of the men – whose experience with harassment on campus they describe as either upsetting or very upsetting. This is disturbing enough, but as teachers and supervisors we should realize that these harassment experiences can have a marked impact on our students' ability to function in our classrooms and laboratories. Twenty-four percent of the women and four percent of the men reported that their experience with harassment interfered unreasonably with their education and work performance.

Yet it is hard for us who are teachers and advisors to see just how widespread and corrosive the experience of sexual harassment is at MIT. We have a hard time seeing the effects of harassment because the victims, our survey reveals, usually don't want us to see them. This is especially true of the female victims of harassment. Return for a moment to the experience of sexual harassment described in the opening paragraph. What did this woman do to get out of her situation? She avoided her harasser, even at the expense of dropping a class to do so. She was terrified, too frightened that he would get angry and try to hurt her to complain to a dean or to anyone else, like a sympathetic teacher or an adviser, people who might have helped

her.

This is only one woman's voice, to be sure. Her response to harassment, however, is much more common than we would like to think. For many – we could really say for most – women victims of harassment a sense of helplessness, embarrassment, and futility, as well as fear of reprisal and the conviction that complaining would only make the situation worse, combine to inhibit formal complaints and even

undergraduate co-ed dorms, Baker House and East Campus. The survey came into being in order to deal with a very practical problem. Following the issue of the Report on Sexual Harassment in October of last year, the housemasters and tutors in all the residences were asked by President Vest and Dean of Student Affairs Art Smith, to develop programs in the living groups that would address the issue of sexual harassment. We were

**What it [the survey] does not provide and should have, a number of our women respondents pointed out, is reliable information on the extent and character of gender harassment and discrimination (often called sexual discrimination). Too often, we were told, women encounter at MIT demeaning, insulting, degrading remarks from men who have no sexual interest in making these remarks but simply want to put women down.**

informal talks with faculty members. The preferred strategy of women victims of harassment in this survey was to avoid further contact with their harassers. That's what sixty-two percent of the women said they did. Over half the women also said they tried just to ignore the incident. Only a small fraction of the women (9%) reporting incidents of harassment talked informally with a housemaster, tutor, faculty member, or dean about their experience, and an even smaller fraction (7%) filed a formal complaint.

These are only some of the findings of a comprehensive survey made last spring of the residents of two

committed to doing something, but we were not sure how to address the issues most effectively with our students. We felt we needed to have a clearer picture of undergraduate attitudes and conduct with regard to harassment before we could develop any programs. Both Assoc. Provost Jay Keyser and Special Assistant to the President Mary Rowe agreed with our idea of surveying these two large and quite different dormitories and have given us, as has Art Smith and his colleagues in the Dean's office, all the support we needed to carry it out.

The survey questionnaire was based  
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Campus Harassment Survey**  
(Watson & Oye, from preceding page)

on protocols developed for previous surveys on harassment elsewhere and modified to suit our particular needs by a joint student-faculty committee from both houses. Of the 737 students resident in these two houses 359, or 49%, filled out the questionnaire, a very high rate of return for surveys of this sort. More men than women responded, but the response rate was somewhat higher for women (56%) than it was for men (43%). The racial diversity of the respondents – 57% white, 25% Asian/Asian-American, 7% Hispanic, 4% African-American, and 6% Other (most of whom are of mixed races) – reflects approximately, we believe, the racial composition of our two houses. Finally, the response rate was highest for freshmen (56%), declining at a consistent if not uniform rate to 37% for the seniors.

These figures on the respondents give us confidence that the survey's results genuinely represent the populations in our two houses. How representative, however, are they of the rest of the MIT student population? With one exception (McCormick, an all-women's dormitory), we see nothing in the characteristics of other undergraduate residences (dormitories) to suggest that our results would not apply to them as well. The dormitory population represents altogether about 75 percent of MIT's undergraduates. As for the independent living groups (fraternities, sororities, and other small communities) it would be difficult to know how many of our results are relevant to their experiences without conducting a survey of at least some of these groups. We are fairly certain, on the other hand, that our results

would not apply to the graduate student population, and we are urging the administration to conduct a similar, but modified, survey of at least some of the graduate residents.

In short, we are confident that the survey provides a wide range of reasonably reliable information on the attitudes and experiences of MIT undergraduate dormitory residents with regard to harassment on the basis of sex, race or ethnicity, and sexual preference.

What it does not provide and should have, a number of our women respondents pointed out, is reliable information on the extent and character of gender harassment and discrimination (often called sexual discrimination). Too often, we were told, women encounter at MIT demeaning, insulting, degrading remarks from men who have no sexual interest in making these remarks but simply want to put women down. Here is what several respondents wrote:

*I have often experienced harassment in the form of sexist put-downs about women being weaker, stupider, less competent, belonging in the home, inferior, etc. I think this definitely interferes with the educational environment by eroding women's self esteem.*

*I feel that I have also been harassed mentally, not sexually, by a professor. I was the only girl in his recitation and he purposely tried making me feel uncomfortable. He only asked me questions and constantly asked if I understood. It was like I was the only one he talked to, and it had the effect of making me feel stupid.*

*An assistant professor made many insinuations and jokes about women being less smart than men. He was basically just intimidating all the women in the class to the point that we did not wish to participate in recitation and our grades suffered.*

Unfortunately we cannot document how many of our women students have encountered this kind of gender discrimination because we failed to ask about it specifically. But given the large number of added comments we received on this issue and the character of many other comments from women throughout the survey, gender discrimination appears to be an important factor eroding the quality of life and work of our women students.

We are not too happy to draw attention to this deficiency in our survey, but we do so for a reason other than frankness. When our students were asked in Question 3, "Have you personally been subject to any of the following acts by someone at MIT with authority over others such as a TA, tutor, or faculty member?" the answers for most acts, thank God, were overwhelmingly "never." And by "overwhelmingly" we mean 98 or 99 percent. But there were two glaring exceptions. When women were asked if they had been subjected to "unwanted teasing, jokes, remarks or questions of a sexual nature" by a person in a position of authority, twelve percent of them said they had, and for eight percent of them not just once but several or more times. We suspect that much of this teasing, etc. emanating from faculty members and TAs would have been described as

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**The Baker House/East  
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(Watson & Oye, from preceding page)

gender discrimination rather than sexual harassment had we asked the right kind of questions here.

The other glaring exception relates to "unwanted sexually suggestive looks or gestures." Again, twelve percent of the women respondents indicated that someone in a position of authority had subjected them to these kinds of looks or gestures. That is much less than the 63 percent of the women who reported they had been subjected to this kind of behavior by

and what is not sexual harassment. Don't believe it, our survey indicates. Sure, teasing and jokes of a sexual nature can be taken two ways and much depends on the context. On that point men and women agreed and disagreed in about the same percentages in this survey. But that same ambiguity did not apply to unwanted letters or phone calls of a sexual nature; nor to deliberate touching, leaning over, cornering or pinching; nor to pressure for sexual

conduct than are men. So overwhelming, in fact, is the difference in the experiences of undergraduate men and women and so consistently do these differences appear in every category of harassing conduct that one must conclude from these survey results that women at MIT are forced to live and work in an environment that is much more hostile, much more demeaning, and much more dangerous than it is for men.

This is a harsh and, for many of us, an unacceptable reality, but it is a reality nonetheless encountered not just by a small fraction but by the majority of our women students. Fifty-eight percent of the women reported they had been subjected to unwanted pressure for dates; 47% reported they had received unwanted letters or phone calls of a sexual nature; 64% subjected to sexually suggestive looks or gesture; 63% subjected to unwanted deliberate touching and the like; 78% subjected to unwanted teasing of a sexual nature; and although not a majority of the women, still an astonishing 32% reported they had been subjected to

unwanted pressure for sexual favors . . . and 13% indicated they had been subjected to an actual or an attempted rape or some other form of sexual assault.

**Next Month in  
The Faculty Newsletter**  
are, they are consistent with the findings of our continuing series, On Teaching and a new feature, On Governance. We would like to highlight them in this issue of The MIT Faculty Newsletter, as will further responses to the question posed in last issue: What should be the intellectual education of the life scientist? We like this challenge and understand the topic of interest to the MIT community.

their peers, but, still, twelve percent seems an alarmingly high figure.

We have highlighted some of the results that seem most relevant to the faculty as a whole. We want to conclude with a few general observations on the results. First of all, attitudes and definitions. Despite some differences between men and women respondents, there was a remarkable convergence in male and female understanding of what constitutes sexual harassment. It is often said (most often by men) that we don't know or can't agree on what is

favors; and certainly not to rape or sexual assault, whether actual or attempted. Men and women alike agreed by 90 percent or more that these acts do constitute sexual harassment if done by a peer, and the percent agreeing is even higher if they are done by someone in a position of authority.

Despite this striking convergence in the attitudes of men and women toward sexual harassment, women at MIT are many times – three, four, five, even six times, depending on the act – more likely to be subjected to harassing

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## On Teaching

### Reviving An Innovation

John G. King

Over the years, MIT people have tried out many educational innovations, including texts which present old material in new ways, changes in format or how students and teacher interact, and entire programs with world-wide impact. Some of these schemes have flourished and become permanent in recognizable form, and are no longer innovations but part of the scene. Others have been modified and absorbed.

Here's a partial list of erstwhile innovations: the three volume series in the introductory electrical engineering core, **Electronic Circuits, Applied Electronics, Magnetic Circuits**; the Physical Science Study Committee course in high school physics; the MIT series in physics (superb books, mostly written by A. P. French, who was honored in a recent symposium, "Learning from Direct Experience"); Project Labs; the special freshman programs (ESG, Concourse, ISP); the Undergraduate Research Opportunities Program (so brilliantly realized by the late, sadly-missed Margaret MacVicar); the 2.70 Introduction to Design competition; Book Night; the MIT Writing Program; physics with take-home experiments; freshman advisor seminars.

Innovations succeed, not only because they are better ideas or fulfill needs, but also, especially at first, because of the revivifying effect of novelty and attention on both student and teacher – the famous Hawthorne effect.

Some innovations have failed, not because they were bad ideas, but because they weren't done right, or

they weren't right for us, or the times weren't right. For instance, self-paced study in physics didn't work at MIT in the early 70's, successful as it was elsewhere. Two new educational schemes that I worked on from time to time between 1968 and 1980 didn't get off the ground either, but since I believe they offer compelling educational advantages, I want to describe them in the hope that they

and get to see the subject and the mind of the teacher up close; he or she gets to work very hard and very closely with our super students and then has two months free of the fragmented MWF teaching schedule. Of course, there are obvious problems of scheduling, economy, and perhaps teaching style – all issues that can be resolved.

Corridor Lab (COL) enriches the

**Just as we have art about the campus – cement fish and steel-plate stabiles and historical exhibits with letters of past presidents and descriptions of early steel processing methods – we should also have cases along the corridors containing apparatus to demonstrate, most often quantitatively, some phenomena of scientific or engineering interest.**

can be revived. I'll describe the simpler one, Corridor Lab, in some detail here, and the other more complicated one, Concentrated Study, only briefly, with a fuller description to come later.

Concentrated Study (COS) is a way for one teacher to present a single subject in twenty working days to twenty students who have no other academic commitment. There is experimental work and lecture/seminar in the morning, and hour-long discussions between the teacher and pairs of students in the afternoon. There is homework, short tests, and a final. The students are made aware of the powerful value of unbroken time

educational environment while making negligible demands on the teacher, in obvious contrast to COS where it is the teacher-student relationship that is enriched through undivided attention. Just as we have art about the campus – cement fish and steel-plate stabiles and historical exhibits with letters of past presidents and descriptions of early steel processing methods – we should also have cases along the corridors containing apparatus to demonstrate, most often quantitatively, some phenomena of scientific or engineering interest.

The following series of questions  
(Continued on Next Page)

## Reviving An Innovation

(King, from preceding page)

and answers should make clear what COL is: How many show cases should there be? Ten is pathetic, a thousand is overkill – a hundred or so; where would they be? A good place to start is the third floor infinite corridor; what are the contents of some representative boxes? Pendulums – free and driven, damped and undamped, simple, physical, cycloidal, coupled, chaotic. The same, but electrical. Waves – water, sound, radio, light, matter. Reflection, refraction, interference, and diffraction. Signals and noise, white, pink,  $1/f$ , Johnson and shot, spectra, auto- and cross-correlation. Force needed to break a paper clip or a hair. Explosions (small) of adjustable mixtures of gases. It's not hard to fill a hundred boxes. The variety of ways in which the phenomena can be made manifest is also instructive, from the 19th century optical lever, to today's sensor, microprocessor, and actuator.

How would COL be used? Selected experiments could be assigned, and reports with data, graphs, and interpretation requested. There would be much informal, aleatory interaction with passers-by, not to be deprecated as it may stimulate new ideas. One could make a start in filling holes in one's knowledge, especially in remote fields - he or she might look at the box on strain gauges or surface tension, etc. Finally, there are staff and students who would do every experiment, all 300.

How does COL differ from a museum, such as the Exploratorium? COL would be here at MIT, accessible day in and day out, and its experiments would generally be more quantitative

and more technical than museum exhibits.

How would the experiments be chosen? By asking everyone in every department to make a list of important phenomena, devices, or techniques to display in COL.

How would COL be developed? By two able technicians assisted by student employees and with help from people in individual departments and guidance from an interdepartmental faculty committee.

What about maintenance and vandalism? Failures from both causes can be minimized by careful design study; staying conservatively within ratings, Lexan windows, formidable knobs, suitable alarms. Some of the development staff time would be needed for maintenance. The few boxes that we have had in the hall for ten years, relics of our first trial, have suffered more from lack of maintenance than from vandals.

How much will COL cost? As usual, salaries are our chief cost. If we were to build one box a month on the average for ten years, the entire project would cost a few million dollars, and maintenance and improvement might be one hundred thousand dollars a year.

Who pays? Some NSF, some MIT, and perhaps private funds to honor someone to whom COL might appeal.

Would COL be worthwhile? Always a difficult question to answer about untried things. Consider, however: are museums worthwhile? Are teaching labs worthwhile? Didn't you ever learn anything from an exhibit in a showcase? And doesn't the rich variety of experimental experience provided by COL seem uniquely and eminently worthwhile? COL can play a role, not only in our own educational program, but also in our attempts to bring technological education to the public. Finally, a unique installation

## Preservation of Intellectual Assets

(Moavenzadeh, from Page 4)

example, after the oil crisis of 1973, many institutions expanded their energy-related research. When international competitiveness and productivity began to be hotly debated in the political arena, academic institutions immediately capitalized on that issue. Now we are entering a new era: We call it global warming and K-12 education. How much of this is of long-term concern? How much will disappear in short order?

The political time horizon for keeping any such issues alive in the media is much less than half the lifetime required to develop the necessary intellectual underpinnings for a solid research base. Therefore, academic institutions are caught up in an impossible juggling act, crystal-ball gazing, and hoping for the best. The consequences on education, on our intellectual assets, and on the quality of our intellectual life, have been substantial – but it is hard to measure exactly how and with any degree of precision.

The administration of an academic institution is thus caught in a vicious circle of raising more research funding – to support their **own** growth and sustain their **own** bureaucracies. Perhaps time has come to take stock of both the purpose and the mission of academic institutions in this era of an evaporated Cold War, coupled with shrinking government funding, declining economic output, and the reality of an expanding global village.

It is not clear what the answers may be, but it is certainly clear that a re-examination of the post World War II academic strategy for MIT is in order. Such an examination must begin here and now – with a focus on the fundamentals, namely the preservation and expansion of our intellectual assets.

[This article is the first in a continuing

# Behind the Barricades at MIT: Teaching the Arts and Humanities

Kathleen Cragin

*Special to the Faculty Newsletter*

The challenge of being a student at an institute devoted to science and technology is rivaled perhaps only by the challenge of teaching the arts at that institute. Recent conversations with faculty of MIT's School of Humanities and Social Science yielded intriguing insights into their experiences with students. Without question, these custodians of the arts believe that MIT students are as unique as the institute itself. "The infrastructure of MIT seems to be built

true for artists.

There is no question that MIT students are some of, if not *the*, best and brightest this nation has to offer. And teaching poetry or drama to a physics major here is not as incomprehensible a task as is perhaps thought. While an MIT student may initially feel uncomfortable tackling the ambiguities of non-quantifiable principles, it is that unfamiliar territory that leads them to real discoveries, notes Evan Ziporyn, assistant professor

observations or physical sets of numbers.

Jerome Rothenberg, professor of economics and poet, believes that the analytical and intuitive must maintain separate expression, and attempts rigorous discipline in his research and creative writing over these "two sides." Yet the two in fact seem to find concentric ground in his teaching, reflected in his humanistic approach to economics. "In my teaching, I am willing to allow kinds of considerations into expositions that would be very likely omitted from mainstream treatments of a subject." Teaching students of different disciplines the economics of the environment, he encourages them explicitly to confront an economic perspective with that of their own disciplines.

These faculty and many others at MIT espouse the important role arts and humanities play in education. By integrating the arts into a core curriculum, students come to "a kind of intellectual flexibility," notes Ms. Soll. As Professor Ziporyn remarked, the interface between "analytical-directional thinking and intuitive thinking" can be applied to a student's particular science.

Across the nation there emerges acknowledgement of the important role arts and humanities play in education. Dr. August Giebelhaus, professor of history and interim director of the newly formed Ivan Allen College of Management Policy and International Affairs at the Georgia Institute of Technology, outlines recent

**MIT unconsciously responds to the notion of a symbiotic relationship between art and science because MIT likes people who are mavericks. Students here are mavericks-in-the-making, creatively pushing beyond today's theories towards tomorrow's new ideas.**

on the assumption that you are passionate about something. If you are passionate, the place nurtures you," notes Alan Brody, professor of theatre arts and playwright.

MIT unconsciously responds to the notion of a symbiotic relationship between art and science because MIT likes people who are mavericks. Students here are mavericks-in-the-making, creatively pushing beyond today's theories towards tomorrow's new ideas. Beth Soll, senior lecturer in dance, notes that the characteristics of mavericks – "independent, eccentric, and energetic" – also hold

of music.

Stephen Tapscott, professor of literature and poet, approaches this concept of symbiosis by likening metaphor to physics. He contends that MIT students are "faster at understanding how metaphors work because, if you study physics, you are studying things that are in many cases metaphors. You don't observe a quark, particle speeds, or a bundle of energy. It's a concept and then – a metaphor. Consciousness processes metaphors in similar ways." Students studying physics study systems of metaphors designed to explain certain physical

**(Continued on Next Page)**

## Behind the Barricades at MIT: Teaching the Arts and Humanities

(Cragin, from preceding page)

changes there. Prior to July, 1990, their College of Science and Liberal Studies perceived humanities and social sciences as strictly “service units.” Using MIT as its “peer,” the Institute has now moved away from the concept of service orientation and toward integration. The Ivan Allen College stresses the interdisciplinary aspect of these studies, focusing on the application of history, technology and society, literature, communication and culture, and economics to scientific discipline.

At the California Institute of Technology, professors within the humanities and social sciences division are encouraged to cross-teach, further encouraging the symbiosis between disciplines that hopefully translates into a students’ understanding of the world they will enter. Interestingly, the strongest voice urging an integrated humanities curriculum come from alumni faculty.

Similarly, Rensselaer Polytechnic Institute stresses interdisciplinary education. Thomas Phelan, RPI’s dean of humanities and social sciences, says more and more of an emphasis is made to combine the sciences with humanities. While they could not be all things to all people, they could **relate** the arts and sciences to science and engineering, hiring those who have degrees in both disciplines.

MIT’s own Commission on Industrial Productivity joins this cadre in “emphasiz[ing] the importance of an holistic approach” to education, as Associate Provost Ellen Harris states in a recent article. The report calls for all undergraduates to have “an understanding of the diverse nature

### In Light

and first may the plum tree  
opens, out of a central calm  
astonished into blossom:

pistil and stamen  
and fleshy plum-flower,  
breaking  
through:

into historical  
air and the luminous  
common heat: if the world

did resemble the soul  
at the center we would know  
no other body,

walking the mown rows  
of the orchard in May  
and the scent

of sweet-vinegar  
winter-softened  
brown fallen plums: for an  
hour,

pierced by an exact desire,  
I knew the self could be  
relinquished: this is the after  
life,

this body.

Stephen Tapscott

and history of human societies, as well as their literary, philosophical

and artistic traditions.”

Glorianna Davenport, assistant professor of media arts and sciences, explains how art and science dovetail, noting, for example, that many physicists play a musical instrument. The symbiotic relationship, she states, is critical to the breadth of individuals. Her experience has found that faculty have tried to provide a “richness of opportunity and wealth of selectivity” within their curriculum, helping students develop methods of critical and expressive observations.

While MIT and a few other institutes may be microcosms to the national macrocosm where the arts suffer a degree of marginalization, it is the *students* who keep programs alive and vital. As Beth Soll observes, “MIT students do everything here; they’re not limited in their activity and so in that sense MIT is very receptive and supportive” of the arts. Evan Ziporyn concurs when he states that “[T]he choice is not whether the arts will be important here; the choice is whether the students feel it’s something they do surreptitiously [or] whether they feel that it is an integrated part of their education.” Students’ increased involvement and commitment, notes Professor Tapscott, give rise to the “sense that a critical mass of practicing artists is just beginning to gather itself into a consciousness and strength.” Continued growth and interest in drama courses, for example, further support the efforts of faculty.

An enormous creative potential exists at MIT and these teaching artists are eager to access and exploit that potential. Students are encouraged to be active and creative in music, dance, theatre, and literature, not solely for the sake of the art, but because those skills can be practically applied to their chosen disciplines. The link between artistic ability and training

## Reactions to the Colloquium on Teaching Within a Research University

Thomas Kailath

*[The publication of this article was postponed from an earlier date, and refers to the colloquium "Teaching Within a Research University" held at MIT last October.]*

As an alumnus (Sc.D., '61) who has been teaching for almost 30 years at Stanford, it is nice to be back on a short sabbatical, and to see that MIT's concern with education is as strong as ever. The colloquium brought out several facts and perceptions that MIT certainly needs to consider very carefully. Nevertheless, it was my feeling that the discussion somehow got sidetracked into the old chestnuts of "teaching vs. research," "publish or perish," "TA's vs. RA's," etc., rather than focusing on the issue posed by the title of the colloquium, or even the pointer given by President Vest when he recalled the late (great) F.E. Terman's comment that the point was not "teaching" or "research" but rather "learning."

First an apology: What I have to say here is not original, or even unfamiliar to the panel or the audience, but it may be worthwhile to say it again. (Was it the beaver, or just the boojum, who said "What I tell you three times is true"?)

Learning is not just the accumulation of more facts and more techniques, which most MIT students can already do pretty well on their own. Rather, it is the accumulation of insight and judgement, of ways of putting together old facts to solve new problems, of trying to see what new facts may need to be uncovered or developed to tackle a problem, of learning to ask questions (over time, more and more the "right" questions) and rigorously developing the answers and exploring the

consequences, and so on and so on. In other words, all the skills gained in doing research. And what better person to convey these to a class of bright and (if we are doing our job right) still eager students than someone active in research, who perhaps even the previous night had to bring these skills to bear in attacking some new problem or answering some new questions. The questions might even have been stimulated by thinking about the material for the next day's lecture! And in fact one of the reasons for

almost at the other extreme (UROP being a successful exception proving the rule).

Now, more briefly, to two other points. Emphases change, and even in the same subject, what was important ten or twenty years ago is no longer relevant or vital now. A faculty active in research is better able to convey this changing sense of the importance of different topics and to properly modify the syllabus and more broadly the curriculum. Also, after having listened to some of the

**...Over the years I have come to believe that in many American universities we attempt to teach too much, and we need to make serious efforts to go in the other direction. We need to keep in mind that, beyond a certain point, too much fussing with a curriculum benefits no one but the academics involved.**

being at a research university is that much research often grows out of the imperatives of lecturing and teaching.

One might ask, of course, how we might make time for this style of teaching in an already more than full curriculum. However, over the years I have come to believe that in many American universities we attempt to teach too much, and we need to make serious efforts to go in the other direction. We need to keep in mind that, beyond a certain point, too much fussing with a curriculum benefits no one but the academics involved. A few topics or courses more or less don't ultimately make much difference to one's education. This point of view was pushed to an extreme in say Oxford and Cambridge, but we are currently

discussion, I feel it is important to stress that we need proper ways of evaluating teaching in a research university – what may seem to be unfocused and unprepared discussion to overworked and overstressed students, an issue to be examined in its own right on some occasion, may only later be seen to be more significant and more useful than a neatly and sequentially presented package of facts. So, for example, peer evaluation, as well as feedback from past students, need to be more extensively and more uniformly brought into the teaching evaluation; moreover, the questions asked of current students need also to be appropriately designed. One could elaborate on these points, and of course bring all the necessary disclaimers and qualifiers. But in closing, perhaps it was Provost Wrighton who gave the best summary: "Research is important," and certainly nowhere

# Letters

## To The Faculty Newsletter:

The following faculty in the Women's Studies Program wish to urge the selection committee for the next group of MacVicar Faculty Fellows to make every effort possible to recognize teaching excellence in their colleagues who are women and minorities.

Susan Carey	Janet H. Murray
Isabelle de Courtivron	Ruth Perry
David Halperin	Margery Resnick
Jean Jackson	Ann Russo
Louis Kampf	Elizabeth Wood
Sherifa	Zuhur

## To The Faculty Newsletter:

I'm a grownup, more or less, and I certainly should know better. There's even a little pamphlet about the Humanities at MIT which opens with the brave announcement (by Paul Gray) that "the humanities, the arts, and the social sciences are essential to our efforts." And indeed the air has seemed full, over the past few years, with words to the same effect.

But not, apparently, when it comes to finding MacVicar Fellows. I don't know any of my colleagues honored in the first round of Fellowships, and I certainly don't mean to call into question their qualifications. But I must raise the issue: were no worthy candidates at all in the School of HASS? No "committed and inventive" faculty members in the entire school? I know from my own experience of my colleagues in HASS that that is just not the case.

One other troubling question – an ironic one, given the gender of the distinguished administrator for whom the Fellowships are named – were those charged with naming the Fellows

announced commitment of the Institute, under the leadership of the new president, to attracting, keeping, and promoting women and people of color to the faculty. It's sad to be forced to believe that the commitment stops, somehow, when it comes to passing out the goodies.

**John Hildebidle**  
Associate Professor of  
Literature

## To The Faculty Newsletter:

The MacVicar Faculty Fellows, according to President Vest, were appointed to emphasize "MIT's commitment to enhance its undergraduate education program." Noble words and a noble idea.

Looking at the list of the first six fellows led me to puzzle over just what that "enhancement" might consist of. The new fellows are all from departments of science and engineering. I can only conclude that either there's no one worthy of the fellowships in humanities or social science, or that only the sciences and engineering are capable of providing "enhancement."

Coming from a teacher of literature this may sound petty or envious. But no such motive is likely to underlie my wonder at all the fellows being white males. I suppose women and people of color haven't been around MIT long enough to enhance undergraduate education. Perhaps they're only concerned with graduate students. Or maybe they just don't have the necessities for heavy-duty pedagogy.

During the last few years we've read or heard many brave words from the administration about encouraging the humanities, social sciences, women, minorities. But as they say, action speaks louder than words.

**Louis Kampf**  
Literature and Women's Studies

## Dear Former Colleagues:

Your current issue (Vol. IV No. 3) is devoted to the forces which have shaped and continue to change the character of the Institute. A new aspect of these forces is the scale of the financial commitment involved. It does not surprise me that some students will cheat to preserve the investments in tuition and housing made by them and their sponsors, or that some research staff will falsify data to preserve their positions, or that some principal investigators will present the ideas of gifted subordinates as their own. Statements of ethical procedures are certainly needed, but these are meaningless without the vigilance of experienced and suspicious minds. Ideally these all-too-human failings can be stopped at the level of individual sin before they can expand into criminal conspiracies. I remember reading in *Fortune* in 1936 that the U.S. airplane industry was no larger than the chewing gum industry; no doubt its important people knew one another personally – the potential for fraud was minuscule. The situation is different now, particularly in the field of medical research, where clear-cut progress is so difficult to demonstrate.

**E. Eugene Larrabee**  
Professor Emeritus  
Aeronautics and Astronautics



## Newsletter Acquires Facsimile Machine

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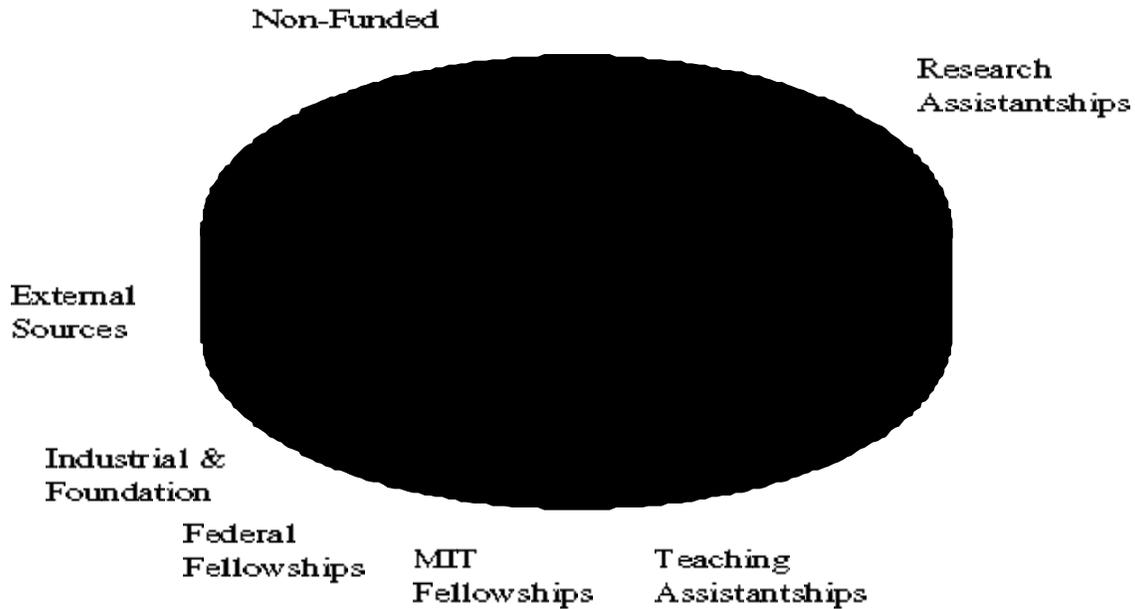
We welcome articles or letters on any topic of interest to the MIT community. Please address all submissions to: **MIT Faculty Newsletter, 38-160**; by E-Mail at **FNL@ZEISS.MIT.EDU**, or to our new FAX number.

## M.I.T. Numbers

### Sources of Graduate Student Tuition Awards (Fall 1990)

	# of Students (EFS)*	% of Total Enrollment
Research Assistantships	2,012	39.30
Teaching Assistantships	450	8.79
Graduate Instructorships	0	0.00
Federal Fellowships/Traineeships	133	2.60
MIT Endowed Support (Departmental)	72	1.41
MIT Endowed Support (Off. Dean Graduate School)	56	1.09
MIT General Support	399	7.79
Industrial Fellowship Support	207	4.04
Foundation Fellowship Support	189	3.69
Students Sponsored by External Sources	350	6.84
Non-Funded or Funding Unidentified	1,251	24.45
<b>TOTAL Tuition Support</b>	<b>5,119</b>	<b>100.00</b>

\*The term "EFS" refers to an equivalent number of fully-supported students and is computed by dividing the total fall term tuition support by the fall term tuition of \$7800 per student.



Source: MIT, Reports to the President, June 30, 1991