

The MIT Faculty Newsletter

Vol. III No. 1

October, 1990

MIT Imposes NSF Fellowship Limit

Frank E. Perkins

MIT's new policy which caps the amount of General funds allocated to the support of NSF graduate fellowships is now in place, and the first phase of implementation has been completed. The cap was established because of the rapidly growing gap between our tuition and the fixed cost-of-education allowance that NSF provides for each fellow "in lieu of tuition and fees."

In the fall of 1989, I estimated the resultant shortfall for FY 90 to be about \$2.9 million, and showed that the combined effects of our anticipated tuition increases, NSF's proposed expansion of the number of fellowships to be awarded, and NSF's stated intention to hold the cost-of-education allowance at its current level of \$6,000 per fellow could lead to a \$4 million annual shortfall in as little as two years.

Throughout the spring of this year efforts were made to convince NSF of the need to increase the cost-of-education allowance to a level more in line with tuition at private research universities and/or to relax their requirement that the allowance be accepted in lieu of tuition and fees.

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FROM THE FACULTY CHAIR

Transition to a New Administration

Henry D. Jacoby

The winds of change are beginning to whistle through the head offices of the Institute, and since many faculty have been away I will try to bring everyone up to date on recent developments and the likely sequence of events in the next few months.

Charles Vest will take over as president on Monday, October 15. One of his earliest duties will be to chair the faculty meeting on Wednesday the 17th. He and his family are going to live in the President's House on Memorial Drive, but the exact date of their move is unsure because the house is in the last stages of several months of renovations. The improvements include an overhaul of the heat and vent system and air conditioning of the public spaces, and the upgrading of handicapped access with a reconfiguration of the front steps and installation of an elevator. The work schedule is tight, with efforts now pointed to being ready for the first major social function, a community-wide Newcomers Reception which the Vests will host on October 16.

Also on October 15, David Saxon will retire after seven years as chairman of the MIT Corporation. David and

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Family and Work Committee: Overwork or Addiction?

Rosalind Williams

"You try to make the system fit the personnel, not the personnel fit the system. There's a big difference."

--Red Auerbach

The MIT community is indebted to the Committee on Family and Work for its thorough, thoughtful examination of the relations between working life and family life at the Institute. The Committee has gathered essential information and has outlined the major issues confronting MIT in this area. I am going to express some reservations about this report, but I hope these comments will serve to draw attention to the importance of the Committee's report, and to encourage further thought and action concerning its proposals.

The Committee was charged with reviewing family-and-work conflicts and policies affecting three groups: faculty, staff, and students. Most of my comments, however, will pertain to faculty, and especially to junior faculty, because I am best acquainted with this group. (For the record, I have three children who are 6, 10, and 14 years old.)

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Editorial

"The Times They Are A-Changin'" (And We Had Better Change With Them)

Not so long ago, there was a golden age. Some of us remember it, all of us have heard the stories. MIT was the fountainhead of science and technology that had made our nation the richest and most powerful on Earth. The nation and its people were grateful. Research funds were so plentiful that we were actually forced to set research priorities, balancing interest and importance. Proposals were short, almost *pro forma*, because the MIT name on the letterhead almost guaranteed acceptance.

It wasn't just that research was almost pure pleasure; teaching was simple and satisfying. We **knew** exactly what our students needed to learn and we **knew** the best way to teach it to them. They worked hard because they were so pleased to be admitted. And when our students had done all that we asked them to do and learned all that we asked them to learn, they were rewarded with a bewildering array of job offers.

Not nearly so long ago, Massachusetts had its miraculous golden age, reflecting the glory of MIT and the industries MIT spawned. The new age of high technology had arrived and Massachusetts was its avatar. First computers and then biotechnology and then we would come up with something else. We had the lowest unemployment level in the country and taxes were actually going down. Massachusetts was showing the country the path to a prosperous future.

The golden age (the most recent golden age) of the United States lasted somewhat longer but it too came to an end. The most prosperous nation on the planet went from banker to debtor almost before anyone noticed what was happening. Now we import advanced technology and export raw materials.

Our cities are falling apart and our people are getting mean spirited.

Maybe the golden ages weren't as golden as they seem in retrospect. Certainly the benefits weren't equally distributed, but they were nice while they lasted. They came into existence when new syntheses were made and they began to die when it became an object of faith that the future would be a simple continuation of the past.

And so the U.S. continued to rely on the ability of advertising to sell goods better suited for production than for consumption, Massachusetts refused to believe that our computer manufacturers wouldn't continue to dominate the market, and MIT assumed that it would continue to be recognized as a National Treasure and treated accordingly. But the world caught up to and passed the country and the state. Now MIT's pre-eminence shows up only in the last significant digit. The rest of the world is catching up to MIT.

Life is much easier for the front runner. We had our golden age because we were the first to realize that new problems needed new tools. We showed that reductionism, formal analysis, and first principle analysis could be applied to engineering problems; we defined what an engineer was and what an engineer did; we showed how a research university could interact with government and industry to mutual benefit; we developed the modern curriculum and teaching methods.

The focus has changed. Now issues of complexity, scale, and interdependence are paramount. The analytic tools that we labored so hard to develop have become mechanized and are widely available. New mental constructs and new methods of visualization are needed to help us

comprehend the far more complex problems we have to solve. New combinations of expertise must be formed. We must decide what it is that those who will work in this more complex arena must know, or at least what habits of mind they must bring to the problem.

But the changes are not just technical. It has become obvious that technological choices are not socially neutral. If we continue to ignore this fact, we will be considered to be either irrelevant or disingenuous - and rewarded accordingly. Technology is deeply imbedded in society and we must find ways to reflect the complexity of reality. We must find the way to motivate and prepare our students to face a world of change and complexity. We must find ways for a private university to survive and prosper in a state and in a country that are not, at this juncture, inclined to be either rational or generous.

We must be prepared to make major changes in the way we think, the way we teach, and in the way we organize ourselves. We had better do this quickly, before we find ourselves scrambling to catch up.

The change of administration is a largely symbolic act at MIT. Although the formal structure of the Institute deeds little power to the faculty, MIT, more than almost any other school, is controlled by the intellectual interests of its faculty. The new administration must be prepared to help us move into areas whose limits are not entirely clear, must help us form new and flexible organizational structures, must convince the country that MIT is once again defining the future. Every indication is that we have the right president for the task. We will have embarked on the road before the next issue of this *Newsletter* appears. Good luck to us all.

Editorial Committee

We're Baaack!

After a long, but not terribly arduous summer contemplating editorial and technological changes, *The MIT Faculty Newsletter* is proud to be - back. And in honor of our return, we thought it might be helpful to offer a brief review of our publishing process, and to fill you in on our new (and planned) innovations.

The MIT Faculty Newsletter is overseen by an **Editorial Board** composed of faculty members from throughout the Institute. Membership on the Board is entirely voluntary, but the Board members try to ensure that and schools within the Institute are represented.

Each issue of the Newsletter is organized by a (volunteer) subset of the Editorial Board, an **Editorial Committee**. Approximately five faculty members comprise each issue's Editorial Committee, and it is their job to select a focus for the current issue (main theme, particular topics), solicit articles (cajoling, browbeating, threatening), review solicited and unsolicited material ("great", "excellent", "noteworthy", "eh"), determine basic layout for the issue (who goes first), and is responsible for the Editorial.

The *Newsletter* is input on a PC using WordPerfect 5.1 (although we can deal with - and would appreciate - any type of word processing program on a floppy disk when submitting an article) and then layed out using the desktop publishing program PageMaker (new for us this year). We hope soon to add a scanner to our hardware to even further improve the creativity of the output.

Each Editorial Committee works with the Production Editor, and meets between four and five times before the *Newsletter* is "put to bed" (literally "subwayed to the printer").

The *Newsletter* is then printed, shipped to Graphic Arts for mailing, and the process repeats with the next Editorial Committee. The full Editorial Board meets approximately twice a semester, when questions of policy and politics are discussed. And that's it.

The intent of *The MIT Faculty Newsletter* is to be a voice for and a representative of the MIT faculty - and so it is only with your support (writing articles, sending in letters,

serving on the Board and/or on a Committee) that the *Newsletter* can continue to prosper and grow. We encourage all faculty members who would like to participate in this process, to contact any member of the Editorial Board (listed on Page 2), to write to us at 38-160, or to call x3-7303.

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Next Issue

On October 15th, Charles M. Vest will be officially installed as President of MIT. The next issue of *The MIT Faculty Newsletter* will feature an exclusive statement from President Vest to the MIT faculty.

We encourage all faculty members to submit articles concerning the incoming administration, in the form of suggestions, comments, or even questions. In addition, we welcome contributions of any sort (articles, cartoons, letters, etc.) on any topic of interest to the MIT community.

Please submit all pieces to: *The MIT Faculty Newsletter*, 38-160, or to any member of the Editorial Board.

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Rosalind Williams is Associate Professor, The Writing Program.

Gerald L. Wilson is Dean of the School of Engineering.

Tenure and Teaching

Suggestions and Guidelines

Gerald L. Wilson

Faculty promotion and tenure decisions in the School of Engineering have long been based on candidates' teaching, research, and service. Over the past two decades, the source of information has increasingly shifted to individuals outside of the Institution. As a result, the focus of the discussions has shifted to the research, as opposed to the teaching or service leadership of our faculty. We can obtain detailed information covering the nature and impact of a faculty member's research from thousands of miles away and, to exaggerate some, a ranking the individual accurate to two decimal places! When asked about the teaching contributions, the standard response is, "I have not observed _____'s teaching in the classroom, but from her/his talks at conferences, I am sure she/he is an outstanding teacher." (You fill in the blank.)

"Suggestions and Guidelines for Assessing and Reporting on Teaching Contributions of the Faculty" - See Page 10

The School of Engineering has continued to try to understand, evaluate, and weigh faculty members' teaching contributions in all tenure and promotion cases. People tell me the perception is that, "teaching does not count." I can only tell you that the perception is dead wrong. Nevertheless, it is true that teaching usually occupies a very small portion of the discussion of a faculty member's accomplishments. There is so little to discuss because so little is known.

On Page 10 is a reprint of the document "Suggestions and Guidelines for Assessing and Reporting on Teaching Contributions of Faculty" - a report resulting from discussions I have had with, and suggestions given to me by, a variety of my faculty colleagues in the School. The guidelines were adopted by Engineering Council last spring, and will go into effect this fall with the upcoming promotion and tenure discussions. They do not represent an increase in the requirements for success at MIT. Rather, we have raised the requirements for the knowledge base upon which promotion and tenure decisions will be made. I welcome suggestions for improving the document and, therefore, the process.

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Courage Needed for Change

Margaret L. A. MacVicar

Perhaps the greatest surprise to me as dean for undergraduate education has been to learn what typical promotion and tenure case documentations contain. Or don't contain. I was not so starry-eyed as to believe that good teaching and high quality educational contributions would have equal weight with research achievement in all promotion and tenure decisions. I expected that for some cases it might be so, and that, for a few, achievement in teaching enterprises might predominate other considerations. My expectations assumed that the assessing of a candidate's accomplishments in research and teaching would be based on substantive and considered understanding about what constitutes excellence in them.

I was not prepared for the primitiveness and wasteland of the typical case documentation with regard to assessing educational achievements. Compared to the richly delineated parameters and nuances we have honed by which to judge research accomplishments, there are but pale imitations for judging teaching accomplishments. Perhaps this difference lies in a mistaken snobbery that research achievement can only derive from innate genius while teaching achievement

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can be had by anyone simply by learning good execution. Perhaps it is because excellence in teaching is so hard to assess. Or perhaps it is because we haven't worked very hard to learn how to assess it. No matter, the result is a dearth of elaboration and lack of articulation about educational complexities when a colleague's teaching is discussed.

For research, there are well-understood tip-off phrases in reviewers' letters pointing to excellence: "seminal", "best of her generation", "path breaking", "world class"; I've seen no analogous ones for teaching. Whereas almost all reviewers seem able to name with awesome exactness the very two people on the globe between whom the candidate ranks in

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Freshman Design Project Success Highlights Lessons for All

Travis R. Merritt

The first photo shows a young man seated in a shopping cart. The text reads: "Here we see a simulated handicapped student in a simulated wheelchair attempting to get into the Student Center through a button-operated set of outward-opening doors 'designed' for that purpose. Notice that the left-hand door, as it swings open, blocks the student's entrance, forcing him to navigate around the door (hopefully before it closes again). If he had parked within the door's immediate trajectory, it might actually have flattened him. This arrangement was obviously not thought up by a real handicapped person, or with the needs of a handicapped person in mind. A simple solution would be to have a single door opening to the right, and staying open for a while."

This report was but one percent of the total yield from the Freshman Design Project, a new and significantly successful feature of this year's Residence/Orientation period for the entering Class of 1994. On Friday, August 31, a scant half-day after their arrival at MIT, the new students assembled at 9:00 AM in Kresge to hear a brief slide-illustrated talk by Professor Woodie Flowers about the consequences of the human insensitivity - sometimes merely irritating, often far worse - in the mindless design of "ordinary" things. Thus fired up, the freshmen sallied forth across the campus in a hundred randomly assorted groups of ten to find and document examples of their own. Each group was armed with a campus map, paper and magic markers, and a Polaroid camera. They had three hours to produce a concise report, mounted on a tabloid-sized piece of poster board, not only describing and picturing their little-horror-of-choice but exploring its probable causes and suggesting feasible

ways of setting it right. They worked on their own, unattended by faculty or staff leaders, although graduate students were available, if needed, at several "consultant stations."

Not the least of the Project's benefits was the lesson it carried about the importance of collaboration. As one freshman put it, "The first thing the ten of us had to design - and in a hurry - was an effective way of working together."

The level of enthusiastic participation was in itself astonishing. Nearly every freshman joined in, and ninety-nine groups turned in reports - insightful, instructive, usually artful, often laced with humor. Their targets were diverse: impenetrable doors, self-tangling venetian blinds, impossible access for the handicapped, shower faucet confusion, dreadful auto dashboard panels, befuddling signs, sadomasochistic Pringles containers, hallways leading nowhere, mis-located light switches, and toilet paper dispensers cunningly located to require a contortionist's agility. Several groups found fault with the Polaroid cameras themselves.

Not the least of the Project's benefits was the lesson it carried about the importance of collaboration. As one freshman put it, "The first thing the ten of us had to design - and in a hurry - was an effective way of working together. At 9:45 we were a bunch of strangers. By noon we were something

like a team. And we figured out the cooperative strategies on our own."

The Project, orchestrated by the student R/O Committee and the UASO with generous funding from the Context Support Office, was thematically anticipated and reinforced in the selection of *The Design of Everyday Things*, by Don Norman '57, as the Book Night text mailed to the freshmen for summer reading. The entire joint production provided a meaningful early encounter with a key element in MIT's institutional ethos. It was also in harmony with a recent renewal of emphasis on design, hands-on learning, and an experiential approach to education which is making itself felt in curricula here and nationwide. Most important, perhaps, it underscores the urgent need for awareness of the human surround - social, cultural, psychological - which must condition technological and scientific advance.

The Freshman Design Project could have been done anywhere. Clearly, though, this kind of activity has a peculiar aptness here. Nor is its application restricted to the human ramifications of engineering and science. Whatever our disciplines, we need constantly to be re-imagining their relational aspects, their connections with life as it is daily enjoyed or endured by people who are not certified "experts." For several years, not so long ago, "multiple literacy" was something of a rallying cry for the re-ordering of our educational priorities at the Institute. The welcome new stirrings of contextual learning, particularly those which link theory with the things of this world and which eliminate artificial boundaries that needlessly separate complementary fields of knowledge, challenge the MIT faculty to a vast and exciting "design project" of their own.

Campus Police Reject Leniency for Student Demonstrator Faculty Resolution Ignored

Jonathan King and Louise Dunlap

Sitting in the Middlesex county courtroom watching the prosecution of Jennifer Huang '90 was a disturbing experience. Jennifer was tried September 21st for Trespassing, Disturbing the Peace and Assault and Battery - a felony - during the April 6th student demonstration against apartheid in front of the MIT student center. Throughout the proceedings, we were painfully aware that this was an MIT student being tried for peacefully demonstrating on her own campus in front of her own student center.

Two campus police officers testified that Jennifer said nothing, and did not resist arrest. They further testified that while she was lying on her stomach on the ground they forcibly pulled her arms behind her back and handcuffed her. They then picked her up and thrust her face-down into the back of a police van. Officer Lucy Figueiredo testified that, as they were throwing her into the van, Jennifer kicked Figueiredo. The

boot was introduced as the "dangerous weapon." Extraordinary: two officers handcuff and bodily shove a young woman into a police van and the young woman is charged with Assault and Battery!

Upon delivering the verdict of

the larger community, were employees of the Commonwealth spending their time and our tax money on this case? Why were MIT employees involved in a case that so negatively affects free expression among the students? MIT

should have been present in defense of Jennifer, not calling for her conviction.

At its April 18th meeting the

faculty passed a resolution requesting that charges be dropped against the students arrested in the demonstration and that any court costs incurred be paid by MIT. This has not occurred. The students were charged, and the court costs were not paid. The failure to respond to the faculty resolution needs to be evaluated.

We trust the officers of the faculty will report to us on why the Administration failed to respond to our resolution, and why they called for the sentencing of one our undergraduate students, guilty only of taking democracy seriously.

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guilty on the Assault and Battery charge, Judge Hassett asked the prosecution if they objected to her granting a continuance - no punishment and eventual expunging of the record. The district attorney walked to the gallery - past Officer Figueiredo - directly to Edward McNulty who represents the Campus Police and the Institute at court cases. McNulty indicated "no", and the district attorney returned to reject the continuance and call for sentencing. Jennifer's lawyer will appeal for a trial by jury, extending the costly process for another several months.

Why was this case being tried? Why, given the very real crime afflicting



Context Support Office

MIT, In Reality

Kicking off an exciting and event-filled year of "contextual" projects, the Context Support Office and the student Undergraduate Association are co-sponsoring a seminar series. Held each Tuesday at 4:00 PM in Room 6-120 (refreshments starting at 3:30), "MIT, In Reality - Today's Issues, Tomorrow's World" will feature faculty from around the Institute, and is designed to introduce

students to research being done at MIT and related contemporary issues.

As some topics might be appropriate for faculty to recommend as supplements to material being discussed in class, faculty are being urged to check out the term's offerings and to recommend them to their students. Even better, faculty members are welcome to bring their class to a seminar.

For more information about the seminar series, or for contextual questions or comments, contact the Context Support Office, x3-7909. As Context Co-director Larry Lidsky has said, "Introducing the real world to our research makes it more complicated, more interesting - and more fun."

NSF Cap in Place

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These efforts were unsuccessful, as were efforts to modify NSF's rules governing the supplementation of fellows through partial research assistantships. Subsequently, MIT elected to cap the General funds for meeting the shortfall at \$2.9 million starting with the current academic year and for the foreseeable future.

The \$2.9 million cap is sufficient to support only 184 fellows at our 1990-91 tuition levels. Yet last year we had 196 NSF fellows active at MIT and another 20 on reserve status. Thus, last spring it was clear that we would have to limit somehow the number of NSF fellows at MIT, or individual departments would have to find additional funds for support of their NSF fellows. With one exception our departments have indeed taken the latter course of action. This fall we have now enrolled 207 active fellows, thereby indicating that our departments have collectively found other sources of support for some 23 fellows and their attendant \$360 thousand shortfall. In the short term, i. e., for this current year in which there was little opportunity to make other arrangements, the use of funds from these other sources may be a reasonable option. However, it is doubtful that many departments can sustain this use of such funds for very long, especially when one considers that the shortfall and the attendant demand for additional funds are expected to grow each year.

One department, viz., Mechanical Engineering, actually found it necessary to decline to honor the NSF fellowships of several newly admitted students in order to remain within the capped dollars allocated to that department, but did in each case offer other forms of support to each of these students.

Because we have gotten through this first round of the new policy without major disruption of departmental budgets and admissions procedures, there is a danger that the seriousness of the problem

will be downplayed. My purpose in writing this brief article is to make sure that no false sense of security develops. Three forces will conspire to make the second year of the new policy much more difficult to implement. These forces are:

1. MIT's annual tuition increases are likely to continue while the NSF cost-of-education allowance remains fixed.

2. NSF is committed to expanding the number of fellows even if their originally planned rate of expansion is reduced.

3. It is my sense that departmental funds for helping with the shortfall are already stretched to the limit and may have been provided at the expense of other programs which will increasingly press for their restoration.

The most likely impact of these forces is that we will be able to support a decreasing number of NSF fellows in the future, and will be forced to make many more negative decisions regarding the support of NSF fellows than were required this past year. As the numbers of such decisions become significant and affect students in many departments, the full consequences of our new policy will be realized.

What are the realistic prospects for the next few years? I see at least five possibilities:

1. NSF could increase the cost-of-education allowance to a more acceptable level. There are voices within NSF who label the current level as "unconscionable" and would like to see at least a 50% increase. Perhaps the new senior management of NSF will be responsive to these voices and to those from other universities who share our concerns.

However, it is also chilling to note that sequestration under Gramm-Rudman-Hollings led in the past to a

temporary reduction in the allowance and could conceivably do so again.

2. NSF could modify their rules regarding the cost-of-education allowance. We came close this past year to an agreement on one useful rules change and will continue to argue for such changes.

3. Many departments will actually decline to honor an increasing number of NSF fellowships, especially now that there is time to place appropriate notices of this possibility in our Practical Planning Guide for new students and in various departmental publications.

4. We may be able to find new mechanisms, acceptable to NSF, through which research sponsors can utilize NSF fellows on their sponsored projects and can support all or part of the shortfall. One such mechanism has been proposed by Professor Warren Seering and is currently under review.

5. MIT could increase the level of the General funds cap. Note, however, that any increase in the cap transfers directly and negatively to the Institute's bottom line; therefore, attempts to increase the cap must compete with the many other pressures for Institute funds and are not likely to be accepted easily.

The NSF tuition shortfall problem is, it seems to me, one piece of a larger problem, viz., the huge reduction in federal fellowship support which has occurred over the past two decades and the questions of national commitment to graduate education which those reductions imply. Efforts are underway by several national university organizations to press for substantial increases in such fellowship support; however, the realities of our federal budget suggest that we will all have to adjust to the idea that the funds available for meeting the NSF tuition shortfall are finite.

Science Requirements at MIT: A Report and Commentary

Hartley Rogers, Jr.

In the fall of 1989, the deans of Engineering, Science, and Undergraduate Education appointed the Committee on the Science Requirements (CSR). This committee was created as a follow-up to, and upon the recommendation of, the Science-Engineering Working Group. It was (and is) intended that the responsibilities of the CSR include further consideration of issues raised in the Working Group. (The Working Group was chaired by Professors Silbey and Wormley.) CSR is to bring its recommendations to its appointers, and, in particular, to submit its recommendations to the Committee on the Undergraduate Program (a standing committee of the faculty chaired by the Dean for Undergraduate Education) for further discussion and direction. While the CSR is an *ad hoc* committee, there is some expectation that the faculty will eventually make CSR a standing committee.

Charges to the Committee include the following: (A) Preparation and submission of recommendations regarding new or existing educational experiments relevant to current or prospective General Institute Requirements in science and engineering. (Current experiments include SP01-SP02 in molecular science and biology, 8.01X-8.02X in physics, and certain other Science Distribution subjects.) Recommendations would be submitted after appropriate monitoring and evaluation; (B) Formulation and submission of recommendations regarding the nature and structure of the General Institute Requirements in science and engineering. (These requirements currently include: core requirements of two specified terms of mathematics, two specified terms of physics, and one specified term of molecular science ("the chemistry

requirement"); and elective requirements of one elective term of laboratory and three elective terms of Science Distribution subjects.) In particular, the CSR is asked to consider the possible inclusion in the requirements of a term of biology; (C) Service by the Committee as a center of interdepartmental communication with regard to content, method, and effectiveness of subjects used for the General Institute Requirements in science and engineering.

The present membership of CSR includes three members of the School of Engineering [Professors Haus (associate chair), Rose, and Sonin], four members of the School of Science [Professors Danheiser, Greytak, Lodish,

monitoring of SP01 and SP02 by faculty and student evaluations and by direct observation; consultations with the teachers of SP01, SP02, 8.01X, 8.02X, and 7.01 (7.01 has been newly revised as a Science Distribution subject); initial consideration of alternative forms and emphases for the Science Distribution requirement; a survey, relevant to the laboratory requirement, of currently available opportunities for student "hands on" experience in the freshman year; and a formulation of the purpose, nature, and role of MIT's core requirements as perceived by the Committee.

The statement concerning the core requirements is given as follows in the working papers of the Committee:

Undergraduate education at MIT has been, and continues to be, distinctive among the major universities of the U.S., not only in specific knowledge imparted, but also in attitudes, habits of mind, and analytical abilities developed.

and Rogers (chair)], two members of the School of Humanities and Social Sciences [Professors Diamond and Lightman], one member each from the Schools of Architecture and Management [Professors Glicksman and Little], an Associate Dean for Undergraduate Education [Ms. Richardson-Enders], and an undergraduate member [Pamela Monaghan, a junior in Chemical Engineering]. It is worth noting that the academic background of each faculty member from Architecture, Management, and Humanities and Social Sciences includes graduate work in science or engineering.

CSR began its work in the academic year 1989-90. Its activities have included the following: initial

"a) To give the student analytic ability and to develop in the student confidence in his/her powers of analytic thinking; and to provide all MIT students with a common background in science as one of the defining features of an MIT education; b) To provide the student with a common body of knowledge and methods on which upperclass education can be based; c) To provide, with each core subject, an introduction into a disciplinary area."

It should be noted, in this formulation, that the core is not expected to be a comprehensive collection of desired common knowledge. Considerations of depth and analytic ability require that a selection be made, while considerations of usefulness in departmental curricula and of student

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Suggestions and Guidelines for Assessing and Reporting on Teaching Contributions of Faculty

(Continued From Page 5)

Hiring, promotion, tenure and compensation considerations in the School of Engineering should be evaluated with the expectation that MIT engineering faculty will demonstrate

without having had a primary teaching responsibility.

Some promotions will be based primarily on educational contributions. Others will be based primarily on

lecturer should, with other faculty colleagues, attend several lectures or recitations taught by the faculty, and provide written evaluations to the department. Similarly, laboratory subjects should be observed *in vivo* and written evaluations should be prepared. These evaluations as well as oral suggestions and constructive criticism should be provided to the individual for purposes of self-evaluation and feedback. The use of video taping should be encouraged for self-evaluation.

While it is true that junior faculty should be counseled against focusing all energy into education to the total neglect of research, it is also true that outstanding researchers with little enthusiasm for teaching would better serve the Institution through appointments in the research ladder, rather than through appointments to the rank of faculty.

Graduate Teaching

Many graduate subjects support research activities that involve groups of faculty. Consistent with the need to guide, encourage, and evaluate junior faculty, faculty mentors and others should sit in on several class meetings and provide written evaluations to the department and written and oral evaluations to the individual.

Undergraduate Student Mentoring

An undergraduate's first tentative steps in original research - through a UROP project, a laboratory project or an S.B. thesis - often involve large investment of faculty time in one-on-one interactions. S.B. theses typically have oral presentations - three or four students and their supervisors meeting as a group. UROP and laboratory projects should similarly include opportunities for oral presentation and discussion to develop student skills in making presentations and defending one's work before faculty and peers. These are excellent opportunities for colleagues to attend and to observe and evaluate the mentoring process.

Graduate Student Mentoring

The common style of research group management entails weekly group meetings with faculty and graduate students that include students leading

leadership and excellence in education as well as in service and research. In assessing educational contributions, teaching-through-presentation skills are an essential and important consideration. In addition, the mentoring of students, the development of their self-learning skills and the ability to inspire students individually to meet their full potential as engineers and leaders, are equally important aspects of the educational contributions of a faculty member. Contributions such as novel organization of subject content, the production of textbooks, educational software, demonstrations, video presentations, the development of student presentations, teamwork and leadership skills, are equally important. They have long-term consequences for our curricula and for the engineering profession.

While it is true that junior faculty should be counseled against focusing all energy into education to the total neglect of research, it is also true that outstanding researchers with little enthusiasm for teaching would better serve the Institution through appointments in the research ladder, rather than through appointments to the rank of faculty. In any case, no faculty member should reach the point of being considered for tenure

research contributions. All considerations for promotion must address both educational and research contributions. Even in a promotion case based primarily on research contributions, at least one-third of the documentation submitted for review by Engineering Council should address the candidate's educational contributions - to the department, to MIT, and to the engineering profession as a whole. Special attention should be given to educational contributions whose impact has reached beyond MIT.

Each department must have means in place to identify the educational contributions of its faculty on a continuing basis. It is inappropriate to concentrate the evaluation of a faculty member's educational contributions just prior to or during the process of evaluation for promotion or tenure.

Following are suggestions for department action and initiatives to foster the development and assessment of creative educational contributions.

Undergraduate Teaching

Junior faculty should be routinely encouraged to teach department core subjects, at least once per year. In those departments where core subjects are large enough to have a lecture, the

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Suggestions and Guidelines

(Continued From Page 10)

informal discussions of their work. Many junior faculty participate in meetings with senior colleagues, whereas others conduct their own meetings. In either case there are opportunities for colleagues to observe the group dynamic and mentoring process, either as regular participants or as guests. Doctoral student mentoring can also be assessed during this process through more active thesis committees, e.g., by requiring informal thesis progress presentations every semester.

Subject Development

Information is readily available on major development efforts through new subject notes, textbooks, laboratory notes, subject outlines, homework sets, lecture demonstrations, handouts for design exercise, laboratory activities, computer software, etc. Just as promotion and tenure cases require that recent publications be included, teaching-related "artifacts" should be made part of the promotion and tenure case documentation for review.

Department Teaching Seminars

The breadth and complexity of the technology in which faculty are engaged result in diminishing opportunities for department faculty to discuss topics of common interest. Department seminars that review the content of subjects and department curricula, with presentations of pedagogical approach and defense of subject content, provide an opportunity for faculty, and even students, to come together on common ground for discussion and debate. These would not only be opportunities to build a sense of common cause and community spirit, but would again provide an opportunity for faculty to present their teaching perspectives and to share in the teaching creativity and perspectives of others. Each department is encouraged to foster such seminars.

Courage Needed For Change

(Continued From Page 5)

his/her research field, reviewers are usually unable to rank a candidate's teaching prowess compared to anyone's, in any field, living or dead.

Testimonial and endorsement frequently substitute in considerations of teaching performance for the critique common to evaluating research performance. From hearing a twenty-five minute talk at a research conference by the candidate, a reviewer might offer confidently that the candidate will be an excellent classroom teacher. Gratitude is expressed for the candidate's willingness to shoulder a department's most time-demanding subject.

Enrollment figures are frequently cited meaningfully as evidence of good teaching, especially if the trend is increasing. Student-done evaluation survey scores of such things as blackboard technique, text choice, and course organization are also offered. Rarely do senior faculty colleagues document first-hand a candidate's classroom teaching by attending the subject. Nor do we sit in to offer coaching or to monitor over time his/her growth and maturation as an instructor. Encouragement and advice to transform promising class notes into a textbook, or to export innovative pedagogy and teaching ideas to other institutions, are not commonly given to junior faculty.

Thus, at promotion and tenure deliberations, a candidate's research record is usually one of national and international impact, showing the benefits of much mentoring from colleagues and thoughtful career strategizing, while his/her teaching record rarely if ever has impacted the pedagogy of a discipline or made a reputation beyond his/her own institution, or even beyond his/her own

department. The teaching achievements record is unmentored and unstrategized. It is the residual. Why do we let things be this way? I would like to read in some reviewers' letters careful and rich discussion of a candidate's intellectual growth in the classroom and other teaching settings. There could be examples cited and discussed, such as her fascinating new approach to presenting the concept of duality to students, or his clever first-time-ever tabletop demonstration of genetic principles, or her creative use of multimedia presentation for teaching design.

Besides seeing published research articles and books passed around the decision table, perhaps we also could see occasionally a candidate's syllabus and exams. I would like it to be notable and presented with pride in presentations of the case, that a candidate's teaching approach resulted in a major improvement in understanding by students as compared to when the subject was taught by others. There is no longer need for a listing of a candidate's sponsored research contract volume. In personal statements, it can no longer be sufficient to say "I enjoy teaching" and then use the rest of the pages to lay out a detailed future research plan. Should there not be also attention to teaching plans and aspirations?

There is much hunger within us to reaffirm our commitment to excellence in teaching, values deeply and closely held at MIT but which have gotten away from us. The outside world rumbles and rails at the doors of research universities, critical and suspicious about their dedication to this kind of excellence. Here is where MIT's courage and leadership is critically needed and will be sorely tested.

FROM THE FACULTY CHAIR**Transition to a New Administration**

(Continued From Page 1)

Shirley are moving back to their home in the Los Angeles area. Fortunately David will continue to be involved in MIT affairs; in June he was elected a Life Member of the Corporation and will maintain an office here (9-235). Paul Gray has been elected by the Corporation to be the next chairman, also effective October 15, and will shift down the hall to the Chairman's office in 5-205. Paul and Priscilla have already moved to the chairman's residence at 100 Memorial Drive. It is evident that all the principals are looking forward to mid-October with great anticipation. As Paul put it the other day, "Thirty-three days, seven hours and eight minutes, but who's counting?"

A most enjoyable event of the transition will come on Friday night that week (October 19) when the faculty will host a dinner to honor Paul and Priscilla. A faculty committee chaired by Tom Allen has planned the party, and it is going to be great good fun. (Please note: the invitations with reply cards have been mailed to faculty at their home addresses, and that list is not always up to date. If any faculty member has not seen the invitation, check your mail pile, and if that fails give me a call.)

The pace of Dr. Vest's activity at the Institute has risen steadily since his election by the Corporation and first public introduction to MIT on June 18. In mid-summer he had to juggle the beginning of his orientation to MIT with residual obligations as provost of the University of Michigan. But each passing week has seen more and more days here in Cambridge. Much of the time has been spent meeting with faculty and senior academic and administrative officers, and absorbing MIT arcana. (If it's raining, can you get from the President's office to Building 39 without getting wet?) He has met with several groups of faculty as well as with individuals, including a session with the

Faculty Advisory Committee on the Presidential Search on his first work day here. He will meet with the Faculty Policy Committee in late September for an introduction to faculty governance and a general exchange of views about the direction of the Institute.

A most enjoyable event of the transition will come on Friday night that week (October 19) when the faculty will host a dinner to honor Paul and Priscilla.

A key focus of all this activity, of course, has been the selection of a provost, who Dr. Vest has said will come from the MIT faculty. In addition to discussing the choice with particular individuals and groups, he sent a letter to all the faculty soliciting views on candidates and issues in the selection. Rumors of "who" and "when" are sparse as of this writing. Meanwhile John Deutch continues to shoulder the duties of the office. Earlier in the year John had announced his intention to step down on June 30, to return to work on physical chemistry and public policy issues, but he has adjusted his plans in order to keep things moving until a new person can take over.

In other areas as well our colleagues are going the extra mile, stepping in, or staying on, to insure a smooth transition. In April Gerry Wilson, who is Vannevar Bush Professor and a joint appointee of EECS and Mechanical Engineering, announced that he would resign the post of Dean of Engineering effective September 1. He has agreed to continue to lead the School as late as the end of January, by which time a new dean should be in place. Philip Khoury,

Professor of History, has moved up from Associate Dean to Acting Dean of Humanities and Social Science, and will hold that post until a new dean is selected. Nan Friedlaender has returned to the Economics Department to teach and to pursue her research in economics and public policy.

Art Smith, Professor of Electrical Engineering and former Chair of the Faculty, has accepted a one-year assignment as Acting Dean for Student Affairs, during which time a new dean will be selected. Former Dean Shirley McBay resigned her post effective June 30, and is on a two-year leave from MIT as president of the Quality Education for Minorities Network, an organization devoted to improving pre-college education. Ken Smith, who is Guillard Professor of Chemical Engineering, had long anticipated that at the end of ten years he would relinquish the duties of associate provost, vice president for research, and director of Whitaker College. Now is the time, but Ken also is being flexible to allow the new administration to get its new team in place.

Plans also are firming-up for the inauguration. Because of the timing of the Vest selection it was not possible to arrange an inauguration this fall. This left a choice whether to schedule it in the winter, when festivities would have to be indoors with a limited audience, or to wait for spring when outdoor events can be held. The decision is to wait until spring when more people can participate in what is an important community event. The tentative date of the formal ceremony is May 10, with other activities to be planned in the surrounding days. The chairman of the Corporation, in consultation with the president and the chair of the faculty, will soon appoint a Committee on the Inauguration to plan and carry out the celebration.

The Cultural Studies Project

David Thorburn

Fortifying and extending advanced research in Humanities at MIT is the central goal of The Cultural Studies Project, an interdisciplinary initiative generated by the Humanities faculty and underwritten by the School of Humanities and Social Science and the Office of the Provost.

The Project's ultimate goal is the establishment at MIT of a Center for Cultural Study, offering internal and external fellowships and providing a continuing presence at the Institute of world-class interdisciplinary humanistic scholarship.

The Project's immediate goals include the sponsorship of scholarly

the first phase of a plan mapped out in the Report of the Committee on a Center for Cultural Studies at MIT, available from the Office of the Dean, School of Humanities and Social Science, E51-230.

The proposal to establish a Center for Cultural Study emerged from discussions among MIT humanists at a weekend retreat held on Cape Cod in the spring of 1989. During the following academic year a committee appointed by Dean Ann Friedlaender and chaired by David Halperin, Professor of Literature, worked on the proposal, holding hearings and informal meetings with all Humanities faculties. The Final

broadened customary modes of reflecting on traditional material.

This emerging scholarship has blurred the boundaries separating traditional intellectual disciplines and has conferred decisive importance on the category of "culture." The notion of culture as an autonomous system is an enabling principle of the new scholarship and explains its preoccupation with the ways in which social practices, beliefs and institutions - no less than plays or novels - articulate myths, values, ideologies. The leisure habits of a society, its theater and its wrestling matches, its hospitals and prisons, its family organization, its systems of economic exchange, its scientific paradigms and its dominant technologies, its political conventions and bodies of law - all these demand interpretation in their full complexity as concrete historical and social realities and as symbolic "texts" which articulate or display particular values, assumptions, and conceptual frameworks.

This shift of the humanities and social sciences toward a larger, transdisciplinary conception of "cultural studies" coincides remarkably with the essential character of the humanities at MIT, which have developed outside the conventional Departmental arrangements typical of most American universities. The whole environment of the Institute, the Report notes, has fostered a highly interdisciplinary humanities faculty, and this distinctive feature of humanistic work at MIT has been expanded in recent years by the addition of such enterprises as the writing program, women's studies, STS, the media lab, and film and media studies, whose faculty have made notable contributions to emerging forms of cultural study.

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conferences and lectures, and an ongoing initiative to explore the humanistic uses of computing resources.

The inaugural event for the Project is the international conference, "Epidemics: Perspectives in Cultural Study," to be held on campus October 19 and 20. One aim of this conference is to offer a concrete illustration of what cultural studies is, in this instance by deploying medical, historical, literary, and anthropological perspectives in the study of how societies define and attempt to deal with epidemics.

Future conferences will also aim to be both intellectually innovative and relevant to the experience of modern life.

The Cultural Studies Project is

Report, submitted to the Dean in June, 1990, thus represents a powerful consensus of faculty in History, Literature, Foreign Languages and Literature, Writing, Music and Theater Arts, and Anthropology.

The Report is a response to fundamental changes in the nature and scope of humanistic scholarship in recent decades and also a response to the special circumstances of the humanities at MIT.

The Report notes that the last thirty years have witnessed a major transformation in the humanities and social sciences. The individual disciplines that constitute those fields have enlarged and often radically altered their scope and methods. Traditional interpretative procedures have been extended to new objects, while new methods have

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Family and Work Committee Report

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For all its virtues, the Committee's report never seemed to address the basic source of the tension between family and work at MIT: long working hours. The report proposes ways of modifying the MIT benefit structure and work schedule so parents can spend a little more time with their newborns, and have a slightly better chance of getting their research done while their children are small. What most needs to be modified, however, is the expectation, whether implicit or explicit, that MIT faculty will spend many hours each week in the lab, office, or library, not to mention the classroom.

There is growing evidence that overwork is often stressful for the mental and physical health of individuals and also for the health of families. I would also add that overwork undermines the health of community life: a major obstacle to democracy in our country today is the widespread lack of time for citizenship. The time crunch is a fundamental political issue, and it is the most fundamental humanistic issue at MIT now. It deeply affects all of us, not just parents. All faculty members need more time for whatever personal and civic pursuits they deem significant.

Faculty members with children, however, are especially crunched for time because they are caught between two sources of overwork. Children, especially younger ones, demand time, lots of it, and demand it now. For many junior faculty, the clock of early childhood is ticking away at the same time as the tenure clock - and both clocks move relentlessly and quickly.

It is worse than bad policy - it is immoral - for MIT to assume, even implicitly, that the only way to reconcile these two competing demands on time is to give parents more money and options to buy child care. Parents should also have the option of giving the time

themselves without foreclosing the possibility of an MIT career. In other words, MIT should find ways to accommodate families, instead of the other way around.

The problem with such statements is that they are assented to and dismissed at the same moment. Of course we should have more time for family life; of course it won't happen

their pride seems misplaced. So does their assumption that they are helpless to resist their compulsion; considering how alcohol and cigarette consumption have fallen dramatically in this country in recent years, we can well imagine that overwork too will cease to be regarded as a socially acceptable display of toughness.

All addictions are socially

For all its virtues, the Committee's report never seemed to address the basic source of the tension between family and work at MIT: long working hours....The very term "workaholic" implies an analogy with alcoholism. Too many people here not only admit they are workaholics, but boast of the fact.

here. The Committee on Family and Work discovered a pervasive sense of fatalism among the MIT faculty, a sense that no imaginable changes would ever change the culture of workaholicism here.

How valid is this assumption? To answer this question, we have to analyze the causes of overwork at MIT. Those who assume that people here will always overwork, no matter what, tend to argue that the sources are personal. Here at MIT we so love our work (the argument goes) that nothing will stop us from running back to the lab or the office on weekends.

One problem with this argument is that it confuses love of one's work with addiction to it. The very term "workaholic" implies an analogy with alcoholism. Too many people here not only admit they are workaholics, but boast of the fact. Considering the personal and social costs of overwork,

constructed; it is naive to see them simply as a personal choice, or as a personal failing. The drive to overwork may be highly internalized, but it involves larger social and economic patterns. On the simplest level, it involves the pattern of looking over one's shoulder, of keeping up with the competition. While there will always be a range of preferences in working habits, at MIT the range has been shifted to the high end of the spectrum. One extreme has become the norm, so that the most workaholic people set the pace for everyone.

But the source of overwork is by no means limited to the "MIT culture." The real problem with the we-love-our-work-so-much argument is its flattering implication that MIT is somehow different from the rest of the world. The fact is that in the United States the pressures to work longer hours have

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Family and Work Committee Report

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steadily become more intense during the past decade as the cost of living has outpaced income, and as job security has declined. In the United States the average work week is now 48 hours long; the percentage of employees who put in an even longer work week continues to mount; and vacations are shorter (not by days, but by weeks) when compared to those in other industrialized democracies. (For statistical details, see the report of working hours in *The New York Times* News of the Week in Review, June 3, 1990.) Many other people outside MIT also love their work - but they too are working long hours not only from love, but also to make ends meet, to keep their job, and to have any hope of advancement.

MIT prides itself on being different, but the workaholic culture here all too well reflects - rather than corrects - the structures of the larger society. Those structures are not eternal, but changeable. They are formed not by nature but by culture, economics, and politics, and they should not be taken for granted.

The need to address them is particularly pressing in scientific fields where the past decade has brought ever keener competition for ever more limited research funds. When scientists have to spend so much time and energy just to raise part of their own salary, they are under ever greater pressures to work harder and longer. The funding system, then, exploits scientists' love of their work. They have to hustle and compete relentlessly simply to go on with their work.

This situation is unhealthy for individual scientists, and also for science as a collective enterprise. If the present trends continue, only extremely focused personalities are going to enter many scientific fields. It is not obvious that these people are necessarily going to do the best science, and it is certainly obvious that certain social groups (notably women) are going to select themselves out of this

rat race. Can this situation be healthy for science?

I would urge all of us to think more about bargaining for change, instead of assuming that overwork is an inevitable condition of doing our work. We have to see that overwork (and its consequent damage to personal and civic life) is not just a personal problem to be solved by working harder. We have to think about structural

they do.

I would go even further and raise the question of quantity - that is, just how much productivity we should demand from junior faculty. They must be expected to turn out quality work, but they do not have to be expected to turn out so much of it so fast. We all know of faculty members who work feverishly in their younger years, only to become noticeably less productive as

For many junior faculty, the clock of early childhood is ticking away at the same time as the tenure clock - and both clocks move relentlessly and quickly. It is worse than bad policy - it is immoral - for MIT to assume, even implicitly, that the only way to reconcile these two competing demands on time is to give parents more money and options to buy child care.

causes and collective solutions. In doing so, the faculty can learn from the wider MIT community. According to Professor Elias (chair of the Committee on Family and Work), MIT staff members were on the whole more assertive and articulate than faculty members about listing steps that could be taken here to harmonize family and work life.

As I have tried to suggest above, those steps cannot be limited to MIT policy changes, when the sources of overwork are national and even global. Still, MIT has great prestige that should be used to push in desirable directions. For example, MIT could begin to raise questions about the cultural assumption that a long work week results in significantly greater productivity. The principle of "quality time" should be applied less to childrearing, where adult standards of efficiency don't make much sense, and more to the workplace, where

time goes by. Tenure is a long-term, even a lifetime, commitment. While no one can predict health and longevity for any individual, MIT should be willing to make some reasonable assumptions about lifetime achievement, and to trust people to pace themselves wisely over the years, rather than insisting upon a uniform, relatively inflexible timetable.

I realize that these comments echo many other discussions at MIT, ranging from Paul Gray's famous inaugural plea to reconsider the "pace and pressure" here, to more recent discussions of admissions policies. These echoes only remind us how fundamental and pervasive is the problem of overwork. It affects students, administration, and staff as well as faculty, and it affects non-parents just as much as parents. This problem must be addressed if we are to improve the quality of family life for individuals employed here, and if we are to improve the quality of life at MIT as an institution - as an extended family.

Who's In Charge Here?

Space Wars

Jean Jackson

The old Film Studies area in Building 20, right down the hall from our Anthropology/Archaeology headquarters, has been empty for at least two years. We are interested in this space because we have spent a considerable amount of time looking for much-needed offices. It turns out that the space is not being used, because Building 20 is scheduled for demolition and CRSP (Committee for the Review of Space Planning) has decided not to allow any new occupants in the building's empty spaces.

During this past summer we watched major renovations occurring in two other nearby areas of Building 20. One, the new language laboratory, has cost over \$100,000. Given this investment, one can be quite sure Building 20, or at least that wing, will be standing for at least five years more. The other renovation project, new offices for the Office of Undergraduate Education, has also been completed. These renovations were very nicely done and we certainly don't begrudge the fine people now benefitting from their good fortune.

Meanwhile, however, we simply do not have enough offices for our faculty. We have lecturers housed upstairs, isolated from the to-and-fro walking and chatting the inhabitants of wing D enjoy, and other lecturers' offices are way off in Building 26. And yet right next door, behind the debonair Fred Astairs dancing on the walls, a bleak and bare space suggests a ghost town movie set.

We have argued, we have lobbied, we have tried everything. Of course we would pay for the renovations - a matter of cleaning and some paint. We already have the money. We have even offered to go in ourselves with the paint and Mr. Clean, and have offered to submit a letter saying our tenancy would only be for six months. But no dice.

When we suggested that we might just liberate the space ourselves (I would not mind being chided for this sort of thing - I am no neophyte at illegally but not immorally occupying various kinds of real estate), we were told that such an action would produce all kinds of problems, that we had to wait until the Magnet Lab decision was appealed, etc. The whole thing has been infuriating!

Over the years I have heard about many other similar battles. And it is ironic that here at MIT the real space wars are being fought on and over *terra firma*..

.....

Ever try to enter an Institute building through one side of a pair of double doors? Ever wonder why invariably only one side is unlocked - usually the side you didn't try? Ever wonder why both sides aren't unlocked?

We wondered - and asked. "It's probably some kind of mechanical problem," we were told. Possibly. Or perhaps just laziness on the part of the key holder. Got any ideas?

"Who's In Charge Here?" is reserved for short pieces reflecting troublesome rules, regulations, general inconsistencies, and random anomalies that can seem to pervade the Institute. We encourage submissions on any and all topics, with the goal of encouraging some changes.

Please send all commentary to: *The MIT Faculty Newsletter*, 38-160. A floppy disk accompanying your article would be most appreciated.

Cultural Studies Project

(Continued From Page 13)

The Cultural Studies Project aims to exploit these developments and in the process to address the central "problem" of the humanities at MIT - the absence of graduate programs and other forms of advanced research.

It has been widely predicted that the late 1990s will be a period of intensified competition for the most talented new Ph.D's. The absence of

The absence of graduate programs in the humanities makes the Institute especially vulnerable to the harmful consequences of a seller's market.

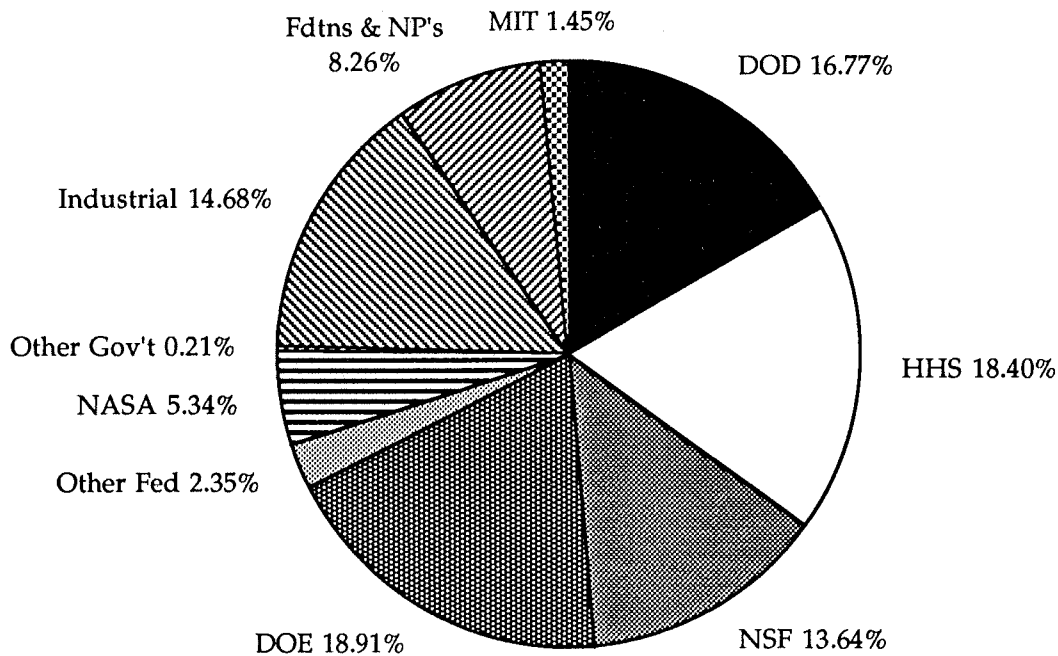
graduate programs in the humanities makes the Institute especially vulnerable to the harmful consequences of a seller's market. But The Cultural Studies Project, supporting initiatives at the cutting edge of humanistic research, will help MIT retain a competitive edge in these adverse conditions.

Without altering the current administrative organization of the humanities sections, and without impairing their important teaching and service functions, The Cultural Studies Project promises to encourage faculty development and renewal, to keep the Institute intellectually competitive in the humanities, and to give greater national and international visibility to MIT's contributions to humanistic scholarship.

M.I.T. Numbers

On-Campus Research Expenditures By Major Sponsor

FY 1989



Constant Dollars (1989=100), (\$000)

	FY1974	FY1979	FY1984	FY1989
Dept of Defense	30,705	26,403	42,765	47,921
Health & Human Services	30,284	37,583	44,860	52,565
NSF	42,620	40,703	38,133	38,962
Dept of Energy*	22,433	72,850	63,590	54,045
Other Federal	12,295	15,813	12,083	6,713
NASA	17,827	16,483	14,682	15,256
Total Federal	156,164	209,835	216,113	215,462
State Local & Foreign Gov't	2,210	2,275	407	593
Industrial	8,863	14,136	34,193	41,937
Foundations & Nonprofits	17,435	16,542	19,443	23,602
MIT Internal & Lincoln	2,001	2,281	3,502	4,134
TOTAL	186,671	245,068	273,658	285,728

Note: Due to rounding, totals may differ from actual figures by ± 100 .

*1974 - ATOMIC ENERGY COMMISSION

Tanks

Harvey M. Sapolsky

Most of us, whether we wanted to or not, have done some thinking about tanks recently. Just over a year ago we were confronted by that extraordinary image of a long column of Chinese tanks being blocked by one brave individual. A few days later the tank commanders apparently had different orders, and began the bloody suppression of all opposition in and around Tiananmen Square.

This time last year there was much discussion about the potential and the need for balanced force reductions in Europe. A key issue was the number of tanks that would be permitted along the central front. The Soviet Union and its Warsaw Pact allies were said to have tens of thousands more main battle tanks than did NATO, and the fear was that Soviet-led armor units could break through defenses at the Fulda Gap or elsewhere and quickly capture most of European industrial capacity. But then in a span of a few months Communism in Eastern Europe, and along with it the Warsaw Pact, collapsed. Soviet tanks now sit in their sheds in what is East Germany but will not be for long, awaiting a schedule for transport home while their crews live on what is essentially the West German dole.

Given the changes in Europe, the debate began here about the size and possible uses of a peace dividend. U.S. forces were certain to be reduced, but no one knew by how much. Quickly placed on the chopping block were the Army's armor units which seemed to have lost their purpose because of improved U.S./Soviet relations. Several tank divisions were designated for early demobilization.

Also in jeopardy were the M-1 tank plants in Ohio and Michigan, the nation's only tank production lines. If armor units were being demobilized, there seemed little point in building more tanks. Pressure did develop in

Congress to keep the facilities running, perhaps through foreign sales. A British order was a possibility and so too was one from the Saudis. But as time passed it seemed more likely that the Saudis would buy a new British tank that would be subsidized by the British government in order to keep their plant working.

In December tanks were again in the news. American troops seized control of Panama, ousting General Noriega from power. The quick strike by U.S. special operations forces drew

The collapse of Communism not only frees the democratic spirit, but also reawakens nationalistic passion and religious zeal. The Soviet Union may soon crumble as a political unit, leaving unsettled what element among its several surviving parts own which of its many weapons and resources.

praise from military analysts, but not the performance of the 82nd Airborne's light tank, the Sheridan. A tired 30 year-old weapon, it was said to lack punch and protection. Much discussion ensued about the failure of past efforts and the need to start anew to develop an effective light tank which could be easily transported by air for use in low-intensity conflicts like Panama.

Suddenly, the focus of attention has shifted to heavy tanks once more. In August, Iraqi forces equipped with thousands of Soviet-produced tanks and other armored vehicles occupied Kuwait and threatened the flow of oil from the Persian Gulf upon which so much of the world has grown dependent. Tanks were our response. First came the Airborne's Sheridans, then the M-60s of the Marines and now, by the hundreds, the Army's main battle tank, the M-1A. Armor units once slated for demobilization are moving to the Kuwaiti front. Joining them are British and

French tanks and Saudi, Egyptian, and Syrian armor forces. The potential exists for armor clashes with the Iraqis on a scale the world has not witnessed since the Second World War. Although the military outcome of a conflict between the Iraqi and United Nations forces cannot be said to be in doubt, the long-term results surely are. We wait to see whether or not the sand in the Gulf area is quicksand.

The Cold War may be over, but not the possibility that tanks will find work. The end of the Cold War has eliminated only the bipolarization of tensions, the tendency to define all conflicts as U.S./Soviet confrontations. As relations between the superpowers improve, the constraints on many of these conflicts will be lifted. Old disputes suppressed by the needs of the superpowers to hold allies in check can easily rekindle when the requirements for coalition discipline fades; and new ones may arise because of regional dissatisfaction with the terms of disengagement between the superpowers or because of pure opportunism as in the case of Iraq's move to the southeast.

The collapse of Communism not only frees the democratic spirit, but also reawakens nationalistic passion and religious zeal. The Soviet Union may soon crumble as a political unit, leaving unsettled what element among its several surviving parts own which of its many weapons and resources. Revolutions are seldom orderly or blood-free and it has been a revolution that we have been observing. There are many, many scores to settle. The tanks are likely to rumble again, even in the Soviet Union.

Tanks, of course, are just a metaphor for military power, which in turn is only a part of the security studies equation. Security studies is a subfield of international relations and is

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Science Requirements at MIT

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freedom in choosing a major after the first year suggest that the selection of core content be the same for all students.

I conclude this summary report with some personal comments on matters before the Committee.

(1) Undergraduate education at MIT has been, and continues to be, distinctive among the major universities of the U.S., not only in specific knowledge imparted, but also in attitudes, habits of mind, and analytical abilities developed. MIT's record of medical school admissions, for example, is extraordinary. (Some medical schools indicate that they treat MIT applicants as a virtually separate group, not because of science background, but because of the students' disciplined readiness for training and work in their chosen profession.)

(2) Educational emphasis (especially, perhaps, in science and engineering departments) continues to shift from emphasis on specific technical knowledge to development of a base of knowledge, attitudes, and abilities appropriate to life-long learning and relearning within a chosen profession.

(3) MIT welcomes students of diverse educational and cultural backgrounds. The freshman core subjects currently play a crucial role for these students with regard to (1) and (2) above.

(4) The following areas of current concern at the Institute relate closely to the Committee's work and to each other: (a) opportunities for hands-on experience, in the freshman year as well as later; (b) an introductory experience in engineering in the freshman year; (c) the nature and place of molecular science in the curriculum [including inorganic and organic chemistry (as in 5.11), solid-state science (as in 3.091), and biology]; (d) pressures within departmental curricula and the related consideration, primarily in engineering departments, of integrated

five-year programs and of matters of professional accreditation; (e) the educational and cultural role of the Independent Activities Period at MIT, for freshmen and for upperclass students.

(5) Effective consideration of any of these matters requires, in some measure, simultaneous and credible consideration of them all. Area (c) relates to (b), and to (d) as well, since the possible absence of chemistry from engineering curricula is an accreditation issue in some departments. Areas (a), (b), and (e) are closely related to each other and to the laboratory requirement. Area (d) is related to the nature and effectiveness of the Science Distribution requirement and, perhaps more important, to the perceived role and format of all the science requirements (since accreditation issues may have as much to do with perception as with substance).

(6) Eventual developments in the science requirements could include one or more of the following alternatives; (a) A laboratory, UROP, or engineering requirement to be normally taken in January of the freshman year; (b) A two-term core requirement in molecular science, possibly in one of the following forms: (i) SP01 and SP02; (ii) chemistry followed by molecular cell biology (the latter as in 7.06); (iii) chemistry followed by the option of either solid-state science (as in 3.091) or molecular cell biology; (c) Specification of a survey subject in modern biology (for example, the new 7.01) as a Science Distribution requirement for students who do not have other biology; (d) A requirement that all students take "further mathematics" as part of the Science Distribution requirement.

Tanks

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concerned with understanding the causes, conduct, and consequences of war. At MIT these studies are primarily the responsibility of the Defense and Arms Control Studies Program in the Center for International Studies. The Program has an interdisciplinary faculty and prides itself on its ability to integrate technical and political analyses in the examination of security issues. About 40 graduate students, most of whom are PhD candidates in political science, are affiliated with the program.

The faculty interest that created the program developed in the 1960s and 1970s with a concern both for the effective management of defense resources and the desire to limit the arms race. It was initially nuclear weapons and missiles that attracted attention. But as relations between the superpowers stabilized, interest broadened to include all levels and types of conflict. Tanks have diffused more widely in the world than have nuclear-armed missiles, but even these are spreading. Cold War or not, unfortunately or not, the need for security studies persists.

In the beginning of September, the Program hosted a dinner for a large delegation of senior Soviet weapon development and production officials who were in the Boston area for a conference on conversion. Among the visitors was the managing director of a Soviet armored vehicle factory who was seeking to sell tractors instead of armored personnel carriers. No one was quite sure how good a tractor the factory could make, but all present knew the armored vehicle to be well tested and that it had a worldwide reputation as a quality product. Conversion will not come easily or quickly for either the Soviets or us.

FSU PROFESSOR EXPLAINS THE FIFTH FORCE

STRONG
WEAK
ELECTROMAGNETIC
GRAVITATIONAL
\$



Physics