

The MIT Faculty Newsletter

Vol. IX No. 3

January/February 1997

Letters

The Interface of Science and Engineering with Medicine at MIT

Richard J. Cohen

To The Faculty Newsletter:

The October/November issue of the *Faculty Newsletter* contained a pair of articles by Professors Linda Griffith-Cima and Martha Gray with contrasting views on the futures of Biomedical Engineering and the Harvard-MIT Division of Health Sciences and Technology (HST). The core issue, I believe, is how the Institute should deal with research and education at the interface of engineering and science with medicine. Interdisciplinary programs pose challenges when the disciplines are encompassed by different departments at the Institute, but the task becomes much more complex when a program interfaces with a field, such as medicine, which is outside of MIT's current domain.

One conclusion I have reached in my 25 years experience at MIT as a student and faculty member in the HST Division, is that, from the point of view of faculty interest and achievement of program-

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Biomedical Engineering—A Cornucopia of Challenging Engineering Tasks

Robert W. Mann

To The Faculty Newsletter:

I read with great interest the article in the October/November *MIT Faculty Newsletter* "A Modest Proposal for Biomedical Engineering Education," by Linda G. Griffith-Cima. I concur especially with the italicized: "*The diversity of engineering itself prohibits a single cogent intellectual educational program of its applications in biology and medicine to be developed*" and "*Biomedical Engineering as a specialty is best treated as a Minor within a given Field of engineering.*"

These were my convictions when the formation of departments of biomedical engineering were in their ascendancy elsewhere. I was asked to document my argument against the practice, which I published in 1985 in the *IEEE Engineering in Medicine and Biology Magazine* ("Biomedical Engineering, A Cornucopia of Challenging Engineering Tasks—all of Direct Human Significance"). In face-to-face dis-

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MacVicar Faculty Fellows

Hands-on Learning at the Integrated Studies Program

Arthur Steinberg

Following is the first article in a new Faculty Newsletter regular feature highlighting MacVicar Faculty Fellows. Please see Page 15 for a complete introduction to this new column.

Why should an archaeologist have developed a deep interest in hands-on learning? I suppose that most of us have had our educational philosophies formed by our own educations and experiences. I came from a very cerebral and verbal family that did little with their hands. As a result I turned at an early age to friends with old cars and other machines that needed fixing and I have enjoyed that ever since. I have about 20 motorcycles of various ages that need work and care all the time, which is more than enough to make up for what I missed in my early youth.

When Nan Friedlander, the late dean of Humanities and Social Sciences, asked me if I was interested in running the alternative freshman program called the Integrated Studies Program (ISP), I

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TEACH TALK

IAP Series Offers Useful Tips For Improving Teaching and Learning

Lori Breslow

“Good morning,” called out Professor Eric Grimson (EECS) loudly enough so that it was clear to the sixty of us sitting in the room that we were both to pay attention and to respond. Maybe it was the hour of the morning (or maybe we’re not so very different from the students we teach) but all the sixty of us could muster was a pretty anemic, unconvincing “good morning” in return.

“No,” said Grimson, who repeated the greeting, this time with even greater insistence. It was clear this guy meant business – we weren’t going to get off the hook until we gave him the kind of response he was looking for. So the second time around we came back with a “good morning” that rivaled the enthusiasm and vigor of the “Hallelujahs” at a summer revival meeting.

“That’s better,” said Grimson, satisfied.

And that’s precisely how Eric Grimson begins every one of his 6.001 lectures. He makes sure his students’ good mornings “raise the roof in 10-250.” Why go through the exercise? “First, because it establishes a specific ritual in the class,” Grimson explained. But more important “because it helps set a certain climate and a certain level of expectation for the course. It tells students now we’re beginning, and we’ve got serious work to do, but we’re going to have fun doing it.”

Grimson passed along this piece of advice during the kickoff workshop, “The Big Picture: Tech’s Top Teachers Talk Turkey,” of the “Better Teaching @ MIT” series. Held for the fourth year in a row during IAP and sponsored by the

Teaching Resource Network, “Better Teaching @ MIT” brought together over 200 faculty, teaching assistants, staff, and graduate and undergraduate students in eight workshops to discuss how teaching and learning can be strengthened at the Institute. And if there was one theme that emerged from the series it was this piece of good news: There are concrete things that can be done – many of them as simple as getting your students to say good morning at the start of every lecture – to improve what happens in the classroom.

Polishing Classroom Performance

Several of the sessions, like “The Big Picture,” were aimed at helping instructors improve their own performance in the classroom. Presenters discussed teaching large lectures, smaller classes and recitations, and even distance learning courses. For example, Professor Robert Silbey, Chemistry, talked about the importance of motivating students, advising instructors to “pitch material just beyond the students’ grasp.” Silbey also suggested that each individual lecture within a large lecture class “should be self-contained,” because when a lecture has a discrete beginning, middle, and end, there is a coherence to the material being presented.

Neal Hartman, Sloan School lecturer, furthered the discussion on how to lecture well by focusing on presentation skills, offering tips on saying what you want to say effectively – and maybe even with some pizzazz. Covering both the “vocal and nonverbal channels,” Hartman explained how inflection, silence, eye contact, and movement could each

contribute to a strong delivery. (Professor Patrick Winston’s talk on “How to Speak,” now an IAP classic and the capstone of the “Better Teaching” series, had not yet been delivered at the time of this writing.)

Dean Jeff Meldman, UAA, then addressed the “third channel,” the use of visual aids, in his portion of this workshop. Focusing on blackboards and overheads, Meldman had workshop participants develop their own guidelines for the use of these two media by centering the discussion on three simple questions, “whether? which? and how?” For example, in contrasting the benefits and drawbacks of each, audience members noted that while blackboards allow ideas to unfold, if copies of overheads are distributed at the beginning of a lecture, students may be able to reflect more easily on the points being made because they don’t have to worry about copying what’s going up on the board into their notebooks.

In the workshop, “Using New Technologies in the Classroom,” Professors John Belcher, Physics, Gregory Rutledge, Chemical Engineering, and Bruce Tidor, Chemistry, picked up where Meldman left off by demonstrating how they have pressed the computer into the service of their teaching. New technologies, for instance, allow the unseen to be seen, which was illustrated by Belcher’s computer visualization of electromagnetic fields and Rutledge’s and Tidor’s representations of chemical compounds and processes.

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IAP Series Offers Useful Tips

Breslow, from preceding page

Strengthening Student-Instructor Interaction

“Students should feel welcome in your classroom,” said Dean Arnold Henderson who was the first speaker in the session, “Never Use a Red Pen and Other Tips for Dealing with Classroom Challenges.” Part of a panel of “troubleshooters” that included Jane Dunphy, lecturer in Foreign Languages and Literature, and Mary Rowe, university ombudsperson, and moderated by Mark Schuster, associate professor in Urban Studies and Planning, Dean Henderson gave voice to a message expressed in a number of different ways throughout the series: How we relate to students in the classroom is an integral part of how we teach them, and how well they will learn.

In fact, one of the most involved discussions in the series came after an audience member attending “The Big Picture” workshop suggested that videotaped lectures could effectively substitute for the real thing. Neither Professor Silbey, Grimson, or Marcia McNutt, EAPS, the three panelists, seemed enthusiastic about that possibility, with Bob Silbey perhaps best summing up their feelings with a statement he made later in the session. “In teaching,” Silbey said, “the social interactions are more important than the information delivery.”

The “troubleshooters” on the “Never Use a Red Pen” panel gave advice on a number of different kinds of student-faculty interactions, ranging from how to handle issues of academic honesty (including the use of bibles, the subject of another pretty lively debate) to how to compensate for cultural differences in the classroom, to how to help students with learning disabilities. At the end of this workshop, Schuster lead a case discussion based on a scenario that was part of a handout entitled “Problems,

Pitfalls, Booby Traps (and Surprises) in Teaching.” Audience members were asked to consider what they would do if a student made a joke in class at the expense of some minority group, thereby offending other students in the class. Consensus was by no means reached on what the instructor should do in that situation, but that was exactly the point: There is often no right answer to the quandaries we face as teachers. And although the “Pitfalls” handout sketched almost thirty other possible problems instructors could encounter, another handout called “Guidelines for Handling Problems, Pitfalls, etc.” reassured workshop participants that these kind of difficulties were not only manageable, but often presented opportunities for learning.

Focusing on Learning

While strengthening classroom performance and connecting interpersonally with students certainly aids learning, several sessions focused specifically on ways to strengthen student skills.

EAPS Professor Kip Hodges, now also dean for Undergraduate Curriculum in UESA, and I, for example, talked about how to improve students’ ability to communicate. We agreed that if MIT students are to become better writers and speakers, we need to give them ample opportunity to practice those skills. Hodges provided a list of low and high impact writing assignments, with examples of the former including essay questions on problem sets and exams, brief syntheses of assigned readings, and written critique of lectures (yes, Hodges asks his students to critique his lectures in writing!) and examples of the latter including laboratory reports and term papers. Similarly, students can get practice in speaking by doing everything from asking and answering questions in

class, to explaining a problem they solved on the board, to giving a major presentation individually or as members of a team. Both of us stressed, as well, the importance of frequent, specific, and extensive feedback on communication assignments if students are to improve.

Two sessions were devoted to discussing ways students could move from passive recipients of information in the classroom to active participants in their own learning. Professor John Essigmann, Toxicology and Chemistry, described his course, “Biotechnology and Engineering,” which he co-teaches with Professor Robert Langer.

The basis of the course is a fictitious company Essigmann and Langer create to develop and market a pharmaceutical product. They then assign students to teams analogous to divisions in a corporation (e.g., marketing and production). Essigmann explained he and Langer do very little lecturing during the semester; most of the time students work in their teams to accomplish whatever they must do in order to successfully bring their drug to market.

EECS Professor Lynn Stein, the second presenter in the “Active Learning” workshop, gave audience members a chance to practice what she and Essigmann were preaching: She divided the audience into groups of four or five, and after making sure group members introduced themselves to one another, she had them work together to design a course. While the groups worked, Stein visited each of them two or three times to make sure people were moving in the right direction. At the end of the session, Stein did some wrap up, sharing with her “students” some of the ideas that had emerged from the group discussions.

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IAP Series Offers Useful Tips

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Some Tips from the Experts

Here's a sampling of the advice given by the "Better Teaching" panelists:

"Our students are instrumental. They like to have tools to solve problems. Give them one tool per lecture."

Prof. Robert Silbey

"I call on students during recitation so that everyone participates, but I also want to make sure some students don't dominate the conversations, and that I save face for students if they don't know the answer to a question. So I use two rules. The *House of Representative Rule* allows a student who has been called on to cede his or her time to another student once during a recitation. The *Hockey Rule* earns the student who has been contributing a great deal a two-minute rest."

Prof. Eric Grimson

"Make sure students know what the U.S. norms are about academic honesty because those norms can differ from culture to culture."

Prof. Mary Rowe

"There isn't one right way to present. Experiment to find out what's natural, comfortable, and effective for you."

Dr. Neal Hartman

"If you don't use them well, don't use them at all."

Dean Jeff Meldman on visual aids

"Look for ways to make the students experience an active learning process rather than a passive one. Examples include lecture handouts with blanks to be filled in, using microquizzes in recitations, getting students involved in answering questions from other students."

**Profs. Eric Grimson, Robert Silbey, and Marcia McNutt
in their "Teaching Dos and Don'ts" handout**

"As long as you speak slowly and loudly enough, accents are not a problem."

Dr. Jane Dunphy

"Active learning is a chance for the students to practice skills with the instructor there because people learn by doing. It is a supervised, pedagogical process."

Prof. Lynn Stein

"Requiring frequent writing exercises, providing substantive feedback, stressing the importance of understanding audience, and requiring revisions are all ways to nurture writing skills."

Prof. Kip Hodges

Finally, for the first time this year, the "Better Teaching" series hosted an outside speaker. Physics Professor Eric Mazur from Harvard described the "peer instruction" technique he uses in his introductory physics class. Appalled by the scores his students received on a diagnostic exam that tested elementary physics concepts, Mazur searched for a way to move from the "plug and chug" approach of many introductory science and math courses. His "peer instruction" method presents students with

conceptual problems they solve in class. After recording their answers in a classroom vote, students then discuss their results with fellow students, and vote again. Mazur presented data that showed students scored better both on conceptual material and problem solving after he adopted this teaching method.

Like any skill, improving teaching comes, in part, from being exposed to "best practices," good ideas, and savvy techniques. During IAP, some of MIT's

most successful practitioners were willing to share their experience and their expertise, and in the conversations that took place, the teachers became the learners.

Handouts and overheads from the "Better Teaching @ MIT" series will be available on the TRN Home Page (<http://web.mit.edu/uaa/www/trn/>) in February. Additional information on Eric Mazur's peer instruction can be found at his website (<http://mazur-www.harvard.edu>).✦

From The Faculty Chair**Protecting the Educational Commons**

Lawrence S. Bacow

Late last term I received the following e-mail from an undergraduate.

Hi, I understand you are the Chair of the Faculty and that you help remind professors of the end of the term policy for assignments. I never understood why there was even a guideline until this year. It seems that three of my four classes are in violation of the end of the term policy (from what the Undergraduate Office told me at least). These specific cases are now a moot point...the work is almost done and there really isn't much I can do about it now. I am just concerned that this is happening. I feel totally overwhelmed – my work is suffering, I have only slept 20 hours in the past 7 days, I am sick; I am not performing to my ability because I am stretched so thin by all the assignments. It is hard because I am putting in the time, I am prepared but with so much to do in one time frame, it is impossible. MIT is a fabulous university and 99% of the time I say I am glad to be here, but this is ridiculous. So they really wonder why students are so stressed out? No matter how organized a student is there is no way they can do 2 tests, problem sets, 1 design project, 1 technical paper, 2 presentations, and an additional paper in less than a week. It is impossible to complete all that work and to have that work be good. I thought MIT just hated me right now, but those end of the term rules are to prevent students from feeling the way I do right now...disappointed with my performance, exhausted, overwhelmed, and just plain sick of it all. So, if you could just remind the faculty as an entire group of the rules hopefully a student won't have to feel the way I do right now next term.

*Sincerely,
Name Withheld*

I would like to report that I rarely receive such impassioned pleas, but I cannot. This past term, I received complaints from students, deans, housemasters, and athletic coaches about violations of the *Rules and Regulations of the Faculty*. In addition to the end-of-term problems described above, these violations included scheduling classes on Saturday

The most common excuse offered for failing to comply with the end-of-term rules (which limit the number of assignments that can fall due during the last week of classes) is, "I just wanted to give my students more time to complete the last assignment." A close second is, "The students all voted to extend the due date for the last assignment into reading period." One

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morning, infringing upon the protected 5-7 pm time slot for undergraduate subjects (intended to give students time for athletic activities and dinner), holding evening quizzes or exams without either canceling a class or a problem set during the same week, and my favorite, having an assignment fall due on the Friday following Thanksgiving!

Based upon conversations with offending faculty, I have come to the conclusion that we are just as creative as our students in inventing excuses for our inability to meet a deadline or otherwise comply with the rules. Some of the strategies used to avoid technical violations are quite remarkable. Let me give you some examples.

faculty member announced to his class that the final assignment for the term was due on the last "legal" day according to the rules, that it was to be placed in a box outside his office, and that since he was going out of town until just before exams, he would not be collecting the box until the start of exam week. Last year, one faculty member gave an entire class incompletes to allow the students to complete the final project during IAP, in effect extending the term by more than a month. Other faculty members have made the last assignment "optional," a word that has a contrary meaning to MIT undergraduates when spoken by a faculty member in the same sentence with "assignment."

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Protecting the Educational Commons

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As we begin a new term, it is perhaps useful to review why the end-of-term regulations exist. In planning our subjects and assignments, each of us optimizes locally. Left to our own devices, most of us would have final assignments fall due immediately before exams. Without any opportunity for faculty to coordinate in real-time, our students will experience compression of work at the end of the term. Learning will suffer. While the rules do not eliminate the end-of-term crunch, at least they limit how much each faculty member may contribute to it.

Local optimization is a very powerful instinct. Each of us is capable of constructing very persuasive arguments why it makes sense in the context of *our* subjects to have, for example, a quiz and an assignment fall due during the last week of the term. Indeed, every time I have called a faculty member to discuss compliance I have received a very convincing argument for suspending the rules. But students take more than one subject. And given that there are only 24 hours in a day, time devoted to one subject means less time available for another. As I have repeatedly pointed out to colleagues who believe that our rules unreasonably limit their capacity to teach effectively, the rules exist to protect “the commons.” Given finite time budgets, end-of-term pedagogical gains in one subject often come at the expense of the overall learning environment.

Unfortunately, the instinct to optimize locally also has a dark side to it. Faculty have a pretty good understanding of the algorithm used

by students to allocate their scarcest resource – time. Students put the most time into their most demanding subjects. A faculty member who believes that his or her subject is receiving short shrift may be tempted to increase work load in order to command more of the student’s time. This temptation may lead to a form of escalation in which each of us compete for student time by making our subjects

Students may not feel free to voice dissent especially after a faculty member has stated his or her point of view.

Let me close by noting that since the faculty have created these rules, we can also change them. Any faculty member who truly finds them onerous is welcome to come before the Faculty Policy Committee to seek amendment. I will be happy to bring to the floor of

A faculty member who believes that his or her subject is receiving short shrift may be tempted to increase work load in order to command more of the student’s time. This temptation may lead to a form of escalation in which each of us compete for student time by making our subjects ever more demanding.

ever more demanding. The end result is the letter that prompted this column.

You might ask, “If students want to suspend the rules governing the date of the last assignment, or whether the class should meet on Saturdays, why shouldn’t we let them?” I can think of two reasons. First, the rules we are talking about are creations of the faculty, not the students. Logically, if we allow students to suspend the end-of-term rules by vote, shouldn’t we also allow them to vote to suspend other faculty rules? If so, be prepared for student votes on the general Institute requirements, grades, and other aspects of the academic calendar. Second, a showing of hands during a class often misrepresents student preferences.

the faculty meeting any amendment endorsed by the FPC. But until we vote to change the rules that we have imposed upon ourselves, I believe we have an obligation to comply with them. I hope you agree. If not, expect a phone call from me at the end of the term.✚

Upcoming Faculty Meetings

Remaining faculty meetings for the semester are:

Wednesday, March 19
Wednesday, April 16
Wednesday, May 21

Meetings are held at 3:15 pm
 in Room 10-250.

MIT Computer Connection Needs A Major Upgrade

Newsletter Staff

For more than a century, the reputation of MIT throughout the world has been one of advanced technology, state-of-the-art facilities, cutting edge scientific and engineering excellence; and it's been well-deserved.

So why, as we head toward the millennium, is it virtually impossible to purchase on campus a simple desktop computer or peripheral at even a moderately competitive price? Why is there no campus-based computer store worthy of MIT's outstanding international reputation? Why is there *only* the MIT Computer Connection?

The MIT Computer Connection (MCC) is an embarrassment to the Institute. Sequestered in a basement corner of the Stratton Student Center, the MCC has been historically understaffed, understocked, overpriced (unless you happen to be a Macintosh user, in which case up until recently it had been marginally competitive), and the keeper of "banker's hours" (10 am – 4 pm, if you're lucky). The MCC's major asset appears to be its willingness to accept MIT requisitions and purchase orders; no mean feat considering the Institute's rapidly deteriorating credit stance in the community.

The standard joke among computer users and technicians at the Institute when referring to the MCC had been that the telephone was always answered, "MIT Computer Connection, hold please." Now telephone technology has replaced the live human voice with a recording requesting you leave a message for a return call. (Experience has shown the call to be returned between 24-48 hours later.)

In a recent conversation with the *Faculty Newsletter*, Tom Mullins,

director for Information and Finance – Information Systems (the person designated by Vice President Jim Bruce to be responsible for the MCC) acknowledged that there were problems. A fairly new hire (November, 1995) Mullins appears to be just beginning to appreciate the extent and complexity of those problems. Having no background in computers *or* sales, Mullins barely knows where to begin. A good place to start might be by asking and answering the following questions:

- Why is the MCC almost exclusively a Macintosh shop? At a time when 90 percent of all personal computers sold worldwide are DOS/Windows-based machines, stock and sales at the MCC are 80 percent Macintosh.

- What percentage of MIT computer users (faculty/students/staff/administration) use Macintosh machines and what percentage use non-Macs? (And what would the ratio be if the MCC was competitive on non-Mac pricing?) Amazingly, it appears no one has ever asked that question (or at least no answers are available). Given that every student and virtually every faculty/staff/administrator has an Athena e-mail account, determining an accurate percentage should be trivial; and results might assist in forming appropriate MCC stock and marketing strategies.

- Why are there no PC "clones" (non-name brand DOS-Windows based computers) at the MCC? Only IBM and Dell computers are available. It seems obvious that a thriving (and somewhat captive) market for rentals, leases, upgrades, etc., could easily be established. With the rapid turnover in computer technology and prices,

especially with the technology-oriented student base at the Institute, an inexpensive-to-purchase or rent/lease machine would appear to be an ideal solution to financial constraints.

- Why are the prices of the 20 percent non-Macintosh machines from Dell and IBM *higher* than those offered to those *not* affiliated with the Institute? Shouldn't those prices be lower? [Two recent articles in the *Faculty Newsletter* addressed this concern: see "A Dell of a Deal," Vol. IX, No. 2, and "Delled Again?" Page 10 of this issue.]

It seems clear that at minimum a significant restructuring and reconceptualization of the MCC is necessary if it is to become a viable, useful part of the MIT community. Current attempts to run it on a for-profit basis (the Institute actually charges the MCC rent!) are misguided at best. According to Tom Mullins, the current product markup is 8 percent, down from 13 percent. Yet anything short of a "service to the Institute" concept for the MCC would be inappropriate.

A February 1996 Reengineering report concluded that "MCC's current structure can't last." Among its conclusions were:

- Mass-market resellers offer very low prices;
- Comfortable educational discounts are disappearing;
- MCC prices exceed street prices in some cases, and will soon do so in other cases;
- People don't buy from MCC when it costs more (or, if they do, they complain and are unhappy);
- Much MCC consulting results in outside rather than inside purchases, thereby misallocating expense.

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MIT Computer Connection Needs A Major Upgrade

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Yet no action whatsoever has been taken by the administration to improve or change the MCC. In fact, the situation has only gotten worse; now even Macintosh prices are at best only 1 percent lower than those of local competitors.

MIT needs and deserves a high quality computer hardware and software outlet. Promised changes with the inception of Reengineering have failed to materialize. Perhaps the best solution of all would be

to “outsource” the MCC—an increasingly common choice by the MIT administration (e.g., food service, parking). Several local computer vendors who have been informally approached on the subject of setting up shop within MIT and offering the community substantial discounts and service have virtually salivated at the idea. (And the thought of having an on-campus facility that could actually repair computers is most enticing; the currently misnamed

“PC Repair” housed in an adjunct office in the Stratton basement will only accept Macintosh, IBM, and (just recently) Dell machines for repair.)

The MCC is long overdue for both a philosophical and a technological upgrade. For an Institute credited with creating and housing both Athena and the World Wide Web Consortium, anything less than a first-rate computer facility would continue to be an embarrassment. ❖

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Release 1 of MIT Electronic Catalog Announced Only Limited Access Available

Newsletter Staff

As part of Reengineering’s ongoing attempt to upgrade MIT’s purchasing system, Vice-President William R. Dickson, in a memo dated February 4, 1997, announced the impending release (March 3) of the MIT Electronic Catalog (ECAT). “A Web-based sourcing, ordering, and purchasing system,” initially ECAT will be used for purchasing laboratory and office supplies from MIT’s approved vendors (VWR Scientific and Office Depot, respectively).

Mirroring many of the advantages of other electronic ordering systems, ECAT will feature:

- MIT-specific prices;
- Up-to-date on-line catalogs;
- MIT-specific items not available in the vendor’s standard catalog (MIT letterhead, envelopes);

- A “Virtual Storeroom” mirroring the Building 18 stockroom, in addition to VWR’s standard 1000-page catalog;
- Actual quantities available in Office Depot’s Billerica warehouse.

Unfortunately, as with the purchase and attempted implementation of other Reengineering-driven computer-based “state-of-the-art” systems, the MIT administration may be attempting a startup before the system is sufficiently operational.

As noted in Mr. Dickson’s memo, only desktop computer users connected directly to MITnet and using the Netscape Web browser will have access to ECAT. But the caveat is that the Netscape helper application Ksign is also required, and currently runs only on the following platforms:

- PC’s running Windows for Workgroups 3.1.1;

- Apple Macintoshes;
- Athena Sun workstations.

Windows 95 or Windows NT users will be unable to access ECAT. Although Dickson states that Ksign “should be available for [these users] in the near future,” postponement of purchase and implementation until these most-common operating systems were brought on-line might have been wise.

It’s exciting to see innovative technology being introduced to the Institute community, but experience has shown that Version 1 releases of software are frequently more trouble than they are worth. Perhaps in the rush to show progress in the Reengineering effort the decision-makers should err on the side of caution, and wait until software packages are truly MIT-specific – and ready for the broadest segment of the MIT community. ❖

Annals of Reengineering**Delled Again?**

Theodore A. Postol

In the last *MIT Faculty Newsletter* [Volume IX, No. 2] published more than two months ago, I reported that the MIT administration was knowingly allowing Dell to sell laptop computers to the MIT community at prices roughly ten to fifteen percent above Dell's "street price." It is also about one year since I called this situation to the attention of Professor Jim Bruce, MIT's program manager for Reengineering and vice president for Information Systems. Professor Bruce not only has administrative responsibility for overseeing MIT's purchasing of computers, but he is also in charge of reengineering MIT's "bridge to the twenty-first century."

When I originally attempted to call this matter to Professor Bruce's attention, he provided a reengineered explanation of why the purchasing leverage of the combined MIT community is lower than that of people not affiliated with MIT.

[Your failure to understand why the MIT community pays more than the street price is due to] differences between the model you have for how computers are sold and how the marketplace actually works. Far from being monolithic and having only a single way to sell each product, each computer company sells through many different sales channels.... This often leads to discontinuities in the market where one product will be available in only one sales channel, or where very similar products will have different prices in different channels.

Apparently Professor Bruce's post-modernist deconstruction of the techno-economic market imaginary is one of the many profound insights that flow from a truly deep understanding of reengineering. Professor Bruce's analysis of how the market system works may explain why the *Faculty Newsletter* has received

no response from the administration about the excess costs of computers purchased through MIT.

However, being an un-reengineered soul, and a clinger to bourgeois affectations like prudence (and only occasionally cleanliness), I have not been able to convince myself that Professor

of months since the publication of the first *Faculty Newsletter* article on this subject, the marvelous negative discounts from Dell appear to have increased from about ten to fifteen percent per laptop computer to nearly twenty percent. No doubt this is a result of a tough minded reengineered management that has sent

This 100 MHz Pentium-based laptop can be purchased by you as a privileged member of the MIT community for \$2,983. Of course, if you are not affiliated with MIT, you can instead purchase nearly the same package for \$2,599. However, don't let the \$384 price differential fool you; the MIT bundle differs from the street price version of it in two ways. The non-MIT bundle comes with a faster modem card (33.6kb versus 28.8kb) and with a carrying case that Dell sells separately for \$69.

Bruce's nuanced understanding of the market explains his silence. So I dug through my garbage can looking for my last letter from President Vest (fortunately it was printed on recyclable paper) telling me about the pleasures of teaching, research, community service, and, most of all, about the need to save money through Reengineering and harder work. This letter seemed strangely inconsistent with the lack of administrative response to this issue. As my un-reengineered mind groped for an answer to the dilemma posed by the Vest letter, the explanation for administrative silence came to me in a blinding flash. The problem is being quietly addressed by Professors Bruce and Vest, the administrative giants who brought us the frugalities and insights of Reengineering.

I have now confirmed that this speculation is correct. During the couple

the right message to Dell. The equation is clear: Reengineering = Progress!

As an example of the advances that have been made in the past two months, lucky dog members of the MIT community can now purchase, at a *Dell of a Deal*, a Latitude LMP100SD "bundle." This 100 MHz Pentium-based laptop can be purchased by you as a privileged member of the MIT community for \$2,983. Of course, if you are not affiliated with MIT, you can instead purchase nearly the same package for \$2,599.

However, don't let the \$384 price differential fool you; the MIT bundle differs from the street price version of it in two ways. The non-MIT bundle comes with a faster modem card (33.6kb versus 28.8 kb) and with a carrying case that Dell sells separately for \$69. Since the faster modems being offered at street

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Delled Again?*Postol, from preceding page*

prices cost between \$50 to \$100 more than the slower modems generously being dumped onto MIT buyers, the real negative price break is between \$503 to \$553, a fantastic near 20 percent negative price advantage to the community!

All of the other Dell bundles to the MIT community I checked had similar negative price advantages, so rest assured

computer discussed above. One is a 120 MHz Pentium-based Sharp (model 9030) and the other is a 120 MHz Texas Instruments Extensa 600 laptop. Both of these machines had the same solid construction and feel that the Dell had, and both had faster CPU's. Both machines performed favorably relative to the Dell when tested using *Windows Magazine's*

The New York Times. See the box on this page for sample prices from Tuesday 28 January.

The memory of any of the machines listed can be easily upgraded by purchasing custom memory from a wide selection of suppliers. 8 MB RAM upgrade modules are now selling for less than \$100; and 16 MB upgrades are going for less than \$200.

From *The New York Times*, 1/28/97

Toshiba Satellite 110CS, 100MHz Pentium, 28.8 modem, 8MB RAM, 810 MB Hard Drive \$1188.

Toshiba Tecra 500CS, 120MHz Pentium, 28.8 modem, 16MB RAM, 1.3 GB Hard Drive \$1699.

Sharp PC9000, 100MHz Pentium, 28.8 modem, 8MB RAM, 1.1 GB Hard Drive \$1488.

Sharp PC9030, 120MHz Pentium, 28.8 modem, 16MB RAM, 1 GB Hard Drive \$1799.

IBM Thinkpad 365XD, 100MHz Pentium, 28.8 modem, 8MB RAM, 810 MB Hard Drive \$1588.

IBM Thinkpad 365XD, 120MHz Pentium, 28.8 modem, 8MB RAM, 810 MB Hard Drive \$1899.

CompUSA Superstore in Brighton 2/3/97

Toshiba Laptop 120MHz Pentium with Lithium Ion battery, 16 MB RAM, 1.2 GB Hard Drive, 10X CD-ROM, and 11.3 inch Dual-Scan Screen for \$1999.99.

Compaq Laptop 133MHz Pentium, 16 MB RAM, 1.0 GB Hard Drive, 6X CD-ROM, and 12.1 inch Dual-Scan Screen for \$2699.97.

WinBook XP5 (price direct from WinBook)

XP5 133 Lithium Ion Battery, 256K L2 Cache, 16 MB RAM, 1.3 GB Hard Drive, 33.6 KB internal FAX/Modem, and 10.4 inch Active Matrix Screen for \$2199.00.

The roughly comparable Dell "bundles" for 133 MHz Pentiums at the MCC are listed at \$3460 and \$3693, about fifty to sixty percent more than the roughly comparable WinBook.

that after the administration collects its modest overhead charges from your grants, they are working hard to look out for your interests.

Fortunately, for those of you who remain with un-reengineered minds and wish to purchase portable computers at reasonable prices, there is a radical concept that allows you to do so. It is called the *open market*.

Since I no longer do business with Dell, I recently purchased two computers that compared quite favorably in performance to the 100 MHz Dell

Wintune 95 program. It was not possible to perceive any speed differences among all the machines when working in a program like Word 7, and when tested against MatLab benchmarks, all achieved performance levels roughly comparable to that of a SPARC-10 work station.

In December, we bought the Sharp 9030 and the Texas Instruments Extensa, each for about \$1950. Since the time of our purchase prices have dropped still further. Examples of advertised prices for laptop computers can be found every Tuesday in the *Science Times* section of

I look forward to an explanation from the administration of how they are serving our community's interests by not addressing the pricing practices and service shortfalls of the MIT Computer Connection [see article, p. 8].

Professor Bruce may think that Reengineering requires that MIT be exploited by the market place, but to this un-reengineered mind it does not appear to be the case. However, what we don't need now is more doubletalk about cost cutting through Reengineering while we continue to get a *Dell of a Deal*. ♦

Letters

The Interface of Science and Engineering with Medicine at MIT

Cohen, from Page 1

matic goals, research and educational programs at the interface of science and engineering with medicine can be highly successful. HST has existed because of the enthusiastic participation in its programs of hundreds of faculty from Harvard and MIT. HST has attracted the very best students to its M.D. and Ph.D. programs; these students have gone on to distinguished careers. Discoveries at the interface of science and engineering with medicine have been at the forefront of medical advances. HST can point to many achievements of its students and affiliated faculty in this area.

A second conclusion I have come to is that interdisciplinary programs, such as HST, are fraught with institutional stresses. One origin of these stresses is the competition between the proprietary efforts of organizations (departments, schools, universities) to achieve and protect their *core* mandates and the needs of interdisciplinary programs which extend beyond these mandates. Over the years while I have been an observer of, and participant in, HST, I have been struck by the institutional conflicts that have surrounded it. MIT at times has been very distrustful of HST, Harvard Medical School, and the field of medicine. In the mid 1980s MIT, I believe, might have disbanded HST had it not been for the chorus of support for HST's mission from MIT and Harvard faculty and HST students. Harvard Medical School at times has been reluctant to commit faculty and financial resources to HST. MIT departments have been concerned that

HST competes with their resources and programs. For many years the Whitaker College of Health Sciences and Technology and the Harvard-MIT Division of Health Sciences and Technology functioned as competing organizations with virtually the same name. More recently the MIT Center for Biomedical Engineering and HST have had overlapping objectives and competed for resources. I do not wish here to assign blame either to HST or other organizations at MIT or Harvard Medical School for the above conflicts; I wish only to indicate that such conflicts have surrounded HST from its inception and adversely affected HST's functioning. For example, these conflicts have limited HST's and MIT's ability to obtain funding for major research initiatives at the interface of engineering and medicine, and have also led to HST over its history to being limited to a tiny handful of primary faculty appointments (these few faculty have ultimate responsibility for several hundred HST M.D. and Ph.D. students). Furthermore, in part because of these conflicts and controversies, HST has had a lame-duck or temporary MIT Co-Director for the past several years. Despite these severe handicaps, for 25 years HST's programs have generally performed extremely well winning national and international recognition.

I believe that looking forward to the future, we need to learn from our history while not being captives to that history. First, we should recognize that the interface of science and engineering

with medicine continues to be an exciting intellectual area for MIT as well as an area where the Institute can make a major contribution to human welfare. This is also one of the few areas where MIT can reasonably look forward to a growth in research funding and licensing revenue, and is one of the most attractive areas for philanthropy. Since MIT does not have a medical school, MIT's strategy in this area should be to utilize its strength in basic sciences and engineering to make advances at the interface with medicine. MIT requires links with a medical school and teaching hospitals to make these advances.

Second, MIT should recognize that the interface of engineering and science with medicine is a truly interdisciplinary area which is not naturally subsumed under the mission of any one existing department or school at MIT. Thus, a truly Institute-wide effort and organization is needed. Accordingly, MIT should publicly declare that contributing to health and medicine is a major objective of the Institute and to establish (or reestablish) an organizational entity (which for historical reasons might be called *Whitaker College*) which has the primary responsibility for achieving this goal. Whitaker College must be set up to be institutionally stable, which requires that it have a small primary faculty dedicated to its success. Faculty members in Whitaker College may come from a variety of disciplinary backgrounds, but should have as their

(Continued on next page)

Letters

The Interface of Science and Engineering with Medicine at MIT

Cohen, from preceding page

principal objective applying science and engineering to solving problems in health and medicine. This goal contrasts with the goal of departmental faculty in the Schools of Science and Engineering who have as their primary objective making contributions to basic disciplines of engineering or science. Whitaker College should have the explicit goal of fostering collaborative teaching and research efforts with faculty in established disciplinary departments as well as coordinating joint programs with faculty at Harvard Medical School. Thus, Whitaker College should be the MIT home for HST, and the director of Whitaker College should also be the MIT co-director of the Harvard-MIT Division of Health Sciences and Technology.

I believe that biomedical engineering, defined as applications of engineering to solving problems in health and medicine, would be best accomplished by Whitaker College working in

conjunction with the engineering departments. Biomedical engineering is quintessentially the type of activity that Whitaker College ought to foster. Of course, individual MIT faculty are free to pursue interests independent of a particular organizational structure. On the other hand, until MIT defines what its institutional objectives are and defines a coherent organizational structure, outside funding agencies are unlikely to fund major new programs in this area at MIT (this has certainly been made clear by the Whitaker Foundation which is accelerating disbursement of its resources to initiatives in Biomedical Engineering). Other natural themes for Whitaker College include applications of physics to problems in medicine, quantitative physiology, medical imaging, and new drug development.

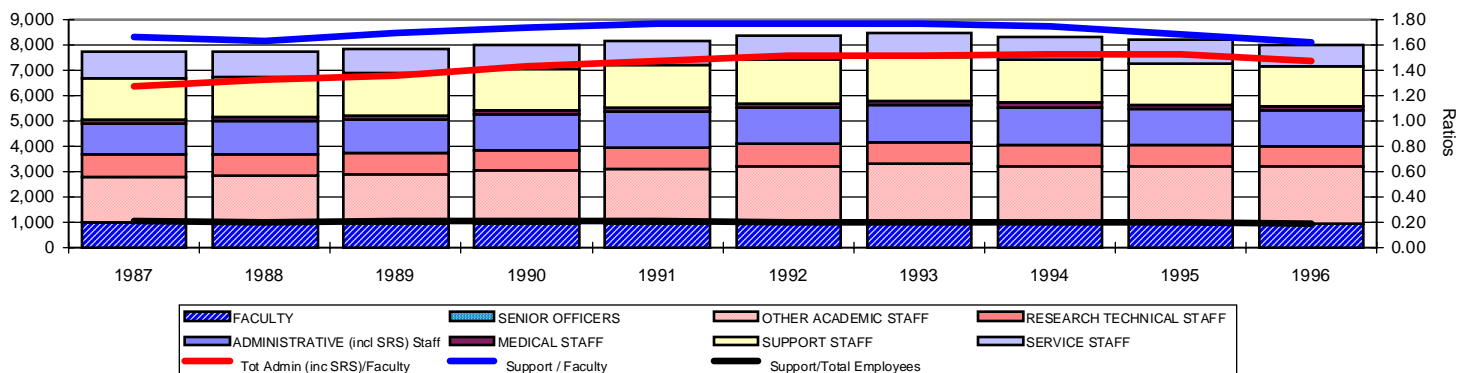
Many issues remain to be worked out. For example, what should be the procedures for the review of faculty in

Whitaker College for promotion and tenure? The ultimate goal should be to have a clear definition of the Institute's objectives with respect to interdisciplinary approaches to health and medicine, and a functioning organizational structure. Most importantly, the organization should facilitate diverse faculty across the Institute to work together in joint research and educational programs at the interface with medicine. We should not set up multiple overlapping structures which compete internally and externally for resources. We should fight the impulse to take a topic which is truly interdisciplinary and try to force it within a disciplinary structure; we should remember that Nature is not cognizant of the disciplinary boundaries of university departments.

Professor Richard J. Cohen
Harvard-MIT
Division of Health Sciences
and Technology



Staffing Trends
1987-1996



Source: MIT Planning Office; Personnel

Letters**Biomedical Engineering – A
Cornucopia of Challenging
Engineering Tasks***Mann, from Page 1*

cussions with proponents of BME departments, I extended the improbability of a single faculty and curriculum which embraced not only “a combined mechanical-electrical engineering department,” but also included a combined mechanical-electrical chemical engineering department.

I also concur with the characterization of the HST program. Frankly, I am flabbergasted that anyone familiar with HST and its evolution would even suggest that biomedical engineering education, or research, at MIT must be run by HST. As the only “working” faculty member among the Harvard and MIT administrators constituting the Executive Committee of the then Program, and as P.I. of the only (and largest participant and dollarwise) NIH Program Project Grant the Program/Division has ever had, and as member of the M.D. Curriculum Committee for over a decade, and co-organizer of, and teacher in, the three-subject “Quantitative Physiology” series for MIT undergraduates, I despaired as I watched the Program/Division squander what it started out doing well, in its reach for unrealizable ambitions. As a result, faculty like me who started with high hopes withdrew, to the point where I suspect one can count on one hand or at the most two the number of MIT faculty who constitute our fraction of the “approximately 200 faculty members (who) have primary appointments in a ‘classical’ department at either MIT or Harvard,” to quote from the companion article by Martha Gray (“Multidisciplinary Education and HST: A Nexus for Health Sciences and Technology”) in the same issue of the

Faculty Newsletter. The point that exclusivity of collaboration with Harvard Medical School faculty is no longer essential is also a kindred point. HST banked too much on the notion that *institutional* collaboration was mandatory while any investigator who is actually engaged in research knows the imperative is the *personal* relationship with the other-institution colleague.

Finally, the most trenchant aspect of the article, and the reason I have sent copies of this letter to the provost, Engineering dean and my department head, is the central thesis that much of the present promise and challenge in biomedical engineering is at its interface with biology. I have been only too aware of this opportunity for a long time. Reference 12 (“Induction of heat-shock protein synthesis in chondrocytes at physiological temperatures”) of my article mentioned earlier, was based on a 1982 MIT Mechanical Engineering S.M. thesis which I initiated as an outgrowth of my synovial joint research. After failing to interest any of our biology colleagues in the question, (now M.D.) Steven Madraperla conducted the research at MGH.

As pointed out in last issue's *Newsletter* article, times have changed, we have an undergraduate biology subject requirement, and collaboration within MIT between biology and engineering faculty is growing. My premier example of the power of engineering/biology integration is the little-publicized fact that much of the success of the human genome project at Whitehead/Biology is due to the creativity of a small, local MIT Mechanical Engineering graduate-staffed firm, Intelligent Automation

System, that developed the automated processes essential to the accomplishments.

However, my belief diverges a bit from the opinion expressed in the *Newsletter* that “I and many of my colleagues are convinced that the School of Engineering – with close ties to Biology and the rest of the School of Science – is the natural home for the (BME) structure.” Although for over four decades now I have characterized MIT as “an institute of technology in which departmental boundaries offer no impediment to those engaged in interdisciplinary research,” given the necessity of biology (and brain and cognitive sciences, not to mention biophysics) to contemporary biomedical engineering, I would opt for a structure which overtly embraced the School of Science.

In conclusion I want to thank Professor Griffith-Cima and Professor Gray for setting forth so clearly the needs and opportunities at the juncture of engineering and the human condition. In my view (prejudiced no doubt) this is the best edition of the *Newsletter* I have read.

**Robert W. Mann, Sc.D.
Whitaker Professor Emeritus
Biomedical Engineering**

[Editor's note: Copies of Prof. Mann's article “Biomedical Engineering, a Cornucopia of Challenging Engineering Tasks — all of Direct Human Significance,” *IEEE Engineering in Medicine and Biology Magazine*, September 1985, pp. 43-45, can be obtained from Prof. Mann: e-mail rwmann@mit.edu; telephone 253-2220.]

MacVicar Faculty Fellows**Hands-on Learning at the Integrated Studies Program***Steinberg, from Page 1*

jumped at the opportunity. I proposed that the whole program be focused on two one-semester subjects concerned with different technologies in their respective cultural settings, and that they include hands-on experiences with each of the technologies. Nan and Margaret

experiment with different kinds of cooking, followed by a study of the development of the clock and watch in Europe and America and the students take apart and reassemble a mechanical alarm clock. The last unit in the fall semester is about Japan and the evolution

in the Merrimack Valley. Students engage not only in different weaving and dyeing techniques, but also create a business plan for a new textile mill in Lawrence in the 1850s. Then we compare and contrast the American and Japanese automobile industries while students

I have the pleasure and honor of introducing a new feature of the *Faculty Newsletter*: a series of reports and observations on teaching at MIT, authored by MacVicar Fellows.

The MacVicar Faculty Fellows program was begun in 1992 to reward and encourage excellence in undergraduate teaching. It is named in honor of former Dean for Undergraduate Education Margaret L.A. Mac Vicar, who at the time of her death in 1991, had become an educational leader not only within MIT (most notably as founder of UROP and advocate of the biology requirement) but also nationally, through her service on numerous committees and projects relating to educational policy.

Each year since 1992, a group of three to six faculty members has been chosen by a special selection

committee convened by the provost. There are now 29 Fellows, each serving for ten years. Collectively the recipients form a small academy of exemplary scholar-teachers.

As the number of Fellows has increased, so has their desire for communication and collaboration. Beginning last spring, the Fellows started meeting regularly for luncheons at which they have discussed common interests and considered ways of encouraging teaching excellence at MIT. At some of these luncheons, various Fellows have presented brief descriptions of their teaching experiences as a way of launching a general discussion. One presenter was Arthur Steinberg: his article provides a summary of his remarks.

More such articles will follow from other Fellows. The presentations at the luncheons have been so stimulating that the Fellows have agreed they would like to see them evolve into a series of essays

to be published first in the *Faculty Newsletter*, and later as a printed collection. The latter might someday be given to all new faculty upon their arrival at MIT, for example. One can certainly imagine other forms of publication arising from the MacVicars' collective teaching experience; however, it seems wise to let things begin modestly and evolve naturally.

If you know Arthur Steinberg, you will appreciate that something has been lost in the translation to paper from his expansive, live presentation. But much has been captured that will be of value to all teachers here. I share your happy anticipation in looking forward to future articles by other MacVicar Faculty Fellows.

Rosalind H. Williams
Dean for Undergraduate
Education and Student Affairs

MacVicar supported the program wholeheartedly and generously.

Over the eight years that I have run ISP these 2 subjects have developed into interesting anomalies of the freshman year at MIT. They are almost the only place in the academic program that our freshmen can have extended hands-on experiences, and in HASS-D subjects at that. In the fall we examine food habits in various cultures and the students

of the samurai. The samurai sword is the point of departure for students to try their hands at blacksmithing, making first some traditional hooks, and then works of their own design.

The spring semester is concerned with the development of the factory system and mass and lean production. But we begin with a look at craft weaving in the Andes before examining the textile industry of the mid-nineteenth century

disassemble and reassemble single-cylinder engines, which are then tried out in go-karts.

In addition to the hands-on workshops, students read, discuss and, above all, write a great deal. We are trying to impart good analytical and communication skills along with all the other learning. To this end students keep written journals, write many shorter

(Continued on next page)

MacVicar Faculty Fellows**Hands-on Learning at the Integrated Studies Program***Steinberg, from preceding page*

papers in several drafts with frequent feedback, and work in teams on projects like the mill business plans. Our goal is to give students learning experiences that draw on all their abilities and potentialities, and integrate those experiences in such a way that students will enjoy what they are doing while they learn. We are also concerned that students become good team workers, while still maintaining their individualities. We wish in the end to produce life-long learners, not mere skill acquirers.

Why hands-on learning at all? Are lectures, problem sets, and computer simulations not adequate learning experiences? Our students think not. They come to ISP with wide ranges of

experience; some are afraid to “tinker,” while others thrive on it. All of them leave ISP with greater confidence in their abilities to tackle problems, be they mechanical or verbal, intellectual or emotional. They are a bit more willing to take risks, to try something new, something unknown. My favorite account of this new-found confidence comes from a woman who had been in ISP and had come there in order to gain some confidence in doing hands-on tasks. The next summer she had a job in a laboratory where she was the youngest, least experienced worker. When a large piece of electronic apparatus stopped working, she was the only one with the confidence to pick up a screwdriver,

remove the rear panel, and trouble-shoot the problem. She fixed it, became the lab heroine, and tells the story years later with enormous relish and style.

All the teaching and curriculum revision in the program is done by a team consisting of Debra Aczel, Peter Dourmashkin, Freddy Steinberg, and me. It could not be done by one person alone. But hands-on learning must be experienced to be appreciated; writing about it cannot convey its importance and value. We all encourage you to visit our classes and workshops, and get in touch with us. E-mail me (arthurs@mit.edu) or Debra (daczel@mit.edu) for more information.✦

**Academic Administrators Interview Faculty****Melinda Cerny**

During January and February, the Academic Administrator Network (AANet) team from Student Services Reengineering is interviewing. We are talking to the heads of departments to learn what issues may be unique to their departments and to gain an understanding of their educational mission. We are also talking to other faculty, recommended by their department heads and academic administrators, to hear what they need to meet their commitments as teachers and advisors.

Already, we have heard that departments would like a central data base that departments can pull information from more easily. Faculty who are teaching would like to have access to their students’ records (e.g., “Does a student have the prerequisites to take my class?”). We have also heard a

very strong concern that as we streamline administrative services, more work will be “dumped into the laps” of the department administrators.

These issues are important and are being addressed. The goal of Reengineering, after all, is not to relocate work from one group to another, but to eliminate duplication of effort. We also hope to strengthen communication among departments and other Institute student service offices and to provide better technological tools to faculty and staff so they can better help our students.

This past fall, the AANet team surveyed and interviewed academic administrators to gain their perspective on their jobs and the services they provide to students. What we heard from your administrators is a strong commitment to their students and to their faculty. Most find their positions extremely

challenging and rewarding. We also heard, however, a strong need for more professional training and development. Like all professionals, academic administrators need to continue to grow in their competencies, establish professional ties with other student service professionals, and feel a sense of partnership in the educational mission of their departments.

The Academic Administrator Network is working to strengthen the professional relationship between faculty and staff and to work with them both to improve the educational environment for our students. Faculty input is critical to help us achieve these goals. If you have not been interviewed (or, if you have not already been invited to participate) and would like to contribute to our work, please contact me at cerny@mit.edu or at x8-7232.

FY97 Department Telethons Achieve Record-Breaking Results

Heidi Ganss

The Association of Alumni and Alumnae of MIT is pleased to report that the FY97 Department Telethons for graduate alumni concluded in mid-November with record-breaking results! The money raised through the Department Telethons goes directly to the academic departments at MIT. During Telethon training sessions, department heads and faculty members stressed the Institute's great need for support for graduate students and most of the gifts were designated to fellowships.

The 251 volunteer callers from 18 MIT departments, programs, labs and centers contacted 3,922 graduate alumni during 12 successful nights of calling. Association staff reported 3,072 pledges totalling \$290,621! This figure represents a 78 percent pledge rate and an average of \$1,158 raised by each caller.

Telethons were held from 6-10 pm in the Bush Room in Building 10. Dinner was provided to volunteers as well as lots of prizes and incentives. Training is critical to the success of the Telethons and Association staff review the nuts and bolts of telethoning while department representatives speak to callers about departmental priorities. The presence of department heads always motivates the volunteer callers, the majority of whom are graduate students. One EECS caller wrote in his evaluation that "...having Department Head Paul Penfield at the Telethon made a big difference – it underlined the Department's interest and needs...".

While kudos were extended to all of the participating departments and volunteers at the Annual Thank You Reception at the Museum of Science,

Joseph Collins HM, Director of the Alumni/ae Fund, specifically recognized a number of departments who reported outstanding results. The following departments were recognized for their superlative Telethon results:

Center for Real Estate

Largest percentage increase in dollars — 73%

Chemical Engineering

Most volunteer callers in one evening — 24

Chemistry

Largest total increase in number of volunteer callers — 100%

Civil and Environmental Engineering

Highest total number of pledges — 312

Electrical Engineering and Computer Science

Most alumni contacted in one evening — 423

Most credit card gifts — 34

Highest total dollars pledged in one evening — \$34,320

Largest total dollar increase — \$11,591

Mechanical Engineering

Most volunteer callers in one evening — 24

Political Science

Largest percentage increase in number of volunteer callers — 400%

Sloan School of Management

Highest pledge rate — 96%

Highest dollars per caller — \$2,484.

The success of the Department Telethons is due to the high calibre and strong commitment of the volunteer callers – alumni, graduate students, and MIT staff and faculty. Special acknowledgement was given to the top volunteer callers including the following MIT faculty and staff members – Andrew Whittle (CE), Sharonleah Brown (AA), Paula Anzer MCP '89 (DUSP), and Rama Rao (EAPS).

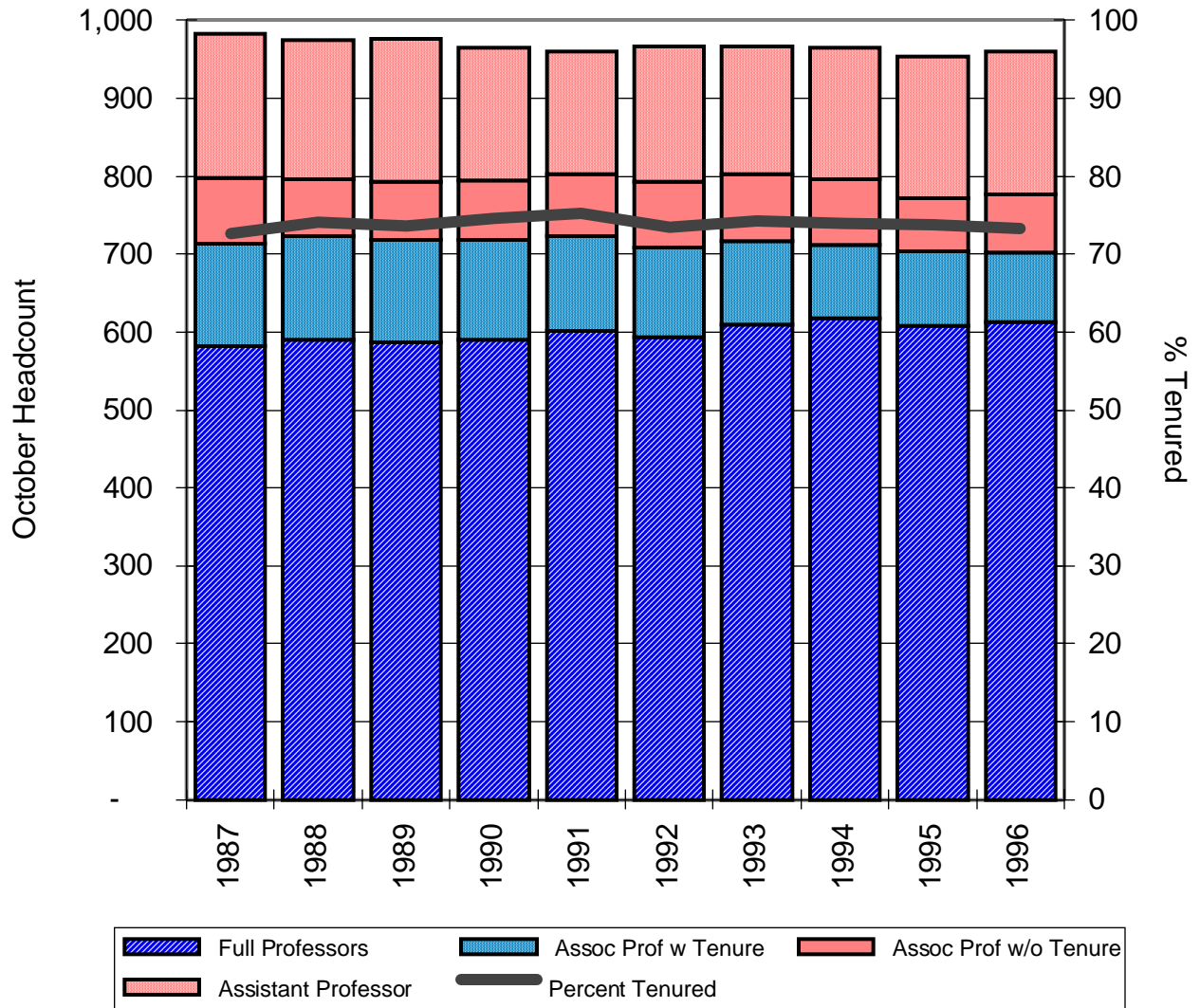
"Volunteers are the essence of the Alumni Fund," Joe Collins observed recently. "Their willingness to take time and ask others to increase their support of MIT are the key ingredients of the success of the Fund in recent years."

The Department Telethons have grown in recent years and the Alumni Association is always striving to increase the number of participating departments. Currently, the following departments, centers, and programs participate: ME, AA, CE, EECS, ML, NU, OE, CH, CM, EC, AR, DUSP, CRE, EAPS, PH, Sloan, TPP, and PO. Other departments interested in collaborating with the Alumni Association on this important and worthwhile endeavor, please contact Heidi Ganss at the Alumni Association by calling x3-7540 or emailing to <ganss@mit.edu>.

Association staff and Department Telethon volunteers are looking forward to breaking more fundraising records in FY98! Recruitment for FY98 has already begun and staff and faculty interested in serving as a telethon volunteer for their department should contact the Alumni Association for more information on the various ways to get involved.♣

M.I.T. Numbers

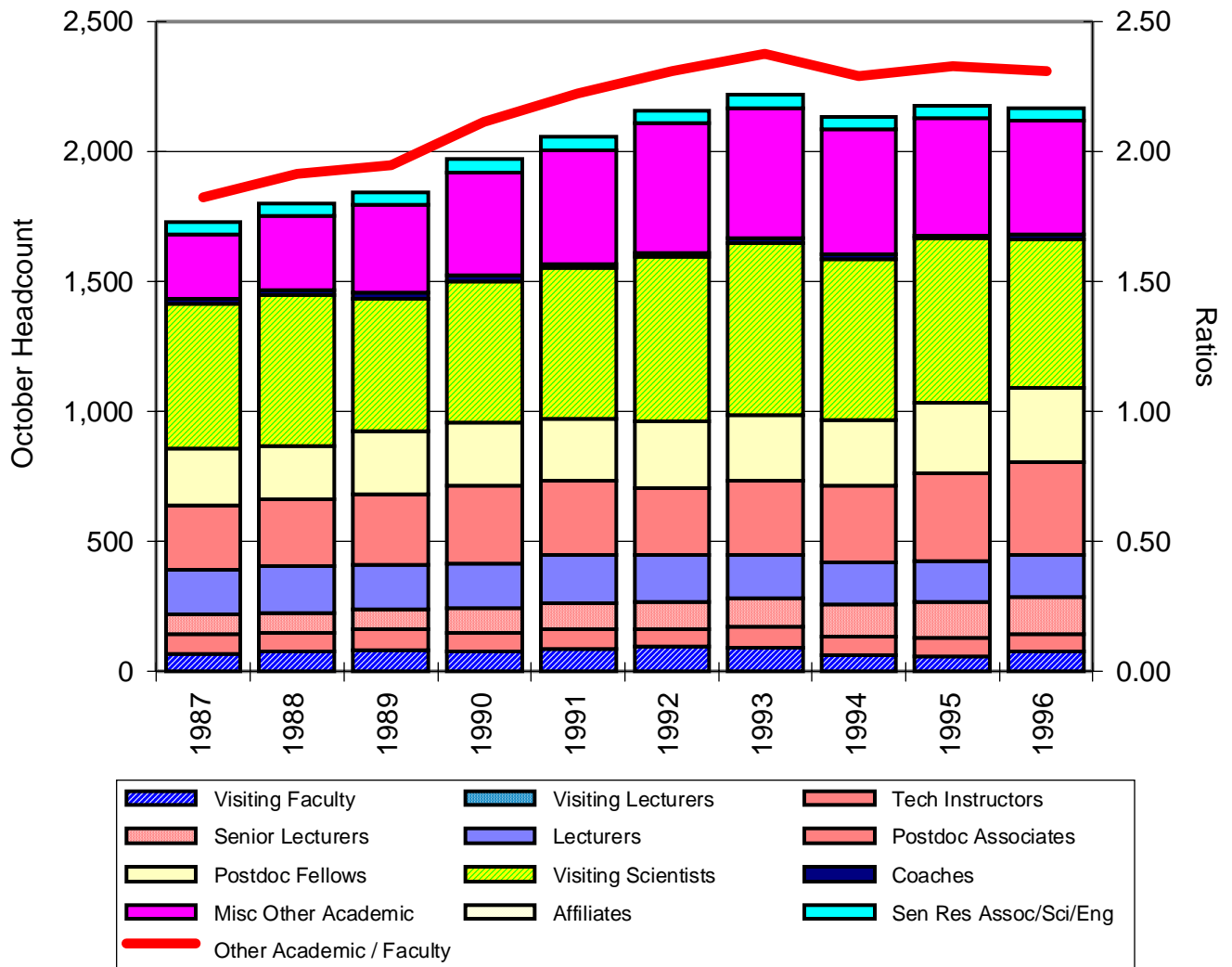
Faculty Members 1987-1996



Source: MIT Planning Office

M.I.T. Numbers

Other Academic Staff 1987-1996



Source: MIT Planning Office

M.I.T. Numbers

Sponsored Research 1987-1996

