

The MIT Faculty Newsletter

Vol. X No. 3

November/December 1997

From The Faculty Chair

Faculty Involvement in Student Life

Lotte Bailyn

Since the tragic death of Scott Krueger in September, the Institute has been engaged in extended conversations about the educational climate at MIT. Concern centered first on the question of alcohol abuse, and it remains a very complicated issue. The administration is working on a detailed analysis of the current policies regarding alcohol at MIT and refining them to be in accord with both the law and the principle of responsible drinking for those over age 21. And both the IFC and the UA have come out with very thoughtful ideas on how to deal with the abuse of alcohol. But two events since Krueger's death raise questions: the delivery of a keg to an underage student with a false ID at one MIT fraternity and the hospitalization of a BU freshman after becoming intoxicated in the room of an MIT student in another fraternity. These two incidents indicate that despite the efforts of the administration and student leadership, recognition of the seriousness of alcohol abuse has still not permeated the Institute. And the fact that both incidents happened in fraternities raises once again the question of how to ensure that fraternities fit in with the overall educational goals of MIT.

The concern about freshmen in fraternities led to the introduction, at the October faculty meeting, of a motion to house all freshmen on campus. During the following month there was an outpouring of concern from students, parents, and alumni. From those connected with the FSLIGs came a picture of a supportive environment, a haven that alone made it possible "to survive the first year." Even parents, initially

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Undergraduate Research: A Continuing Story

Norma McGavern

Spreading far and wide

Early this fall I received a phone call from someone at UCLA. How common was it, the caller wanted to know, for colleges to have undergraduate research programs, and did I happen to know of others besides MIT's? The next day another person from UC Davis called wanting to know the same thing. I wondered how many people at MIT might ask an identical question.

When UROP started in the fall 1969 semester, MIT was virtually the only kid on the block – we were the first and only school that invited every undergraduate to do research during the academic year with faculty in every single discipline. It wasn't long before word spread and others began to copy the concept; in some cases, even the name. Although there are now dozens of UROP-like programs, you needn't look too carefully to find big differences. Sometimes their program belongs to a single school or is open only to a single discipline. Or it is available specifically to honors students or other selected groups of students. (The University of Delaware, for instance, started out with an honors research program, the University of Michigan with a research program for incoming minority students.)

In the early 1980s, a national Council on Undergraduate Research was established by a network of university faculty and administrators to promote undergraduate research and lobby for funding. By the late 1980s, membership had expanded to about 200 colleges and universities. Most of these colleges had either just created or were about to create programs for

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From The Faculty Chair**Faculty Involvement
in Student Life***Bailyn, from Page 1*

disturbed by the system of residential choice and worried especially about fraternities, reported the extent to which their sons grew in maturity and responsibility after joining a fraternity and how important the "brothers" were to their well being. From the other ILGs and the dorms, also came a plea for choice: of where to live and with whom to live. And so, at the next faculty meeting, a different "sense of the faculty" motion was passed (see below), that accepted the diversity in the residential system but asked for a less frantic and more informed choice. And the

administration has responded with steps to implement that motion.

Again, however, questions remain. The "sense of the faculty" motion was passed in November by about 60 faculty members, a rather small percentage of the whole. It is clear, therefore, that there is an issue here that goes beyond alcohol or residential choice. A key question is whether faculty want to be involved in student life. The Task Force on Student Life and Learning has called for an integration of life and learning, a bridging of academics not only with research but also with community. If we mean this, then a number of significant

changes will have to be made. One has to do with the resources available for the support of non-academic student activities and another relates to faculty time. In both of the debates about alcohol and the residential system, there was a call for more student-faculty involvement. But that would require greater support for joint activities and some rethinking of what we expect the faculty to do. And that, in response to the events of the last few months, is an important conversation I hope we will have.❖

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Text of the "Sense of the Faculty" Motion Passed at the November 19th Faculty Meeting

It is the sense of the faculty that:

1. MIT should move immediately to begin a comprehensive, deliberate examination of its residential system, including the suitability of undergraduate residences as freshman housing, with the goal of bringing the system into fuller alignment with MIT's educational mission.
2. The introduction of freshmen to MIT should be characterized by:
 - a proper orientation to the Institute's academic environment;
 - a sense of belonging to the larger MIT community;
 - greater opportunity for interaction with faculty and each other; and
 - the ability to make a calm, informed choice of living group.
3. The Institute should commit significant funds to the design and implementation of new initiatives that strengthen the ties between faculty and students, and enhance the living and learning experience for all students.
4. The newly promised undergraduate dormitory should be seized upon as an opportunity to experiment with the design – programmatic and physical – of a residence that consciously integrates student life and learning.
5. These initiatives should have significant input from students, staff, faculty, and alumni/ae.
6. Timely reports should be given to the faculty and the MIT community about the design, implementation, and evaluation of these initiatives, beginning in April 1998.

The Housemaster's Role in Residential Life

Halston Taylor

For the first time in years, MIT has been experiencing a campus-wide discussion about the quality of student-faculty interactions and the gulf – intellectual and cultural – that divides the campus at Massachusetts Avenue. The substitute motion that passed the November faculty meeting concerning the residential system (see Page 3) reflected a desire among many faculty for the Institute to re-dedicate itself to finding meaningful ways for students and faculty to share more than lecture hall space during daylight hours. Although we *do* need to work to find new ways to improve upon the quality of student-faculty interactions all across the Institute, there is already one program in place that a select number of faculty have found especially rewarding over the years – MIT’s housemaster program.

For almost four decades now, virtually all of MIT’s dormitories have been home to a senior member of the MIT community, usually tenured faculty members, but occasionally untenured faculty and senior administrative staff. These individuals – the housemasters – serve as the representatives of the wider Institute within each student residence. Each dormitory is unique, as is each housemaster, and thus the role carved out by each housemaster is to a large degree unique. Still, there is a core of responsibilities that all housemasters share. Most importantly, housemasters help to provide leadership in each of the Houses. This doesn’t mean that the housemasters “run” the Houses; rather, housemasters work with the Residential Teams (students, house managers, and graduate resident tutors) to enhance the quality of life in each residence.

The prospect of living among a couple of hundred MIT students may seem

overwhelming to the typical MIT faculty member, but it’s important to realize that housemasters aren’t alone. The students are responsible for a large array of activities, and each dormitory has a house manager, whose job it is to attend to the business and physical operations of the dormitory. Each dormitory also has a staff of graduate students – called “graduate resident tutors” – who actually live on the dormitory floors and are the first line of defense in mediating between the challenges of the Institute and student life. Finally, MIT has a superb student services support staff who can be called

to rooms. This fact makes the job of housemaster in one of the dormitories challenging in certain respects; like all large, complex organizations with long histories, the dormitories are hard to change. But, student self-governance makes life easy for housemasters in many other important respects. In particular, housemasters don’t have to do it all. They can, and do, focus their attention on the few things they think are important, while mostly giving advice to those who are doing the lion’s share of actually running the dormitory on a day-to-day basis.

Current housemasters (and MIT affiliations)

Ashdown House (Graduate students), **Vernon M. Ingram** (Biology)
 Baker House, **William Watson** (History)
 Bexley Hall, **William Orme-Johnson** (Chemistry)
 Burton Conner, **Halston Taylor** (Athletics)
 East Campus, **Jed Buchwald** (Science, Technology, and Society)
 500 Memorial Drive, **Borivoje Mikic** (Mechanical Engineering)
 Green Hall (Graduate students), **Anne McCants** (History)
 MacGregor, **Munther Dahleh** (Electrical Engineering and Computer Science)
 McCormick, **Charles Stewart III** (Political Science)
 New House, **John Essigmann** (Toxicology and Chemistry)
 Random Hall, **Nina Davis Millis** (Libraries)
 Senior House, **Henry Jenkins** (Literature)

in for help in those few cases where the experience of a seasoned professional is needed.

If MIT faculty did not know it before, they certainly know now that each MIT residence, whether it be an on-campus dormitory or an off-campus independent living group, is home to strong student cultures. On the whole, the houses are self-governing, with students themselves having the responsibility for deciding everything from how “house taxes” will be spent to how residents will be assigned

Just as every good teacher isn’t necessarily suited to teaching in large lecture halls, all MIT faculty are not necessarily suited to living among students as housemasters. And even those who are well suited to serve as housemasters aren’t likely suited to serve in *every* dormitory. Still, the faculty at MIT who perform this role gain a richer understanding of student life, and by and large find the role immeasurably rewarding.♣

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A Challenge – Several, In Fact

John Hildebidle

I suppose it's reassuring to be reminded that, even at a "mature" age, I am capable of learning. But it's such a messy process, education – isn't it? The recent ponderings and conversations, arising from the sad death of Scott Krueger, are a case in point. An ultimate lesson seems to me to be that we are still trying to find the proper question to try to answer.

One thing I am sure it is *not* is alcohol – *pace* the Boston Licensing Board. It cannot be anything but wise and helpful to be certain we are, personally and institutionally, supporting the laws of the Commonwealth. But, given that we include in our community a large group of adolescents under extreme academic pressure, and that we live in the contemporary USA, it can hardly be surprising that at times there are incidents of drinking, and indeed of so much drinking as to seem to endanger lives. I mean, when was the last time you went to a party, had five or six glasses of wine or beer, and then got behind the wheel of your car to drive home? Good thing nobody stopped and breathalyzed you, I'd say.

Maybe the issue is R/O, then. It seemed so, to me – and I was glad that at last R/O would be seriously scrutinized and maybe substantively altered. I have been a vocal opponent of R/O since about a week after I arrived at MIT, 14 years

ago. And I was sure I had it all scoped out. Here's where the learning starts.

Partly because of an op-ed piece I wrote in the fine new undergraduate newspaper, *The Observer*, I've attracted a lot of instruction from my undergraduate colleagues, both in person and by e-mail. And it has suddenly dawned on me that, against all reason and logic, R/O *works*. Somehow, after a hellish week of anxiety and pressure (I used to say that the only useful thing R/O taught freshmen was how to function on little or no sleep), new arrivals at MIT achieve enough academic "orientation" to set up a workable freshman course program, and begin satisfactory undergraduate careers (I don't know what the flunk out or dropout rate is, but my sense is we like to think it's low). And they find somewhere to live – somewhere that they quickly and passionately and seriously think of as "sanctuary" (Jay Keyser's term) or "home" (their term, with surprising frequency). What more could we ask?

So what *is* the question? I've come to a conclusion about that, which I gladly offer to you. The issue before us, as the "sense of the faculty" motion at the last faculty meeting acknowledged (see Page 3), implicitly, is how to break down the vast chasm between ourselves and our students, how to take on a role – a useful,

humane, non-intrusive, non-judgmental role – in the lives of the undergraduates who surround us. What remains is for us to act on that – and to get beyond the one excuse that ought never to be accepted at MIT, i.e., "I'm busy." After all, a permanent condition of task-overload is the nature of this place (that may be another issue we need to confront, in due course). But how many of us even take on undergraduate advisees with any real energy?

So I offer a challenge to my colleagues. Before February 1, take at least one of the following steps:

- 1) Volunteer to offer a Freshman Advisee Seminar, next autumn.
- 2) Apply for a House Mastership.
- 3) Write a letter to all the current house masters, offering your services immediately as a House Fellow.
- 4) Write a letter to the FSILGs, offering to take on the role of "advisor" to the living group.

All four tasks are, I am assured, considerably undersubscribed. All four are worthy and even necessary ways to engage the lives of students on their own terms, and on their own ground. If we are serious about "taking back" Orientation, about "experimenting" with the communal basis of a new dormitory, the paths are already in place to do so.♣

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Newsletter Seeks Input

Perhaps the most positive outgrowth of the recent campus-wide discussion of changes in R/O and related issues is the expression of divergent opinions by members of the MIT community.

In the hope of maintaining a variety of expression, the *Faculty Newsletter* is continuing to encourage discussion and

debate of topics that affect the faculty as well as the wider MIT community.

Several of the articles in this issue of the *Newsletter* are unsolicited contributions from faculty members. Others are offered in response to requests for information on particular topics or are one of our regular features. But whatever their source, the continued give-

and-take is perhaps the most exciting part of the process.

It's easy to reach us with your particular viewpoint or opinion. Perhaps, most simply, is by e-mail [fnl@mit.edu]. You can also write us [38-160] telephone [x3-7303] or FAX [x3-0458].

We look forward to hearing from you and sharing your perspective.♣

Undergraduate Research: A Continuing Story

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undergraduate research. While counted as full programs, some were as small as a single research group with a single faculty member. None were much like MIT's.

The National Science Foundation began to actively encourage undergraduate research in 1987 when it offered Research Experience for Undergraduates (REU) site and supplemental grants in math, science, and engineering. The push to expand undergraduate research and make connections with curricular and other changes has grown stronger in recent years. A current NSF grant announcement for "Vertical Integration of Research and Education in the Mathematical Sciences," offers a telling example. It calls for "the development of a community of researchers and scholars in which there is interaction among all the members" including "Undergraduate Research Experience such as faculty directed projects...and participation in interdisciplinary teams...[which] may range from group activities to an individual faculty member mentoring an undergraduate [and] should include exposure to the many opportunities for careers in the mathematical sciences and the development of communication skills."

In response to encouragement from NSF, as well as ongoing efforts to reinvigorate their curriculum, many schools are trying to broaden the base of programs that started originally on a narrow basis – to help integrate students from two-year colleges, for example. Some are expanding their programs so they will affect the school's entire undergraduate experience. SUNY-Stony Brook, which consults frequently with us, cites their research programs for first-year women and minority students

as responsible for increased retention. About 40 percent of its undergraduates now participate in research activities. Carnegie Mellon students pursue independent research and study through courses, paid work-study, senior honors programs, and internships. At a research symposium last year 200 student projects

is our insistence on the academic nature of the research experience. A paid UROP is recognized here on academic transcripts. It occasionally costs UROP a bit in participation numbers when we winnow "jobs" from paid but credit-worthy research experiences.

Chief among the differences between MIT's and even the larger programs is our level of participation: 80 percent of seniors here have done at least one UROP. Another significant difference is the widespread nature of undergraduate research within MIT. Every department and interdisciplinary laboratory has UROPers.

were presented. The University of Missouri and Kansas State University are tying research with discovery-based learning. Cornell is considering how to create a broad undergraduate research program. There are plenty of other examples. Caltech, incidentally, has long had a successful program called Summer Undergraduate Research Fellowships (SURF), that may be the nearest in spirit to MIT's UROP, although it includes students from other schools.

Chief among the differences between MIT's and even the larger programs is our level of participation: 80 percent of seniors here have done at least one UROP. Another significant difference is the widespread nature of undergraduate research within MIT. Every department and interdisciplinary laboratory has UROPers. (The fact that in an institution whose prime emphasis is science and engineering 10 to 15 percent of UROPs happen in the humanities and the social sciences is exceptional.) Then, too, there

A hefty amount of UROP's growth after 1973 was in the number of UROPs done for pay. This was aided, without doubt, by UROP's waiving overhead (now called F&A costs) on stipends paid from sponsored research. The aim wasn't only to make it inexpensive for faculty to pay undergraduates, but to encourage them to charge undergraduates to their research grants as they would if the students were fully-fledged professionals. If the waiver was to disappear someday, UROP staff occasionally wondered, would faculty continue to pay students from their own funds anyway? We would know the answer in 1995.

The 1994 "disaster" and some things we learned

The indirect costs waiver disappeared on July 1, 1994. The question that summer was, would UROP survive? Would it change irrevocably? There seemed to be little chance it could remain

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the same. The new federal regulations applying indirect costs to sponsored research-paid UROP stipends would rack up the faculty costs of having a UROPer by 65 percent. Sponsored research money could no longer be “mixed” with UROP fund account money. UROP and the faculty would have to pay employee benefits, too. (The benefit percentage ricocheted around that spring, adding to the confusion, but thankfully settled at 6.5 percent, a special rate for UROP alone, where it will remain for the foreseeable future.) Worse yet, the overall financial climate didn’t look good either; federal research money was threatened across the board that summer. There didn’t seem to be any good news. An article in the April 1994 *Faculty Newsletter* by Walter Lewin, mincing no words, called it “The UROP Disaster.”

Any program that experiences nothing but growth and success probably has a harder time coping with trouble – or being viewed as needy. For more than 20 years UROP made much out of little. Quarters were modest, staff was small. Waiving overhead and leveraging faculty money with a few hundred dollars of UROP’s own money, we were able to make many students and faculty happy most of the time. Negotiations over proposal funding may have been hard sometimes, but sooner or later students and faculty won funding.

Now we all had to adjust to a different reality. Funding requests were going to be turned down; we had gotten used to saying “yes,” and now we had to get used to saying “no.” UROP needed to find a place in the line of programs in need of financial help and the ministrations of Resource Development. We had to become wiser about fundraising opportunities and be able to

make UROP’s case. On the chance there was a political opening, we needed to make our case known in Washington, too.

To our surprise, the “disaster” never really happened. True, 1994 was not a good year, but it was not a terrible one either, and it looks more and more like UROP’s only bad year. After months of instability and turmoil we found more support than we anticipated, and UROP was able to begin to build a firmer financial foundation.

After an initial chill caused by the new regulations—when paid UROPs immediately decreased by 38 percent—things began to look up. The next semester, and every semester thereafter, faculty demonstrated their willingness to fund undergraduates, never mind that (a) stipends can no longer be shared between UROP and faculty, and (b) the added cost is now 74 percent of the basic stipend (6.5 percent employee benefits on the student stipend, plus 63.5 percent overhead on wages and benefits). It is hard to find this kind of support for undergraduate research anywhere else.

The happiest thing we learned as a result of the 1994 crisis was how much support for the program existed, and how UROP alumni – a substantial number of whom are out in the world now – are beginning to recognize what they gained from UROP. With a boost from the CUP in 1996 recommending MIT actively seek a \$10 million endowment for UROP, there began to be a seismic shift in fundraising energy. A trickle of new funds became a stream. In spring 1997 the Paul Gray Endowment Fund for UROP became our largest endowed fund to date. We don’t have as much as \$10 million yet, but we feel we are on our way.

Then and now – how is UROP different?

So what has really changed? A look back to the 1980s gives some perspective on where UROP is now.

The need for pay. 1980-81 marked the beginning of UROP’s second decade. Tuition, about to rise significantly and drive up the need to work for pay, was still only \$6,200. UROP stipends paid \$600 a semester and \$2,200 in summer. (Stipends are now \$1,050 a semester, \$3,600 in summer). The self-help level for students on financial aid was \$3,000. It was still possible for UROPers to earn more than a third of the total cost of their education, or well over 100 percent of their self-help, from a year’s UROP wages. This is no longer true. Not only is it harder to get today than in 1981, but a year-long UROP stipend now provides only 18 percent of the student budget, and 66 percent toward self-help. Keep in mind that over 60 percent of UROPers who work for pay are also recipients of financial aid, compared with 53 percent of undergraduates overall. Available time, of course, is the issue, else students would simply take jobs in addition to UROP.

Faculty sponsorship. Most faculty in 1981 typically paid about 60 percent of their students’ stipends from sponsored research grants; the rest came from UROP funds. Some students had their entire stipends paid by faculty, so they weren’t limited to the \$600 or \$2,200 ceilings. A few were paid entirely by UROP funds. The total faculty contribution to the student payroll by way of UROP in 1980-81 was a whopping \$1.1 million—it was the first year earnings from sponsored research topped the million mark. Last year—fiscal year 1997—faculty payments to

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Undergraduate Research: A Continuing Story

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students were \$4.4 million, once again reaching the same level as our 1993 record year that happened to occur the year before the “disaster” year. But in 1997 faculty sponsorship was without benefit of waived indirect costs or the encouragement of shared funding to ease the pain. Faculty are paying UROPers because they want to.

Motivation, and survey data. A 1981 survey reported that students named the “most significant gain” of UROP participation to be “personal contacts with professors and other professional members of the MIT community.” In a 1993 UROP survey, 72 percent of UROP participants said getting to know a faculty member was an important gain from participation. This percentage trailed only slightly behind other factors, such as gaining research or professional experience and expertise, and earning money. Data from the Class of 1994 Senior Survey revealed that students doing UROP had more meaningful contact with their UROP supervisors than with their academic advisors and were more satisfied with the intellectual excitement in their major and with their undergraduate education as a whole. UROP supervisors were a prime source of graduate school or employment recommendations. Participation in UROP was correlated with improvement in intellectual curiosity, academic self-confidence, and writing and public speaking skills.

Focus on academics. Credit or pay—what’s the difference? The answer, of course, is that there should be none. Few other programs have managed to offer the choices MIT does – credit, pay, or volunteer – and still keep the program on a robust academic footing. Other programs frequently combine internships with varieties of independent study and

research “jobs.” By treating all modes alike in academic terms, UROP has upheld the same high standards for all participants. After the 1994 “disaster-that-wasn’t” UROP arranged for transcript recognition for paid and volunteer UROPs and streamlined undergraduate-research-for-letter-grade designations (called “URG”), once a varied stew of independent study course numbers. Evaluations – still the primary feedback on the quality of the student’s and faculty member’s experience and always read closely – are to be written whatever the mode.

To the extent they will affect undergraduate research, academic innovations resulting from the deliberations of the Task Force on Student Life and Learning will likely place UROP ever more securely as part of the curriculum. In a Student Advisory Committee Report prepared for the Task Force and reported in *The Tech*, students see a “research triad” of “academics, research, community.” Also, *The Tech* explained, “research helps integrate theoretical science with engineering, community enables students to understand independence and adult life, and academics has always been the core of education.”

UROP “off campus.” In the 1970s students worked on UROPs with some 200 non-profit organizations and nearby corporations. Students frequently had two supervisors, the off-campus supervisor and the MIT faculty member. This often created an awkward reporting situation. The off-campus program was beginning to give way by 1980-81 to a growing number of research opportunities available on campus, and increasing opportunities to earn pay. In 1994-95, after the indirect cost changes, corporate support for

undergraduate research looked promising once again.

We reinvented an off-campus program, a 1990s’ version called the Undergraduate Corporate Research Fellows (UCRF) program. It was announced in the May 1995 *Faculty Newsletter* in an article entitled “UROP Opens a Door to Industry.” UCRF has prospered and is slowly but steadily growing. Sponsors, who pay a fee that comprises a student stipend, administrative costs, F&A (overhead), and materials and services for faculty, include over a dozen companies in the U.S. and in several foreign countries.

Location, location

Early next year, UROP will be making a symbolic move. Building 20, UROP’s home since 1969, will be torn down near the end of spring 1998. This will bring an end to 28 years in the old “Rad Lab.” In 1981, after more than 10 years in Building 20, a renovation of its two-and-a-half rooms ended a decade of UROP’s looking like a 1970s’ style experimental program. A second renovation transformed UROP into part of an Undergraduate Education Office under the then-new dean for undergraduate education Margaret MacVicar.

In January we will move nearer the geographic center of MIT in the Infinite Corridor. We hope this temporary move will become permanent. It seems fitting that a program so central to the heart of the undergraduate academic experience should be on its way to a new neighborhood near Admissions and important and developing student and faculty support services. You could say we’re putting one of the best things at MIT on display as students come in the door. ❖

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TEACH TALK

What the Students Say

Lori Breslow

Over the past semester, I've been given the opportunity to meet with groups of students to listen to what they have to say about their education at MIT. These conversations have been important and enriching to me, as I hope they have been to the graduate students, undergraduates, and alumni who have joined me. While many of the discussions have been about housing, R/O, or alcohol on campus because of the soul-searching this community has done in the recent weeks, in this "Teach Talk" I want to focus on students' perspectives on their learning (and, by implication, of course, on our teaching). For in listening to what the students have been saying, I've been privy to some extraordinarily intelligent, imaginative, and astute observations.

What I'm about to report may be old hat to many of you who have been at MIT longer than I, or who know MIT students better than I do. Most of what I'm going to describe comes from a conversation that took place at a pika faculty-student mixer in mid-November. When I arrived at that event (later, unfortunately, than I had planned), rather than finding a crowd engaged in the usual party banter, house residents were sitting together in their living room in animated conversation with two other faculty members; Professor Dick Larson, Course 6 and director of the Center for Advanced Educational Services (CAES), and Professor Stephan Chorover, Course 9. The remainder of that conversation, which lasted for over another hour, was far ranging, honest (as far as I could tell), emotional, and at times intense. It was, I thought, an outstanding example of what can happen when students and teachers try hard to *hear* what each other is saying.

I wish I could recreate the atmosphere in the room for you. The best I can do is offer you some snapshots. There was the student who was so excited about what she wanted to say that she bounced up and down waiting for her turn to speak. A second young woman was so frustrated about some of her MIT classes that upon finishing her diatribe, she literally flung herself back from the edge of the couch on which she had been perched. There was the clicking, clattering sound of students snapping their fingers to signal they agreed with something someone said. And there was the young man who, when called on to speak, simply said, "I do have something to say, but I know Amy has been trying to get the floor, so I want to give her a chance." (I tell students in my communication class that at the base of all good listening is the ability to suppress the ego. If that young man's act was not a perfect example of that principle, I don't know what is.)

I want to make it clear that what follows are my recollections of that evening; Professor Larson and Professor Chorover may have different impressions, as may the students. (Everyone in attendance is invited to send their reactions to this column to *The Faculty Newsletter*.) And again I want to stress that the ideas I'm going to describe are devoid of the passion which, in many cases, accompanied their expression. I'm also going to distill down our conversation, which often took twists and turns, into six main themes – please understand that we weren't nearly so logical in our exploration!

Here, then, are some of the ideas I heard that evening:

*Putting Ideas in Context
Is a Vital Aid to Learning*

The students didn't exactly express

this point as I have. Instead they talked about the professor who explained how a certain set of equations once helped him understand something about the nature of the solar system, or the faculty member who asked his students to consider a phenomenon from a changing set of perspectives. The point is that classroom discussion was broadened to go beyond a narrow topic, a specific equation, or a particular concept.

In another "Teach Talk," I wrote about the importance of giving students the "picture on the box." I likened teaching in science and engineering to putting together a jigsaw puzzle because of the number of ideas or elements that have to be manipulated at any one time. I suggested that one technique to balance the necessarily focused nature of teaching technical subjects, is to pull back the lens and, from time to time, help students marvel at how a specific topic connects to a larger idea – the picture on the box of the jigsaw puzzle. Some things we know about learning support the view that this is a powerful educational tool. James R. Davis, for example, writing in *Better Teaching, More Learning*, reports, "...researchers have found that context, meaning, and prior knowledge affect information processing directly and deeply."

But the pikas didn't need to study cognitive psychology to come to this conclusion. They told us that when instructors provide them with a sense of the larger picture, it made what they were learning more engaging, more comprehensible, and more meaningful.

*Meeting Ideas in More than
One Setting Is Exciting*

Not only did the students say they were fascinated when they learned
(Continued on next page)

What the Students Say

Breslow, from preceding page

something about the broader implications of their course material, but they were also excited to hear the same idea discussed in different subjects. For example, one young woman told us – with great joy – how wonderful it was when she learned (in the same semester!) about fluid dynamics in her mechanical engineering course, her biology course, and her geology course. The advantages of this multi-perspective view is also supported by research into learning. Joseph Lowman, a professor of psychology at UNC, Chapel Hill, summarizing at least 30 years of work in learning theory, writes in *Mastering the Techniques of Teaching*, “Students will learn and remember information better if they have many cognitive associations with it; the learning of isolated information is more difficult and less permanent than the learning of information that is connected to a network of other material.” The logistics of consciously building connections between disciplines within the MIT curriculum may be mind-boggling, but if the two dozen pikas talking to us that evening at all represent the student body as a whole, these are precisely the kinds of connections that are mind-enhancing as well.

Recitations Shouldn't Be Lectures

Whatever the function of recitations in a particular subject is meant to be, the students were firm in their opinion that what they *don't* want is for their recitation instructor to get up in front of the class and deliver another lecture. (Or, and here I'm projecting my own prejudices into the conversation, the recitation instructor who fills the hour working problems at the board with only a wayward glance once in a while towards the students she/he is supposed to be teaching.) The students want recitations that are interactive although, as I'll describe in the following sections, they

have mixed feelings about group work, and some of them readily admit to their own reluctance about speaking in class. Thus, the obstacles to making recitations more participatory are real and difficult to overcome. But, it seems to me, it is the responsibility of the recitation instructor both to create a climate in the classroom that encourages interaction, and to structure assignments that naturally lend themselves to student involvement.

So, the students described how they “humor” the instructor by scooting their chairs together and huddling over their papers, while, in actuality, they are solving the problems on their own. On the other hand, when the problem is conducive to working together, there seemed to be much enthusiasm for doing so.

Working with Other Students Is Often Effective, but Sometimes Isn't

Because I'm a devotee of collaborative learning, what the students had to say about working together was of particular interest to me. Teamwork in class (that is, primarily recitations and small classes) got mixed reviews. The students reported many of the problems they were asked to solve in teams simply didn't lend themselves to group work. (It is true that one of the “axioms” of collaborative learning is that groups should only be asked to work on tasks that, by their very nature, need more than one person to accomplish them. But often in technical subjects, this is more easily said than done.) So, the students described how they “humor” the instructor by scooting their chairs together and huddling over their papers, while, in actuality, they are solving the problems on their own. On the other hand, when the problem is conducive to working together, there seemed to be much enthusiasm for doing

so. What that means is that it is up to the instructor to make teamwork a worthwhile investment of students' time and energy.

What the students did talk about with unabashed enthusiasm was getting together informally outside of class to work with each other. One young woman described a group of four who studied together every week with papers spread out across the pika dining room table.

She talked about how members of her group supported each other both intellectually and emotionally through a class that could best be described as challenging. Another person reported how she and her teammates got through assignments much more efficiently than a group of students who hardly ever consulted one another on work for the course.

The fact that students study together is, I'm sure, no news to most MIT faculty. The fact that they see studying together as an integral and important part of their educational experience was surprising to me.

It's Hard to Figure Out How to Behave in Class

One of the pikas was a young man who had transferred to MIT from a liberal arts school where he had studied engineering. He began his contribution to the discussion with something like, “What goes on, anyway, with MIT students

(Continued on next page)

What the Students Say

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when they get into class?" What he was referring to was the reticence of our students to participate in class discussions, either by asking questions or by answering questions instructors put to them. This behavior seemed foreign and downright confusing to this student who was used to classes where students spoke freely and at will.

That question began a cascade of comments about what it's like to sit in a class at MIT. The students spoke of their reluctance to ask questions about material that's confusing to them for fear of "holding the rest of the class back," and, of course, for fear of being seen as stupid. Even if they know the material inside and out, many of them said, they don't want to answer questions in class because they're worried they'll be seen as a showoff. (There was widespread disdain for the student who was always answering the instructor's questions.) I get the sense that many MIT students are between a rock and a hard place: They can't participate in class because they run the risk of being labeled either foolish or loud-mouths.

One more observation on this point: When I told the students that in working with faculty I had come to believe their instructors really wanted to be able to interact with them in class, they seemed surprised. I described one faculty member with whom I consulted who confided in me that he "felt lonely" in front of his class – even though there was a roomful of people! I got the feeling that I might as well have been telling them their instructors were space aliens from Mars....

Education Has a Human Dimension to It

One student told this story. All semester long he had been having an e-mail correspondence with another student whom he had never met, I believe about a class project they were working

on. One day in another class, the story teller was paired with a second student to work on a problem. The pika said he felt awkward in the situation because he was being asked to work with a stranger. By some coincidence (or stroke of luck) he found out the other fellow's name, and, as I'm sure you've guessed by now, it was the student he had been e-mailing all semester. At the end of his story, the student expressed his frustration with the anonymity and isolation of MIT classrooms. His point was that even the simple act of asking students to introduce themselves on the first day of class would go a long way to humanizing the situation. (Even in large lectures, it would be possible to give students the chance on the first day of the semester to exchange names with the people sitting near them.)

Richard Light, in a classic study of teaching and learning at Harvard (*The Harvard Assessment Seminars Second Report, "Explorations with Students and Faculty about Teaching, Learning, and Student Life,"* 1992), found that involvement with others was a key to a successful college experience. "Nearly every student who describes strong academic performance," Light writes, "can point to a specific activity that ties academic work closely to another person or a group of people." If it is true that MIT students are more shy than the average college student (and I don't know if they are or they aren't), and if it is true that they are particularly shy in class because it is there they feel most tested, then we, as faculty, need to grease the social wheels. We can make it easier for students to connect if we make it clear from the beginning of the semester that our classes are places where *people who know each other learn together*. It may take some effort to get students over their initial reluctance to make contact, but once they do, the potential

for successful learning is significantly increased.

I realize this "Teach Talk" has been a hodgepodge of ideas and observations; that it has not, by any means, been a methodical exploration of teaching and learning. But that is often the way people talk to one another, and it was the way the conversation unfolded that evening. As I said, I was so amazed at what I heard from these students, at how articulate they were about the strengths and weaknesses of an MIT education, that I couldn't help but want to report my experience to a wider audience.

I've spent the last four or five years combing through the literature on learning theory, pedagogy, educational assessment. And in a little over an hour, these students had done a pretty credible job of summarizing much of what I had read. I only hope I listened well enough so that I can apply what I learned to strengthen my own interactions with my students, to better my own teaching, and to improve their learning. ❖

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Potential Pitfall

Responses to our first "Problems, Pitfalls, Booby Traps, and Surprises in Teaching" have been...well ... non-existent. If you remember, we sketched a scenario in which the instructor in a large lecture class was faced with students who were sleeping, eating, reading the newspaper, etc., and we asked for advice on how to handle that problem. Unless MIT students have taken a sudden turn for the better, we know this happens, and that there are those of you who handle it very effectively. We hope you're willing to share your techniques with others. Please send a quick response to fnl@mit.edu or tl@mit.edu.

What Price Diversity?

Kerry Emanuel

In April of this year, the Association of American Universities, composed of 62 universities and colleges, including MIT, issued a statement on the importance of diversity in university admissions. The report affirmed the universities' commitment to "take into account a wide range of considerations – including ethnicity, race and gender" in evaluating prospective students and stressed the benefit to all students of education in a diverse environment, where race and gender figure prominently in the definition of "diverse."

The report documents a sea change in the universities' defense of affirmative action programs. Whereas such programs were originally conceived as a means of accelerating the intellectual and material advance of minorities, nowhere in the report is it suggested that present affirmative action policy actually benefits minorities; instead, artificial means of increasing minority student populations are defended on the basis that "all students encounter and learn from others who have backgrounds and characteristics very different from their own." In short, we now import underqualified minorities not for their own benefit but for the benefit of the majority student population. As a purely tactical move, this is a wise change of defense, because there is now overwhelming evidence that the policies practiced by most university admissions offices are actively harmful to minorities.

What are those practices? The report of the AAU claims, disingenuously, that "we do not advocate admitting students who cannot meet the criteria for admission," skirting the fact that those criteria are consciously warped to admit otherwise unqualified minorities. The admissions decision criteria at MIT are discussed in a 1989 report entitled *The Recruitment and Retention of Minority Students at MIT*. Applicants are divided into four groups categorized as: 1) will likely be a top

student; 2) will likely be very successful; 3) will likely be successful; and 4) probably cannot succeed. All those in the first category are admitted. All minority and some non-minority applicants are admitted from the second category. Many minorities but few non-minorities are admitted from the third category, and no one is admitted from the fourth category.

This overtly race-conscious admissions policy is mirrored at other institutions. The results are predictable. At 26 elite private colleges, the average black student's SAT score was 170 points below that of an average white student and nowhere was the margin less than 95 points. Nationwide, only 26 to 28 percent of black students graduate from college, a full six years after admission. At MIT, a representative of the Registrar's Office refused to reveal the GPA of minority students, claiming that "it would be misleading," but according to Dean Leo Osgood, required withdrawals in the six-year period from 1990 to 1995 were composed of between 33 and 55 percent of black students, who made up about 15 percent of the undergraduate student population. To maintain "diverse" populations of students, the very best universities must admit marginally qualified or underqualified students who would have made good candidates for admission to slightly less prestigious institutions. These, in turn, must draw their minority students from a pool otherwise eminently qualified for admission at the next tier of institutions, and so on. This domino effect guarantees that the bottom of each class at all universities is disproportionately composed of minority students.

The negative effects of the policies advocated by the AAU are far reaching. Qualified applicants are turned away in favor of less qualified applicants. Minorities fail at alarming rates. Those minorities who would have been admitted under a race-blind policy nevertheless experience self doubt and are stigmatized

as part of the underqualified group. The high failure rate and overrepresentation of minorities among poorer students cannot help but give non-minorities the mistaken notion that minorities are intellectually inferior, hardly the lesson the AAU presidents would have them learn. In addition, these policies reduce the incentive for K-12 educators to challenge minority students...if minorities can be admitted to MIT with a 650 SAT score, why strive to raise them to the 750 level?

We can agree with the AAU's affirmation that in defining admissions standards, we "must take fully into account not only academic goals and standardized test scores, but also the many unquantifiable human qualities and capacities of individuals." In admitting students, let us by all means account for the content of their character, but to take into account the color of their skin runs contrary to all principles of democracy.

MIT, rather than slavishly following the failed policies of the last generation, should instead lead us into a new world in which each student can regard each other as equally qualified. It can do so by announcing that henceforth, in keeping with the goal of equal opportunity for all, race and gender will not be accounted for in admissions criteria. Yes, this will have the immediate effect of reducing the kind of cosmetic diversity favored by the AAU, but it must be remembered that those underqualified students admitted under the present policy would instead be admitted to the next tier of institutions, reversing the aforementioned domino effect. This will largely eliminate the destructive performance disparity between minority and non-minority students and increase incentives for K-12 educators to improve minority performance. Then, as performance improves, real diversity will flourish at all universities.♣

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Annals of Reengineering**Reengineering Update**

Janet Snover

In the September issue of the *MIT Faculty Newsletter*, Professor Alexander Slocum of Mechanical Engineering suggested that it would be helpful if the *Newsletter* carried a Q&A or a special page dedicated to Reengineering. Professor Slocum wrote that unless Reengineering is continually marketed to the faculty, they might “suffer from severe apathy and misinformation.”

As head of the Community Involvement team, I discussed this idea with the managing editor of the *Newsletter*, and we decided to include a regular update on Reengineering. It will feature items from the various projects, and will include both positive and negative aspects of Reengineering. This first column will correct some inaccurate news linking upcoming changes at *Technology Review* to Reengineering; will provide information from the recent review of the Mail Services redesign; and will include some updates on SAP.

If faculty members have specific questions or concerns about Reengineering that they would like to see addressed in future articles, they can send them to me via e-mail <jsnover@mit.edu>, call me at x8-5993, send a note to my office, Room N52-413, or contact the *Newsletter*.

Restructuring at Technology Review

A column in the November 14 issue of *The Boston Globe* incorrectly attributed staff changes at *Technology Review* to MIT's Reengineering effort. The changes, which were approved by *Technology Review*'s Board, are *not* part of the Reengineering project. In fact, the publisher and editor of *Tech Review* plan to relaunch the magazine in 1998 with major changes in both content and design.

The new editorial focus will be on innovations in science and technology, and articles will be written by professional writers rather than by experts. The publisher and editor want the magazine to appeal to a broader audience, and aim to increase its circulation from about 90,000 to a long-term goal of 200,000.

Two positions at *Technology Review* were eliminated and all the remaining design and editorial positions have been revised. Current staff can reapply for the new positions.

Review of the Mail Services Redesign

One of the most controversial of MIT's Reengineering projects involved the redesign of Mail Services. Though the furor in the community about Mail has died down somewhat, there were still issues and questions about the redesign that Senior Vice President William R. Dickson and Physical Plant Director Victoria Sirianni thought should be revisited. For that reason, they convened a team in June to study how Mail Services was doing.

Specifically, the team was charged with reviewing the implementation of the redesign in the following ways: document the goals originally established by the Mail Services redesign team, understand current processes, evaluate progress toward full implementation, and recommend additional elements to improve the overall process.

The review team finished its work and submitted a report to Mr. Dickson and Ms. Sirianni in late October. Though it would be premature at this point to publish their recommendations since these are still being considered, Mr. Dickson agreed it would be helpful to share some of the overall findings and

data on savings. Here are some excerpts from the report.

“Many elements of the redesign have now been fully implemented. In some cases, variations from the original design have been necessary in order to ensure sound business practices and to respond to community reaction. Rollout of both the distributed mail centers (DMCs) and outbound mail systems were slowed, partially due to difficulties encountered in convincing the community to adopt new practices. At present, all of the planned 36 DMCs are fully operational and receiving inbound mail, but it is estimated that only 60 percent of the mail leaving the Institute is processed using Mail Services' outbound mail system.”

Regarding inbound mail: “The DMCs provide exchange locations for departments and Mail Services, equitable delivery services across the Institute, twice-daily deliveries, and 24-hour community access. Same-day delivery is the standard for delivery of inbound mail, and next-day service is the standard for handling interdepartmental mail.”

“Overall savings achieved through staff reductions and minimized postage costs are estimated at \$800,000.” Here are the elements of that savings:

- The number of full-time-equivalent central staff in Mail Services has been reduced by 12, with associated savings to the Institute of approximately \$492,000 annually.

- The use of a mail consolidator service, with cost reduction of 2 1/2 cents in postage per envelope, resulted in savings estimated at \$31,000 in fiscal year 1997.

- Handling of international mail centrally resulted in FY97 savings of

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approximately \$134,500 to MIT's departments, labs, and centers. The new international mail contract has reduced the cost of letters from \$7.00 to \$6.10 per pound, and air printed matter from \$5.50 to \$4.45 per pound. (These rates compare quite favorably to the normal U.S. Postal Service rates of \$16.00 per pound for letters and from \$7.20 to \$9.25 for air printed matter.)

- Improved overnight carrier services have been negotiated, resulting in a reduction of eight percent for domestic service and 19 percent for international service. Savings are estimated at \$85,000 overall.

- Departments, labs, and centers have saved about \$45,000 through the elimination of 64 percent of the postage meters on campus.

- The upgrade of software to barcode and sort bulk mail also has resulted in savings. For example, the savings in mailing *Tech Talk* alone to outside subscribers is approximately \$15,000.

In the "Lessons Learned" section of the report, the review team noted some

significant challenges in trying to make changes at MIT. "Perhaps the most difficult issue faced by the Mail Services manager was the task of implementing a new organization whose success was based on the acceptance of the community where use of its services was not mandatory....Community resistance was strong, resulting in substantial delays in the identification of space for distributed mail centers, implementation of the DMCs, and rollout of the outbound mail system."

SAP Updates

More than 700 employees, who were selected by their departments, have already been trained in SAP Basic Skills and in Display and Reporting since the beginning of August. This was referred to as Phase One training. The Management Reporting Project's training team is now preparing for Phase Two, which it will pilot with the Administrative Services Organization (ASO) beginning in January. The ASO staff will start their training with procurement functions including requisitions, journal vouchers, manual

reservations, and the MIT credit card.

On November 20th, the Management Reporting Project announced enhancements to the "SAPweb" lookup tool, which provides an interface to data in SAP. Many of your administrative and support staff colleagues are using the tool to look up information about SAP purchase orders and invoices. Now, users can see the account numbers (cost objects) charged for each item and the split among accounts if more than one account was charged. In addition, a number of bug fixes were incorporated into the new version of "SAPweb." In one day of usage since the enhancements were announced, there were 698 requests for requisition or purchase order information from 102 individuals. A tool like "SAPweb" is significantly reducing the number of phone calls made from departments, labs, and centers to Accounts Payable and Purchasing because users can now get the information they need on their own.♣

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Changes in Grading System Evaluated

Paul Lagace

Grades seem to be a constant source of discussion, whether it be grades on a specific exam or problem set or overall grading systems. And with good reason as this is a metric which we use in assessing the performance of our students. We do, however, recognize that this metric has its imperfections, so we continue to search for ways to improve this metric.

With this in mind, in the spring of 1995 the faculty gave its approval to a three-year CUP (Committee on the Undergraduate Program) experiment to use (+) and (-) modifiers on grades reported internally. After over two years of experience with such a system, it is time for us to evaluate the effects this

system has had on the MIT educational career of our students and on your work as a faculty member. And we further need to think about what *permanent* changes we may want to make to the MIT grading system. No matter how inefficient this metric may be, we want to do our best to improve on it.

In early November, the CUP subcommittee charged with monitoring this experiment sent a survey to all faculty and all undergraduate and graduate students – a rare occurrence that all three groups are surveyed about a single issue. It is important that you take the time to fill out this survey so that we are able to obtain the proper reflections and opinions of the faculty in order to ensure that we

can bring forth the best background information and associated recommendations to the faculty. This will enable us, as a faculty, to choose a system which best meets the needs of the entire Institute community – students and faculty.

I encourage you to respond to this survey and to further discuss these issues with colleagues and with students. This will best prepare us for an intelligent discussion in an upcoming faculty meeting and a resulting good decision. Feel free to contact me directly (pal@mit.edu, x3-3628) if you have particular thoughts. A discussion site, where further and more detailed views can be voiced, is planned. Please watch for more information.♣

Annals of Reengineering

New Student Services Center Combines a Variety of Functions

Carla Lane

Back in the old days, students who needed a cash advance first had to go to the Student Financial Aid Office in Building 5 to get approval and then to the Bursar's Office, 10 minutes away in Building E19, to pick up the money. To the time it took to carry out these transactions, one can also add the time spent making phone calls to figure out where to go in the first place. Those students who didn't call ahead risked going to the wrong place altogether.

This was before Student Services Reengineering and its most visible product, the new Student Services Center (SSC). Centrally located on the Infinite Corridor in Building 11, the SSC has brought together many of the services that students previously had to track down in three separate offices: the Registrar, the Bursar, and Student Financial Aid. Now, students can go to one place to get copies of their academic and financial aid transcripts, sign scholarship checks, discuss their student account billings and make payments, receive loan entrance counseling, and much more. They can also check student job listings, replace lost MIT ID cards, and change the amount in their MultiPlan accounts.

Following last year's successful pilot, the full-service center opened in August in time for the start of the academic year. The staff, most of whom are drawn from the three "home" offices (Registrar, Bursar, Financial Aid), are trained in a full range of student

services, so they can help students directly and give proper referrals for the services the Center doesn't provide. A few functions still require visits to the other offices, but plans are underway to bring them all together in one academic and financial information services organization that will be located above the SSC, on Building 11's second and third floors. When this arrangement is in place, students won't have far to go for more specialized services. The staff of the Student Information System, whose work has been critical to the SSC's development, will also be a part of the new organization that will report to the Office of the Dean of Students and Undergraduate Education.

The SSC owes much of the increased efficiency in service delivery to another Reengineering success, WebSIS, the Web-based student information system. WebSIS lets students transact for themselves many operations that used to require staff support. Online, students can now check their grades, registration status, and progress toward fulfilling the General Institute Requirements; update their addresses and other information; and review their student accounts, financial aid status, and loan information. Students can also check subject listings and schedules, and preregister. A cluster of Athena Quickstations, which provide Web access around the clock, is located just outside the SSC. (There are also other Quickstations around campus.) Some SSC staff time is devoted now to

showing students how WebSIS functions, but this service will be in less demand as WebSIS becomes a more familiar campus feature.

The mission of the SSC is "to provide financial and academic services to all students, faculty, staff, parents and alumni/ae in a friendly, accurate, and timely manner and in a way that ideally will allow more time for their educational and personal interests." To help ensure that they are meeting these goals and can adapt to changing needs, the SSC staff regularly asks students to fill out service evaluation cards. And while it is too early to measure the SSC's effect on education, there is no question that it has lessened the bother of its business end. On their survey cards, students consistently give high ratings for the friendliness, accuracy, and timeliness of service; and, to quote a few, here is what they say:

"This is the most convenient and efficient place on campus!"

"Great facility. It has made life easier."

"Service is exemplary."

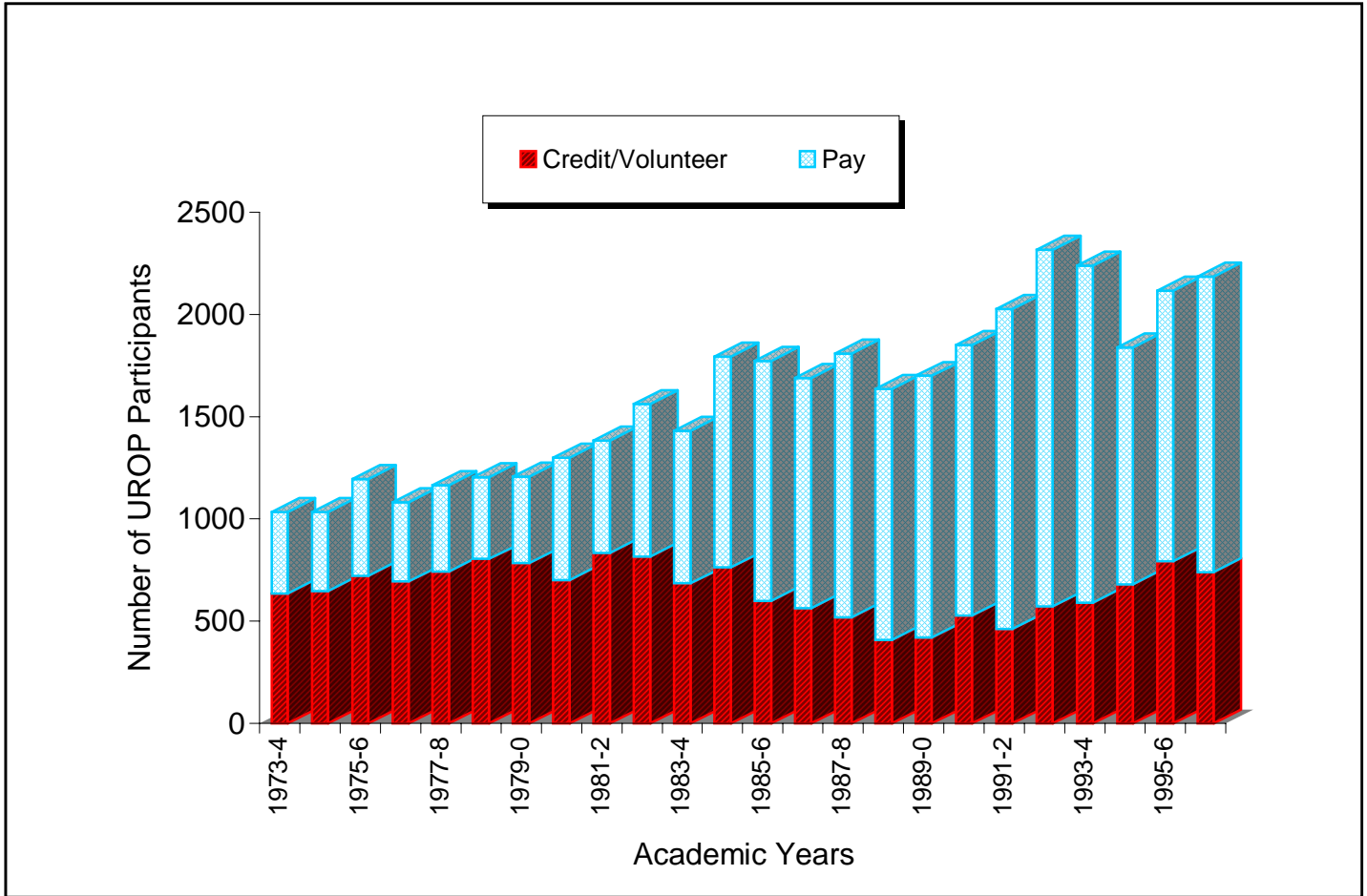
And even, "I like MIT a lot. Yee-hah."

The SSC is open Monday through Thursday, from 9am to 5:30pm, and from 10am to 5:30pm on Friday. The staff invites all faculty to come and visit. To get a full listing of their services, please also check out the SSC Web site at <<http://web.mit.edu/ssc/>>.✦

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M.I.T. Numbers

UROP Participants (1973-1997)



Source: MIT UROP Office