

The MIT Faculty Newsletter

Vol. XI No. 3

January/February 1999

Y2K: Hype or Havoc?

Gayle Willman

Traditionally, the end of a century has been a time of doomsday predictions and unrest – both imagined and real. According to Dutch bank ING Barings, the British and Dutch stock markets fell sharply in 1699 and 1799. At the end of 1899, the Dow fell 23 percent, and prices continued to drop sharply for several weeks into New Year 1900. As one writer for *The Economist* observed, “A millennium, even more than a centennial, would be spooky enough without the fear of a computer failure.”

Media hype about Y2K, much of which strains credibility, has become common. It is not unusual to hear expressions of surprise or, unfortunately, boredom from people who should be paying attention. “You’re really serious about this!” was a comment heard by Year 2000 Team members who recently staffed a Lobby 10 Y2K exhibit. MIT is serious about potential Year 2000 computer and microchip failures. Over the coming months, this column will address several topics related to MIT’s Y2K preparations.

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FPC Sub-Committee on Changes to the MIT Retirement Plan

Overview of the Interim Report

Sheila Widnall

The Benefits Office, in conjunction with the Strategic Review of Benefits Committee and the Committee on Faculty Administration, have developed proposals to deal with issues affecting the MIT Retirement Plan (MITRP). Some of the proposed changes are required to keep the plan tax-qualified, and were instituted on January 1, 1999; some offer increased flexibility to draw retirement benefits while working part-time and increased benefits from a lowering of the normal retirement age to allow individuals to phase into retirement.

One component of the changes is a response to concerns that the plan’s investment options are too limited, with only the Fixed and Variable Fund available for managing participants’ accounts. The changes that provide access to a wider set of options will allow participants to build an investment portfolio to meet their individual needs. Finally, since the

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Martin Luther King, Jr. Visiting Professors

The Plight of the Woman Scientist of African Descent

Stephanie Espy and Lynda M. Jordan

The thread of freedom forms the basic patterns in man’s [and woman’s] struggle to know himself [herself] and to live in the assurance that other men [women] will recognize this self. The ache of every man [woman] to touch his [her] potential is the throb that beats out the truth of the American Declaration of Independence and the Constitution. America was founded because men [and women] were seeking room to become. We again are seeking that room.

MLK, Jr., February, 1960

The above is an excerpt from the document entitled, “What Is the Student Movement?” written by the Reverend Dr. Martin Luther King, Jr., on the occasion of the February 1, 1960 student sit-ins in Greensboro North Carolina. Four freshman students left the campus of North Carolina Agricultural & Technical College, and took their seats in forbidden territory. . . the lunch counter of Woolworth’s, Inc.

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From The Faculty Chair**Is There a Place for Community at MIT?**

Lotte Bailyn

Creativity, Community, Civility: a story of and a plea for the 3 Cs. MIT has always valued *creativity* – it has been its mainstay, the basis of its reputation, the criteria by which people are judged. It is the core attribute of its faculty, and the ability we try to select for and create in our students. Nothing we do should undermine this core value. It is MIT.

Now the Task Force on Student Life and Learning comes along and asks

for instance, that an interdepartmental research project was born at one of its tables – the best sign possible of a creative intellectual community.

And yet. During a session last year on faculty development, there was discussion of the lunch room, with many junior faculty saying that it served their development well. In it they not only met faculty from other departments, but were able in a more informal atmosphere to be “mentored”

inclusive of many different kinds of people.

An even more upsetting episode has recently come to my attention. Some of you may have seen a description of this incident. An assistant professor, young and not a member of the dominant white male category, entered the lunch room. With her were members of her research group. As they were getting their food a man sitting near the buffet confronted them, demanding to know if any of them were faculty or staff. When told that she was a member of the faculty, he demanded to know who her guests were and indicated that this was no place to bring guests. What an unpleasant, embarrassing, and demoralizing experience for an assistant professor bringing her research group to share a lunch. Here’s the message: If you’re not one of the majority, don’t come alone, but also don’t come and bring guests. In other words, don’t come. What a way to celebrate community.

And this brings me to the third C: *civility*. Community without civility is self-defeating. And given the fact that we are no longer a homogeneous group (indeed, there is continuous effort to increase the diversity of our faculty) civility must be inclusive. It must extend to all those we have invited to join us. They share the core creativity that represents MIT or they wouldn’t be here. Let’s add civility to community, and community to creativity. What a nice vision, or am I only dreaming?✦

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us to add *community* to this core competence. They urge us to combine creativity with community, both with students and with members of other research groups, even other departments and schools. One of the nicest manifestations of this attempt to create community has been the Faculty Lunch Room, started by Joel Moses. In ways even more than the old Faculty Club, perhaps because of its informality, it has allowed faculty to come together in easy conversation. I understand,

by their senior colleagues. But there came a discordant voice. One young woman professor indicated that she felt completely out of place in the lunch room and had stopped going there. She didn’t feel comfortable sitting at one of the communal tables, and felt conspicuous sitting alone. So is our lunch room fostering a community of the old (and new) boys’ network? If so, it is not serving the goals of community for an MIT that is, and is trying to become even more so,

Overview of the Interim Report

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servicing of the plan has gotten beyond the capacity of MIT to manage, the plan administration will be outsourced.

These proposals for change have been presented to the MIT community in a variety of forums. But the issues are complex and constrained by legal and regulatory requirements. Some are highly technical, requiring considerable effort to master all the details. Therefore, the Faculty Policy Committee appointed this sub-committee to study the proposed changes, and to recommend modifications, if necessary, to meet expressed concerns.

The Committee is presenting an interim report on their findings to the Faculty Policy Committee, and distributing it to the faculty, and will follow with a final report in the spring when individual concerns have been received and the changes have been completely specified.

It is not the intention of the Committee to substitute its report for MITRP descriptions, documents, and the annual reports, which are available from the Benefits Office and on their Website, <web.mit.edu/benefits/www/>. Rather, we wish to lay a sufficient foundation for our observations and conclusions. We hope that the work of this committee will help in the discussion of the changes in progress.

In our review to date, we have concentrated on those issues that for legal and regulatory reasons had to be settled to meet a January 1, 1999 deadline, and other changes that were put in place at the same time. Four issues, among these several changes, have received most of our attention, and our conclusions about these items can be summarized as follows. Each is discussed in more detail in our report.

The Choice of Fidelity Investments to Manage the Defined Contribution/401(k) Assets. As of April 1, 1999, the management of this component of plan assets will be carried out using the services

of Fidelity Investments to manage individual investment accounts for participants. We have reviewed the steps that the Benefits Office went through, seeking bids and negotiating fees, and we are comfortable with the procedure followed.

The Shifting of Investment Account Expenses from MIT to the Participants. This change will result in a small reduction in the growth of a participant's ultimate retirement assets for those who remain invested in the funds that are "cloned" from the current Fixed and Variable Funds. The increased option to choose other funds with possibly higher returns may make up for this loss. All in all, it is our conclusion that this change, which puts us in line with almost all our competing institutions, is fair. We also believe that this change should be considered in balance with all of the changes, some of which increase benefits to participants.

Required Elimination of Fixed Fund Book Value, and Procedures for Accomplishing Change in Accounting for Certain Fixed-Fund Plan Assets to Current Market Value. To calculate the book value of member Fixed Fund accounts a five-year smoothing procedure for crediting capital gains was used by MIT to lower the volatility of credited returns. With the removal of the guarantee to pay at retirement the greater of the book value or market value, a portion of the capital gains of recent years had to be allocated to member accounts to bring them to market value as of January 1, 1999. We have reviewed the procedure used, and its potential for creating inequities between members of long standing and those who joined only recently, and found it to be a sound approach.

The (Mandated) Choice of an Index Outside MIT's Control For Calculating Returns on Certain Accounts. In the past, MIT has managed the assets that lay behind one component of the MIT-funded defined

benefit account, and the rate of return on members' accounts was based on MIT's actual investment results. The IRS now requires a non-MIT index for this purpose. MIT has chosen an alternative index, and specified maximum and minimum values, on a provisional basis. Discussion continues regarding the ultimate form of the index (which will be revised), and it is the Committee's judgment that this interim step is appropriate.

Several issues remain to be settled, and our Committee will follow them through the coming months. Key among these is the evolution of the system providing withdrawals, annuities, and lump sum distributions, the ultimate selection of the market index for the defined-benefit assets, and possible elimination of post-tax contributions to the defined-contribution component of the plan. Also, with the greater flexibility provided in the revised plan comes greater risk so that the extent and quality of the information provided to participants takes on greater importance.

In our interim report, we cover the key features of the changes made as of January 1, 1999, and further revisions to come in spring 1999 and beyond. We feel comfortable that the changes that went into effect on January 1, 1999 are fair.

We were aided in our deliberations by staff from the Benefits Office, the Personnel Office and the Treasurer's Office. We thank them for their collegial and expert input to our understanding of these issues.

We solicit input from the faculty on our report and on the issues it raises. ❖

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TEACH TALK

Strategic Teaching

Thinking about a Handful of Variables Can Make Your Teaching Much More Efficient and Effective

Lori Breslow

At the foundation of the MBA course in communication I teach at Sloan, is the idea that all communication in a professional setting should stem from a *strategic analysis* of the situation in which the communicator finds him or herself. Our students are taught that *before* they begin to write or speak, they need to consider several variables at play in the situation, including the characteristics of their audience, their objectives, their stylistic preferences as a communicator, and what constraints, if any, they are working under.

Only after a strategic analysis is completed, can the communicator make crucial decisions about content, structure, organization, and tone of the message, as well as the medium that he or she wants to use. This concept permeates our course whether we are working with our students' writing, presentation, or interpersonal communication skills, and the students tell us it is one of the most valuable lessons they take away from the class.

The Benefits of Strategic Teaching

It seems to me that this notion of working from a strategic analysis is equally useful in teaching. Communication in a managerial setting is deemed successful if it leads to the response the sender wants. The same holds true for communication in the classroom. It is only successful if the instructor gets the reaction he or she wants: that is, if the students have mastered key ideas and skills. But beginning the process of planning a course (or an individual lecture, for

that matter) with a strategic analysis is advantageous for another reason: It makes the work that much easier. By consciously identifying the unique characteristics of the course, the instructor creates criteria by which important decisions about content, format, pedagogical techniques, and methods of assessment can be made. As I said, the same holds true at the level of individual classes: thinking about where the students are in their comprehension of the material, what is to be achieved in the class period, or what impediments exist at the particular time in the semester, allows the instructor to prepare for individual classes in a much more logical, efficient way.

The Elements of a Teaching Strategy

The elements that comprise a communication strategy within business can be easily adapted to teaching. In order to formulate a teaching strategy, you should analyze:

- The characteristics of your students,
- The objectives of the course (or the individual class),
- Your nature as a communicator,
- The constraints you face,
- The norms of the teaching "culture" in which you are working.

The first four of these elements interact and affect each other. And since all communication takes place in a specific context with its own norms about how one may communicate in that setting, these interacting elements rub up against one another within an environment that exerts its own pressures.

I don't doubt that most instructors take these factors into consideration in planning and teaching their courses. I am only suggesting they ought to be thought about in a more systematic, rigorous way. What follows, then, is a fuller description of each of the five points listed above. In the last section of this column, I'll provide some examples of how planning a strategy can lead to more effective and efficient teaching.

Characteristics of the audience. It stands to reason that the more you know about your students, the better you can tailor both course content and format to their needs. Some of the questions to ask about your students are obvious: Where are they in their careers at MIT? What is their level of familiarity with the subject? What expertise do they have in related subjects that will have an effect on their ability to master the material in your course? What is their attitude toward the course? What parts of the course do you expect they will enjoy? What are they less likely to be enthusiastic about?

In addition, you need to think about the "ingredients" that are going to create the unique "personality" or "chemistry" that every class exhibits as a whole. Do the majority of students have the same level of technical expertise, or are there vast differences in abilities? Is the class ethnically diverse? What is the proportion of men to women? Is the class a mixture of undergraduates and graduate students?

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You may also have a “secondary audience” in the course – for example, your TAs – with whom you also need to communicate clearly and effectively. Going through the same kind of analysis for them as you do for the students enrolled in the course will help guarantee they receive the information they need to do their job well in a form that will be easy for them to integrate.

I’d like to say one last word about “knowing your audience.” As I talk to undergraduates, I hear over and over again how much it matters to them that their instructors know their names. Obviously, in a lecture with hundreds, this is impossible. (Although I did have a colleague at another university who had memorized the names of all 400 freshmen in her introductory class before the semester began. Imagine how surprised the students were on the first day of class when she was able to say, “And Sam Smith, what do you think about that?” staring Sam right in the eye.) If you want to get to know your students even better as individuals, ask them to fill out “bio cards” that list, for example, related courses they have taken, their reason for enrolling in the course, outside interests, or what they hope to learn in the class.

Objectives. In her book, *Guide to Managerial Communication*, Dartmouth Professor Mary Munter describes a process of honing goals from the general to the specific. She advises would-be managers to begin with “general objectives,” which are broad statements about what is to be accomplished. But then in order to think more concretely about what is to be done, she suggests formulating an “action objective” by stating what specific results will be accomplished within what specific time frame.

Finally, she recommends devising a “communication objective” by completing the sentence: “As a result of this communication, my audience will . . .” (p. 4)

Teaching objectives likewise should undergo a refining and winnowing process. Berkeley Vice Chancellor Barbara Gross Davis in her book, *Tools*

to see how much material can be crammed into 14 weeks. Instead of producing a list of topics to be covered, Fuhrman and Grasha in their book, *A Practical Handbook for College Teachers*, recommend instructors devise both broader content goals (e.g., “to understand electromagnetic fields”) and noncontent goals (e.g.,

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for Teaching, advises instructors to start writing goals for a course by thinking about the “big picture.” What – in no more than a sentence or two – is this course about? What will it contribute to the students’ education? If students remember nothing about it except one thing, what should it be? The “big picture” is your sense of what the course will impart to the students that will be of lasting value.

But stopping with the “big picture” isn’t likely to be very helpful when it comes down to deciding what you will teach in the third class or what needs to be covered before the midterm. Sometimes, however, when instructors attempt to formulate more specific objectives for the course, they ended up creating a laundry list of topics. This, too, isn’t very helpful – especially at this institution where standing operating procedure is often

“to be able to use mathematical concepts to understand physical phenomena”). Adding a rough time frame that sets out when you expect to accomplish these goals (realizing some may not be achieved until the end of the semester) is a version of Munter’s “action objective.”

Finally, goals need to be cast in terms of what you expect the students to know and/or to be able to do by the time the course is complete. Another way to restate Munter’s third, most specific goal (“communication goal”) in teaching terms is, “By the time I finish teaching, the students will be able to . . .” In the end, course goals are not about covering a certain number of topics; they are about passing on knowledge to students in a way that they can understand and subsequently use.

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Two more quick points about course objectives: First, restrict them to a realistic number. Four or five goals for the semester should be sufficient. (In planning a single class, I would recommend organizing the period around one main idea with no more than three or four subpoints supporting it.) Second, in an earlier "Teach Talk" ("Contracts in the Classroom" [Vol. VIII, No. 4, May/June 1996]), I advised including a list of objectives on the course syllabus. It may be that the course objectives, as you formulate them on the syllabus, correspond exactly to how you have conceptualized them in creating the course. But it may be that you will need to recast them in a slightly different form for the students, which is simply another example of how text must be composed with the audience in mind.

Characteristics of the communicator. A common question that comes up in the teaching workshops I lead is this: "Since I'm not naturally a very good 'entertainer,' how can I ever hope to succeed in the classroom?"

Here there is good news. In a number of studies about what produces good teaching, one characteristic of the teacher's presentation style stands out above the rest, and it's not the ability to get students rolling in the aisles or to mesmerize them with dramatic oratory. The one quality of the teacher's personality that students most respond to is enthusiasm.

The problem is that teachers often incorrectly equate "enthusiasm" with "entertainment." The dictionary defines enthusiasm as "intense or eager interest"; entertainment as "diverting, amusing, interesting." While much of what goes on in the classroom is hopefully "interesting" (note that is the one adjective enthusiasm and entertainment have in common), it

doesn't have to be "amusing," and it certainly shouldn't be "diverting."

This semester I am co-teaching a Ph.D. course, "Teaching College-Level Chemistry," with Dr. Miriam Diamond. Our second class was about creating an effective course, and on the spur of the moment I found myself asking the students (who by now are

professors are good at infusing humor into the class; others engage their students by asking thought-provoking questions.

The point is to find your own style – the manner in which you are most comfortable presenting yourself – and cultivate that. Audiences respond well when they sense the speaker is most

In a number of studies about what produces good teaching, one characteristic of the teacher's presentation style stands out above the rest, and it's not the ability to get students rolling in the aisles or to mesmerize them with dramatic oratory. The one quality of the teacher's personality that students most respond to is enthusiasm. The problem is that teachers often incorrectly equate "enthusiasm" with "entertainment."

veterans of 18, 19, or 20 years of schooling) whether or not they could tell within the first class or two if a particular course was going to be a good one. Every one of the students said they could. When I asked them how, they told me they could tell right away whether or not the professor – and here I'm using their word – *cared* about the course. And when I asked them how they could tell that, they said by the enthusiasm he or she exhibited for the course material, the course goals, and the students.

As long as you are enthusiastic about your work in the classroom, good teaching can accommodate a number of individual styles. Some teachers are animated; others are more low key. Some may stand in one place and lecture; others go up and down the aisles of the lecture hall like a pedagogical Phil Donahue. Some

his or her own self. In other words, if you're not MIT's answer to Jay Leno don't worry about it . . .

There is one other important characteristic of the communicator to be noted: that is, his or her credibility vis à vis the audience. When we teach this concept to the MBA students, we are careful to remind them that a message going from a subordinate to a superior is likely to be framed very differently from one traveling in the other direction. We also know that "credibility is in the eyes of the beholder," and that there are ways the individual can enhance his or her credibility in a situation.

The case with teaching is somewhat different in that the instructor, at least hopefully, comes into the classroom with ready-made credibility. Yet there are things we can do to solidify that

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credibility. For example, the chemistry Ph.D. students also told us that if the instructor showed up on the first day of class well-organized and prepared, that also tipped them off that the course was going to be a good one. A well-thought-out syllabus, a complete reading list, textbooks that are in the bookstore, all enhance the instructor's credibility.

Constraints. Constraints can be felt at all stages of the teaching process. This isn't news to anyone who has been in the classroom for more than a day. But thinking about the constraints you will be forced to deal with during the semester ahead of time allows you to accommodate for them as you plan the course.

Although there is no way I can list all the impediments teachers may have to deal with, a small sample of the more vexing ones include: the amount of time available to present the material; the number of students that have to be taught; how responsive the students are likely to be to the course material (usually less so for a required course than an elective); what other courses and activities are competing for the students' time; the condition of the physical facilities; the ability of recitation instructors. As I said, the list can go on and on.

Some instructors deal with these constraints as if they didn't exist. For example, even though it may be unrealistic to assume that the amount of material included in the syllabus can be covered in the time allotted, all topics are included anyway. What that tends to do is increase the general level of anxiety in the course as the futility of the effort becomes more and more apparent. Better to think carefully about what can be realistically covered as you write the syllabus, so that you don't have to rush through some topics

or jettison material as the semester progresses. While there is no way that every problem can be accounted for at the beginning of the semester, factoring in constraints as part of your "teaching strategy" will no doubt minimize the ones you will need to deal with in real-time.

"Cultural" norms. Every individual course is embedded within other social systems – departments, disciplines, the Institute itself – that have their own norms, taboos, beliefs, and rituals. In addition, courses themselves build up reputations, which give students a set of expectations about what they are likely to experience (or endure!) if they have enrolled in that subject. These "ways of doing things around here" (my favorite definition of culture) can exert a strong impact on how a course will unfold.

A faculty member and I were brainstorming about possible changes he is contemplating making in one of the courses that is a mainstay of the Institute curriculum. Although I thought his ideas were excellent, my advice was to proceed gingerly because by the time most MIT students will take his course, they will have already been "indoctrinated" in the Institute culture, and may be unnerved by his new ideas.

This is not to say that the changes shouldn't be made – for one thing they are very sound pedagogically – but it is to suggest that he should make the students partners in this shift. He can do this by alerting them to the fact that he realizes he is doing things "a *different* way around here," and by soliciting their feedback on how they are being affected. He may also want to introduce the changes gradually – perhaps over two semesters – because cultural norms are powerful and tend to be resistant to change.

How a Teaching Strategy Can Be Used for Decision Making

MIT faculty members often call me with the following kinds of questions about teaching: "I want to use teamwork in my course, how many students should I put into a group?" or "I want to get more class participation in my recitation, should I call on students who haven't raised their hands?" My answer to these kinds of questions is almost always, "It depends."

Teaching is a craft (or an art, depending on how you look at it). It is not an exact science. There are very few right or wrong answers, correct or incorrect ways of doing things. (This is not to say that all methods or techniques work equally well.) The way to determine how many students should be in a group, or whether or not you should "cold call" is to do the kind of analysis that's been described.

To determine how to construct groups for teamwork assignments ask: What are the objectives of the group work? What will students be expected to do? How can the groups be put together so they are diverse? In order to decide whether or not to cold call, think about whether or not the students have any experience with cold calling, if the climate in your classroom is safe enough for them to be wrong, or what will be lost and what will be gained if you utilize this technique.

That's the beauty of working from the concept of a "strategy": It makes decisions easier because you have guidelines from which to work. And although I can't verify this with large-scale, longitudinal studies, my experience is that it also results in decisions that more often than not work well.✦

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ON THE CUTTING EDGE: INNOVATIONS IN SCIENCE AND ENGINEERING EDUCATION

Exciting changes are occurring in science and engineering education. Come join us throughout the semester as MIT faculty, as well as educational experts from the U.S. and abroad, talk about innovations in the classroom, in curricula, and in technology-enabled learning.

February:

16th: Dr. Charles Kerns (Stanford University)

Associate Director for Design and Deployment
The Stanford University Learning Laboratory
"Unexpected Changes When Technology Is Used In Teaching"
2:00-4:00, The LiNC, 9-057

25th: Professor Richard Larson (MIT)

Director, Center for Advanced Educational Services
"The Physics Interactive Video Project"
12:00-1:00, The Kaufman Room, 9-151

March:

4th: Professor Diana Laurillard (Open University, UK)

Pro-Vice-Chancellor (Learning Technologies and Teaching) and Professor of Educational Technology
"Using Technology To Foster The Key Skills Of Science And Engineering"
2:00-4:00, The LiNC, 9-057

5th: Dr. Steven Ehrmann (American Association for Higher Education)

Director of the Flashlight Program and Vice President of the Teaching, Learning, and Technology Group
"Using Technology To Leverage Change In The Undergraduate Curriculum: What's Worth Doing, How Might You Do It, And How Might You Measure It?"
2:00-4:00, The LiNC, 9-057

29th: Professor Edward Crawley (MIT)

Professor and Department Head of Aeronautics and Astronautics
"Building Systems and Building Knowledge"
12:00-1:00, The Kaufman Room, 9-151

April:

1st: Professor Karl Smith (University of Minnesota)

Professor of Civil Engineering
"Getting Students Involved Using Cooperative Learning: Principles, Strategies And Problem Solving"
2:00-4:00, The LiNC, 9-057

***TBA: Professor David Mindell (MIT)**

Dibner Professor, History of Manufacturing and Technology
"Teaching the Structure of Engineering Revolutions: A Collaboration Between STS and EECS."
12:00-1:00, The Kaufman Room, 9-151

May:

4th: Professor Edward Redish (University of Maryland)

Professor of Physics and Fellow of the American Physical Society and AAAS
"Using The Culture Of Science To Learn How To Teach Science"
2:00-4:00, The LiNC, 9-057

Y2K: Hype or Havoc?*Willman, from Page 1*

The basis for computer failure is simple to describe, though the effects are not. Computer hardware, software, and microchips embedded in electronic devices may interpret the year 2000 as 1900 – or as a date that is undefined – because they store the year in two-digit form. In addition, the year 2000 (unlike most centennial years) is a leap year. It is impossible to say with certainty how much is likely to go

industrial, and other systems, due to the interconnectedness of these systems. When one computer system has a Y2K failure, it can – and does – have a serious impact on the others connected to it. In test environments, this has already happened.

Laboratory and other equipment could be at risk because of embedded chips. Again, it is difficult to predict how a microprocessor will respond to

What about Y2K-related power failures?

Utility providers have expressed optimism about the continuity of service, yet the possibility of brownouts or blackouts has received widespread attention. Fact or hype? Unknown. However, it is known that last August's local power failure created problems in some areas of the Institute. With that in mind, precautions can be taken to preserve health and safety, as well as protect experiments and other work.

A plan for the preservation of data is an especially important precaution and is a good first step to take in preparing for Y2K. If a computer should misinterpret a date and corrupt existing data, it is vital that current backups be available to facilitate recovery. Whether a computer failure is the result of Y2K, a power failure, or other causes, the maintenance of current backups is a prudent practice.

Preservation of the data housed at MIT's Data Center is accomplished with detailed risk avoidance measures. Staffed 24 hours per day, the Center's data is backed up and taken off premises daily. Should there be a power failure, a roomful of batteries is online to keep the Data Center operations fully functional for up to 15 minutes. Within the first 5 to 10 seconds of such an outage, a 400 KW diesel generator is designed to start automatically. Should the generator fail to respond, operators have enough time to manually start the generator,

(Continued on next page)

Laboratory and other equipment could be at risk because of embedded chips. . . In response, MIT has hired specialists on embedded systems to assess non-computer equipment throughout the main campus. These specialists will provide information about steps that can be taken to make these devices Y2K-ready. The assessment will include not only laboratory equipment but also elevators, security systems, and other vital devices.

wrong, because there are so many questions about how any given computer or device will respond to date-related ambiguity. Rumors thrive on this kind of uncertainty. With the end of 1999 only months away, the predicted outcomes of Y2K-related failures range from minor inconvenience to major disaster. The reality probably lies somewhere in between.

We do know the failure of a small percentage of the world's computers could have a disproportionately large impact on financial, educational,

date-related ambiguity. In response, MIT has hired specialists on embedded systems to assess non-computer equipment throughout the main campus. These specialists will provide information about steps that can be taken to make these devices Y2K-ready. The assessment will include not only laboratory equipment but also elevators, security systems, and other vital devices. The first phase of this process is now underway, and administrative officers will be consulted over the next few weeks about the assessment of their areas.

Y2K: Hype or Havoc?*Willman, from preceding page*

or to perform a systematic shutdown of the Center's operations.

Though the Data Center is well equipped to handle data preservation, not all "mission-critical" data is stored in the Center's facilities. Data residing in departments, labs, and centers is equally important to the normal functioning of MIT and should be handled with comparable care.

Finally, it is important to clarify some topics related to MIT's Y2K planning.

Contrary to popular belief:

- Y2K-related risks are not restricted to the domain of those who write lines of computer code. Recent polls have shown that many people believe only large computer programs are at risk, and that "someone will take care of it." In fact, large computer

failure. Ordinarily, over a holiday weekend like New Year 2000, it's unlikely that staff would be nearby to respond to a UPS alarm. A planned shutdown beforehand would provide better protection.

- Most alarm systems (fire, environmental, etc.) are simple notification systems. They do not respond to an outage or emergency – they simply inform those who receive the alerts that there is a problem. Here, emergency action plans are vital, and information about the names and phone numbers of those who should receive alerts must be kept up to date.

- Although there are more than 100 backup generators located throughout the MIT campus, with few exceptions these generators do not provide backup power to our laboratories and offices. The generators are in place to power lights and other essentials for the safe evacuation of buildings in the event of a power failure.

Intelligent planning and sensible precautions are essential components of MIT's Y2K preparations. For advice and information, consult the Y2K Team's Website: <<http://mitvma.mit.edu/mity2k>>, write to y2k-help@mit.edu, or call 253-2000. Team members are also available to make meeting presentations to departments, labs, and centers.

In the months to come, this column will carry up-to-date information about Y2K concerns. Questions are welcomed, and should be addressed to: y2k-help@mit.edu. ♣

[Gayle Willman can be reached at willman@mit.edu]

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Two campus resources are available to provide secure backups. The first is ADSM, an IBM software package that allows users to back up and restore, and to archive and retrieve data files on your computer over the network. An IBM mainframe VM computer is the ADSM file storage server. Information can be found at: <<http://web.mit.edu/is/help/adsm>>.

An off-premise data storage service is also available, and locally-produced backups can be taken to a secure location. Information about this service may be obtained from the Data Center at 253-7049.

programs represent only a fraction of the problem. Desktop computer systems can be affected. Automobiles, alarm systems, and appliances all contain embedded chips. While it is unrealistic to expect catastrophic failures in all cases, there will be some failures.

- UPS (uninterruptible power supply) units on computers cannot keep a computer running for long periods of time. These units are useful for providing computer operators enough time to perform a systematic shutdown, but that presupposes the operator is nearby if there's a power

The Plight of the Woman Scientist of African Descent

Espy and Jordan, from Page 1

The Reverend Dr. Martin Luther King, Jr. wrote the above article in an effort to explain to society the purpose of the student sit-in movement. These types of “radical” demonstrations were necessary to awaken the conscience of America. The demonstrators hoped that these protests would stimulate the implementation of change in this country. They would no longer accept nor tolerate the “less than” mentality that portrayed them as inferior, based on the color of their skin.

It is because of the efforts of these brave students that many of us, of all races and of both genders, can enjoy the *opportunity* of being active participants in society. It is amazing that it was only 39 years ago when people of African descent had to protest to be able to sit at a lunch counter to *buy* lunch. For some of us, this may seem like a long time ago, but for many of us, it doesn't. The remnants of this type of human indignity, as perpetuated by slavery, still exist today.

The words of the Reverend Dr. Martin Luther King, Jr., clearly express the plight of the woman scientist of African descent.

Introduction

As we approach the new millennium, less than one year from now, the numbers of underrepresented minorities in science and engineering fields are still low. Minority women scientists, in particular Black women scientists, i.e., women of African descent, are a small subset of the minority scientists and engineers educated in this country.

This article will briefly: (a) explore the issues associated with being a woman scientist of African descent in academia, (b) address the issues of the undergraduate women of African

descent at MIT, and (c) discuss strategies for change.

Underrepresented minorities in this article are defined as Black, non-Hispanics, Native American, Mexican-American, and Puerto Rican. The definition of African descent includes: African, African-American, and Caribbean nationals, who are Blacks and non-Hispanics.

In order to substantiate the validity of the issues raised in this paper, presented below are questionnaire responses of undergraduate women of African descent (WAD) who are presently matriculating at MIT. The purpose of the questionnaire is to explore the experiences of this subset of the minority community at MIT.

The students themselves are the best resource for obtaining information concerning their experience at MIT. The successful matriculation and retention of minority students can be more adequately addressed once the students' needs are clearly defined. To our knowledge, no information of this kind has been collected or disseminated for any group of minority undergraduates at MIT. The total results of this survey will be published at a later time, however below are general comments that the WAD students shared about their experiences. The comments are direct quotations:

Q: What do you need, if anything, to enhance or improve your educational experience at MIT?

Responses:

- I need more research under my belt. I think that making research a requirement will better prepare students for the future.
- Increased interactions with the professors in my field.
- More involvement with programs and projects related to my field of

interest.

- More professors who are female and minority.

Q: In general, how are you treated at school?

Responses:

- Sometimes there is racism, sometimes [there is] not.
- I am treated equally most of the time.
- I have had a few racist experiences.
- Most cases I am treated fairly, but racism is prevalent at MIT.
- Sometimes there is racism, sometimes there is not.
- I am aware of discreet racism here.

Q: How do you feel when you go to class?

Responses:

- I am somewhat discomforted in class because I see so few people that look like me.
- Non-minority students are cocky! They believe that they are of superior intelligence.
- I don't have any problems in class, but students from other races do not speak to me.

Q: How do your professors interact with you?

Responses:

- Only in classes of my specialization are professors more likely to make themselves available to me.
- They make themselves available sometimes.
- A professor has never spoken to me willingly; I have to go to the professor to speak to him.
- I have time to chase them.

Q: If you were to encounter a problem at school, who would you turn to for help?

Responses: [In order of student ranking, (1) being the best]

(Continued on next page)

The Plight of the Woman Scientist of African Descent

Espy and Jordan, from preceding page

- Family (1)
- Peers of the same race (2)
- One of my Deans (3)
- Peers of another race (4)
- Professor (5)

Q: Do you ever feel inadequate or inferior?

Responses:

- At the beginning of freshman year I did. I received a packet in the mail from a student group on campus saying that I was accepted because I was a minority and I was taking a more qualified person's spot.

- Non-minority students and professors are so condescending.

- Many other people don't seem to have as much struggle with trying to adapt to MIT.

- Sometimes I feel like I have to work harder to prove myself when I shouldn't have to.

- I haven't had the best experiences in group projects at MIT. I contribute, but not as actively as I'd like because I sometimes feel like there are too many "wannabe" leaders in the group.

- I always feel I can do better than my performance in class. I comprehend the materials, but when it comes to testing, I second guess so much that I lose sight of the task at hand.

- At a place like MIT, it is impossible for a semester to go by without feeling like I don't belong here, that my acceptance was a mistake and that I am not up to standard.

- Today I was at the machine shop (the only girl in the shop) and people were explaining things to me slower than to the guys like I am hard of understanding.

Issues Facing Women Scientists of African Descent in Academia

Women of color are confronted with two dilemmas as they progress through

the academic infrastructure(s). In addition to the issue of gender, we must also deal with the issue of race. Most will agree, although some reluctantly, that there are discrepancies associated with the treatment of women in academia, and in society in general. However, issues facing minority women in the academic environment are rarely, if at all, openly discussed.

The sociological aspect of being a woman of color, more specifically a woman of African descent in American society, is a very complex topic and must be the topic of another paper. Nevertheless, it is important to say that slavery had a tremendous impact, which is still relevant today. The societal perceptions of who we are as women of African descent, are frequently limited to the intellectual and cultural comfort zones of the particular environments with which we are associated.

Every academic area has a particular intellectual comfort zone. Let's use a simple example in chemistry; there is a basic level of knowledge that all chemists share: the periodic table. All chemists are familiar with the periodic table and are comfortable with the information on the table, their intellectual comfort zones.

Every subject area in academia, and its subdivisions, establish their own intellectual comfort zones which reflect a body of knowledge that is inclusive for that particular subject.

Additionally, suppose we put a laser physicist, an electrical engineer, a business executive (all whom do not know how to dance) and a professional dancer in a dance studio and tell all four to dance for 30 minutes. The dancer would be within his/her comfort zone and would not see this

request as a problem. However, the other three individuals would be very uncomfortable and could see this request as a major undertaking. They would be operating outside their cultural comfort zone.

Science and engineering, as do all academic areas, have their own cultures. Culture in this context is defined as a way of governing which is shared within the confines of a particular subject area.

In addition to the comfort zones that are associated with particular academic fields and environments, we all have internal cultural comfort zones, representative of the environment and value systems in which we were raised. Even people who belong to the same ethnic group can have different cultural comfort zones. The personal limitations that we bring to academia contribute to the barriers that are associated with inclusiveness. These barriers exist in the academic community as a whole, and in science and engineering in particular. There is a level of discomfort for the minority individual (underrepresented minority men and all women) to become a part of the main stream infrastructure of the particular academic area.

Concurrently there is an equal, if not greater, level of discomfort that the majority group experiences when someone different joins the group. The majority group has established, over the years, a resistant culture. A resistant culture as defined by Girton and Yowell ("Educational Reforms for Students at Risk: Cultural Dissonance as a Risk Factor in the Development of Students," 1992, ED366696), is an elaborate system of beliefs and behaviors that are adopted by a particular group to insulate

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The Plight of the Woman Scientist of African Descent

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themselves from the demands of acculturation and socialization experiences that they consider alien or conflicting to their interests. It is simply too much trouble to try to understand or address the issues (individual and group) that are associated with diversity. This resistant culture not only exists between a minority/non-minority environment, but also exists between males and females within the minority communities.

The race issue *and* the gender issue often become weighty encumbrances. Some women of color search for ways to assimilate into mainstream society by emphasizing their similarities, rather than their differences, from the majority population. The level of (perceived) assimilation is limited by the external factors of skin color, body build, facial features, length and texture of hair.

A recent example of this phenomenon occurred last semester. It was relayed by Dean Leo Osgood of the Office of Minority Education. Two female students, both minority women, were taking the same course. Each woman had different hues of skin color; one with lighter skin, the other with darker skin. Both students worked together and therefore their grades were very similar. Their test score, problem sets and final examination scores were similar. When the students received their final grades, the student of lighter skin color received a whole letter grade higher than the student with darker skin color. Dean Osgood assisted in the resolution of this incident, but what effect do you think it had on the women?

The physical characteristics of the woman of color which portray an African heritage are often correlated with lack of intelligence. As a

consequence, some women of color resort to cultural assimilation. Cultural assimilation (Sarah Lebrec-Wyman, "How to Respond to Your Culturally Diverse Population," 1993, ED363948) is when one cultural group acquires the values, characteristics, behavior, and attitudes of another culture while shedding its own cultural values and characteristics. The travesty of cultural assimilation is that the woman of color is in denial and negates the essence of herself. She internalizes emotions that are associated with her negative experience as a woman of color, which she will still have to address some time during her career.

The predominate historical portrayal of women of African descent in the media as sex objects, or in a position of servitude, affects how we women are viewed in society, as well as in academia. These cumulative subliminal messages have a pronounced effect not only on the students, faculty, and administrators, but also on the women themselves. In the academic setting, we are constantly combating the stereotypes that are embedded in historical negative associations. The intellectual background and capacity of women of African descent are always being challenged. We are constantly addressing issues of low expectation, isolation, and ostracism. Clearly, other minorities and women may also face the same problems in their daily lives, but the consistent allegations that we as minority women are given preferential treatment and consideration because of affirmative action laws, is simply unsubstantiated rhetoric.

Women of African descent, even at the undergraduate level, who have successfully transversed all the stereotypes to pursue a career in science

or engineering had to overcome tremendous obstacles on every imaginable human level. It takes intellect, courage, perseverance, fortitude, and faith to participate in this journey.

Issues Concerning Undergraduate Women of African Descent (WAD) at MIT

As we approach the new millennium, it is important to see where MIT stands in terms of the enrollment and matriculation of women of African descent in science and engineering fields. Undergraduate enrollment data was obtained from the Registrar and the Office of Institutional Planning. Data on the women of African descent was obtained from the Office of Minority Education (OME).

African-American women are the majority of undergraduate women of African descent at MIT. Women from Africa are the least number of undergraduate WAD. The African women come from Senegal, Nigeria, Ghana, Ethiopia, Kenya, Algeria, South Africa and Sierra Leone, based on the demographic data obtained from the OME. [See Table 1, next page.]

The percentage of undergraduate women of African descent was maintained at 2% of the total undergraduate students from 1994 to 1997 and increased slightly to 3% in 1998. [See Table 2, next page.]

The total percentage of undergraduate WAD majors in science and engineering was 3% of the total undergraduate students in 1994 and 1995, and was maintained at 4% of the total number of women undergraduates 1996-1998.

The total percentage of undergraduate WAD majors in science

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and engineering at MIT was 2% of the total science and engineering undergraduates during the last five years.

The total percentage of undergraduate WAD majors in science and engineering was 5% of the total undergraduate women majors in

science and engineering for the 1994 academic year. This percentage increased to 6% in the 1995 academic year, and was maintained at that level throughout the remaining academic years.

At present, the undergraduate WAD constitute 16% of the total minority

population. Freshman WAD are 15% of the total freshman minority population. The total undergraduate minority population represents 16% of the total undergraduate population at MIT. [See Table 3, next page.]

Profile of the Undergraduate Women of African Descent at MIT

The Pursuit of a Career in Science or Engineering :

- Thirty-three percent of the undergraduate WAD were influenced by their family or friends.

- Twenty-five percent were influenced by their teachers.

- Thirty-six percent had other influences, such as: the desire to develop their natural talent in science and math, the M.I.T.E.S. program, other summer programs, the desire to improve the deteriorating state of their country.

(Continued on next page)

Table 1. Percentage of Undergraduate Women of African Descent (WAD)

Academic Year	African American	Caribbean	African
1994	90	8	2
1995	89	7	4
1996	92	4	4
1997	91	4	5
1998	89	6	5

Table 2. Percent Total Women of African Descent (WAD)

Year	WAD/ TUG	WAD/ T UW	S&E WAD/ WAD	Frosh WAD/ WAD	S&E* WAD/ TSEU*	S&E* WAD/* SEW	S&E* WAD/ T UW	*SEW/ T UW	*TSEW /TSEU
1994	2	6	56	32	2	5	3	63	34
1995	2	6	67	25	2	6	3	63	36
1996	2	6	64	26	2	6	4	63	38
1997	2	6	69	23	2	6	4	65	39
1998	3	6	63	27	2	6	4	62	38

Total Undergraduate Students (TUG)

Total Undergraduate Women Students (T UW)

Total Science (S) and Engineering (E) Women of African Descent (S&E* WAD)

Total S & E Undergraduate Women Students (SEW*)

Total S & E Undergraduate Students (TSEU*)

* These data represent undergraduate students in their sophomore through senior years at MIT who have declared a major.

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Table 3. Percentage WAD as compared to Total Minority, Total Freshman Minority and Total Undergraduate Students.

Academic Year	WAD/Total Minority	Freshman WAD/ Freshman Minority	Total Minority/ Total Undergrad
1994	16	18	14
1995	16	12	14
1996	17	14	15
1997	16	13	16
1998	16	15	16

- Six percent were influenced by their community.

- One hundred percent of the students indicated that their families were very supportive of their decision to pursue a career in science of engineering.

Extracurricular Activities:

- Seventy-five percent of the women are involved in campus women organizations.

- Eighty-five percent of the women are involved in minority organizations.

- Twenty-one percent of the women are involved in non-minority organizations.

- Three percent are involved in student government.

Solutions for Change

Students' Suggestions:

Q: List three or more things that you would like to see implemented to support your undergraduate educational experience at MIT.

Responses: (direct quotes)

- More campus events that favor the entire community and not just the "white" or "international" communities.

- Some monthly social event where minorities can get together and enjoy each other's company.

- Financial support, motivational support, emotional support.

- Community unity among minorities, increase in the number of minority faculty members, better rapport of professors with students.

- Some type of mentoring program; more advisor/student interaction other than the beginning of each semester. Student/faculty functions at least three times per year.

- I would like to see an increase in the amount of financial aid at MIT. I feel the social support for black women is great here. We could also increase the contact with black women students and black women faculty.

- More people of African descent hired into administrative positions; undergraduates of African descent need to believe in themselves more; my institution should definitely do more to help international students to settle better.

- I think motivational support is most needed around here.

- Academic support.

- I would like to see a lookout program hooking up freshmen MIT students with upperclassman.

- Classes dealing with racial issues; more Black faculty; Black networks within majors.

- Financial Aid packages with less loans and work study.

- Motivational support from minority professors.

- I would like to see more academic support. At MIT so many minority students feel as though they are not making it. Everyone here says "struggling." It makes you feel so displaced or ashamed to even do well. I heard of one story of someone actually doing well on an exam to the plethora of "Oh, I failed" or "I'm struggling." If the case is that we are really struggling, something needs to be done. If that is not the case, we need to build up our academic self-esteem.

How can we as faculty and administrators initiate change?

First, we must break down the barriers. There are two major barriers that have to be addressed.

(1) *Don't Negate the Students' Culture.* If the education system does not value the various cultures of the students, there will always be a large void in the number of minorities and women educated and professionally employed as scientists and engineers in this country. Educators can not assess the true potential of a student without tapping into the innate resource of knowledge that is inherent within each individual's culture.

(2) *Change Attitudes.* The biggest and most concrete barriers are the stereotypical attitudes toward the students. Intellectually superior attitudes and/or the ignorance exhibited purely on skin color or race needs to be eradicated. As educated individuals, it is our responsibility to look inside ourselves and recognize and address the insecurities that we have.♣

[Lynda M. Jordan can be reached at lmjordan@mit.edu]

A Guide for Women who have been Recently Diagnosed with Cancer of the Breast

Lawrence T. Geoghegan, M.D., F.A.C.S.

When a woman first learns that she has breast cancer, it is usually such a shock that she finds it difficult to take in any more information. The idea for this booklet came from hundreds of women who had recently been diagnosed with breast cancer. They asked for written information that they could read and digest at home, that could give them a chance to think about what questions to ask when they return to see their physician.

We wrote this booklet to give you that chance, and hope it alleviates some of your anxiety.

Special thanks go to Dawn Metcalf, LICSW, for her wise and sensitive work on this project, and for writing the section on support services.

Thanks also to the members of MIT Medical's Cancer Support Group for invaluable suggestions, and to the many MIT Medical staff who reviewed this pamphlet: Marie J. Avelino, R.N., Bethany Block, M.D., Sarajane (Sally) Ciampa, Rochelle R. Friedman, M.D., Laureen Gray, R.N., C.S., Annette Jacobs, William M. Kettle, M.D., Annie S. Liao, M.D., Dawn C. Metcalf, L.I.C.S.W., Janice M. McDonough, R.N., C.S., Marla J. Notaro, R.T. (R) (M), Margaret S. Ross, M.D., William A. Ruth, M.D., Elaine L. Shiang, M.D., Dolores Vidal, R.N., C.S., Arnold N. Weinberg, M.D., Lori Ann Wroble, M.D.

MIT Medical offers a multi-disciplinary approach to care: the best possible medical treatment combined with sensitive emotional support.

Breast Cancer

Learning that you have **cancer** is frightening to everyone. But the diagnosis of **breast cancer** is in a

category by itself in terms of the fear and anxiety it creates in the women it affects.

In this brochure we hope to dispel some of the myths about breast cancer, and to help women cope with the disease.

It is important to know that:
. . . the diagnosis is in no way a death sentence,

. . . in most cases early diagnosis and treatment leads to normal life expectancy,

. . . breast preservation is the norm.

This brochure attempts to unravel the complexities of staging and treatment of the disease to allow women to make rational decisions about their care.

Discovering Breast Cancer

An abnormal mammogram, finding a new lump, or a nipple discharge can lead to discovery of breast cancer.

Diagnosis

Diagnosis is confirmed by removing tissue from the lump or the suspicious area seen on a mammogram. There are several methods available.

If there is a **palpable lump** (a lump that can be felt), the next step is usually a **needle core biopsy**. This technique may be possible even if the area is not palpable but is visible on ultrasound. A needle core biopsy avoids a formal operation since it can be performed by a radiologist in the x-ray area with a local anesthetic. Without a formal surgical procedure, the provider can establish the diagnosis, and the patient and provider can then discuss the treatment plan.

If the suspicious area can only be seen on a mammogram, the next step is usually **needle localization** and an **open surgical biopsy**. In this procedure

the radiologist **localizes** (locates) the area with a thin marker needle guided by mammogram, so the surgeon can remove the marked area in question.

The area removed is so tiny that most women say this is not a very painful procedure. In fact, most women are given a prescription for a small amount of pain medication to take after the procedure, and most report that they don't need it all. The procedure does not deform the breast, although there may be some temporary black and blue discoloration. It usually takes 48-72 hours to get the result of the biopsy.

What's the difference?

Needle localization requires open surgical biopsy to remove the tissue, while a needle core biopsy actually takes multiple small samples of tissue for diagnosis, using ultrasound for guidance of the biopsy site.

Although both procedures establish the diagnosis of malignancy, needle localization and open biopsy may provide more initial information. In many cases, the cancer may be completely removed and its characteristics better defined than is possible with a needle core biopsy.

QUESTION: I have been told that I have breast cancer. What does that mean? Are all breast cancers the same?

ANSWER: For the purpose of discussion we will divide breast cancer into two types, invasive and noninvasive. Noninvasive cancers are also known as DCIS, or **ductal carcinoma in situ**.

Almost all breast cancers begin in the mammary ducts. When malignant

(Continued on next page)

A Guide for Women with Breast Cancer

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(cancer) cells spread or invade breast tissue outside the ducts, we call this **invasive** cancer. The implication is that the malignant cells can not only invade surrounding breast tissue, but ultimately can also spread (metastasize) elsewhere in the body.

Non-invasive cancer (DCIS) has not spread beyond the mammary duct where it started. By definition, it also has not spread beyond the breast (metastasized). However, if not removed, DCIS does have the potential to become invasive. From a practical viewpoint, it should be treated as a very early form of invasive cancer.

These two types of breast cancer are treated differently, primarily because DCIS, by definition, has not spread to other parts of the body.

The biopsy usually tells which of the two types of cancer you have.

Treatment of Ductal carcinoma in situ

Ductal carcinoma in situ (DCIS) hasn't invaded surrounding breast tissue. By definition it has remained in the duct where it started. **Since it hasn't metastasized, axillary lymph node dissection or removal is not necessary.**

Treatment is aimed at local control in the breast. Currently the treatment consists of wide local excision – surgical removal of the cancer – usually followed by radiation to the breast. This is because DCIS, if not treated adequately, has a high incidence of invasive local recurrences.

Radiation treatment, or radiotherapy, is performed by a radiotherapist, a physician who specializes in the use of radiation to treat disease. MIT Medical uses radiotherapists at Massachusetts General Hospital and at Mount Auburn Hospital.

Recent studies have suggested that some patients don't require radiation. This depends on the size of the tumor, the cell type, and whether or not the surgeon was able to remove a small amount of normal breast tissue on all sides of the cancer tumor.

When the pathologist examines the tumor, if the tumor extends to the edge of what was removed, it implies that there is cancer left in the breast, which must be surgically removed before deciding on radiotherapy.

Treatment of Invasive Breast Cancer

Invasive breast cancer therapy is aimed at controlling the disease locally and systemically – throughout the body.

- **Local control** means surgically removing breast tissue, rendering it incapable of producing or harboring breast cancer. Two current therapies are mastectomy (total removal) or lumpectomy followed by radiation to the surrounding breast tissue in the affected breast.

- **Systemic (total body)** therapy uses chemotherapy or hormonal therapy to eradicate any microscopic cancer cells that may have spread beyond the breast to other parts of the body.

Patients are often confused by this. It is important to understand that radiation is a local therapy – an alternative to mastectomy when preservation of the breast is preferred. Large, well-controlled studies have demonstrated that in patients with early cancers, lumpectomy and radiation have been proven to be as effective as mastectomy for local control.

Chemotherapy, by contrast, is treatment to the whole body, and is necessary when (and only when) there is the chance that the cancer has spread beyond the breast.

Staging

Breast cancers are classified by stage, based on size of the primary tumor, microscopic appearance, and evidence of local (lymph node) or distant (metastatic) spread. What treatment is best for each individual woman is determined by considering all these factors.

The stages range from 0 through IV, with many complex subcategories, and by itself the stage (classification) does not address many important issues, such as a patient's suitability for breast-conserving treatment or the risk of distant relapse with or without systemic therapy.

Your surgeon will discuss your own condition – and what your particular stage (classification) does and does not tell you – when you meet.

The physician's goal is to make his or her very best recommendation for treatment based on the stage of the disease and the patient's general medical condition. The stage is determined by removing the primary tumor (cancer), and microscopically examining a number of lymph glands from the axilla (underarm) on the same side as the cancer. Other less specific tests, such as bone scan and liver function tests, are also used to check overall body function and health.

QUESTION: Please explain the surgery involved in establishing the stage.

ANSWER: First let's talk about the term **biopsy**. In this case it means removing tissue from the breast for examination by the pathologist. A biopsy can be done with a needle by the radiologist or the surgeon without subjecting the patient to a formal surgical operation. This is called a **needle core biopsy**. It removes only a

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small amount of tissue from the suspected cancer. It is a convenient method of establishing the diagnosis, but the area in question must either be visible on ultrasound or palpable by the physician.

Another type of biopsy is *open surgical biopsy*, performed in the operating room under anesthesia. This technique is used to remove the entire area in question or when the area can't be palpated or seen on ultrasound.

QUESTION: My doctor used the term *axillary dissection*. What does that mean?

ANSWER: Axillary dissection is the surgical removal of some of the lymph glands from the underarm, on the same side as the breast that has the malignancy. The procedure is done in conjunction with lumpectomy, or as part of a modified mastectomy if that is the choice of the patient and caregivers.

Axillary dissection requires general anesthesia. Patients usually spend one or two nights at MGH or MIT Medical's Inpatient Service. Most patients report some discomfort from the surgery but are up and around and eating normally the morning after the operation. A small catheter drain is usually removed 24 to 48 hours after the surgery.

The operation is designed to remove an area that has definite anatomic boundaries and contains between 6 and 15 lymph glands – only a small portion of the total number of glands in the area. If mastectomy is chosen rather than breast preservation, axillary dissection is done as a part of the mastectomy operation.

QUESTION: What is sentinel node biopsy?

ANSWER: Sentinel node biopsy is an ongoing experimental technique of trying to identify the first (or

“sentinel”) lymph node, and making a diagnosis after removing just that one node. There are two techniques for identifying the sentinel node, and both techniques are usually used. One involves injecting a dye, and seeing which lymph node is the first to receive the dye. The other uses a radioactive injection, and following the trail of the injection by using a counter or wand.

Since this technique is still experimental, it is usually followed by removal of the typical 6-15 nodes.

Mastectomy Or Breast Preservation?

In most cases women can choose breast preservation rather than mastectomy. The decision to preserve the breast requires that in addition to lumpectomy the patient must undergo postoperative radiation therapy, to reduce the possibility of another cancer.

Radiation therapy requires treatment visits five to seven days a week for five to six weeks, according to the recommendations of a radiotherapist.

QUESTION: Why choose mastectomy if breast preservation is as effective?

ANSWER: Some local breast cancers are too extensive to remove. This may be due to the actual dimensions of the tumor or because it is associated with a large component of DCIS (ductal carcinoma in situ), suggesting that the disease may be multifocal – arising in more than one location in the same breast.

Also, if the breast is small, disfiguration of the breast can sometimes be obvious after an adequate lumpectomy.

Some women, particularly older women, prefer avoiding the five to six weeks of radiation therapy, which requires daily trips to the hospital, or

want to avoid the side effect of this type of treatment: fatigue, skin reddening, radiation exposure, etc. Others may worry that lumpectomy and radiation treatment is not as safe a choice as mastectomy, despite extensive research results to the contrary.

Systemic Therapy: Women with positive lymph nodes.

Chemotherapy, hormonal therapy or both?

The decision about systemic (whole body) therapy is based on whether cancer cells are found in the lymph nodes removed at axillary dissection or during a mastectomy. The lymph nodes act like “sieves” and in most cases are the first line of defense when a cancer tries to spread.

If lymph nodes are involved, systemic therapy is recommended.

- In pre-menopausal women, clinical trials strongly suggest that chemotherapy prevents the recurrence of breast cancer better than hormonal therapy.

- In post-menopausal women, however, the use of hormonal therapy (tamoxifen) is most effective. This is particularly true in patients with tumors that test positive for estrogen receptors. The tamoxifen binds to these receptors and provides some protection against local recurrence in the affected breast and cancer in the opposite breast as well.

QUESTION: What is an oncologist?

ANSWER: Oncologists are physicians who specialize in the study of tumors. Their primary role is recommending and administering systemic therapy. MIT Medical uses oncologists at MGH and at Mount Auburn Hospital.

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Systemic Therapy: Women with negative lymph nodes.

In the past, women whose nodes were not involved (node negative) were usually given the option of not undergoing systemic therapy.

Today, however, we know that even women in the most favorable group, those with tumors less than two centimeters in size and negative axillary lymph nodes, still have a 10-20 percent chance of recurrence of their disease over the next 10 years. Unfortunately, there are not yet any accurate predictors of which patients will experience recurrence of cancer. This has led oncologists to be more aggressive in their recommendations to women in general and in particular to women with negative nodes.

QUESTION: I have heard the term E.R. positive. What does this mean?

ANSWER: E.R. stands for estrogen receptor. Tumors are routinely tested for these receptors. Tumors that are E.R. positive are more susceptible to hormonal therapy, such as tamoxifen. This is good news, because it means that the tumors are more receptive to treatment and have better prognoses.

QUESTION: What is the typical follow-up like?

ANSWER: Although follow-up is planned for each woman individually, this is a typical follow-up plan:

1. Mammogram once-a-year.
2. For the first two years, examination every three months by the surgeon, the radiotherapist, and oncologist in rotation.
3. For the next three years, examination every six months by the surgeon, the radiotherapist, and oncologist in rotation.
4. From that point on, yearly examinations by your surgeon for breast specific exams and your primary

care physician for routine general exams.

Support Services

When faced with the diagnosis of breast cancer, most women feel they need two things: information and support. At MIT Medical we try to meet both these needs in a variety of ways. Your personal physician, surgeon, nurse practitioners, and mental health resource people work together as a team, sharing information to provide the highest standard of coordinated care.

Each woman may need different forms of support, so we provide a variety of support resources to choose from:

- For the past several years an on-campus Cancer Support Group has been meeting regularly. This group is open to any member of the MIT community with a diagnosis of cancer – not just breast cancer. There is no charge for the group, and the meetings are usually coordinated by Dawn Metcalf, LICSW, Social Worker, and Peter Reich, M.D., Chief, Mental Health, both at MIT Medical/Cambridge, (617) 253-2916. The group meets during the workday to allow people who are on campus to attend. It is specifically dedicated to the support of cancer patients themselves, so it is not open to family members or friends. For more information, call Dawn Metcalf or Peter Reich.
- Individual members of the Cancer Support Group are also available to help newly-diagnosed patients and patients in the process of developing a treatment plan, to talk about their experiences and reactions to their diagnosis, treatment, and outcome.

• Health Education at MIT Medical /Cambridge maintains a comprehensive library of information,

resources, and support available in the Boston area. They also have information about on-line resources, prostheses, wigs, and service organizations.

- At times of emotional stress and uncertainty the Mental Health Service can be a valuable resource for patients and families.

- There are social workers who specialize in medical case management, individual support and counseling, and family support and counseling.

- There are also psychologists and psychiatrists and a clinical nurse specialist with expertise in individual and family counseling.

- The staff also have information about benefit programs, family medical leave, and other areas of concern.

Several psychiatrists have a particular interest in women's health. They can:

- meet with individual patients and families,
- consult and coordinate care with other providers, and
- provide short-term treatment.

During treatment for a serious medical illness, a psychiatric consultation about depression and coping skills during treatment can often be helpful and reassuring to patients and families, who wonder if what they are experiencing is normal, and if enough is being done. We recommend that a woman consider a "consultation" appointment to make an initial contact and lay the groundwork for support during treatment.

We hope this information helps you understand how we evaluate, diagnose, and treat breast cancer.

If you have further questions, ask your physician or nurse practitioner. ♣
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Orientation '98: A Break From The Past

Alberta Lipson

Introduction

Last year, the MIT community debated a number of serious issues having to do with alcohol use, freshman housing, and the orientation period. These issues were certainly not new to the community, having been studied in previous years. However, due in large part to the alcohol-related death of freshman Scott Krueger and other incidents, these issues came to a head and led to a strong effort to improve orientation.

In previous years, the introductory period to MIT was called Residence/Orientation (R/O) and was dominated by residence selection and Rush. This year's period became known as Orientation '98 to signal its break from the past and its attempt to balance the three goals of orientation: (1) to introduce freshmen to the richness and excitement of MIT's academic life, (2) to start to integrate new students into the community by introducing them to upperclass students, faculty, staff, and each other, and (3) to give them sufficient information to enable them to make appropriate housing decisions.

To document the impact of programming changes on Orientation '98, a short two-page survey was given to incoming freshmen on Registration Day. The survey focused on orientation events and housing and academic decisions. A large majority of the freshmen (75%) responded and they were representative of the freshman class population. This article summarizes the major findings, and, where relevant, compares them to the 1997 orientation survey results.

Unlike the orientation programs at many other schools, MIT's orientation period lasts for nearly two weeks. Not only do freshmen have to become

knowledgeable about the MIT curriculum to plan their first semester schedule, but they also need to quickly acquire sufficient housing information to choose their first-year residence. For the purposes of this report, Rush refers to the process of selecting a Fraternity/Sorority/Independent Living Group (FSILG). Students can choose to participate in Rush if they are interested in joining and/or living in an FSILG. Even though both men and women participate in Rush, women generally do not live in sororities until their sophomore year. Students interested in residence hall living enter a computerized housing lottery where a specially-designed algorithm assigns them to a residence hall. Students can participate in Rush as well as a housing lottery if their preference is uncertain.

There were a number of innovative changes in Orientation '98. The Math Diagnostic was administered by mail, and half the class took the Freshman Essay Evaluation on-line during the summer to make the introduction to MIT more welcoming and less onerous. Opportunities for freshmen to come to campus early and become acquainted were expanded with the addition of the Ocean Engineering and Freshman Service Programs to the already existing Freshman Leadership and Interphase Programs.

On the first day of their arrival, freshmen were greeted with a Welcome Dinner where they dined with faculty, administrators, and upperclass students. For a number of activities, students were broken up into groups of 10 and each group was assigned an upperclass orientation leader who acted as their mentor. Also added were other new programs such as the Residence Midway to give students

additional information about residence options, an alcohol education program, and a Science Symposium. In the past, Rush events were the focus early on. This year, Rush started a day later, and the first three to four days included some activities for the whole class such as the Welcome Dinner, the President's Welcome Convocation, "Contact" MIT (academic convocation), the Science Symposium, Academic Expo, and mealtime events with orientation leaders.

Major Findings

- Data show some improvement in academic orientation. Compared with last year, higher percentages of students indicated they had sufficient time and information to make informed decisions about their first-year subjects.

As Table 1 (next page) shows, slightly higher percentages of students in 1998 thought they had sufficient time and information and slightly lower percentages thought it was difficult to select classes for fall term. Some scheduling and programming changes may account for this. The *Freshman Handbook* was mailed in early May along with the packet the Admissions Office sends to incoming students. Previously, the handbook had been mailed separately in mid-June. Freshmen had opportunities to discuss academic issues with their orientation leaders. In addition, Academic Expo underwent great alterations and became more interactive.

- Although a number of students thought proposed changes in residence orientation and the negative publicity resulting from the alcohol-related incidents would harm Rush, survey data reveal few differences between 1997 and 1998 residence

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Table 1. Academic Subject Decisions: 1997 Compared to 1998

Whether Students Had Sufficient Time and Information About Freshman Curriculum to Make an Informed Decision

Time

	<u>1. Not at all Sufficient</u>		<u>3. Mixed</u>	<u>5. Very Sufficient</u>		<u>Mean</u>
1997	4%	12%	22%	33%	29%	3.7**
1998	2%	6%	19%	34%	39%	4.0

Information

	<u>1. Not at all Sufficient</u>		<u>3. Mixed</u>	<u>5. Very Sufficient</u>		<u>Mean</u>
1997	6%	11%	23%	35%	25%	3.6**
1998	2%	8%	21%	34%	34%	3.9

Whether Students Found It Difficult to Select Classes for Fall Term

	<u>1. Not Difficult at All</u>		<u>3. Moderate</u>	<u>5. Very Difficult</u>		<u>Mean</u>
1997	20%	31%	23%	20%	7%	2.6
1998	24%	31%	25%	15%	5%	2.5

T-Test: *p<.05, ** p<.01, *** p<.001

selection experiences (e.g., participation in Rush, number of visits to FSILG's, etc.).

In both years, two-thirds of the students participated in Rush (1998, 64%; 1997, 65%). In 1998, 83% of the men and 52% of the women participated, while in 1997, 78% of the men and 51% of the women participated. In addition, the percentage of students who visited FSILG's and residence halls and gave them serious consideration did not change at all. (See Table 2, next page.)

In 1997 and 1998, the questionnaire asked students who participated in Rush if they received a bid from the FSILG of their choice. In each case,

two-thirds received a bid from their favored FSILG. Both surveys also asked about the outcome of the residence hall lottery. In 1997, 71% received their first choice and in 1998 86% received their first choice. Since the lottery algorithm did not change, it is possible the Residence Midway gave more visibility to smaller residence halls which may have been overlooked in the past in favor of larger, more popular residences.

• Because students must choose a residence during their first few days on campus, a key question has been whether new students have enough time and information about the various options to make informed decisions.

The data indicate some improvement in these areas compared with last year. However, residence selection remained difficult for many.

Compared with 1997, higher percentages of students thought they had sufficient time and information to make informed housing decisions. (See Table 3, next page.) A number of changes may account for this pattern, including the new Residence Midway and the many opportunities that freshmen had to discuss housing issues with their orientation group leaders. Prior to 1998, each FSILG sent freshmen their own individual mailing, while in 1998, all residence information was coordinated and mailed in the same packet. One-third or more of the students in both years said it was hard to make a decision. However, students in 1998 were more likely to say the decision was difficult. This is discussed in greater detail later on.

• In 1997 and 1998, residence selection was a more difficult experience for men than women. In 1997, men living in FSILG's and residence halls found the residence decision equally difficult, while in 1998 men living in FSILG's found residence selection more difficult.

In 1997 and 1998, women were more likely than men to say they had more time and information as well as less difficulty making an appropriate housing decision. (See Table 4, p. 24.) This is understandable since men have a wider array of choices which can cause considerable confusion. There were some similarities and differences between men who lived in FSILG's and in residence halls. In both years there was little difference between these two groups with regard to

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Table 2. Residence Hall and FSILG Visits: 1997 Compared With 1998

	<u>Visited FSILG's</u>		<u>Gave FSILG's Serious Consideration</u>	
	<u>% of Students</u>	<u>Mean # of Visits</u>	<u>% of Students</u>	<u>Mean # Considered</u>
1997	90%	3.7	64%	1.7
1998	87%	3.7	66%	1.8

	<u>Visited Residence Halls</u>		<u>Gave Res. Halls Serious Consideration</u>	
	<u>% of Students</u>	<u>Mean # of Visits</u>	<u>% of Students</u>	<u>Mean # Considered</u>
1997	96%	5.8	86%	2.9
1998	92%	5.7	89%	3.1

Table 3. Residence Selection Questions: Comparisons Between 1997 and 1998

Whether Students Had Sufficient Time and Information About Residences to Make an Informed Decision

<u>Time</u>						<u>Mean</u>
	1. Not at all Sufficient	3. Mixed		5. Very Sufficient		
1997	15%	19%	24%	23%	19%	3.1***
1998	6%	13%	19%	29%	34%	3.7

Information

						<u>Mean</u>
	1. Not at all Sufficient	3. Mixed		5. Very Sufficient		
1997	6%	13%	24%	37%	20%	3.5***
1998	3%	10%	23%	34%	30%	3.8

Whether Students Found It Difficult to Make a Decision About Housing

						<u>Mean</u>
	1. Not Difficult at All	3. Moderate		5. Very Difficult		
1997	25%	24%	16%	21%	14%	2.8**
1998	21%	19%	17%	26%	16%	3.0

T-Test: *p<.05, ** p<.01, *** p<.001

information, but men living in FSILG's were less likely than those in residence halls to say they had sufficient time to make an informed decision. In 1997, both groups found it equally difficult to make a housing decision, while in 1998, men in FSILG's found it more difficult.

Increased difficulty might be related to having greater quantities of accessible information. It is also possible that the nationwide focus on Scott Kreuger's death and fraternity lifestyles may have made what is normally a difficult decision even harder. So although Table 2 shows similarities for 1997 and 1998, the impact of the past year's events may have shown up in the decision-making process.

Women also had greater difficulty in 1998 than in 1997. Perhaps the events of last year affected women who chose to live in FSILG's. (In 1997 and 1998, 15 and 23 women respectively who were survey respondents lived in FSILG's. The response rate for the 1998 survey was 75%, and the response rate for the 1997 survey was 54%.) Women who chose to live in FSILG's in 1998 were twice as likely as those in residence halls to say the housing decision was difficult (52% compared to 27%). These differences between students in FSILG's and residence halls will no longer be an issue in a couple of years, since President Vest has announced that all freshmen will be required to live on campus in the year 2001.

• In spite of the fact that living group decisions were made quickly, approximately 90% were satisfied with their choice and men living in FSILG's tended to be more satisfied than other men. This replicates the 1997 pattern.

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**Table 4. Residence Selection Questions by Sex and Living Group
(1997 and 1998 Surveys)**

	<u>Men</u>	<u>Women</u>	<u>Men in FSILG's</u>	<u>Men in Residence Halls</u>
<u>Had sufficient time to make informed decision</u>				
<i>Scale (1=Not At All Sufficient to 5=Very Sufficient)</i>				
1997 Mean	2.8	3.5***	2.6	3.0**
1998 Mean	3.5	4.1***	3.2	3.6**
<u>Had sufficient information to make informed decision</u>				
<i>Scale (1=Not At All Sufficient to 5=Very Sufficient)</i>				
1997 Mean	3.4	3.7***	3.4	3.3
1998 Mean	3.6	4.0***	3.7	3.6
<u>Had difficulty making a housing decision</u>				
<i>Scale (1=Not Difficult at All to 5=Very Difficult)</i>				
1997 Mean	3.0	2.4***	3.0	3.0
1998 Mean	3.2	2.7***	3.5	3.0**

T-Test: *p<.05, **p<.01, ***p<.001

Men and women tended to be equally satisfied with their living group choice. Since the majority of women are housed in residence halls, receiving or not receiving a bid has little bearing on their satisfaction with their living group choice. Not surprisingly, men who Rushed and received a bid from the FSILG of their choice were more likely to be satisfied than men who Rushed and did not receive a bid. Also, men who lived in FSILG's were somewhat more satisfied with their decision than those in residence halls. (See Table 5.) This pattern of increased satisfaction with FSILG living has been seen in other surveys – the 1994 and 1998 senior surveys as well as the survey of freshman year 1994-95. These surveys indicate that features

such as communal dining, good social life, close friendships, a sense of community, supportive upperclass students, alumni whom they considered friends/mentors, and intellectual stimulation were more commonly found in FSILG's than residence halls. Perhaps some of these features begin to have an impact right away.

- Approximately two-thirds of the students were satisfied with Orientation '98. Although similar percentages of students indicated satisfaction in both the 1997 and 1998 surveys, the percentage of students who indicated dissatisfaction was lower in 1998. In 1997, men living in residence halls were the least satisfied group, while in 1998 their level of satisfaction greatly increased.

In 1997, 23% of survey respondents were dissatisfied with orientation, while in 1998, 10% were dissatisfied. (See Table 6, next page.) A number of reasons may be offered for this decrease. Perhaps the introduction to MIT was a more positive experience because Rush was not the focal point that it has been. Perhaps having an orientation group leader that one can form a relationship with from the beginning helps the adjustment process. Another possibility is that information was more timely and more accessible. The *Freshman Handbook* was mailed out earlier; all the residence information was sent together in the same packet; the Residence Midway was introduced to provide needed information; and Academic Expo may have been more informative since it contained hands-on, interactive activities.

Orientation satisfaction increased for males in residence halls, while it decreased for those in FSILG's. (See Table 7, next page.) This may be an indication that other activities besides Rush played an important role in Orientation '98.

In 1997 and 1998, the receipt of a bid from a favored FSILG had a greater impact on women than men, since it did not affect men's overall satisfaction with orientation while it did affect women's satisfaction. In 1998, 76% of the women who Rushed and received a bid and 53% of those who Rushed and did not receive a bid were satisfied with orientation. In 1997, 80% of those who Rushed and received a bid and 63% of those who did not were satisfied with orientation. This is an expression of the important role Sorority Rush plays in the lives of freshman women. An important
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Table 5. Satisfaction With Choice of Living Group

	<u>Very Dissatisfied</u>	<u>Dissat- isfied</u>	<u>Mixed</u>	<u>Satisfied</u>	<u>Very Satisfied</u>	<u>Mean</u>
<u>All respondents</u>	3%	3%	6%	19%	70%	4.5
<i>(Men only)</i>						
Rushed/Received Bid	1%	<1%	6%	20%	71%	4.6**
Rushed/Didn't receive bid	5%	4%	8%	26%	58%	4.3
<i>(Men only)</i>						
FSILG resident	<1%	0%	5%	18%	76%	4.7***
Residence Hall resident	4%	3%	5%	26%	61%	4.4

T-Test: *p<.05, **p<.01, ***p<.001

Table 6. Overall Satisfaction With Orientation: 1997 and 1998 Compared

	<u>Very Dissatisfied</u>	<u>Dissat- isfied</u>	<u>Mixed</u>	<u>Satisfied</u>	<u>Very Satisfied</u>	<u>Mean</u>
1997	5%	18%	20%	43%	15%	3.5***
1998	3%	7%	26%	44%	19%	3.7

T-Test: *p<.05, ** p<.01, *** p<.001

Table 7. Percent Satisfied with Orientation by Sex and Living Group Type

	<u>Women in Residence Halls</u>	<u>Women in FSILG's</u>	<u>Men in Residence Halls</u>	<u>Men in FSILG's</u>
1997	66%	71%	43%	66%
1998	65%	74%	65%	57%

question to be pursued in the future is whether there are any long-term effects associated with not receiving a bid.

In summary, Orientation '98 was associated with a number of positive changes, including giving freshmen better access to academic and residence information, providing them with

more time to make a decision, and increasing the orientation satisfaction of men in residence halls, a group which evidenced very low satisfaction last year. But the residence selection decision was difficult for over 40% of the students, and it was a bigger problem for men than women. Having

all freshmen live on campus in 2001 should greatly ameliorate this problem since freshman men will only have to choose among ten residence halls, rather than 10 residence halls plus 34 FSILG's.♣

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A Beautiful Concept

Norma McGavern-Norland

An Idea and Its Underlying Principles

Margaret MacVicar (MIT's first dean for Undergraduate Education and an MIT graduate student when she invented UROP in 1969) had a nifty idea some years ago. This was the idea that she developed into UROP (the Undergraduate Research Opportunities Program, if there is still someone who doesn't know the acronym) 30 years ago next fall. The name has been borrowed, sometimes along with much of the program itself, by other colleges and universities around the country and even around the world.

Most schools have taken MIT's UROP idea in the right spirit and adapted it to their own needs. Sometimes the name is inventive – there is URECA (eureka!) at SUNY Stony Brook, for example, although “UROP” is becoming virtually generic. The University of Delaware has a URO program and the University of Minnesota and the University of Utah have programs called UROP. At the National University of Singapore there is an Undergraduate Research Opportunity Programme, as there is at London's Imperial College where the “O” is a plural. Nearby, at Boston University, there is “UROP/FROP,” the UROP for matriculating students, the FROP for engineering pre-freshmen.

It is hard to imagine that MIT's program was once the only one of its kind. The concept was so simple: make use of what you have a lot of (research in our case) and establish that as the basis for bringing together students and faculty. The self-interest of both parties keeps it afloat – students' desires for hands-on experience and being connected with faculty, the faculty's

desire to advance their research and be connected with students in a less formal setting than the classroom.

It may seem hard to recall now, but before UROP existed in the 1960s there was far less social interaction between most students and most faculty than there is now. Exceptional or aggressive students could always find faculty to do research with – they always have and always will. The concept of students working with faculty was hardly new. So it is not surprising that the most cutting criticism of UROP in those years was the challenge, what was novel about it? What was the big deal? My answer to both questions is that scale matters.

It is not difficult to set up a limited research program, or a one-time research group, or offer research opportunities in a single department or area where it is expected to provide the necessary hands-on component of classwork. These are the kinds of research programs many other colleges have today. They are often small, or limited to certain students, or to a particular discipline, frequently engineering. It is a different thing entirely if the program is for everyone, whether they be freshmen or seniors, or have high or middling GPA's and, most notably, if the opportunities exist in all disciplines, not excluding the humanities. The very best programs are often “no big deal”; they fit a given situation so naturally they are unobtrusive. Sometimes people assume they were always there.

When UROP was a new idea, skepticism about newness wasn't the only concern. Some faculty had doubts, and thought having students as collaborators *was* a big deal. The reason was that they thought undergraduates would be costly. Never

mind whether they got paid or not: they would use up supplies, and they would undoubtedly break things. In the early 1970s, UROP used to grant small amounts of money for “materials and supplies” to relieve those concerns and allow supervisors to at least come out even. By 1973, most of this materials funding was dropped as faculty began to realize students' contributions were real and were far outweighing any breakage.

UROP may have been a simple idea, but simple ideas don't necessarily sell themselves. In an old file, I recently came across a collection of labels that were to be section headings for a history of UROP Margaret MacVicar never got to write. They read: “Strategic Aspects,” “Non-Adversarial Stance,” “Non-Invasive Packaging,” “The Department as the Basic MIT Unit,” “Faculty Must Feel in Control,” and “The Role of Selfish Motives.” It is not too difficult to see what she was getting at. She knew that if the program was going to work and be a positive addition, it had to be a perfect fit with how faculty and students actually work and live. Behind UROP's simple goals were some important principles, the same principles that govern UROP today:

Institutional fit. Research is MIT's prime “currency,” and what most students who come here are interested in. Since faculty do serious research, students should be expected to do the same, working as collaborators with faculty, doing “the real thing.” Since faculty research does not fit neatly into semester blocks and often has its own pace, UROP research should have the same flexibility, with different credit or pay rewards, and varying research beginning and ending times. As

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departments are the essential MIT unit, departments set the standards for credit-worthy research. In general, students do all that faculty do, and that includes writing proposals, making presentations, and so on.

Program flexibility. Research in one department or area may take a different form than research in another. Standards for a UROP project have to accommodate the arts as well as chemistry. When an idea fails to conform to a common format but nevertheless has academic merit, faculty enthusiasm, and is “done in the right spirit,” UROP will offer support. There is also no absolute standard for financial support. Departments have varying needs for financial support for UROPers over time. Hence, much is negotiable. “The right spirit” is undefined, but we know it when we see it.

Mutual benefit. One only has to look at what happened in 1994 to see there is motivation to do UROP even when it is heavy going financially. Faculty continued to pay UROP students despite the fact that in mid-summer 1994 those students suddenly cost 65% more because of a new federal indirect cost agreement that went into effect July 1st. After an immediate participation drop in fall 1994 (due to shock, financial readjustments?) the number of UROPs done for pay resumed the upward curve that began in 1973 and has continued ever since.

Freedom of choice. As beneficial as UROP can be to both parties, faculty have always been free to accept or reject becoming a UROP supervisor (or accept or reject a particular student for that matter) and students are free to either do UROP or not. Overall, people have seemed happy to have this choice. The type of reward (pay, credit) is also an option in most cases,

although people frequently have preferences in one direction or another.

Academic soundness and quality. Faculty are responsible for ensuring the academic soundness of a project. Without insisting on academic standards (i.e., all work must be credit worthy, whether done for pay, credit, or on a voluntary basis) UROP might be only an interesting co-curricular. While departments are responsible for academic oversight, UROP has the overall concern of catching up with problems such as feedback about an unworthy project, poor supervision, student absenteeism, copyright issues, etc. Each of these problems occurs from time to time and is generally solved by the parties concerned, most often with UROP’s assistance.

Educational Values, Principles, and UROP

While this article was being prepared, a sophomore wrote to UROP about her project: *“It felt incredible to actually act as an equal to a professor! He spent years and years studying knot theory, and here I was, understanding his abstract paper and writing to him as an equal! This project has been the most exciting academic experience I’ve had so far.”*

The same week, a faculty member wrote to UROP: *“Joe [a pseudonym] is the greatest thing to happen to me since I’ve been at MIT. My first surprise came when my colleagues started saying in faculty meetings, ‘Who does Joe work for? Wow, are you lucky!’ And, indeed, sometimes I think Joe ought to have my job. . . My grad students are in awe of Joe, and that’s the way it should be. Let them shake a bit and learn from him.”*

With comments like these (and they are not rare, I hasten to add) it is easy to understand the wish to cultivate this kind of enthusiasm about more

elements of undergraduate education. It is because of UROP that MIT has achieved some of the broader goals of both the MIT Task Force on Student Life and Learning and the nationally-focused Boyer Commission Report.

The Boyer Commission Report on Undergraduate Education in Research Universities, funded by the Carnegie Foundation for the Advancement of Teaching and made public in spring 1998, set off a round of self-examination in many research universities. The report begins with an idealistic framing of the issues. The introduction quotes President Vest pointing out that “government funding of research in the universities is also an investment in the education of the next generation, with every dollar doing double duty, a ‘beautiful and efficient concept.’” The report adds: “The university’s investment in research faculty also does double duty with teaching ideally enhanced by the research experience of both faculty and students.”

That UROP does “double duty” is evident in the fact that the Boyer Report cites UROP as an example of a “sign of change” [“Ten Ways to Change Undergraduate Education,” p.1, *Reinventing Undergraduate Education: A Blueprint for America’s Research Universities*, April 18, 1998.] (remarkable, given that it is nearly 30 years old) in how research universities can educate and integrate their research and teaching. The report goes on to outline how a university might be a “synergistic system” by making research-based learning the standard, constructing an inquiry-based freshman year, removing barriers to interdisciplinary education, linking communication skills and course work, culminating with a capstone

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A Beautiful Concept

McGavern-Norland, from preceding page

experience, educating graduate students as apprentice teachers, using information technology creatively, changing the faculty reward systems, and cultivating a sense of community. At MIT, UROP has long had an effect in many of these areas.

Many UROP collaborations are interdisciplinary and many UROP projects are literally done in MIT's interdisciplinary laboratories and centers; graduate students are frequently the daily supervisors of UROP students; more UROPers know faculty well than non-UROPers and thus may be said to have stronger ties to the MIT community; and, UROPers are called on to make formal presentations and write research papers more frequently than those who haven't participated. Much of this has been confirmed by survey data and was mentioned in previous *Faculty Newsletter* articles. Data from the most recent survey of seniors in the Class of 1998 told us that 21% of seniors who had been UROPers (82% of seniors were participants) were co-authors or single authors on published papers; 20% had made presentations to professional societies.

MIT's Task Force on Student Life and Learning outlined 11 principles in its final report to the MIT community [published in September 1998]. Underlying these is the larger goal of bringing together faculty and students through the triad of academics, research, and community. Of the 11 principles, more than half are in some way related to undergraduate research. The report's recommendations are specific about enhancement and expansion of undergraduate research. In a section that discusses the first year, the report mentions that more students should be exposed to research early in their careers, since "many

students do not have real research experiences until late in their undergraduate studies, if then." The first recommendation states that MIT should "expand UROP. . . and set a goal of involving 100 percent of undergraduates in research experiences sometime during their four years on campus." To accomplish that, UROP should receive "adequate

middle or end of the first semester that freshmen generally gain a sense of how much time they can actually consider "free time." About 52 freshmen did UROP in the fall semester 1997, comprising 6% of all fall UROPers. (In fall 1998 the number was almost identical.) By the spring semester the percentage of freshmen rose to 18%. By summer the

Data from the most recent survey of seniors in the Class of 1998 told us that 21% of seniors who had been UROPers (82% of seniors were participants) were co-authors or single authors on published papers; 20% had made presentations to professional societies. . . It may be worth noting, too, that one consequence of involvement in UROP for 22% was learning that "research is not for me," no doubt an important conclusion to those students.

resources from the Institute in terms of funding, staff support, space, and coordination." Faculty participation as UROP supervisors or teachers of research subjects should be recognized formally, the report suggests, and considered in tenure and promotion decisions.

UROP and Recommended Educational Goals

UROP and freshmen. It is true that freshmen come to MIT eager to participate in research. Their interest and enthusiasm are evident in the "All About UROP" meetings UROP holds for incoming students. In the first semester, however, the demands of the core requirements and other coursework generally make participating difficult, if not impossible, for most freshmen. Students are still uncertain at this point about how much time they have to commit to research. It is not until the

percentage would rise to nearly one-third of UROPers.

Another condition that inhibits freshman participation is lack of experience. UROP helps freshmen fill this gap through the IAP UROP Mentor Program that has been running since 1993. After several weeks of learning what research is about, with the experienced UROPer serving as instructor, the majority of pre-UROP participants are usually offered formal UROPs by their mentor's faculty supervisor. It is clear that faculty value freshmen who obviously have more than a nodding acquaintance with their research and have already gained some understanding of laboratory equipment and procedures. A nice side-effect of the Mentor Program is the challenge and excitement many of the UROP student mentors feel as a result of this teaching experience, the

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*A Beautiful Concept**McGavern-Norland, from preceding page*

first such experience for most. The latest (1999) Mentor Program got off to a rousing start with participation of upper-class student mentors and pre-UROPers as much as 150% higher than last year, and with higher enthusiasm to match.

The research seminar experience. Although the Task Force suggested Advisor Research seminars for freshmen that are offered to the entire freshman class, this need not be the only way of connecting beginners with the range of research. We have long noticed that every year there are faculty who offer Advisor Seminars with subject matter related to issues in their research. Students who show real interest often follow it up in the spring by joining the faculty's ongoing research. Any seminar where the faculty member is also the students' advisor is time-consuming for faculty. We asked faculty in our UROP survey in December 1998 what kinds of experience, if any, they would ideally like students to have before they take them on as UROPers.

According to early and still incomplete data, faculty who had UROPers regularly (i.e., virtually each semester and summer) were almost unanimous in responding "course taken in the appropriate subject area." The next most frequently checked were "relevant laboratory/work experience" and "a seminar about your research or related research area." This kind of experience or information could easily be imparted in an IAP seminar or regular undergraduate seminar held during the semester without necessarily including the function of advising.

Is UROP for everyone? Responses to UROP questions in the 1998 Senior Survey told us that while over 82% of seniors had participated in at least one

UROP, 5% said they never had time for UROP and another 5% said they had never been interested in doing UROP. It may be worth noting, too, that one consequence of involvement in UROP for 22% was learning that "research is not for me," no doubt an important conclusion to those students.

Students are not the only ones who sometimes choose not to do UROP. We sent faculty a survey about UROP in December 1998. Although the data is incomplete at the time of this writing, a look at a subset of responses indicates that while only a small number said they had never participated in UROP, they cited the fact that work in their area was unsuitable for undergraduate researchers or was unlikely to interest undergraduates. Although 68% of this subset are regular supervisors (virtually every semester and summer) or frequent supervisors (at least once during a calendar year) there are also many who choose to take on UROPers only occasionally or infrequently. UROP staff have long noticed that individual faculty have periods of heavy involvement and other periods of light to no involvement as supervisors. Having a choice about participating is important to both faculty and students.

UROP Next Year and After

UROP has been so agreeable and fulfilling to both faculty and students that it has become a model, as the Task Force recommendations illustrate, not just to other colleges, but to the building or improvement of other elements of undergraduate education. In many ways, this makes sense: build on what works. It is also important when making changes or building on UROP's success that we keep intact those principles that make it work as well as it does, and that make people

happy about how it works. Remove choice, for example, and you have changed an important underlying principle.

Because it is not only the millennial year but UROP's 30th anniversary year, academic year 1999-2000 will be a milestone for UROP. It will mark another year, I am sure, of endowment building which began in earnest only about five years ago, but has moved us well along toward the half-way point of a \$10 million goal. Enhancements and special editions are planned for our Website and printed Directory.

The writer, director of UROP since Margaret MacVicar's death in 1991, will retire in July 1999. Some of the details of how UROP will be administered after July are still in the process of being worked out, but it is clear that our most important goal will continue to be having a close connection with faculty, with departments, and with those who have responsibility for the undergraduate program.

It will continue to be important for UROP staff to be aware of educational issues and initiatives so that UROP can respond appropriately. The UROP office is fortunate in having staff members Michael Bergren, chief UROP administrator, and Melissa Martin, administrative assistant, who are deeply committed to UROP and know its history and every bit of its operations. One way to ensure this may be via a voluntary advisory committee of faculty who have been long-time UROP supervisors. Another way will be to have leadership that helps UROP keep its reputation intact and make new and better ties to the MIT community.♣

[Norma McGavern-Norland can be reached at ngavern@mit.edu]

A Conversation about Diversity of Thought A Journal for Students

Eileen de los Reyes

The following was originally presented as an IAP lecture in January.

What I would like to do this evening is share with you the story of what I have done in my academic career, speak about diversity work at elite institutions, and pose a series of questions.

The Story: Prior to coming to MIT I went to the University of Puerto Rico where I stayed for one year before going to Wellesley College. I graduated from Wellesley. Wellesley was a continuation of my experience in all-girls/women's schools. You can imagine what happens to anyone that comes from that background and lands at MIT.

My first year at MIT was not a happy one. I came to MIT in the Wellesley College bus. I used to cry on the way back. MIT was quite a lonely place where people worked constantly – during holidays, Saturdays and Sundays, where buildings had numbers and people looked as if they were in another planet—all by themselves. People at MIT had a weird sense of fun; fun meant working at the Institute and not having “a life.” My sphere of action was only the Political Science Department and once a year I crossed over to the Student Center for registration. It was then and only then that I realized that there was a larger institution: an institution that for me was quite alienating even when faculty and students in my department were very supportive. The larger institution was an enigma and one that I did not care to decipher since it did not seem to be inviting.

But, I adjusted to and even came to appreciate MIT. Let me explain. At MIT what matters is the ability to do the work. I have to say that in my seven years at MIT all I did was work on the research question that I wanted to address. I found that being a Puerto Rican, which was at the center of my research, was never seen as being a problem or made me feel as if I was “less

than” others. Who I was and what I was researching were both valid and celebrated. This, I soon found out, was not the case elsewhere. At MIT I found the space to think about what was important to me.

However, neither MIT nor Wellesley prepared me for life after 11 years at elite institutions. I actually believed, or was trained to believe, that I could go on being an elite researcher doing what I wanted to do. The tense interaction between believing that I could continue working in this manner and the pressure to become part of the discourse on diversity has resulted in

specifically the condition of students of color, radicalized me: to say to parents that their children deserved the kind of mis-education that I witnessed was, and continues to be, not just unacceptable – but immoral.

As a result of this experience, I moved my family out of suburbia to Boston and accepted a position as project director of the Student Support Services program at Salem State College (SSC), which works with 300 students of color and a staff of 11. Again, suffice it to say that neither MIT, nor Wellesley, prepared me for

I hold the conviction that within our communities we cannot tolerate being divided between those who are the “real” researchers and those who do diversity work. Those that have been co-opted into thinking that they are the chosen ones to be the researchers ought to reconsider.

moments of frustration, even anger, but also intense joy and hope. I can assure that there has never been a dull moment.

When I was about to finish my Ph.D. at MIT, it dawned on me that I had spent 11 years in libraries. I decided that I had to move outside of the safe spaces provided by academic institutions. As a way of leaving these safe libraries, I accepted a position in a Latino community agency creating four peer tutoring programs in two middle schools (Boston High, Charlestown High, Martin Luther King, and Edwards) and two high schools. The program was called the Hispanic Drop-Out prevention program. I worked for the Latino Parents' Association. This began my own education about mis-education and powerlessness. I also worked in English High and organized another peer tutoring program. What I saw in the public schools,

what I experienced. I failed miserably. I know that people at elite institutions do not use the word failure or the construction “I have failed,” but I did and had to resign. Throughout this experience, I insisted that I could change the organization and the College alone. My training at MIT, which emphasized individual work, achievement, and competition, had me convinced that if I did what I knew how to do, I could “fix” things. I also assumed that I could change the place without understanding the history or the culture at the institution. I assumed that I could figure almost everything out because of who I was and where I came from. I learned an important lesson: beware of diplomas from renowned institutions that may cloud your ability to learn from and with others and which may do serious damage to one's humility. This, of course,

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A Conversation About Diversity of Thought

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assumes that we arrived here with humility.

I accepted a position at SSC in the Interdisciplinary Studies Department where I taught Women's Studies courses and also created a program for students for whom English is a second language. I then accepted a faculty position at Harvard working with students who are getting their teacher's certification and with those who are planning to work in urban schools, teaching a course titled Education for Social and Political Change. I also co-chair the Diversity Committee. There are days where all I do is *diversity work*.

I want to share with you my analysis of elite institutions and diversity work. I share this with you so in case you start to observe similar things you can say "Oh, I remember hearing this somewhere." First, research institutions often have a divided intelligentsia: those who do the "real" work: these are called researchers and are engaged with the "external" world; and those who do "un-real work" or diversity work and are engaged with the "internal" workings of the institution. While the first group, those who do "real" work, views the institution/the context as not relevant to their construction of knowledge; the second one views the changing demographics of their institutions as a site of contestation, both intellectually and in practice. Those who manage to do both real and un-real work are called successful, stressed-out, superhuman beings. Of these superhuman beings there are a few and you need to make sure you take good care of them. The question for me became, if this is my analysis, what do I do now? Where do I stand?

I believe that diversity work at elite institutions requires the disciplined and uncompromising stance that every faculty and student at the institution must be committed to becoming an intellectual and diversity worker. While I argue that everyone must do the work, I want to speak directly with faculty and students of

color. I hold the conviction that within our communities we cannot tolerate being divided between those who are the "real" researchers and those who do diversity work. Those that have been co-opted into thinking that they are the chosen ones to be the researchers ought to reconsider. As Paulo Freire would say, "this is an error in analysis."

I want to make an historical argument and want us to remind ourselves that too many people fought for all of us to be here. I don't think they fought to have us become organic intellectuals of the elite whose main concern is to address the issues of those in power. I believe they fought for the right to enter any and all spaces, to conduct ourselves with dignity, and to work hard for the next generation.

I believe our mission is to construct knowledge with others about those issues that concern our communities; to do the very real work of being constantly aware and connected with other faculty and students of color and all those who, like us, are struggling to be in these kinds of institutions. Our mission is to remain whole and help and take care of each other so that together we can go back to our families and friends ready to make a meaningful contribution, ready to contribute to social change. This, I believe, is what so many of our parents, grandparents, great grandparents, and other members of our families and communities fought and died for.

I would also argue that faculty and students of color ought to reject the idea that individual competition and success are sufficient to make a significant contribution to our communities—to social change. We must educate ourselves—even within institutions that value individualistic competition in democratic collaborations and collective social action. Impossible, you may say. I want to tell you that my experience at the Harvard Graduate School of Education confirms that it can be done.

For example, there are two very significant spaces where I have seen democratic collaborations and social action: the teaching community that I teach with in the course Education for Social and Political Change, and a small seminar of doctoral students. What is distinct about both of these spaces is the commitment of all members to work together, to construct knowledge together, to challenge each other, to take care of each other with the objective of educating ourselves for social action.

I have also seen a whole School—the Harvard Graduate School of Education—led by courageous and visionary student/leaders who have decided that the time for change has come and that they are willing and able to move the School to a space of justice and hope. This process has not been easy, it has taken many years, a lot of work by those who chose to do the work. They have experienced a lot of pain and a lot of frustration. They have also shared the laughter, fun, and the deep sense of accomplishment that comes from having done good work.

Those who fought before us did not deceive us into believing that it would be easy, that we would not be required to make huge sacrifices. Somewhere along the line we began to believe that the work was done, that we could relax, that we had arrived. This is not the case. Recent anti-affirmative action measures signal a new, very aggressive move against people of color. I leave you with the following questions: What position will you take in the struggle? What kind of work will you do? Who do you stand with? What are you willing to sacrifice?

Because I have seen the work of the next and younger generation, I have hope and trust that you will do the work, that you have what it takes, and that you will continue the tradition of struggle. ❖

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New Faculty Website Online

Anna Frazer

Wondering when spring break falls during 2003? Looking for help interpreting the regulations governing end-of-term exercises? Curious about how to get a parking sticker or access the Coeus database? A newly designed resource for faculty is now available online at <http://web.mit.edu/faculty/>. This faculty Website provides links to primary resources for advising, governance, personal business, research, and teaching, as well as Institute calendars and discussion forums.

Initiated by Chancellor Lawrence S. Bacow during his term as faculty chair, the project was carried on by current chair, Professor Lotte Bailyn. Work began with a focus group that brought together faculty members and administrators involved in supporting faculty activities. This group met several times to brainstorm about possible contents for the site. During these sessions, it became clear that faculty need easy access to the primary resources

that inform and support their work as teachers, advisors, researchers, and community members.

Resources were divided into six categories: advising, discussion, governance, personal, research, and teaching, and each page catalogues a number of helpful and informative resources. For example, the advising page includes links to information on careers and financial aid, as well as to policy descriptions. Resources on governance include *Rules and Regulations of the Faculty*, *Policies and Procedures*, exam and term regulations, and thesis guidelines, as well as the record of MIT Faculty Meetings and committee membership rosters. The index of personal resources lists MIT offices that can help faculty members manage their lives outside the Institute. The research category addresses questions relating to funding, logistics, and policies, and the teaching page catalogues resources for improving teaching skills, guidelines for

classroom exercises, and help with logistics such as scheduling, audio visual, and building services.

The focus group meetings also revealed an interest in creating an online community where issues could be discussed. In response, the site contains a direct link to the WebCrossing Community Forum sponsored by Campus Wide Information Systems. Once they have obtained valid MIT Web Certificates, faculty members will be eligible to participate in online discussions. Closed and moderated discussions can also be set up.

With clean graphics and an architecture designed for easy navigation, these pages should help faculty locate the information they need across MIT's labyrinth of Web servers. The pages will be maintained by the Office of the Faculty Chair, and new resources will be added as they become available.♣

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Web Certificates Provide Key to MIT Network

Lee Ridgway

MIT Web certificates are the key to several MIT services available over the Web to authorized users. Certificates provide authentication and set up a secure connection to these services that ensures the privacy of transactions over the Web. MIT's secure Web services include outside ISP access to tute.mit.edu, the Benefits Office, MIT Forums, IS Help Desk CaseTracker logs, NECX, SAPweb, WebSIS, and others.

Among the benefits of certificates is convenience: once you have your set of certificates – site and personal – you can get to any of MIT's secure Web services for which you are authorized. Without certificates, you would probably need a different username and password for each

application. Also, with certificates there is no need to send your Kerberos password over the Internet.

MIT personal certificates are set to expire periodically, based upon when the certificate was acquired. Periodic expiration of certificates helps maintain security by ensuring that only current MIT faculty, students, and staff are in the system. If you have a personal certificate that expires, you will not be able to use any of MIT's secure Web applications until you get a new personal certificate.

Many MIT personal certificates will expire on February 28 or March 1, 1999. (The MIT site certificate does not expire until the year 2006). Information Systems recommends that these personal certificates be renewed as soon as possible. The new

certificate will be valid until December 31, 1999.

To check the expiration date on your personal certificate, go to the Web page at <http://web.mit.edu/is/help/cert/certexp.html>.

To get a new personal certificate, go to the Web page at <http://web.mit.edu/is/help/cert/quicksum.html>.

If you have questions about the process, contact the IS Computing Help Desk:

- Athena x3-4435 "olc" at the athena% prompt
- Macintosh x3-1101 machelp@mit.edu
- Windows x3-1102 pc-help@mit.edu
- UNIX/VMS x3-1103 unix-vms-help@mit.edu.♣

[Lee Ridgway can be reached at ridgway@mit.edu]

Annals of Reengineering

Training Policies and Administration Recommendations

Janet Snover

The project team charged with reviewing MIT's training policies and administration has issued its recommendations in a printed report, which is also available on the Web at <http://web.mit.edu/reeng/www/hrpd/>. (Reports with suggestions for improving other aspects of MIT's human resource practices are also available at this site.) It's important to note that all of the recommendations are under review and have not yet been approved for implementation.

Rationale

The rationale for this project team's work is that "if MIT is to remain an organization whose workforce is characterized by high performance and continual learning, then equal access must be provided to training and development opportunities. Training policies and procedures must promote efficiency, equity, flexibility, and safety. Currently, there are no standards for training budgets, release time, or minimum requirements, nor is there a strategic plan for addressing these issues."

Definitions

For the purpose of the report, "training" is defined as courses designed to develop basic and job-related skills, core technology skills and core competencies, and to promote career development. "Competencies" are defined as knowledge, skills, and behaviors necessary for successful performance in a role or position.

Methodology

The project team did research and conducted surveys on the best practices in higher education and

industry and also reviewed MIT's current practices. In addition, the team surveyed MIT administrators and support staff and also held focus group sessions.

The recommendations include the following components:

- minimum standards for training (dollars, time, courses, or percent of budget)
- the process for setting Institute training budgets, sources of funding (central vs. departmental), and fees (including Tuition Reimbursement)
- the use of technology to track Institute training needs and training received, and
- policies about required courses and certification for certain jobs/roles.

Although the team was able to identify more than \$3 million currently being spent on training, it was impossible to calculate the total amount MIT spends annually because there is no single line item in departmental budgets for training. Consequently, these overall costs are not accounted for in any systematic, easily identifiable way. Essentially, this means that MIT is spending a considerable sum of money for training without being able to clearly break out this cost so that it can be managed effectively. Developing a way to track training costs is therefore the team's first recommendation.

Here are the six specific recommendations:

1. MIT should develop a single budget line item for training costs in departmental budgets.

2. Strategic changes to maintain and develop a staff of high performers and continuous learners should be implemented.

3. Every employee should have an annual plan that specifies performance goals, including training needed.

4. Departments need to implement employee development plans, including adequate resources for training.

5. Training should be easily accessible and of the highest quality.

6. MIT should offer training through a variety of learning experiences and delivery systems.

More details about the recommendations are available in the complete report.

Team members came from the following areas: the Center for Real Estate, the Department of Biology, the Division of Bioengineering and Environmental Health, Information Systems (from both the Training and Publications and the Finance and Administration areas), the Performance Consulting and Training Team, Physical Plant (now known as Facilities), and the Professional Learning Center.

The Training Policies and Administration project team worked under the auspices of the Performance Consulting and Training team and was a component of the Human Resource Practices Development Project. Joan Rice, vice president for Human Resources, is the project's sponsor. ♣

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Letters

To the Faculty Newsletter:

I just finished the “Teach Talk” column on working with TAs [Vol. XI, No. 2, November/December 1998]. My own experience teaching 1.00 (with about six TAs) certainly matches the ideas in the article. But I would also like to add some thoughts about the advantages of appointing one of the experienced TAs as a “head TA.”

This person, who gets paid more than the other TAs, takes on responsibility for coordinating office hours, recitation notes and other aspects of the course. The head TA also has “first dibs” on the summer appointments. (We have a TA funded in the summer to do preparation with the faculty in charge of the fall term version of 1.00.)

At first, I worried that having a head TA would create an unnecessary hierarchy that the other TAs would resent. On the contrary, the new TAs really find it useful to have someone in addition to the faculty member to get advice and guidance from. Also, there are a lot of coordination issues

such as scheduling recitation sections, office hours, etc., that require work on the part of the TAs. The head TA takes responsibility for making sure those tasks are evenly divided among the TAs, giving everyone a sense that the load is shared fairly.

Also, if students have problems they feel too awkward talking to their own TAs about, the head TA can be a good “sounding board” for them. Many students are very shy about talking with the professor if they are unhappy with their TA, but they are often willing to talk to the head TA. Some of the problems can get resolved by discussions between the head TA and the other TAs without faculty involvement. Of course, the professor is always the “court of last resort” for problem solving, but I try to back the head TA’s decisions and reinforce his/her authority whenever that makes sense.

Another advantage of appointing a head TA is that it gives one of the senior doctoral students more experience in course administration and encourages them to think about teaching as a career. Several of my

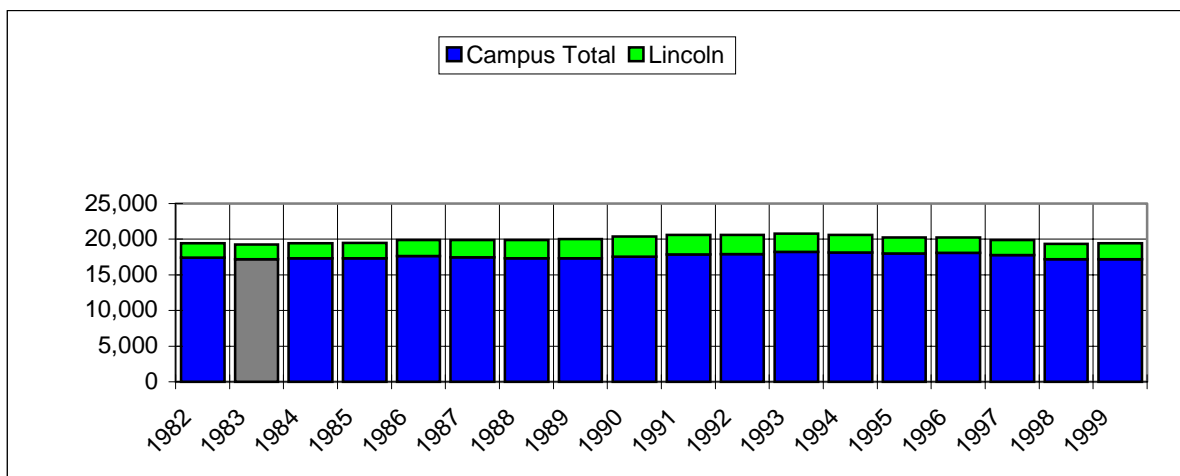
former head TAs are now in academia. The problem of new TAs (particularly those coming from very different academic cultures) is very real. We may need to do more for them. They often find the whole style of student/faculty discourse at MIT difficult to comprehend, and they are very nervous about teaching recitation sections. Having an experienced head TA who understands these issues helps, but we still need to find better ways to orient these new graduate students.

Steve Lerman
Professor

Civil and Environmental Engineering
Director, CECI

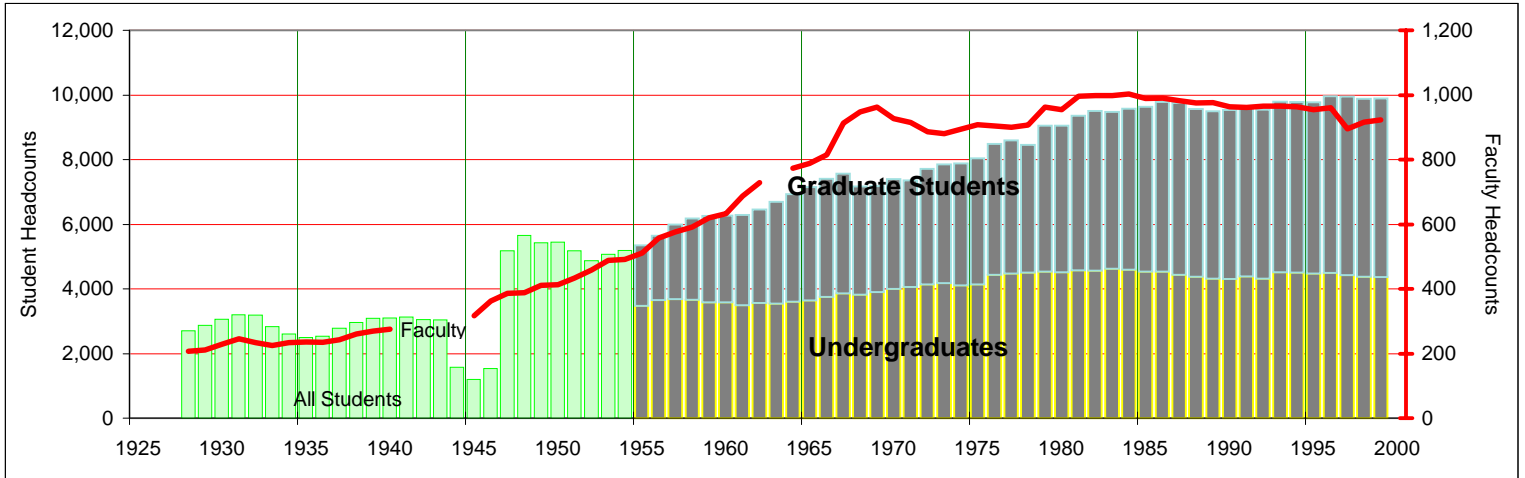
[**Editor's Note:** This year’s “Better Teaching @ MIT” IAP series, for the first time, included a workshop called “How to Be an Effective Head TA,” organized by Michael Jacknis, who was the head TA for 6.014, and Marc Paradis, former 9.00 head TA. Mike and Marc have created an e-mail list for head TAs to share ideas and provide each other with advice. Ask your head TA to contact Mike (mjacknis@mit.edu) if she/he would like to be on the mailing list.]

Campus and Lincoln Laboratory Population Counts (1982-1999)

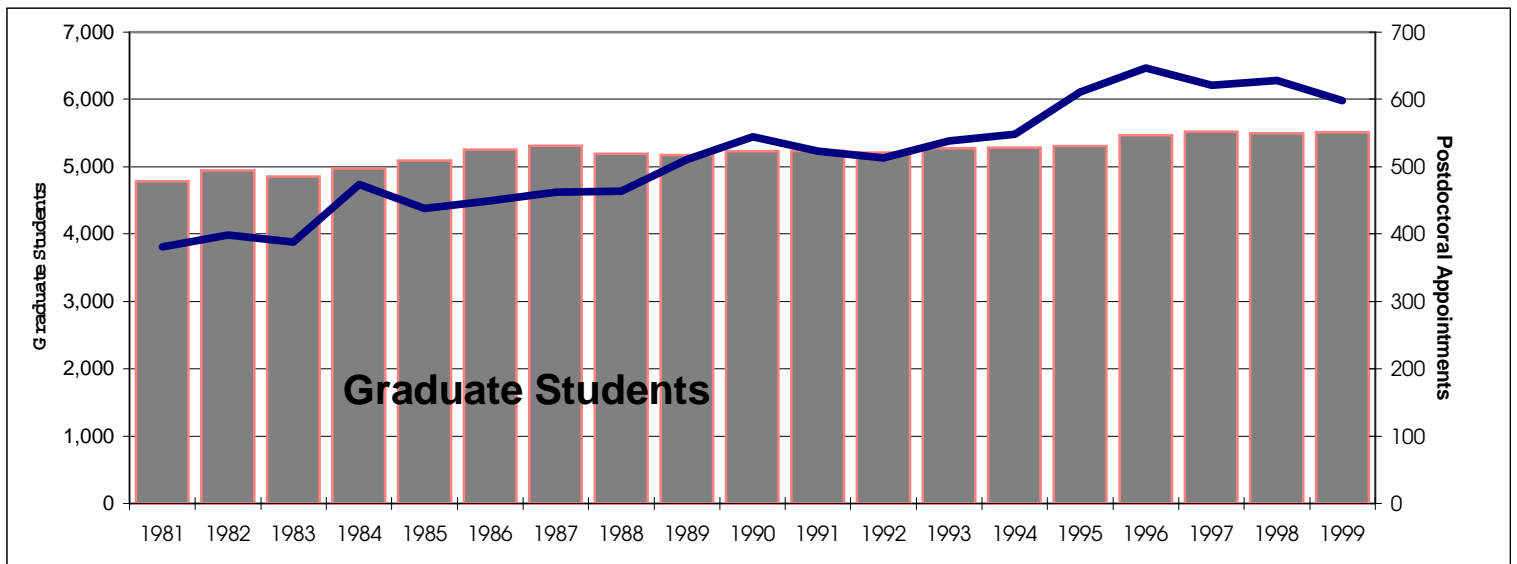


M.I.T. Numbers

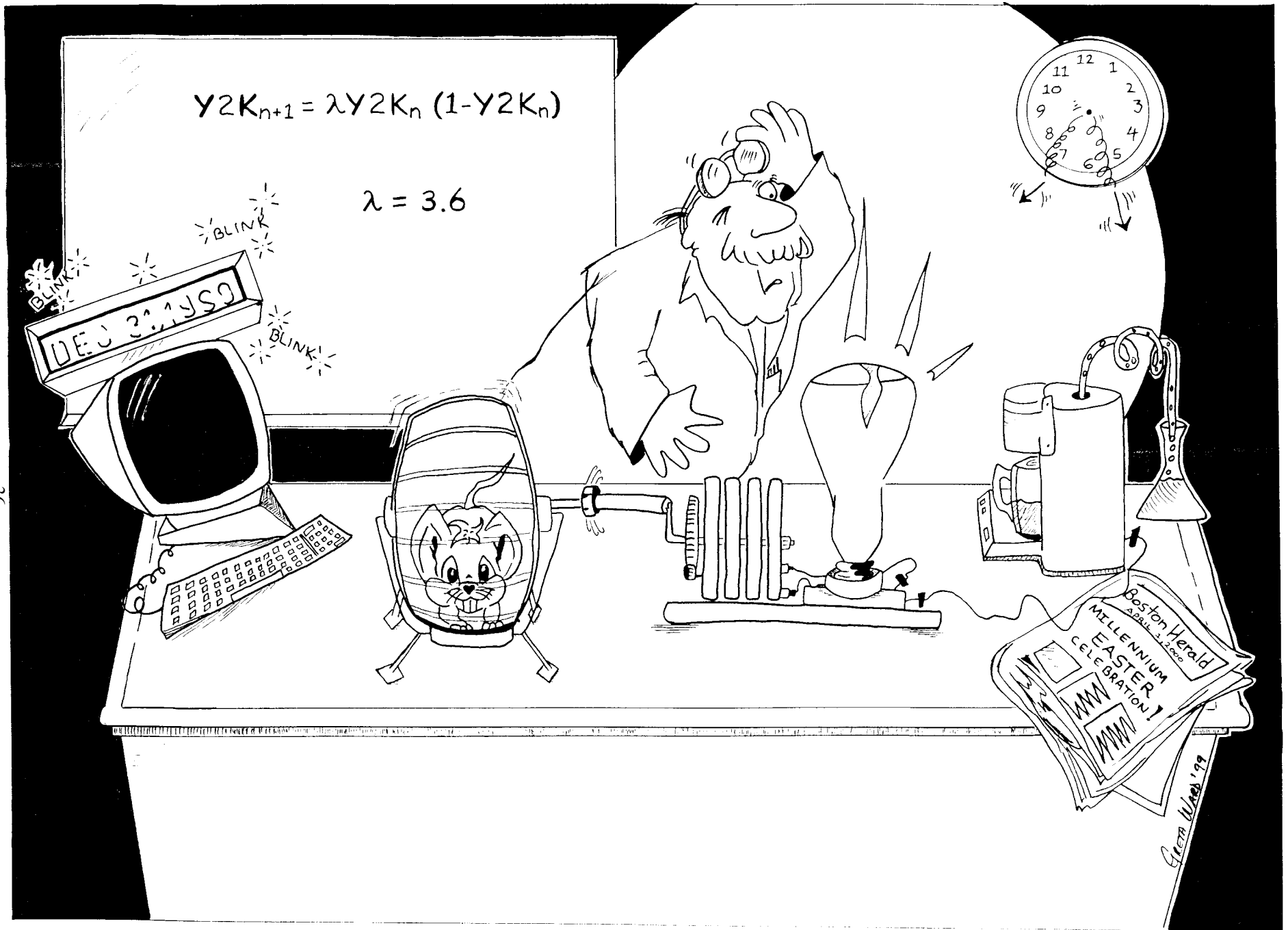
Faculty and Students (1925-1999)



Postdoctoral Appointments (1981-1999)



Source: MIT Planning Office



What Y2K Problem?