

The MIT Faculty Newsletter

Vol. VII No. 2

November/December 1994

In Memoriam

Jerry Wiesner

Howard W. Johnson

For 50 years and more, Jerome Bert Wiesner was a vital part of MIT as staff member, professor, administrator and Corporation member. When he died on October 21, 1994, he left a space in our ranks and in our hearts that will never quite be filled. In an institution where notability is a standard and high reputation is currency, he stood out as scientist, engineer, public servant and academic leader. He was MIT's thirteenth president, science advisor to presidents, a national force in setting science and technology policies, and a

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leader in developing educational and research patterns for more than 40 years. He was, in the truest sense, a superlative citizen and patriot.

He was an intensely complex and intensely decent man, and no simple description will do him full justice. But in the large, what made Jerry such a remarkable personality was his superbly

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Pension Plan Revised: A Good Quick Fix Awaiting An Overhaul

Jack Ruina

At the faculty meeting on November 16, President Vest announced some welcome changes to the Institute pension plan (also described in the November 30 issue of *Tech Talk*). These were steps that partially correct serious deficiencies in the plan, which I discussed in the last *Faculty Newsletter* (Vol. VII, No. 1). The changes alleviate MIT's arbitrary restrictions in pension fund withdrawal options and inequities in the earnings distribution from the Benefit Fund.

The MIT pension plan has been substantially more restrictive in its pension options than most, if not all, other private research university plans, particularly in not allowing the so-called *minimum distribution option (MDO)* – an important choice for many participants. Now, this option will be offered but *only prior to retirement*. At retirement, a participant can withdraw a larger fraction of his/her accumulation than previously permitted and must annuitize the remainder.

Another important change relates to annuities drawn from the Fixed Benefit

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Are Our Students Undereducated? They Think So

Irene Tayler

This is my 19th year at MIT, and ever since I've been here the so-called Humanities have been "troubled." We've tinkered endlessly with HASS distribution, with the writing requirement, with the role of foreign language teaching, and now with the place of the arts. We have just embarked on another experiment that will send us yet another 3-4 years down the tinkering road. The assumption behind all this tinkering seems to be that so long as each department gets a piece of the collective student body, the individual student will get a balanced-enough education. If we HASS faculty (the argument runs) would only look at the Big Picture, we'd see that our curricular concerns really resolve into turf politics.

Maybe so. But when I look at the Big Picture, what I see is quite different. I see class after class of fresh, bright, and relatively unshaped young people arriving at MIT's doors. During the next four years a crucial transition occurs during which they assimilate not only our courses but to a great extent our ethos, our "hidden curriculum" of

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Subscriptions: \$15/year On-Campus
\$20/year Off-Campus

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Editorial

Undergraduates Talk Back

MIT gets much of its international reputation from its status as a renowned research institution. As far as teaching goes, MIT was ranked the number one engineering school this year in *US News and World Report's* national survey. But what do our own students think? The students we admit had the grades and test scores to go just about anywhere for their undergraduate degrees, but they chose MIT. Does the Institute live up to its reputation as an excellent place to learn?

According to a survey of last year's senior class ("1994 Senior Survey"), the first of its kind at MIT, the students have some serious disappointments along with their overall satisfaction with the Institute. Sponsored by the Educational Studies Working Group and Dean Art Smith's Office of Undergraduate Academic Affairs, the surveys were mailed to 1097 seniors and responses were received from 461, with a respondent profile very close to that of the overall class. The shortcomings appear to be concentrated in two areas of the survey – in response to questions about satisfaction with the freshman year, and with respect to improvement in the areas of knowledge and ability which they value. Their evaluations resonate with concerns that are also widely shared among the faculty. How good a job are we doing of educating our undergraduates?

The Freshman Year

MIT freshmen participate in a first-year program which emphasizes basic math and science skills. This is done using large lecture classes, for the most part, with recitation sections which are led by both graduate students and upperclass students. Among the graduating seniors who responded to the

survey, four aspects of the freshman year were identified as being particularly important:

- quality of instruction (92% considered it either somewhat or very important)
- enjoyment of subjects (86% " ")
- intellectual excitement in subjects (81%)
- quality of freshman advising (73%).

cutting edge of technology, basic science, and critical thinking about the impacts of technology. But what do they find when they get here? They find an Institute which shows an indifferent face in lecture halls. They find an impersonal, detached, and largely uncreative approach to teaching math and science. Some learn to feel that they don't matter much, if at all, to their instructors as individuals.

A student who selects MIT is trying to choose a commitment to excellence. The Institute's reputation is one of brilliant, creative research, which represents the cutting edge of technology, basic science, and critical thinking about the impacts of technology. But what do they find when they get here? They find an Institute which shows an indifferent face in lecture halls. They find an impersonal, detached, and largely uncreative approach to teaching math and science. Some learn to feel that they don't matter much, if at all, to their instructors as individuals.

In each of these top four categories, however, the respondents' reported level of satisfaction was low, with only 31-39% describing themselves as being generally satisfied with the freshman year program. In addition, there were strong disparities between the perceived importance of, and levels of satisfaction with, both the degree of personal contact with instructors outside the classroom and opportunities for class discussion.

A student who selects MIT is trying to choose a commitment to excellence. The Institute's reputation is one of brilliant, creative research, which represents the

According to this survey, most of more than a thousand highly qualified students spend this first year feeling dissatisfied or ambivalent about the things they regard as most important — good teaching, subjects they can care about, the intellectual excitement that comes from new insights, and the help they get from faculty advisors.

One of this year's freshmen expressed her impressions in a metaphor about being nourished, saying, "In high school they spoon feed you, making airplane noises to get you to eat; here, they throw

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Undergraduates Talk Back

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the food at you and don't care whether it hits you in the mouth, the nose, the chin...they don't care if you get it in a way that will help you grow.... I have felt like anything could happen to me here, and it wouldn't matter to anyone else." The question is how we as teachers can design a freshman year curriculum (or menu of curriculum choices) which genuinely challenges students to gain insight, to grow in ability – in essence, to care deeply about their own learning process. By and large, the current freshman year coursework doesn't meet those goals. It is an unconscionable waste to ask these students to be intellectually "sidelined" for their freshman year. The introduction they get to the Institute in this way is likely to cause a slow start for these bright, eager 18-year-olds as they enter the remaining three years of study feeling detached and unsupported. That simply cannot be good for them as learners, or for MIT in the long run.

After the Freshman Year

The survey results indicate that while most students are reasonably satisfied with their major and with MIT, there are reasons to be concerned about what they feel they are learning – and not learning – here. (See *M.I.T. Numbers*, Page 28.)

Thus, when they were asked to rank the relative importance of a number of kinds of knowledge and ability, their top five, in order of decreasing importance, were:

- analytical/problem-solving skills (94% important, 93% felt improved)
- self-esteem (88% important, 35% felt improved)
- academic self-confidence (81% important, 47% felt improved)
- writing skills (75% important, 40% felt improved)
- creativity (74% important, 35% felt improved).

Note that of these top five categories, it is only in the first one that our students feel that they experienced substantial improvement and that they expressed much less optimistic views that studying at MIT had improved their knowledge or ability in the other priority areas. The greatest discrepancies between importance of these abilities and improvement in them while at MIT, regardless of the rank in overall importance, occurred in four areas: self-esteem, creativity, public speaking ability, and knowledge of social and political issues. In these and several related respects, our students take a much dimmer view of their education than do their counterparts at other comparable institutions. (See Professor Tayler's article on Page 1.)

This is especially important news for the Institute in so far as perceived deficiencies in these abilities may have interactive effects on MIT graduates. Imagine this scenario – each year, more than a thousand of the brightest students in the U.S. graduate from MIT with excellent "problem-solving" skills, but feel deficient in self-esteem, creativity, knowledge of social and political issues, and public speaking ability. What are their long term career prospects? What kinds of problems will they be likely to try and *solve*? The ones that require personal confidence, moral courage, an awareness of the political and social context, and ability to speak up for the better solution? Not likely.

Unless and until we do a better job of helping our students to strengthen these important aspects of their personal ability, they will be unlikely to apply their skills and intelligence to the kinds of "problem-solving" that is needed to make a real difference in a complex society like ours. But in order to make this contribution, the students themselves

need more than the ability to come up with the right answers to narrowly-defined technical questions. More to the point: we need to help them to develop their self-esteem in ways that will strengthen their courage to pursue significant problems. Toward that end, we, ourselves, need to take a fresh look at the meaning of *mens et manus*.

If we truly aspire to provide our students with a quality education that will properly prepare them to play leadership roles as socially responsible professional men and women, then we need to make this a place in which training in the rigorous application of analytical skills proceeds as part of a broader and deeper technological/humanistic education; one in which students not only learn *how* to apply but where and when to apply their analytical skills; not only what problem to solve but how to identify problems; not just how to provide answers, but also how to ask questions.

Self-esteem, academic self-confidence, and communication (writing) skills are highly interdependent and must be fostered and taught. While engineering and science may be difficult to teach by the use of case studies or some other integrative teaching method, we must find a way to instruct students on how to create and communicate solutions, as well as confidently present and defend their position.

Editorial Committee

The Faculty Newsletter welcomes contributions on any topic of interest to the MIT community. You can reach us by phone, x3-7303; FAX, x3-0458; e-mail, fnl@athena.mit.edu; or inter-departmental mail, 38-160.

From The Faculty Chair**Retirement and Renewal**

Robert L. Jaffe

Jack Ruina's article in September's *FNL* has awakened new faculty interest in the MIT Retirement Plan. His article appeared shortly after a review of certain aspects of the Plan had just been completed by a set of faculty and faculty/administration committees. The recommendations of these committees played a significant role in shaping the Plan changes announced by President Vest at November's faculty meeting. Indeed the review process was largely driven by faculty concerns about career options for older faculty and also about opportunities for institutional renewal in an era without mandatory retirement. I have reported on this project in previous *Newsletter* articles. Given the timeliness of the issue, it now seems a good time to summarize the activity of the past 18 months and to look forward to the next year.

Many of the issues Jack raised require answers from the senior administrators who have responsibility for the Plan and who are familiar with the technical "details" to which Jack rightly calls attention. I believe we will hear directly from them in the near future. Certainly it would not be surprising to learn that the Plan, designed to provide livelihood and security in the days when retirement was mandatory at age 65, needs an overhaul in an era without compulsory retirement.

When I became chair-elect in June 1992 I placed the problem of maintaining faculty renewal in a world without compulsory retirement high on my agenda. Early on I met with Sheila Widnall, who had general responsibility in this area, and set about educating myself. As I learned about

retirement policy issues and the MIT Plan, I became aware of three general categories of problems that had to be addressed:

(i) decisions regarding payout options which had to be made before January 1, 1995 (the date on which our 70-year-old colleagues have to make certain choices regarding their Plan assets);

(ii) the urgent need to develop a template for a meaningful and creative

monopolized the energy of those concerned that it has pushed aside the less pressing matters in category (iii). The good news I would like to report is that the decisions which had to be made before January 1, 1995 have been made – though not entirely to everyone's satisfaction, that the Committee on Faculty/Administration is moving forward on matters in category (ii), and that the Benefits Office, under Joan Rice's leadership,

These changes in the Plan came about through an exemplary collaboration between the faculty and the administration. They represent the culmination of two years' activity on the part of several faculty and faculty/administration committees. At one time or another since January 1993, the Committee on Faculty/Administration (CFA), the Faculty Policy Committee (FPC) and the Steering Committee on the Strategic Review of Benefits (SRB) all studied and recommended policy on these issues. All these committees have significant and vocal faculty representation.

continuing relationship between the retired faculty and the Institute; and

(iii) the need to update Plan services and options especially with respect to flexibility and counseling.

I set to work generating consideration of these issues within the faculty.

In contrast to the impression given in Jack's article, there has been a lively and sophisticated debate during the past two years within faculty and faculty/administration committees on the issues in categories (i) and (ii). In fact, the debate on the time sensitive issues in category (i) has so

has been asked to move ahead quickly on (iii).

At the recent faculty meeting President Vest announced several changes in the Plan (voted by the Executive Committee of the Corporation at its November meeting), which address issues in category (i). The most significant decisions were:

(1) to "uplift" the annuity purchase rate and market value adjustment on a temporary basis (Jack Ruina's article provides an excellent introduction to this issue) to correct for the unusually low rates paid in recent years;

(Continued on next page)

Retirement and Renewal

Jaffe, from preceding page

(2) to allow cash-out of a significant portion of member's accounts (approximately 2/3) upon retirement; and

(3) to permit plan members to make an irrevocable decision before January 1 after reaching age 70 1/2 to defer commencing his/her annuity and to receive the minimum distribution required by law until retirement.

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I am particularly grateful to John Hansman and the members of the CFA who spent last year studying cash-out options (2) and minimum distribution options (3). Along the way, Hansman's committee interviewed almost a dozen faculty ranging from emeriti, to those about to reach age 70 1/2, to senior and mid-career faculty concerned about renewal.

Also, since I became chair, I have led discussions on retirement policy and faculty renewal at meetings of department heads, Academic Council and the Corporation Executive Committee. I have written about the problem several times in this column and talked with faculty young and old on a great many occasions.

Faculty retirement has long provided a dependable stream of resources for

renewal at the Institute. The end of mandatory retirement will almost certainly diminish that flow for a while and result in a graying of the faculty in equilibrium. Faculty who think about changes in the Retirement Plan have had to struggle with the potentially conflicting goals of encouraging

retirement at other universities. These recommendations were presented to President Vest late last spring. After many discussions with faculty and administration who had been involved in the process, President Vest decided to implement MDOs immediately, for reasons he has indicated he will describe

Faculty retirement has long provided a dependable stream of resources for renewal at the Institute. The end of mandatory retirement will almost certainly diminish that flow for a while and result in a graying of the faculty in equilibrium. Faculty who think about changes in the Retirement Plan have had to struggle with the potentially conflicting goals of encouraging retirement and optimizing financial flexibility for individuals.

retirement and optimizing financial flexibility for individuals. Debate on these issues within the committees was lively. There was general agreement that the annuity purchase rate should be temporarily raised while the formula which controls it is reexamined, and that enhanced cash-out options should be offered to retirees. However, there was concern that certain other options under consideration might build significant retirement disincentives into the Plan. Two which attracted the most attention were cash-out options for faculty who choose not to retire and minimum distribution options (MDOs). In the end the SRB, drawing upon the work of the CFA and FPC, made recommendations essentially equivalent to changes (1) and (2). On MDOs, they recommended caution and suggested waiting five years while studying the effect of MDOs on

at a faculty meeting or forum in the near future.

Personally, I am looking forward to moving the focus of the retirement and renewal debate onto the issues in category (ii). It seems clear that older faculty want the option of maintaining an active and intellectually stimulating connection with the Institute. The challenge to the faculty community as a whole is to craft a set of support and service opportunities for retired professors which will make retirement a distinguished and desirable path. As John Hansman outlined at the November faculty meeting, the CFA has begun to collect data and faculty opinion on this subject. I hope that the process set in motion by faculty two years ago will continue to move forward and that those of you who want to contribute will join in.♣

The Institute for Learning and Teaching

How A City Works: A Professional Development Institute for Teachers

Leon Trilling

The Institute for Learning and Teaching (TILT) provides professional development opportunities for school teachers. It also opens their minds to the notion that some systemic reforms will be needed before they can fully apply the new ideas they learned.

In fact, TILT is one activity which grew under the umbrella of the MIT Council on Primary and Secondary Education and now draws support from a variety of public, foundation, and private sources.

We felt that city children might be attracted to the study of technology and science if they saw it as a way to understand their social and material surroundings and eventually as a way to control them. We therefore tried to prepare some of their teachers to examine “how a city works”; to define the resources locally available to them for the purpose, and to encourage them to design open-ended interdisciplinary hands-on projects suitable for their students. We discovered that it was also essential for us to develop the teachers’ leadership abilities and their teamwork skills. Finally, we concluded that the teaching and learning styles required by this approach would not fit comfortably in the current institutional and schedule mold of most American public schools, and we were therefore led to include the need for systemic change (and some ways to achieve it) in our message to the teachers with whom we worked.

Our strategy is to invite the participation of teams from particular schools and school districts. A team generally consists of five teachers drawn from one school – occasionally a high school or a vocational school and one of

its feeders – teachers of math, science, vocational skills, social studies, or English. In addition, the team includes one school administrator and one lay person drawn from the community served by the school – a parent, an academic or an engineer, a businessperson, and occasionally a school board member.

Ten teams attend a three week residential workshop at MIT in July and then participate in a follow-up program which includes particularly the organization of an activity on their home turf in the following spring or summer to share their new wisdom with colleagues and lay plans for local school reform.

The Summer Program

During the first week of the summer program, the teams perform a series of simple tasks designed to get them to work together as a unit. For example, they build a bridge out of wrapping paper and tongue depressors, which spans 18 inches and supports a 12 ounce robot vehicle six inches wide. The materials are assigned a price and a prize is awarded to the team who builds the cheapest bridge able to carry the load.

The teachers also brainstorm to create a “wish-list” of changes which would improve the operation of their school – they return to that list in the third week of the workshop.

In the latter part of the first week, they participate in field trips to see for themselves how a central telephone switchboard works, how the Massachusetts Bay Transit Authority schedules and maintains its trains and buses, or how a water treatment plant works. They hear several background lectures given by MIT faculty or engineers practicing in the urban technologies.

They become familiar with the notion of “webbing” or creating visual models of how the physical and institutional components of a system interact. (For an example, see “How Do People Become Homeless?” on Page 8.)

At the end of Week One, the participants are ready to undertake technical assignments. These focus on the supply and treatment of water and on mass transit in 1992, on the construction of public facilities and the workings of an urban telephone system in 1993, and on electric light and power networks and public health and health delivery services in 1994. In 1993, the teams undertook the following projects:

Construction Projects

1. Concrete technology
2. Zoo design
3. Providing handicapped access to an old MIT building
4. Transitional housing for the homeless
5. Design of a solar house

Telephone Projects

1. The AT&T “500” telephone
2. Telephone switching
3. Telephone security
4. Cellular telephones
5. Fibre optic transmission

In each case, the participants researched the technical and societal background of their project, acquired some understanding of the underlying science and technology, built a working model (or a mock-up in the case of the zoo design project) and wrote a report of their
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How A City Works

Trilling, from preceding page

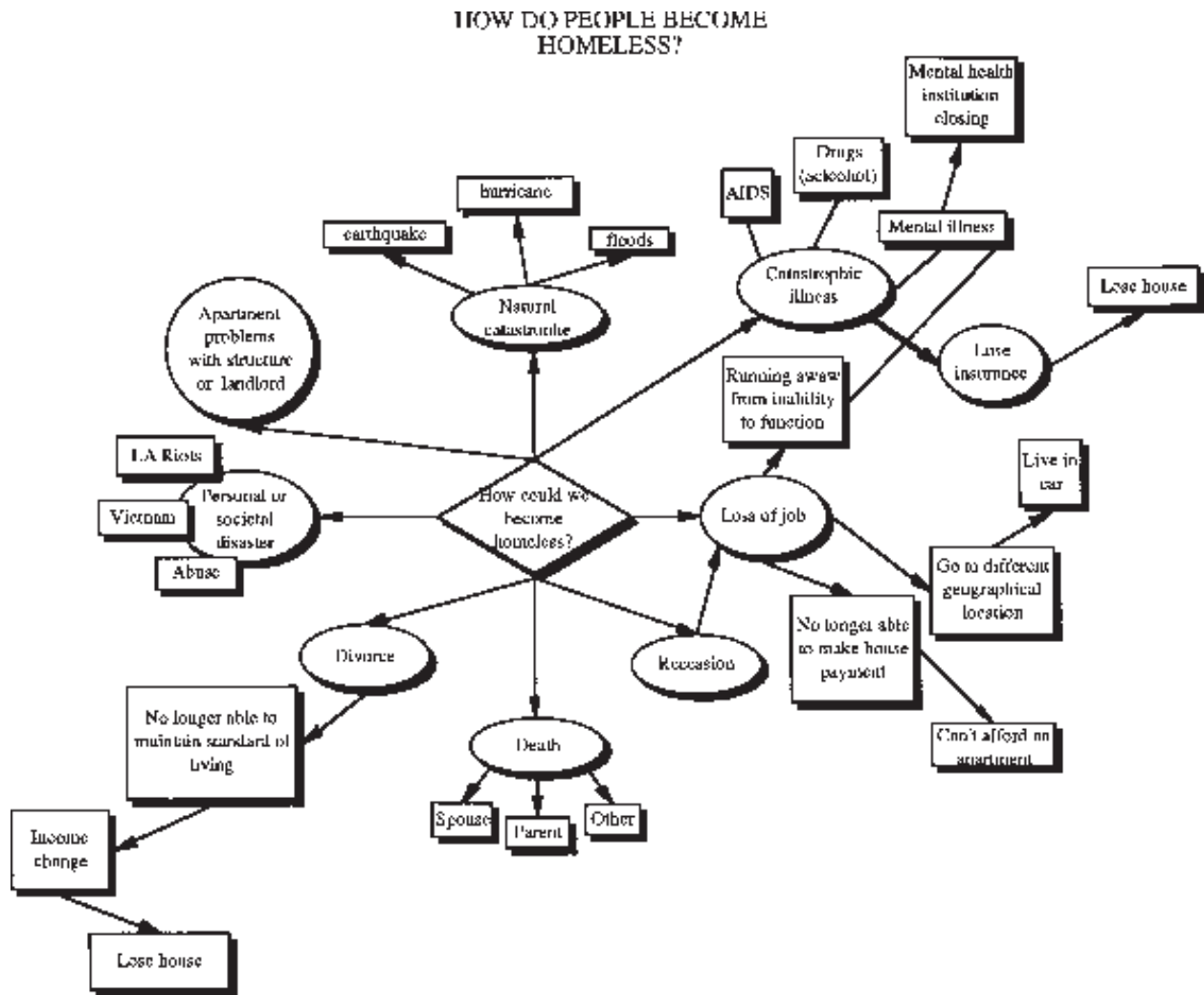
activity. Early in the third week of the workshop, each team displayed their project in the style of a "science fair." In carrying out their work, each team had the support of an advising group consisting of an MIT faculty or staff (or a local senior engineer) and an MIT undergraduate. The senior advisor was not a specialist in the field of the project,

among team members, and to give everyone a chance to contribute to the common work.

The technical part of the exercise included floor plans of several alternative temporary buildings and a scaled down plywood model. The technical design team consisted of teachers from different systems – in this case from Boston,

reassemble in geographical teams in the third week to compare notes and draw conclusions appropriate to their circumstances.

Indeed, the third week is devoted to group discussions of the dynamics of systemic change in schools, to the stresses and insecurities which result from doing things in a new way, particularly when



so that he/she was also learning as the project went on

It turned out, in fact, that the advisor's main task was not to guide team members in the intricacies of the technologies involved, but rather to facilitate teamwork, to moderate arguments

Yarmouth, Maine, and two schools in Dallas. Geographical teams stay together the first week to discuss their school system, include teachers from different systems both to encourage exchanges of views and to give teachers a chance to pick their project, and then

the teacher sees her/his role shifting from that of the ultimate authority to that of a fellow investigator. Some time is also spent in starting the planning of the local follow-up activities which each team is committed to undertake.

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How A City Works

Trilling, from preceding page

We emphasize that our goal is not to produce curriculum materials or to encourage teachers to produce such materials. It is rather to introduce them (or re-introduce them) to the examination of their school as a system (and a component of a larger system), and to urban technologies as systems, in the hope that they will see useful analogies which will color their subsequent planning. In fact, the participation of administrators and community representatives is essential to that process.

The Follow-up Winter

The follow-up activities during the school year are designed in the light of these expectations. They include a hotline and the opportunity to network by e-mail (America Online) and by telephone conferences; the option of school systems to invite their advisors (particularly the MIT undergraduates) for visits during IAP and the use of materials developed in the summer, where teachers find it comfortable. We visit classrooms where the teacher takes advantage of the “webbing” technique, and classrooms where the students build models of cities which emphasize their technical underpinnings. But the main business of the team’s follow-up is the planning of their activities for the following year.

This includes some system-wide discussions to define the target participants – usually teachers at other schools in the system – and the format and topic of the planned activities. One school system is using their local resources and some support from MIT to collect materials and ideas for curriculum units on health care in a broad context (e.g., what is “illness” in various cultures; how are epidemics handled – and on what basis; and how does the public health system work in their community and provide jobs in health related industries).

Another has scheduled a three-day workshop entitled “Opening the Door – Educators Exploring a Factory Environment,” open to any team of two or more teachers who work together. It aims to improve collegiality within the school community and between school and business communities, to develop a better understanding of systems, to see how a factory works, and how to design demonstrations which can be used in the classroom.

appropriate in some form for their students. They also concluded that learning to work in teams and undertaking projects without knowing the outcome in advance called for difficult personal adjustments – they were forms of risk taking both exhilarating and slightly frightening. Predictably, most teachers claimed that the agenda was too charged and did not leave enough time for personal thought; and that the way their projects were

We found that most of the teachers liked their experience on the whole. They realized that they could understand technology in a societal context, and most of them thought that what they discovered was fascinating and appropriate in some form for their students.

Evaluation

How does one evaluate this program? Its goal is to change the attitudes of the participating teachers; in the expectation that in due time that change will have consequences on the learning of their students and on the operating style of their systems. It is too early to measure such consequences, which will emerge slowly over a number of years. But it is possible to get a sense of the teachers’ reactions, from a combination of questionnaires and of free writing exercises done over the first year of their participation, and from observation of their actions during the year.

We found that most of the teachers liked their experience on the whole. They realized that they could understand technology in a societal context, and most of them thought that what they discovered was fascinating and

organized and displayed overemphasized competition between teams – a somewhat unintended reflection of the MIT style on the workshop activities.

But the most directly observable effect of this program lies in the degree of enthusiasm and skill with which the participants organize their own workshops and work at changing their immediate surroundings and their personal learning and teaching style. So far, with much encouragement, they are beginning to change.

[This article is an adaptation of a paper accepted for publication by the *Bulletin of Science Technology and Society*. The members of the TILT Design Team include: Debra Aczel, Linda Breisch, Chris Craig, Alan Dyson, Arthur Steinberg, and Leon Trilling. This article is a description of their collective work.]✦

Writing Initiative Attempts to Bridge Technical and Humanistic Education

Rosalind Williams

One of the most vexing problems in engineering education today involves the no-man's [and no-woman's]-land between technical and humanistic education. In this zone lie knowledge and skills that are directly related to professional engineering practice, but that do not directly involve technological or scientific expertise.

In the spring of 1993, an Interschool Working Group, convened under the auspices of the Committee on the Undergraduate Program, identified three non-technical areas in which engineers need professional education. The Group concluded that engineers need to understand the relationship of engineering practice to the larger society and culture (for example, political opportunities and constraints); that they need to understand the relationship of engineering to the sponsoring organization (for example, financial opportunities and constraints); and, finally, that they need to be able to communicate engineering knowledge effectively (writing, speaking, foreign languages).

As the engineering profession evolves in a context of rapid global change and corporate instability, engineers increasingly need to be able to assume a variety of managerial and entrepreneurial roles. Accordingly, the need for professional education in non-technical areas is becoming ever more crucial. MIT's School of Engineering is responding to this challenge in a variety of ways. For example, it has sponsored development of a subject focusing on open engineering systems, and, even more ambitiously, it seeks to create a new program focusing on the design and management of closed engineering systems.

Efforts to improve the non-technical side of engineering education are a challenge for the entire Institute, not for one School alone. MIT's ability to shape the future may well depend upon our collective ability to meet this challenge. First, however, we should heed the lessons of the past. At MIT and elsewhere, efforts to educate engineers in non-technical skills have raised two persistent questions: *who* will teach these skills, and *how* to make them an integral part of engineering education.

Staffing is an issue because at most colleges and universities, and certainly at MIT, faculty are hired and promoted for pushing forward the frontier of their discipline – not for lingering very long in a pedagogical no-man's-land. Also, while nearly all faculty can agree on the need for non-technical professional engineering education, most feel unqualified to provide it themselves. Since most engineering faculty are not trained in political science, economics, and communication, they look to the humanities and social science faculties for instruction in these areas. Most of *these* faculty members, on the other hand, follow training and career paths unrelated to the professional needs of engineering students. Some engineering schools (such as Cornell and the University of Virginia) have addressed this dilemma by developing a separate faculty charged with non-technical engineering education. This solution is expensive, however, and it is not always easy to attract and retain first-rate teachers in an overtly service role.

Equally daunting is the challenge of finding appropriate curricular mechanisms for integrating non-technical education into the engineering curriculum. While some engineering

teachers try to incorporate “broadening” material into their technical classes, they are always pushing against not only the limits of their own training, but also the limits of teaching time. Class time is finite, and is already overflowing with technical material.

An alternative possibility is for engineering students to take separate classes in areas related to their professional interests. This curricular mechanism is often used at MIT, where many engineering undergraduates take subjects in economics or management as part of their professional education. When this mechanism was discussed in the Interschool Working Group, we retraced some of the familiar arguments about curricular turf: in this no-man's-land, should these subjects “count” as part of an engineering major, or as part of the HASS requirement?

We quickly discovered, however, that such quarrels miss the more serious problem, which is that most of these separate classes fail to focus on the needs of engineering undergraduates. SHSS disciplines have their own definitions and professional goals not necessarily related to those of engineering disciplines. Furthermore, because students in these classes may not share common knowledge about a technical field, the pedagogy and assignments are bound to be rather generic. As a result, students often have difficulty connecting the instruction with the specific demands of their engineering field.

There is no single or simple solution to the challenge of improving the non-technical side of professional engineering education. In the specific area of communication skills, however, one response has proved highly promising,

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Writing Initiative Attempts Bridge

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and deserves consideration as a model for addressing the larger challenge.

This is the Writing Initiative, jointly sponsored by the School of Humanities and Social Science and the School of Engineering. Two years ago, Dean Philip Khoury of SHSS and Dean Joel Moses of Engineering combined resources to sponsor a three-year Writing Initiative, beginning in AY 1993-1994. In serving as faculty director of the Initiative, I have worked closely with Edward Barrett (senior lecturer, Program in Writing and Humanistic Studies) and with Leslie

for that engineering subject; to prepare additional assignments, especially ones dealing with managerial and organizational issues; to edit each other's work; to develop leadership and discussion skills in a small group setting; and to give formal and informal oral presentations.

At this point, engineering students are neither coerced into taking a practicum (it is not required) nor bribed (there is no formal connection, at this point, to Phase II of the Writing Requirement). Students simply get six units of free elective

liberal arts faculty, and graduate fellows. Whenever possible, we try to match the expertise of the graduate fellow to the subject matter of the core class. Whether or not this is possible, the teaching fellow may consult at any time with the engineering faculty member about issues of technical expertise.

The exact relationship between each practicum and its engineering class is highly flexible. Each practicum is a singular blend; each combines coaching on some highly specific assignments with a much more general exploration of the social, managerial, and human dimensions of the engineering process. When students participate in peer review, small-group sessions, and oral presentations, they are developing not only communication skills but also their awareness of the relationships between the technical and managerial dimensions of engineering practice. When their assignments require writing or speaking to a non-specialist audience, they must address the larger social issues involved in their technical work.

The practica therefore extend the long-standing and highly successful tradition of MIT's Technical Writing Cooperative. In the Co-op (as it is often called), instructors from the Program in Writing and Humanistic Studies go into engineering classes to give presentations about written and oral communication, and sometimes to provide feedback to students on particular assignments. This instruction is valuable, but it is usually minimal, and does not offer opportunities for significant feedback or for peer discussion. There is simply not enough time to shoehorn technical communication into already existing technical classes. Mastery of communication skills requires extended effort from students, and also from

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Mastery of communication skills requires extended effort from students, and also from teachers, who have to give highly labor-intensive, individual feedback, both written and verbal. With the satellite-core class model, this time is made available to students who are working on common writing tasks on the basis of common technical knowledge.

Perelman (assistant dean and coordinator of the Writing Requirement, Undergraduate Academic Affairs). Through their collaboration, the Writing Initiative has also benefited from the support of the Program in Writing and Humanistic Studies, and from and the office of the Dean for Undergraduate Academic Affairs, which has generously provided space and staffing.

The basic design of the Writing Initiative is simple. Satellite writing classes, called practica (we are trying to add a touch of Latinate elegance to the Institute), are attached to upper-level engineering classes. All students in the technical subject are eligible to sign up for the practicum attached to that class. Each practicum offers a small group of students (up to 15) an opportunity to work intensively on writing assignments

credit, and a strong expectation, encouraged by most of their instructors, that working on written and oral communication in the practicum will help them master the technical material and will also help them communicate more effectively as professional engineers.

The practica are taught by graduate student teaching fellows drawn from a variety of disciplines, both technical and non-technical. These graduate fellows are selected and trained in a semester-long series of workshops run by Leslie Perelman and Edward Barrett, with assistance from other members of the SHSS faculty. During the semesters in which they teach, the graduate fellows are supervised jointly by the liberal arts and the engineering faculty. In terms of staffing, the practica engage true collaboration of engineering faculty,

Writing Initiative Attempts Bridge

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teachers, who have to give highly labor-intensive, individual feedback, both written and verbal. With the satellite-core class model, this time is made available to students who are working on common writing tasks on the basis of common technical knowledge.

An advisory committee including a member of the MIT engineering faculty (Professor Michael Golay, Nuclear Engineering) and outside experts was assembled to provide general assistance in designing and evaluating the Writing Initiative. During AY 1993-1994 we developed a wide range of procedures (including both numeric and open-ended instruments) to evaluate the first year's experiment, and we have prepared an extensive report on our results. (If you would like to receive a copy of the full report, please call Annie Publow, Dean Perelman's administrative assistant, at 3-3039.)

While there is not space here to summarize that report, the overall result is clear: the Writing Initiative is considered highly effective by the faculty members connected with it, by the graduate teaching fellows, and above all by the undergraduate students. On the 1-7 scale of the Course Evaluation Guide, for example, students gave average ratings of 6 or better to the practicum for quality of presentations, extent of class participation, and overall quality. Just as important, students enjoyed the practica. This comment by a student is typical of responses in general: "Very useful. Even [though] a lot of work. I learned a lot. Absolutely worth it." Students particularly welcomed opportunities to give oral presentations: they praised this as one of the best aspects of the practicum.

For their part, practicum instructors welcomed the opportunity to work with motivated students on a broad range of humanistic concerns in the context of

communication skills. Dr. Barrett summarized his experience in an end-of-the-year report on his practicum, which was attached to 16.621 (Experimental Projects Laboratory):

My assignments were closely structured on the very clear cycle of documentation that forms the spine of the projects lab, a series of written and oral presentations of student experimental projects, from initial statements of projects, through oral and written proposals, design reviews, and progress reports. All writing and all curricular materials were exchanged online over the Athena network, both in and out of class; in essence, the class was always in session, with drafts of reports exchanged and annotated online by the instructor and by student peer groups.

The class prized a dynamic, process-driven structure of assignments, with careful attention paid to the conceptualization of projects and the clear communication to a wider audience of the aim and usefulness of a project. This attention to aim and purpose was facilitated in class by face-to-face discussions around a seminar table, in conjunction with reference to individual computer workstations within that seminar room, with large-screen projection capability for discussion of student writing and other materials....

...I can only add that...the practicum class has been by far the best teaching experience I have had – and by that I mean, I feel that I have taught a class that involved all the students on both a professional and personal level, a class that offered them the opportunity to explore how to think, how to write, indeed, how to conduct oneself in a highly professional, ethical, and human fashion no matter what the field of student or application happens to be.

As Dr. Barrett's comments suggest, when Writing Initiative instruction takes place in an electronic classroom, the practica offer opportunities to explore a range of issues involving the interaction of thought and communication as rhetoric evolves in the electronic age. Dr. Barrett has begun to create a series of intricately hyperlinked multimedia texts that include sample documents, commentaries, videos, still images, and databases, all tailored for specific engineering disciplines. The goal is to create a MacIntosh-based, off-the-shelf software integrating textual, graphical, and oral elements in a seamless instructional web. Besides bringing the teaching of technical communication into the electronic age, these multimedia texts will offer splendid opportunities for advanced research in computer-based communications.

However seductive these electronic possibilities, they should not divert our attention from the intellectual heart of the Writing Initiative: its genuine integration of humanistic and technical education. Our evaluations show that as students improved their ability to express themselves in written and oral forms, they also improved their ability to perform the technical work of the primary class. In the words of Professor Ian Waitz, commenting upon the 16.621 experiment:

The coupling of the Experimental Projects Laboratory and the communications practicum has been an unqualified success. Not only have the students demonstrated increased ability to express themselves in written and oral forms, but they have also developed a greater capability to perform original research – the primary focus of the class. This result exemplifies the interdependence of clear thought and clear expression. ❖

UROP: 25 Years – And Still Counting?

Norma G. McGavern

This is a year that should be one of happy celebration of UROP's successful quarter century. Instead, many of us are worried more about UROP's next 25 years. In last November's issue of the *Faculty Newsletter* [Vol. VI, No. 2], I discussed some problems UROP would face in the year ahead. Faculty and students are now experiencing these problems. We are working hard to adapt to altered policies about overhead, employee benefits, and shared funding.

New rules

The changes affecting UROP are the very direct and specific results of regulations governing sponsored research contracts, and surely *not* devised to cripple undergraduate research at MIT. These regulations, described in numerous campus newspaper articles last year, are part of Office of Management and Budget document A-21. The type of research that is subject to overhead is defined in a section labeled G.2. [This is the relevant language in G.2: "Indirect costs shall be distributed to applicable sponsored agreements and other benefiting activities within each Major Function *[as listed elsewhere in the document]* on the basis of modified total direct costs, consisting of all salaries and wages, fringe benefits, materials and supplies, services, travel and subgrants and subcontracts up to the first \$25,000 of each subgrant or subcontract (regardless of the period covered by the subgrant or subcontract). Equipment, capital expenditures, charges for patient care and tuition remission, rental costs, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of \$25,000 shall be excluded from modified total direct

costs. *Other items may only be excluded where necessary to avoid a serious inequity in the distribution of indirect costs.* [Italics mine.] For this purpose, an indirect cost rate should be determined for each of the separate indirect cost pools developed pursuant to G.1. The rate in each case should be stated as the percentage which the amount of the particular indirect cost pool is of the modified total direct costs identified with such pool."] UROP stipends paid by faculty from sponsored research grants fall into this defined category. It means we can no longer waive overhead as we did from 1973 until July 1994. This amounts to actively discouraging the use of faculty money for student stipends. In jeopardy is more than \$4.7 million in UROP stipends. This was the amount paid to UROP students last year by faculty from sponsored research with overhead waived by UROP.

While these federal regulations actively limit MIT's research opportunities for students, undergraduate research is being simultaneously encouraged at the federal level. Some federally supported undergraduate research stipends are expected to be free of overhead. NSF's Research Experiences for Undergraduates (REU) Supplements and Sites programs are good examples. Many colleges and universities around the country have built their undergraduate research programs – an aim of this NSF effort – on this kind of federal support. Nationally, over 200 programs now offer undergraduate research. Most were created in the past decade. Not one matches UROP in size or scope. Only one program (at Rensselaer) managed to waive overhead as MIT did.

Policy efforts last year

The UROP Working Group appointed by Provost Wrighton last winter had a simple agenda: to see what can be done about changing the new regulations, and consider means for keeping UROP strong. When the Working Group first convened in February last year we believed employee benefits of 43.5% would be charged on UROP stipends, and that there would be 55% overhead on top of that. We did not know how special funds would be treated, nor did we know what would become of UROP's own funds. Chaired by Professor Jim Elliott of Earth, Atmospheric, and Planetary Sciences, the Working Group issued a short report on May 1st that contained several specific recommendations. One of these recommendations, lobbying to get the rules changed, was energetically taken up by Raaj Chitale, '95, a student member of the group. The committee also recommended more vigorous fund raising for UROP and finding other ways of supporting students in undergraduate research. By the time the committee's work was done, some changes had already happened, or begun to happen. One was the lowering of the employee benefits rate by MIT, for UROP only, from 43.5% to 8%, and a few weeks later to 6.5%. Another change having an immediate effect last summer was \$1 million given by the provost to cover the added costs of overhead and employee benefits on stipends faculty paid from sponsored research during July and August. This money, plus the low 6.5% employee benefits rate, enabled students and faculty to have a "normal" summer. Some 930 students participated, a number close to the 1992 and 1993 figures of nearly 1,000 students.

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Washington lobbying

Working Group member Raaj Chitale organized a small undergraduate lobbying group, and won support and encouragement for the trip from the provost. In April, Raaj, Eileen Brooks, '94, and James McLurkin, '94 headed for Washington. With the help of MIT's Washington office, they were able to meet with virtually all those agencies and individuals who have a role to play in this issue. A measure of their success is the powerful enthusiasm they generated in Washington and the continuing discussion that is the result.

Although there have been some changes made to the A-21 document since the students' Washington visit, there have been none that would affect UROP. Nevertheless, the UROP overhead situation has been given serious consideration. The issue has come to the attention of Presidential Science Advisor Gibbons and Admiral Pelaez, head of the Office of Naval Research. No opposition to a reversal of overhead policy for UROP has surfaced. As for UROP's present status, the Office of Science and Technology Policy and the Office of Management and Budget have begun to explore further changes in A-21 as the FY 1995 budget is submitted to Congress, and the UROP question may be addressed in this round of discussion. In this context UROP would likely be a minor agenda item. Assessing the odds, Jack Crowley, director of MIT's Washington office, put it this way, "If the review process permits an opportunity to revisit this issue, it may get a favorable review." Provost Wrighton is currently serving on a special committee of the Association of American Universities on indirect costs. Crowley regards this as "another window on the process and an avenue through which to keep the UROP question on the national agenda."

Operating under the new conditions

When stipend support is plentiful, few questions are asked about how much money there is to go around or about the criteria that determine suitability for UROP support. Things are different now. When only one student out of a potential UROP group of three or four may be able to get UROP funding, students and faculty are understandably motivated to ask *Why*. The truth is, although funding must be packaged differently, the standards and operating principles are the same. But less money joined with high expectations of doing UROP for pay does not make a happy equation.

This is how our own UROP funds are being distributed now. Our resources for this fall semester are roughly \$125,000, one-quarter of UROP's annual budget. Summer accounts for half. (In practice, we try to reserve a bit more money for the spring than the fall since spring is a time of greater demand.) Money budgeted for fall is being used to pay stipends that must now be 100% UROP-funded. We can no longer share funding with faculty (the 60%-40% split we had as a goal for more than twenty years). This \$125,000 figure excludes the few thousand dollars we set aside for our January Mentor Program and the larger but still modest amount we have set aside as "discretionary" money to help needy faculty who can manage to pay a student from sponsored research funds, but cannot afford the additional costs of employee benefits and overhead. The portions of this "discretionary" money we are able to grant are small (\$400 at most to any one faculty member) but will at least cover some 60% of the additional costs.

Criteria for supporting proposals are the same as they have always been. With so many new faculty and so much

change, a brief summary of criteria may be in order. By the time UROP sees any student's request for funding, the proposal already has received a degree of endorsement from the faculty member who will supervise it, and from the department or laboratory UROP coordinator. Priority for funding is a function of several characteristics that are listed yearly in the *UROP Directory*. These are: a clear and convincing proposal that describes the work to be done, working with new faculty, a responsible UROP track record, a history of having received little or no funding in the past (or working for a faculty member for whom this holds true), evidence of faculty enthusiasm, support for the proposal from the departmental UROP coordinator, and—availability of funding. What the UROP office adds to this list is our obligation to make a reasonable and equitable distribution of our funds throughout the Institute. This does not mean having a set budget for a given area; funding needs shift among disciplines, and the interests of undergraduate researchers fluctuate.

The outcome so far this year

In the days when there were fewer demands on funding UROP could give money away for a period of weeks, ending only when the money ran out. Until a year or so ago, the time when money ran out did not arrive until well into October for the fall term proposal round, and well into late February or early March for the spring round. Few students were greatly disappointed if they were turned down late in the semester, for they knew there would be plenty of opportunity in the next funding period. Actual granting of funds (as opposed to merely reviewing proposals) was never based purely on timing. An early proposal may have been more likely

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to be considered, but was not necessarily a sure candidate for funding. This fall we let the funding door stay open for a pre-announced two week period ending September 16th.

All our budgeted stipend money was given out by the final week of September. Money was awarded to 135 students. Few faculty supervisors requested direct UROP funding for more than two of their students. This was fortunate, for we had to limit funding to one student per faculty supervisor. To further slim the budget, some nine freshmen were not funded, but encouraged instead to get a semester's experience by way of credit with the understanding they would be given priority for pay in the spring. Some of these freshmen ended up being picked up by faculty funds. The small amount of UROP money set aside as "discretionary" was distributed among 25 faculty who, although they could afford the stipends, were unable to afford the added costs. UROP administrator Debbie Shoap, concluding this funding round, commented that "Most faculty supervisors felt that the manner in which this was conducted was equitable." She was also impressed that "Many faculty were willing to pick up the cost of a second student."

It is still not far enough into this academic year to clearly see changes in UROP participation. Reading the comments made in evaluations of summer work sent to us by faculty and students led us to anticipate that about 300 students would be paid by their faculty supervisors this fall. These faculty at least have the advantage of UROP's low employee benefit rate of 6.5% that results in a stipend inflation of 62% (6.5% employee benefits plus 52% overhead on both stipend and employee benefits). Last fall about 700 students received stipends from UROP's money,

sponsored research, or a combination of the two. About 250 received credit. This fall UROPers paid by UROP, plus UROPers paid by faculty, may together number between 400-500 students. If we assume a slightly higher participation rate in the spring, we may add an additional 500-600 students in the spring semester for a rough total of 1,000 paid UROPs for the entire academic year. This would be down nearly 40% from last year. Next summer we will doubtless be looking at a similar percentage loss.

Last year 589 students worked for credit during fall and spring terms. Credit UROPs will undoubtedly increase, perhaps as much as 20%, but we probably should not expect a great increase. Two years ago a UROP survey asked undergraduates whether they would have done their UROP for credit or as a volunteer if money had not been available; 53% replied "No." In the same survey students were asked to rank what they most hoped to gain from their UROP experience. Pay was ranked as second of 17 possible choices. Top-ranked was "research or professional experience." Ranked below "money" was "experience in preparation for a career in this area," followed by "technical expertise" and "recommendation for graduate school or professional position." Fourteenth was "academic credit." Since a form of transcript credit is now available to recognize paid UROP work ("URN" Undergraduate Research with one non-degree unit), the need for UROP elective credit is unlikely to climb greatly.

Still counting on a future

Additional money will certainly be coming to UROP this year as the result of several ongoing fund raising efforts. UROP is the star of this fall's alumni/ae fund drive. A Campus Visits program on November 4th highlighted Media Lab UROP students. A Corporate

Fellows Program is hoping to attract industrial support to UROP. We have been making a case for UROP with a number of donors. Every year donations to UROP increase by a few thousand dollars. However, ensuring financial support on a level substantial enough to keep paid UROP a viable choice will take continued attention and more funding than we are likely to gain this year alone.

It is clear that UROP will survive, something that was not obvious last spring. UROP still fits MIT students and faculty better than just about anything else students and faculty do together. Every piece of data tells us this: responses to the UROP survey of two years ago and to the 1994 Senior Survey, the UROP evaluations from faculty and students, UROP's role in attracting students to MIT, the number of professional conferences at which UROPers present their work, their ever-growing professional publications, and the obvious pride students exhibit when they talk to anyone about their involvement in research.

What makes this current struggle especially poignant right now is the fact that it was exactly 25 years ago, in fall of 1969, that UROP began. The notion of linking students and faculty through research was a radical one in those fractious days. It took hold right from the beginning because it was exactly right for MIT. Professor Margaret MacVicar, the late dean for undergraduate education, was the person who had the vision to see exactly how it would work. It has worked, as we all know, very well indeed. With continued support from our president and provost, faculty and alumni, I believe we will be able to continue to keep UROP the most significant program of its kind in the country. What a fine thing it would be if we had Margaret MacVicar here to help us do it. ❖

Committee on Academic Performance**Intermediate Grades at MIT**

Nigel Wilson

The MIT grading system has been the subject of various reviews and studies over the past 50 years. Some of these reviews have focused on specific aspects of the grading system, while others have been broad, encompassing many facets at the same time. While some very significant changes have resulted from these reviews, notably the introduction of freshman pass/fail in 1968, freshman pass/no record grading and the junior/senior pass/fail option in 1973, and the elimination of the grade of E in 1967, many aspects of the grading system have remained untouched.

In the past year the Committee on Academic Performance (CAP) has been addressing one aspect of the existing system which has been present as far back as records go – the lack of intermediate grades between the letter grades of A,B,C and D. It should be clearly understood at the outset that any recommended change in terms of intermediate grades would have to be approved by a vote of the Institute faculty, and would not affect freshman grading, which would continue to be pass/no record.

Why might this be an issue worth examining at this point in time? If one takes a long look at the overall grade point average of MIT undergraduates over the past 40 years (see table), it is clear that significant changes occurred in the period 1960-1970. Over this decade the median graduating class grade point average increased from a range of 3.4-3.5 to a range of 4.1-4.3. This increase was partly the result of a conscious decision to redress the disadvantage it was felt that affected many MIT undergraduates when they

applied to graduate programs in competition with undergraduates from other universities having higher grade point averages (albeit on a lower 4-point scale rather than MIT's unusual 5-point scale). This "grade inflation" of the 1960s resulted from a marked

it addresses the by-product of grade inflation: reduced grade differentiation.

While it could be argued that there had been no need for intermediate grades prior to the grade inflation of the 1960s, since faculty used the full range of four passing grades to reflect student performance, perhaps with the subsequent concentration of passing grades in the A/B set there may now be insufficient ability to recognize differences between students' performance. Thus, for the vast majority of undergraduates, grades are the outcome of a binary grading system, and the ability of faculty to reflect differences in students' performance is rather limited. Intermediate grades could address this concern by providing finer grade resolution.

Where they exist, intermediate grades typically take one of two forms. In the most common form, faculty may use the modifiers + and - to distinguish student performance within the range of a specific letter grade. In another form, grades halfway between the existing letter grades are introduced, e.g., A, AB, B, BC, etc.

In pursuing this issue the CAP has gathered some limited information on grading policies at our "peer" universities. In the interest of getting information quickly and without conducting a national survey, we defined our peer group for this purpose as all U.S. universities which in any of the past four years had sent at least 10 of their graduates to undertake graduate study at MIT. While this is admittedly arbitrary, it does provide a set of 23 U.S. universities which have a good deal of student interchange with MIT, and it includes most of the U.S. universities

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Median GPAs by Graduating Class

<u>Year</u>	<u>GPA</u>
1949-1952	3.4-3.5
1955-1961	3.4-3.5
1962-1963	3.6
1964-1967	3.7
1968	3.9
1971-1987	4.1-4.3
1988-current	4.1-4.2

decrease in the number of C's and D's awarded, and a corresponding increase in A's and B's. No doubt this was due in part to the elimination of freshman grades from the GPA. By way of illustration, in the early 1960s approximately 60% of undergraduate letter grades awarded (excluding pass/fail grades) were either A's or B's, while the comparable figure now is 80-85%. The table also shows that there has been no further grade inflation over the past 20 years. The current initiative is in no way intended to affect the median undergraduate grade point average, rather

Intermediate Grades at MIT

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recognized as academic leaders in science and engineering. Six of these universities use a letter grading system essentially similar to MIT's, without any form of intermediate grades. Fifteen use intermediate grades based on +'s and -'s, while the remaining two use the A, AB, B, BC, etc. system.

Before proceeding further with this question, the CAP wanted to gauge student sentiments and so earlier this semester we distributed a brief questionnaire to all MIT undergraduates (through the living groups). This survey was intended simply to gauge the strength of student feelings about the current grading system compared with possible intermediate grading options, and to solicit comments about these options. Students were asked to rank four grading options:

Option 1: The existing system (A, B, C, D, F with grade points of 5, 4, 3, 2, and 0).

Option 2: A, AB, B, BC, C, CD, D, F with grade points of 5, 4.5, 4, 3.5, 3, 2.5, 2, and 0.

Option 3: A, A-, B+, B, B-, C+, C, C-, D+, D, F with grade points of 5, 4.7, 4.3, 4, 3.7, 3.3, 3, 2.7, 2.3, 2, and 0.

Option 4: The same as option 3 but including A+ and D- with grade points identical to A and D respectively (i.e., 5 and 2).

The results of the survey were somewhat disappointing in terms of total response (656 responses, corresponding to a response rate of about 15%), perhaps indicating that this issue is not of great weight to our undergraduates, or perhaps reflecting skepticism that any change would, in fact, result from this initiative! Of those responding, about 47% favored retaining the current grading system (option 1), 24% favored option 2, 17% favored option 3 and 12% favored option

4. Thus overall about half the respondents favored the status quo, while half favored some form of intermediate grades. The survey also allowed students to indicate any of the grading options they regarded as unacceptable. The results of this were that 3% of respondents regarded the existing system as unacceptable(!) with the corresponding figures for the other options being 13% for option 2, 18% for option 3 and 27% for option 4.

Among the arguments advanced most strongly by student respondents advocating the status quo:

1. Intermediate grades would increase the competitive pressures already felt very strongly by MIT undergraduates, increasing stress and an unhealthy focus on grades, rather than learning.

2. Increasing the number of grades would increase the incidence of arguing for another couple of points on quizzes, exams and/or problem sets.

On the other side of the issue those favoring some form of intermediate grades argue that:

1. Intermediate grades would allow a closer reflection of the performance of individual students in the grades awarded.

2. The grade point impact of being just on the wrong side of a grade boundary would be substantially reduced with intermediate grades, thus reducing the amount of bargaining for the point or two to nudge the student over the boundary.

It is interesting to note that the only time that the issue of intermediate grades is known to have come to a faculty vote was as part of a comprehensive review of grading in 1975. In that case, while intermediate grades were not recommended by the Special Committee on Grading (chaired by Professor Roy

Kaplow) which formed the basis for the debate, an amendment was offered by Professor Senturia in the February 1975 faculty meeting to allow faculty to add the suffixes + and - to the grades A, B, and C (with the exception of grade A+ which was prohibited). This amendment came to a vote and was approved with 48 in favor and 37 opposed; however a "sense of the meeting" motion to exclude +'s and -'s from the grading system at the March faculty meeting was also passed by a vote of 77 in favor and 33 opposed. As part of that Institute-wide debate on grading, a survey of MIT undergraduates was conducted (by the Student Committee on Educational Policy) which showed strong opposition to the introduction of +'s and -'s (55% of respondents indicating they strongly disagreed with the introduction of +'s and -'s, with an additional 19% also expressing disagreement).

The CAP will be continuing its discussion of the merits and liabilities of recommending some form of intermediate grades, with the intent of reaching a conclusion by early February 1995. We would very much welcome the views of individual faculty members on this subject. Please give me a call (x3-5046) or send me e-mail (nhmw@mit.edu) with your comments or suggestions. Preliminary discussions are also planned with the Committee on Graduate School Policy to gauge sentiment about the possible introduction of some form of intermediate grades for graduate study. If a positive recommendation is forthcoming, it would be referred to the Faculty Policy Committee, and if approved there, be scheduled for debate and a vote at one of the spring 1995 faculty meetings. ♦

In Memoriam**Jerry Wiesner***Johnson, from Page 1*

trained intelligence, an ability to see broad and complex perspectives, and, with it all, an extraordinary sense of compassion for his fellow human beings. He had a keen awareness of the large problems and a willingness to extend himself to the limit to do something about them. He was both a creative optimist and prodigious worker, and the combination was irresistible. He had a wide circle of close friends at MIT, in the larger academic community, and in the community of national and international science. Within our faculty there are many individuals who worked closely with him and knew him as a friend. In my case, in the many years that we worked so closely together, I have never seen anyone quite his equal.

Some brief recapitulation of his career will help recall what he accomplished in his years among us. Jerry and Laya Wiesner came to MIT first in 1942 after they had both pursued undergraduate studies at the University of Michigan and he had continued his graduate studies in electrical engineering at the University. He spent an exciting interlude in the Library of Congress Acoustical and Record Laboratory, and he came to MIT as a member of the research staff of the famed Radiation Laboratory. He worked on the development of microwave radar and became, in time, leader of the group working on Air Force radar systems and an associate member of the Laboratory's Steering Committee.

After a brief time in Los Alamos as the war came to an end, he returned to MIT in 1946 as assistant professor of electrical engineering, advancing to a full

professorship in electrical engineering in 1950. In 1946 he had joined the new Research Laboratory of Electronics, which had grown out of the disbanded

**Jerome B. Wiesner 1915-1994**

Radiation Laboratory. He was participant and leader in the research that made MIT a major electronics research center. He held posts in the laboratory as assistant and associate director and ultimately as director of the laboratory. In 1959, he was appointed acting head of the Department of Electrical Engineering.

He took leave from MIT in 1961 to join President John F. Kennedy as special assistant for science and technology. He had known government consulting and service in the preceding years as a member of the President's Science Advisory Committee in 1957, and as technical and staff director to several government

panels. He had also been a participant in the Pugwash group, dedicated to improving scientific communication between the western and communist bloc countries. But it was his involvement with the Kennedy administration which put him at the nerve center of scientific and technological decision making in the United States. His broad knowledge and his wide acquaintanceship with the scientific and technical community, his easy manner, and, most of all, the President's confidence in him made him especially effective in the role of presidential science advisor. He would, over the years, make large contributions as a strong proponent of nuclear arms control and disarmament. His role in the 1963 Nuclear Test Ban Treaty was critical, and he made important contributions to several other fields in the

federal programs for science. He continued his service as science advisor to President Lyndon B. Johnson after the assassination of President Kennedy.

After his distinguished Washington service, he returned to MIT as Institute Professor and Dean of the School of Science in 1964, and it was here that I began a period of close association with him and could observe his remarkable mind and manner. When I began my term as president of the Institute in 1966, my first step was to ask him to be provost, the Institute's chief academic officer. It was not a post that he sought. He had returned to MIT with the hope of a little more freedom in his responsibilities and

(Continued on next page)

In Memoriam**Jerry Wiesner***Johnson, from preceding page*

in deciding the directions of his effort. After some discussion he accepted, and from that point on we worked very closely. Those next years turned out to be a very difficult period in the life of the Institute, and Wiesner was a superb provost through it all. I can see him now in a hundred situations. I remember his way of seeing old situations in new light, reassessing old solutions and developing creative new ones, and energizing everyone at critical times. With Walter Rosenblith, Paul Gray and many others in the administration, the faculty, and the Corporation, we sought, even under the pressures of that extraordinary time, to keep moving forward on the academic and intellectual fronts.

When I completed my term as president in 1971 and moved on to the chairman's post, Wiesner was elected president. He served as MIT's thirteenth president from 1971 to 1980, and the Institute prospered because of his efforts. I believe he regarded the office as the highest honor he had received. Many positive things happened during his administration. In the wake of the upheavals in universities across the country, it was important to develop an effective fund raising campaign. Wiesner enjoyed that often difficult task and proved to be a wonderfully articulate and enthusiastic fund raiser. My impression was that leaders of business and industry usually were delighted to be in his company and he in theirs. Even when there was disagreement on a point of view, they respected his position and his integrity. Of his many efforts for MIT, I believe he was proudest of the founding of MIT's Council for the Arts, the successor to the earlier Committee for the Arts.

When Jerry Wiesner retired from the presidency in 1980 and was succeeded by Paul Gray, he became, once again, Institute Professor, the faculty's highest

honor, and in the MIT Corporation he was elected a Life Member, the trustee body's highest honor. His relationship with the Corporation as a working member of that body was one of high mutual respect and close personal association. In this new and somewhat freer phase of his life, he was able to pursue on a larger and more intense scale causes and issues in which he had long had an interest: disarmament, science policy and education, among others. On the campus he became, with Nicholas Negroponte and others, an architect of a new focus on computer development in the media arts. These efforts resulted in a new program and a new building named by the Corporation the Jerome and Laya Wiesner Building in recognition of their contributions to the arts. He continued his long association with dissident leaders in the old Soviet Union, and co-founded the International Foundation for the Survival and Development of Humanity. The national honors – the academy memberships, the medals, and the awards – continued to be conferred on him, and he accepted them all with bemused modesty.

Perhaps no part of his life illuminates more his courage and his character than his closing years. Suffering a stroke in 1989, he fought his new disability with intelligence and tenacity, resuming a level of activity that was astonishing. The many who had admired Jerome Wiesner in his earlier years now stood in awe as we saw the way he conducted himself in those final years. He continued to work prodigiously, maintaining communication with a full circle of colleagues and helping others with similar difficulties.

In all of this and all of his life, his marriage to Laya and their close partnership was a source of inspiration to all of us. Always active in the community, they made their grand old home in

Watertown a center for their interests and their association with a wide circle of friends. We think often of Laya Wiesner in these times, and the faculty, I know, send her our warm and deepest sympathies and our broadest support.

Jerome Wiesner's full life and his many contributions to our institution, to our country and to our society will be recalled and described for years to come. We and our successors at MIT will remember him with affection, with admiration, and with gratitude.

Coda

Years ago Jerry Wiesner and I were in Spain at a conference in Madrid in which both of us were participating when we received an invitation to call on King Juan Carlos. When we arrived at the palace, we got out of our car and walked to an inner courtyard, where we were passed through and pointed in the direction of a large stairway. We approached the stairway; it was a double stairway, two large circular escaliers mounting two stories, each a graceful arc forming a kind of parenthesis and then meeting at the top. After participating in so many MIT commencements, we knew that a column of two approaching the double stairway leading to the stage is supposed to split. Without commenting to each other or making any signal, he went up the left stairway, and I climbed the one on the right. Although we could not hear the sound of Elgar's music, we were marching to it nonetheless. We reached the top at the same time to the gaping surprise of the guards there who ushered us in to see the king. We had a productive meeting with the king, but I think marching up the stairway together is what remained as the best souvenir of that visit for both of us. And I remember Jerry Wiesner now looking up with that big smile, delighted to be in a new situation, heading for a new experience. ❖

In Memoriam**Jerry Wiesner**

Kosta Tsipis

When I sat down to write about Jerry, I wanted to say many things: about his years in Washington, about his defining contributions to his beloved MIT; about his constant efforts for nuclear arms control and a sensible defense policy, efforts that lasted up to the very last day of his working life; about Martha's Vineyard which he loved so much, about his unbending convictions. But I quickly realized that it is not possible to summarize the life of this Protean man. Besides, summaries carry along a finality inapplicable to Jerry; his persistent legacy will continue to modulate the future.

So instead I offer four first-hand vignettes from his life that speak of Jerry much more characteristically than I could ever expect to do.

Sitting in his cramped first floor study in his house in Watertown, Jerry mused about the beginnings of his tenure as science advisor to President Kennedy. On a cold December afternoon in 1960, Jerry told me, he was summoned to President-elect Kennedy's residence in Washington. While he was waiting in the living room for the young President, he overheard Robert Kennedy talking with Jackie on the second floor landing. "Who is this guy Wiesner?" Bobby was asking.

"Jack says he has the best technical judgement and taste in the country," explained Jackie. The new President had found his science advisor. The nation and the world had gained a passionate, nationally-rational advocate for peace and justice.

In October 1968, an enthusiastic group of MIT students were helping Robert Drinan, the Jesuit priest from Boston College, in his electoral campaign for Congress. I had gone to Jerry's office – he was provost then – to discuss my concerns about Multiple Independently-targeted Re-entry Vehicles (MIRV's) that the Instrumentation Lab was working on. A student walked in and asked Jerry if he would publicly support Drinan's candidacy. Jerry said yes, he would.

"Will you say that he is a good teacher?" asked the student.

Jerry said he couldn't do that because he had never seen Drinan teach.

"Oh come on Dr. Wiesner," insisted the student, "you can say that now, can't you?"

Jerry exploded; he dismissed the student from his office. Then he calmed down, re-lit his pipe, and turned to me. "The little shit," he said. "I have spent my life maintaining my reputation for saying only what I know to be true and this guy wanted me to say something I didn't know." No ideology or parochial interest would sway Jerry from his principles.

In February 1988, at the great hall of the Kremlin, Mikhail Gorbachev was explaining to a group of American arms controllers the need for a 3,000 nuclear weapon arsenal as the minimum requirement for stable deterrence. Jerry piped up, "Suppose your generals come to you and say that if the Soviet Union

attacks first by surprise, the United States would be left with only 50 nuclear weapons; would you give up Moscow to achieve that?"

"No," said Gorbachev.

Jerry persisted: "Would you give up Leningrad?"

"No."

"Kiev?"

"No."

"Vladivostock?"

"No."

"How many does that make?" asked Jerry. Gorbachev said five. "You see," concluded Jerry, "five nuclear weapons would be enough to deter you." Jerry was not merely logical, he was sensible.

On a quiet afternoon last year, sipping Pepsi in Jerry's second floor office at the Wiesner building, we were discussing what makes a good university president. I asked him what he considered his role to be while he was president of MIT. "I was an enthusiasm amplifier," he said. "People would come to me with ideas and I would run around trying to find the money to put them into practice." His humility showed once again, but did not eclipse his self-confidence or his redoubtable optimism.

Jerry, our moral and intellectual North Star for a generation, has set though his glow remains in our mind's eye. Travel through this turbulent world we live in will be more halting without him. ❖

In Memoriam**Jerry Wiesner**

Paul E. Gray

Two days after Jerry died, Robert J. Lurtsema of WGBH aired a moving tribute. It began with a simple statement: “The world has lost one of its great citizens.”

While we at the Institute feel the pain of Jerry’s death with the intensity that is shaped by his five-decade love affair with MIT, his death is, first of all, the world’s loss, for he was, as Anthony Lewis put it, “The Public Citizen” whose gifts of intellect and character – whose passionate desire to make the world a safer, better, more humane home to all its citizens – benefited humankind in specific, measurable ways.

Jerry had no illusions about the ferocious intensity of the Cold War in the 1950s and early 1960s – years in which expressions of freedom in Eastern Europe were brutally suppressed, when the obscenity of The Wall divided Berlin, when the U.S. and the U.S.S.R. came ever so close to plunging into the abyss of all-out nuclear war over Soviet missiles in Cuba. Yet he was, I believe, among the first to understand the collateral deadly hazards associated with nuclear weapons: the radioactive fallout created by atmospheric weapons testing, and an unrestrained nuclear arms race. With patience, persistence, and persuasive argument, he convinced others that the world must move off this dangerous course. In doing so, he worked not only with colleagues in the United States, he opened channels of personal communication with scientists in the Soviet Union – colleagues who advised the government there, as he did here. His influence was central in bringing about the ban on atmospheric weapons tests and in generating interest in the East and the West in parallel, systematic reductions in nuclear weapons.

Jerry’s commitment to deflecting the great powers from a course which seemed likely to lead to unimaginable disaster for humanity was at the very core of his

being. It reflected that quality of *caring* which was evident in other respects as well.

He cared passionately about the Institute and its people – a caring which was reflected in actions aimed at making this special place the very best university one could imagine. He believed that the arts were complementary intellectual partners with science and engineering, and was convinced that strength and scope and excellence in the arts at MIT were as important as those dimensions of our traditional science-based programs. This conviction was expressed in his decision, early in his presidency, to create the Council for the Arts, and, as well, in his role in later years in the creation, with Nick Negroponete, of the Program in Media Arts and Sciences.

His caring for the Institute was also evident in his key role in the creation of the Program in Science, Technology, and Society. Jerry understood technology as a socially derived activity and he believed that MIT would benefit from a more self-conscious engagement with, and study of, the linkages of science and engineering with society.

The quality of his caring at MIT is manifest as well in his commitment to making the Institute more accessible to men – and women – from a broad spectrum of racial, ethnic, and cultural heritage. He was deeply committed to the civil rights movement which took shape in the 1950s and 1960s, and he acted on these convictions in his leadership of the Institute. The decade of Jerry’s presidency stands out as the period of greatest progress in bringing women and minorities to the faculty and the student body. Others have been concerned with these issues in the years since; none has changed the human face of MIT as Jerry did.

His caring extended to his relationships with people across the board. His interest in people was eclectic; he was concerned with the welfare of his colleagues and friends; he was very good at listening; and he was generous with thoughtful,

measured advice. Priscilla and I benefited greatly from his wise and considered counsel, particularly in those months of transition in 1980 from his presidency. Jerry was a reliable friend, and all of us at MIT and elsewhere who relied on that friendship are quite unlikely to find its replacement.

Jerry was deeply interested in the growth of his younger colleagues and he was a marvelous mentor. I was fortunate to work directly for him for thirteen years; that relationship was an ongoing tutorial in the nuances and complexities of the administration of an academic community, and it influenced my personal development beyond acknowledgement.

Jerry found great pleasure and delight in his relationships with students. Even in the difficult years around 1970, when conflicts growing out of the war in Vietnam seemed likely to tear academe apart, he never lost faith in the intelligence and rationality of MIT students, including those who were most radical in their perspective. One of my most enduring memories is of Jerry reaching out to reason with the leaders of the SDS at MIT in early 1970, when this place seemed to be about to slip over the edge into chaos.

For many who were present at Jerry’s inauguration on October 7, 1971, the most durable memory is the poem written for the occasion and read by Archibald MacLeish. It ended with these lines, which are the best words to conclude this remembrance:

Advisor to Presidents, the papers call him.
Advisor, I say, to the young.
It’s the young who need competent friends,
bold companions,
honest men who won’t run out,
won’t write off mankind, sell up the country,
quit the venture, jibe the ship.

*I love this man.
I rinse my mouth with his praise in a
frightened time.
The taste in the cup is of mint,
of spring water. ❖*

Pension Plan Revised: A Good Quick Fix

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Fund. A participant's annuity depends primarily on his/her accumulation in the Fund but depends additionally on two other factors which vary as frequently as month to month; consequently, the real total value of a participant's pension depends on the specific month a participant chooses to annuitize his/her accumulation.

First, MIT values the participant's accumulation in the Fund at the time of annuitization by adding a *market value adjustment (MVA)* to the accumulation. This MVA is based upon how well the investments of the Fund are doing in the market, particularly the bond market; and this varies with time. For example, in November of 1991, the MVA changed by 4% in one month. This was unusual, but even a 1% change might amount to \$10,000 for a long-time accumulation in the Fund. To illustrate the MVA fluctuation further – it was 16% in June of 1986; 1% in September of 1990; 11.5% in January of 1994; and 2.7% in June of 1994.

The second aspect that affects annuity payments is the *annuity purchase rate* (or interest rate) assigned at the time of annuitization, and that remains for the lifetime of the annuity regardless of changing market rates. This rate has varied and has been drifting downwards in the last decade from nearly 12% nine years ago to a low of 5.83% in April, 1994. The increase or decrease in this rate is arbitrarily limited by the Institute to no more than 1/4% per quarter or 1% per year. (A rule of thumb is that a 1% change in this rate corresponds to anywhere from 6% to 8% or more change in total annuity value.)

The revised plan smooths these two sources of variability – at least for those who annuitized since January 1993 or plan to do so by the end of 1995. The revision provides the participant with the larger of either the old formula or a

new one that provides a 5% MVA and a 7.25% annuity purchase rate no matter when you annuitize in this period. This “uplift” is particularly significant for those who annuitized recently when, under the standard plan, both the MVA and the annuity purchase rate were especially low. Although this is a good step, it should be seen only as a quick fix rather than a lasting solution.

The basic problem persists – i.e., the annuity from a participant accumulation in the Fixed Fund depends on the date of retirement rather than on a distribution according to the real earnings of the total Benefit Fund. So the fluctuations in interest rates still affect considerations of retirement. Does the administration really want retirement planning to have any aspect of a lottery? (A wise older faculty member who could afford it would take the MDO and then watch interest rates and speculate about MVA changes before deciding his/her retirement date. This seems exactly opposite to the Institute's interest in fostering early retirement.) If the Benefit Fund's earnings rise in the next decade as they dropped in the previous one, why should recent annuitants not benefit from such earnings increases from the very Fund their pensions reside? (Of course, this means experiencing the drops as well.) Or does the Institute contemplate constant juggling of annuity formulas to get some semblance of equity among retirees? Hopefully, the “powers that be” see the current revisions as a holding operation while they devote the time, effort, and attention to these basic problems in the plan that have been so badly neglected in the past.

It should be some relief to all that at least some significant corrective steps have been taken but, unfortunately, still without genuine consultation with participants in the plan. MIT should

provide a forum for discussions between the administrators and the faculty to consider the major changes that are still needed to effect equity within MIT and comparability, when warranted, with other universities. Such consultation may also help the faculty comprehend the complex legal and financial issues involved and even arouse sympathy for the administrators who have to cope with them. Though faculty committees have presumably had a role in policy formulation and management of the plan, true faculty input and consultation have been absent. Had the plan management been open and responsive to participant comments and concerns, then these hastily generated fixes may not have been necessary. For most of us, our pensions are our primary wealth and for most of us, MIT has been a most considerate and collegial institution. Why not on this matter as well?

It is timely to note that Harvard has had some important revisions to its total benefits package recently. The substance of those revisions is entirely different and not as positive as that of MIT's. The Harvard Faculty of Arts & Sciences objected strongly to the process by which the revisions were made and particularly to the lack of consultation with the faculty. Consequently, the Faculty Council (a representative, elected body of the Faculty of Arts & Sciences) voted (without dissent) to recommend to the faculty the establishment of a Standing Committee on Benefits – with the Council to advise on committee membership. This matter will be voted by the Faculty of Arts & Sciences at its December meeting. There is little doubt that the action recommended will be approved and that it will be extended to involve the Harvard faculty in all its schools.

Can we learn something from our neighboring institution at this time? ❖

Are Our Students Undereducated?

Taylor, from Page 1

unexpressed assumptions about the relationships among areas of the self, work, and community. I have come to think that the Humanities at MIT are perennially troubled at least in part because this ethos has caused Institute-wide problems to settle in our corner – problems of spirit and morale, which in turn mark deeper problems in educational vision. It's not news that MIT students are unhappy (we already knew that). The news is that they judge themselves to have been undereducated by MIT. Let's look at some of the evidence.

When our students leave us, they are autonomous adults; their sense of themselves has jelled, both as individual persons and as members of the community. Many of us (I include myself) believe we have the best students in the world. But their view of us is less flattering. The Consortium on Financing Higher Education (COFHE) has just released for our internal use a chart that compares our graduating seniors' responses to a questionnaire with the responses of seniors graduating in science and engineering at several other major institutions. (The MIT "1994 Senior Survey" was a combined effort of the Educational Studies Working Group and the Office of Undergraduate Academic Affairs, and was given to last year's graduating class.)

The students were all asked how their undergraduate experience had improved their knowledge and abilities in a variety of categories such as "leadership," "creativity," and "ability to think analytically." What the comparison shows is that in one area our graduates feel a little better about their education than do those of other schools, and that is in the "Ability to think analytically and logically." Obviously that's good news; we can be proud. And according

to our students' responses we are almost as good as other schools at teaching the "Ability to work as a team."

But elsewhere we fall far behind.

Perhaps it's understandable that MIT should teach its students much less than Harvard, Johns Hopkins, or Cornell in such areas as "Foreign languages" or "Writing skills," or even in the sweeping category "Appreciation of literature, art, music, drama." Indeed we are not a liberal arts university, nor do most of us think we should become one.

fundamental to the quality of a person's entire life, to the richness or poverty of intellect and experience that affects one equally at work, at play, at home, in society. Surely our students need to be nourished and to grow in these areas as urgently as does any graduate of Harvard.

Yet they do not feel nourished. Or by no means enough so.

Over my years here I've heard it said – repeatedly – that we train our students wonderfully for their first jobs, maybe even for their second or third jobs. But

For too many of our students, an MIT education is not a pleasure. The intellectual demands placed on them feel punishing rather than exhilarating, in large part, I think, because the work hardly touches their inner lives, their sense of worth or purpose.

But what about other areas in which our scores fall shockingly below those of the comparison schools – areas such as "Self-understanding," "Leadership abilities," and "Creativity?" What about the ability to "Identify moral and ethical issues" or to "Develop an awareness or knowledge of social issues?" I urge you to see for yourselves the actual bar charts (which we may not print here, as the comparative information belongs not to us but to COFHE); but I can tell you by way of summary that the comparisons are devastating and should force us to question what we mean by "an MIT education." Even if we were willing to be preoccupied with professional at the expense of personal enhancement, we know that today no leader in any field of engineering or science can afford to ignore its social and ethical implications. And beyond that, these areas are

that they aren't prepared for jobs at the top: jobs that require leadership, creativity, the ability to scrap a worn paradigm or turn a problem on its head. According to this argument we turn out competent drudges who are hired by the graduates of those schools that *do* teach their students a knowledge of social and ethical issues, men and women who *have* developed the confidence and self-understanding that enable them to respond creatively to crises of opportunity.

Balancing this view is another that I've heard at least as often. Namely, that our students take a kind of pride in being "unhappy" here, that they self-select MIT precisely for those qualities of narrow focus and hard-drivenness that make it just barely possible to turn out competent engineers in only four years. In this

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Are Our Students Undereducated?

Taylor, from preceding page

view, our students can learn “Self-understanding” later, and “Identify moral and ethical issues” when and if they meet them; that’s not our job. First they must learn to make bridges or computers that work, *then* they can develop self-esteem, or worry about right and wrong.

Different as these two views may seem, I think they ring a common warning-bell about MIT’s future—both its educational mission and its solvency.

Let me address solvency first. Perhaps it’s true that our students only pretend to be unhappy, that their complaints about pace and pressure are really a perverse sort of bragging. “We are the best and toughest; we can survive where lesser folk would perish.” But this ethos does not make for the kind of passionate loyalty, the deep sense of personal attachment, that translates into widespread, lifelong alumni/ae giving. Of course we do receive wonderfully generous contributions. But many alumni/ae—perhaps especially *young* ones whose memories are still fresh—feel that they have given MIT enough, that they have amply paid their way already, in the double coin of tuition and drudgery; and that while they respect MIT for what they learned here, they do not love us. [Only about 30% of MIT graduating seniors participate in the Senior Gift, compared to 88-93% at comparable schools. (These figures reflect numbers of participants, not size of gifts, which everywhere range from the nominal to the substantial.)] Their education here did not nourish the ground in which social confidence and the virtues of loyalty and attachment are rooted, or it touched the growth negatively, nipping the buds. Moreover, if it’s true that despite their enormous strengths of intelligence and discipline, MIT students do not get the jobs at the top, that they too often wind up working for people

less skilled but better educated than they, then even those most disposed to giving won’t often have the means to make really major gifts. In the past, the government has supported MIT education in ways that made private giving less crucial. Harvard had its wealthy alumni; we had the Department of Defense. But what we have now are graduates who learned to think analytically, but not necessarily affectionately, about their *alma mater*—or at least not until they have been away from it for a few years. [By five years out, 60% of MIT alumnae have given a first gift; by ten years 80%—a gratifying rise, but still below even the senior-class percentage elsewhere.]

So how should this not flattering picture of our students’ ethos and morale affect our thinking about MIT’s educational mission? I think it must affect it at two levels. First we need a searching reanalysis of what we expect from the HASS dimension of our students’ education, including a full review of the way the HASS distribution works—not four years from now, but immediately. And second we need to ask whether we can afford to segregate the main curriculum from the HASS curriculum as we have traditionally done, with the educational mission associated with such topics as “self-understanding” and “knowledge of social issues” relegated to HASS only—and indeed to the *classroom* only. (See Bill Porter’s eloquent piece in the previous *Faculty Newsletter* [Vol. VII, No. 1].) I know we have made innovative efforts before—with co-op programs in writing, with STS, and with ISP, to name only a few. Under President Vest’s leadership the Institute is already looking hard at the Big Picture, in the context of shrinking resources. I urge that in doing so we consider how to begin healing a growing

dissociation in our students between the person and the trainee. Let me explain.

Some features of this Big Picture emerge pretty starkly under the rather harsh light cast by our senior survey. Let me mention three areas that are of concern to me because they are regularly raised by those students who talk to me about what it’s like to be here. First, when these students talk generally of their professors they make a sharp distinction between the expertise and the human being. They are in awe of their professors’ command of information, technical know-how, and intellectual brilliance; but they hardly think of them as persons. In their experience, few faculty encourage individual conversation with undergraduates; some haven’t the time, others haven’t the inclination. Some appear barely to have interests outside their research, such that a student finds he or she can listen to them but not talk with them, even to seek professional advice. The result is that our undergraduates seem to feel they have little sense of human connection with the people who are in many ways their *life models*. That is, the people they most respect come across to them not as *people* but as educational resources. What does this teach them about how to live their own lives? What motives does it foster for generosity, for the kinds of affection and confidence that are expressed in the reciprocities of *all* community, including alumni/ae gift-giving: “As I was deepened and enriched, let me help others to be?”

Second, there is very little in an MIT education that asks students to take the long view, or even to suggest what a long view might entail. Their lives are chopped up into performance-bits: this week’s problem set, next week’s midterm. Their best shot at a “long
(Continued on next page)

Are Our Students Undereducated?

Taylor, from preceding page

view” may well be their list of requirements for graduation. Where in our curriculum are they invited to explore such questions as where their lives are headed, or why it matters? At most in a handful of courses – and of these most are in HASS. Not only will very few of our students ever take such courses at all, but those who do will hardly dare make much of them. Every MIT undergraduate knows that HASS courses are – and in a sense *must* be – their lowest priority. Not a real part of what they’re here for. Not what will earn them the respect of their major professors, or help them get the jobs they need to pay off their tuition loans. Again: a dissociation between the student as person and as master of material skills.

Third, I wish I had a nickel for every student who has told me “Yours is the only course I’m taking that I enjoy.” I also wish I could credit such remarks to my great teaching. But I’m afraid they speak to an entirely different issue. For too many of our students, an MIT education is not a pleasure. The intellectual demands placed on them feel punishing rather than exhilarating, in *large* part, I think, because the work hardly touches their inner lives, their sense of worth or purpose. They work hard for practical goals – the GPA, the job interview, the GRE – and lose sight of all else, for simple weariness. Our students take a justified pride in being “nerds,” in the sense of being people who work hard. But when they joke about being “tools,” I think it is not pride we hear, but sardonic dismay, the dark humor of the dehumanized. A nerd is a person who studies a lot. But a tool is a mere instrument.

MIT cannot afford to be a Tool School. We cannot train leaders by turning out skills rather than skilled people. Our students take away from here a marvelous

technical expertise; but we do them and ourselves great harm if we do not at the same time foster their self-understanding and self-esteem, their sense of responsive and responsible participation in our richly varied culture, their sensitivity to moral and ethical issues, and an awareness of the social and political world in which they live. This means that they must be exposed to professors whom they can emulate as human beings, that they must think about the long view in ways that integrate their life work with their sense of personal contentment, and that this life-work must bring rewards more deeply gratifying and more reliable than financial security – important as that is.

I have been told that the system of Institute requirements was established to ensure that every student would have at least an introduction to the broad sweep of the sciences, social sciences, arts, and humanities, and that – ideally – he or she would take away from this experience a sense of his or her own specialty as part of the larger world of learning. But increasingly the opposite has occurred. In almost every area our distribution subjects have been reabsorbed into the majors, becoming in most cases relatively narrow training grounds on which further specialization is built. That is, in departments with many majors or with strong graduate programs, even this relatively small opportunity for cross-field integration or intellectual experiment has been co-opted in the service of just such dissociation as I traced above.

We, the Humanities at MIT, are habitually “troubled” in part because we are left with the bewildering task of trying to respond to crying needs that our students make evident to us, but that we are ultimately helpless to meet. Many HASS faculty – debating the relative value of this or that course or category

(shall it be history or philosophy? psychology or the arts?) – feel a little like the staff of a crowded refugee camp, quarreling over whether food or shelter should come first; and what about typhoid shots? How can one decide principles of triage when all the external pressures (i.e., the core science and engineering curricula as well as the so-called hidden curriculum) keep sending ever more “refugees” in ever greater need? In such conditions, of course, only a large shift in institutional policy can make a real difference.

I suggest that MIT begin by making a few radical experiments in reintegrative education at the distribution level. We might start with a couple of experimental 24-unit distribution courses, each of which would draw on materials from various science *and* HASS requirements. They should be team-taught, by senior faculty. I think it would help if there were pizza present – a great aid to interaction, as Art Smith has often observed. But the kicker is that they *must* be allowed as full substitutes for some subset of the traditional distribution requirements: that is, the project would have to have pan-Institute backing. Others will have other, doubtless better, suggestions; certainly I endorse those made by Bill Porter in the last *Newsletter*. My point is simply that the separatist, turf-battle model of undergraduate education makes for bad educational policy; it only increases our already troubling tendency towards a narrowly instrumental ethic that – at its worst – turns out disaffected and disabled students.♣

For copies of the COFHE survey, contact Assistant Dean Alberta Lipson, 20B-140, x3-8604.

Letters

To The Faculty Newsletter:

I really appreciated Jack Ruina's thoughtful review of the complexity of our MIT Retirement Plan, having had to unravel, with considerable difficulty, my own options over the past two years. What really puzzled me were the arguments I had by telephone with a close friend in Washington, DC, who is a former Brookings expert in the field of pensions. Ruina's article clarified the key problem: my friend was thinking TIAA and other more progressive plan options and could not believe ours was so narrowly confining.

While the assistance I received from the Benefits officer I persistently pressed into service was excellent, it

fell to me to discover what questions to ask and what the implications would be of any once-for-all-time actions I took on my future monthly income. Not only did I have to educate myself in the specific plan vocabulary but I also had to redefine my status, recorded as "single," so that I could arrange a percentage of my residual annuity to go to my grandchildren rather than all be returned to the fund, should I not outlive my expected life span.

Further, in order to gain greater control over a small portion of my twenty-one year contribution (to the "fixed fund") I had to know to roll over into my investment IRA that maximum amount allowed to be taken

as a lump sum, but only *prior* to annuitization. (That IRA has been averaging a 10-12% return per year.)

With Ruina, I particularly urge greater faculty participation in policies relative to our pension plan. Of some concern, at this time in social history, would be an exploration of how the plan now disadvantages those members who are unmarried (but not without family beneficiaries) at the time of retirement.

Thanks to Jack Ruina, an open discussion can now be joined.

Sandra C. Howell
Professor Emeritus and Senior
Lecturer, Architecture

To The Faculty Newsletter:

I write to congratulate you on encouraging Jack Ruina to formulate his ideas and experience with the MIT retirement plans. Many of his concerns resonate with mine as I approach retirement, and I read his recent article in the *Newsletter* with great interest. MIT seems often to run more as a corporation than as an educational institution, and a paternalistic attitude certainly shines through its retirement system.

I gather from Jack's article, as well as from other sources, that directors are pondering and committees are

meeting to come up with fixes to some of the problems. Rather than reinvent newer and fairer approaches to distributing a retiree's funds, why not give retirees the option to transfer their vested monies to TIAA/CREF, an organization that works on these problems full time? This possibility already exists for Supplemental Retirement Annuities; I should not think it difficult to accommodate regular annuities as well.

Gordon H. Pettengill
Professor of Planetary Physics

To The Faculty Newsletter:

I found the article by Jack Ruina a couple of months ago very informative. I had attended one of the retirement "seminars" and had gotten the same impression; that the amount of retirement income was heavily dependent on exactly when you retired, but I thought I must be mistaken. His article indicated that I was NOT mistaken. It was a very useful thing to bring to the attention of the faculty and I hope it will stimulate corrective action for the MIT retirement plan.

Lisa Steiner
Prof of Biology

To the Faculty Newsletter:

I would like to respond to Prof. Hutchinson's remarks in your last issue, regarding an official reception for lesbian, gay, and bisexual students at MIT.

Prof. Hutchinson expressed his opinion that "homosexual activities are immoral and detrimental to the well-being of individuals and society," which "many people on campus, from a wide variety of backgrounds, consider offensive, injurious and improper." In spite of his expressed belief that homosexual activities are detrimental to the well-being of society, Prof. Hutchinson claims to support an individual's "right to privacy" in matters of "sexual choice." His problem with the reception, apparently, was that it implied "sponsorship" of homosexual activities by the Institute (linking the reception explicitly to promotion and advocacy).

First, I would like to point out that lesbianism and homosexuality are not widely regarded by gay and lesbian people as chosen orientations.

Over the last twenty years, both gay culture and medical researchers have increasingly acknowledged that to be gay or lesbian is a question of either genetic or developmental "status," not voluntary "choice." Homosexual activities are not the result of moral inferiority. Moralists may judge gay people, and we in return may judge their behavior. But being gay or lesbian, meaning that one experiences love and sexual attraction with human beings of the same gender, is a question of status. Not a choice. The choice is whether to be honest about it, and change that status from an invisible shame into acceptance and moral courage.

Dean Smith's office acknowledged that students are especially vulnerable to shame over their status as gays, lesbians, and bisexuals. People often find out that they are members of this minority group only once they mature enough to have relationships outside their family. When undergraduates in particular move away from home, they question their identity in many

ways. They need support to find their courage if and when they find out that they don't fit our mainstream culture's narrow ideals. Students (and faculty) also need to know that their status as gays and lesbians won't hurt their chances for equal treatment academically at MIT. Dean Smith had the courage to make that unequivocally clear, at least from the administration's point of view.

Prof. Hutchinson's letter, full of his own cultural prejudices and fears, is the kind of threatened response that sends the wrong message to gay and lesbian students. These students need their faculty to show courage, not fear, in confronting the truth about human beings – that we're not all heterosexual by nature. And that working for gay and lesbian civil rights is not an attack on heterosexuals. Only a very frightened person indeed could see it that way. We have an opportunity to choose courage and generosity instead. Why wouldn't we?

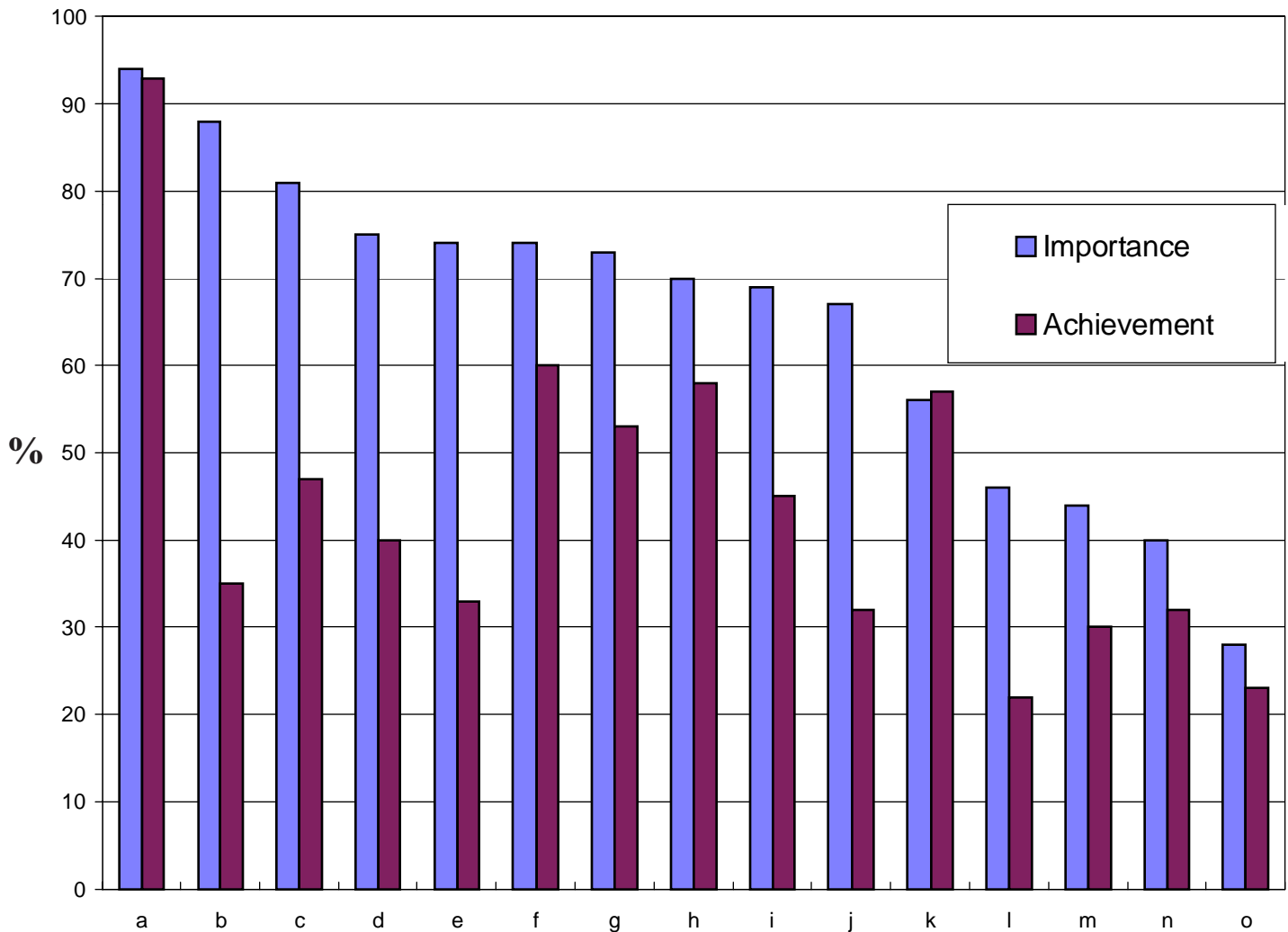
Kristina E. Hill
Assistant Professor of
Urban Studies and Planning

The next meeting of the *Faculty Newsletter* Editorial Board is scheduled to be held during IAP. The agenda for that meeting will include discussion of *Newsletter* editorial policy, possible electronic distribution of the *Newsletter*, and other matters. In addition, Editorial Committees will be established for the coming semester. If you wish to share in the writing and production of the *MIT Faculty Newsletter* and to participate as an Editorial Board member, please contact the *Newsletter* office or any member of the current Editorial Board.

M.I.T. Numbers

1994 Senior Survey

Knowledge and Abilities*



***Perceived importance of various types of knowledge and abilities compared with perceptions that these were at least moderately improved by their MIT education.**

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| a - Analytical/problem-solving skills | j - Public-speaking ability |
| b - Self-esteem | k - Design skills |
| c - Academic self-confidence | l - Knowledge of social/political issues |
| d - Writing skills | m - Appreciation of art, literature, music, drama |
| e - Creativity | n - Awareness of ethical issues |
| f - Intellectual curiosity | o - Proficiency in non-native languages |
| g - Self-understanding | |
| h - Ability to work in a team | |
| i - Leadership abilities | |