

The MIT Faculty Newsletter

Vol. III No. 4

January/February 1991

In Memoriam

James R. Melcher

James R. Melcher, a founding member of *The MIT Faculty Newsletter*, died of abdominal cancer at the age of 54 on January 5th at his home in Lexington. He was J.A. Stratton Professor of Electrical Engineering and director of the Laboratory for Electromagnetic and Electronic Systems. He provided the *Newsletter* with moral and material support at its inception in June of 1988, and characteristically put his beliefs into action by serving as member of the Faculty Newsletter Editorial Board from then until this fall. He was also the chair or a member of the committee for several issues of the *Newsletter*.

Other obituaries have listed his numerous professional accomplishments and recognitions. We would like to focus on another aspect of Jim, the articulate, thoughtful, and intensely moral human being. He was unusual in the degree to which he translated his beliefs into action. His life was in accord with his informed understanding of what was in the best interest of humanity, the United States, Massachusetts, and MIT. The most dramatic example is that he bicycled to and from work in every season, traveling eighteen miles each day since

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The Bilateral Trade of Ideas

Nicholas P. Negroponte

With the recent acute deterioration of the U.S. economy, the familiar specter of trade protectionism is afoot once again in our land. This time, however, the isolationists' discredited complaints have been repackaged and are aimed at a new target - us. MIT's

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international presence is at risk of having its future shaped by political opportunism and media jingoism, rather than by the merits of scientific and technical cooperation with the world community. If we, the faculty, truly believe that the excellence of our academic environment, the quality of our research, and the competitiveness of our industries would be enhanced by protectionism, we should advocate America begin closing its borders immediately. If, on the other hand, we think there are intellectual and economic benefits to gain in the global environment of knowledge, then we had better articulate loudly and clearly the enormous value of an open exchange of ideas with the best minds of all nations. Otherwise, we will find our

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IN DEFENSE OF DIFFERENTIALS

A. V. Litewait*

The MIT Faculty Newsletter issue of May 1990 presented some aggregate statistics showing average salary by rank. These statistics may be interpreted to suggest some systematic and pervasive differentials in terms of gender (p. 17). Not so. If we look at the facts, we must conclude that any charge of differentials reflects a fundamental misunderstanding of the criteria used to induce impartiality in the application of compensation rules.

The Institute has argued that justice is blind and that merit criteria define the contours of compensation. This argument is weak: it relies on subjective assessments. To its credit, the Institute has, in fact, been using a very robust criterion - the only empirical, quantifiable, computable, and totally impartial factor, namely weight. In this way, MIT has applied totally fair and absolutely just compensation principles.

First, the facts; then their interpretation; then the incontrovertible conclusion - beyond any shadow of doubt - MIT demonstrates once again a legendary creativity in all areas, especially in compensation of the faculty contractually for its effort.

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Editorial***A Time For Action***

This issue continues the discussion of what the editors of the *Faculty Newsletter* consider to be urgent items on the action agenda of the Institute.

We need to consider how to maintain the intellectual power, the creativity and the enthusiasm of a faculty which is the backbone of MIT, and which provides continuing inspiration for talented young men

an adequate record of published research, distinguished teaching, and meaningful service to MIT and to their profession over a limited number of years, still feel themselves to be under severe pressure which is often damaging to themselves and to the Institute. The task of making the Institute faculty a collegial community in which appropriate striving and

our evolving perception of the Institute's mission and of the explicit and tacit academic requirements by which we carry out that mission are compatible with the criteria we apply to student selection.

We are aware, as President Vest has also repeatedly stated, that the social and intellectual health of the American community as well as the continued recruitment of future scientists and engineers to MIT and other universities, depends critically on a radical improvement in motivating them. A number of us have undertaken small-scale projects designed to improve science education in the public schools, on our own and with Institute backing. It is useful to coordinate these efforts (as A. Dyson and R. Latanision are beginning to do); it is even more important to define what role MIT should (or can) play in this crucial activity, given its institutional priorities and limited resources.

We also need to begin defining our relationship with industry and the market in the varied entrepreneurship-related activities which we undertake individually and institutionally; these raise tricky ethical questions which we should not postpone discussing.

Indeed, we are concerned that the traditional mix of tuition, endowment income gifts, and contracts or grants for specific tasks may no longer be adequate, especially in the light of increasing stringency of federal funding and competitive difficulties for private research universities. It

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We need to consider how to maintain the intellectual power, the creativity and the enthusiasm of a faculty which is the backbone of MIT, and which provides continuing inspiration for talented young men and women to join us as colleagues.

and women to join us as colleagues. We must do this in a context of evolving family-work relationships and of increasing competition with other universities and with industry and government.

In particular, President Paul Gray made it an important objective of his administration when he took office ten years ago to make the MIT atmosphere more humane and to reduce the demands of "pace and pressure" on faculty and students alike. In spite of his inaugural statement, individual faculty members, particularly those who are untenured and compete to achieve

competitiveness is mitigated by mentoring and collaboration remains to be completed.

Many members of the faculty including those of us who have served or now serve on CUAFA, the Director of Admissions and his staff, and senior members of the Administration are engaged in a continuing discussion to help articulate the qualities characteristic of "excellent" students, and to provide the guidelines needed to weigh the relative importance of diversity of interests, cognitive styles, gender, and origin in their selection. We are also striving to ensure that

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is likely that we need to define an international role for ourselves, with the tensions this is sure to raise between that role and our present role as a leading U.S. institution.

Finally, the appointment of a new president from outside the MIT community at a time of change provides the occasion for an examination of the administrative structure of the Institute, which has grown somewhat haphazardly in response to a succession of specific limited new demands (e.g., from the federal government), perceived technical opportunities (e.g., use of computers to keep more elaborate records), and the increasing range of services deemed appropriate to support our students, staff, and

faculty. Each expansion of the administrative and support services seemed to be the rational response to an urgent problem, but the net effect over the last twenty odd years (1967-1989) illustrated in the data shown on pp. 14-15, has been that the administrative staff has more than doubled while the faculty grew by 10% and the student body grew by 22%.

As a result, many of us feel that it has become harder and more time consuming to get simple things done, and that we are becoming cogs in a complicated machine whose functions and path are ever more elusive.

Editorial Committee

New president, new provost, new deans - with all the new appointments and changing titles it's tough to tell the players without a scorecard.

As a followup to this special double issue of *The MIT Faculty Newsletter*, next month we'll feature a breakdown and analysis of the new (and old) Institute hierarchy. We'll also be offering additionally commentary on the changing role of MIT.

We encourage submissions on topics such as these, or on any subject of interest or concern to the MIT faculty and the Institute.

Please send all pieces to: *The MIT Faculty Newsletter*, 38-160, or to any member of the Editorial Board. And don't forget our electronic mail address: FNL@ZEISS.MIT.EDU.

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FROM THE FACULTY CHAIR**Stresses of the Persian Gulf War**

Henry D. Jacoby

As of this writing the air war in the Gulf is a week old, and a ground war seems unavoidable. Day to day hangs the threat that additional nations will be drawn into the conflict. No one knows how long the fighting will last, how it will end, or what will be its ultimate political and economic effects on the region. The likely impact of these events on MIT is clear however. We, as the society at large, will feel the strains of deep differences of opinion about the war and the policies and events that have led to it. This circumstance will call for an extra effort from all of us to hold this community together.

Several thoughts come to mind about what will be needed. I believe it is important, first of all, that we acknowledge the stresses that will be experienced by individuals and groups within the Institute over the weeks and months ahead. The conflict has been brought home to many of us in minor ways, as we attempt to deal with the anxieties of our children (and ourselves!) and as we cancel meetings and change our travel plans in the face of terrorist threat. And the stresses are real because the stakes in the conflict are so very great, not only for the lives of those caught up directly in the fighting and for the countries in the region, but also for the future role in world affairs of the U.S. and the U.N. system.

The commitment of individuals among us to one position or another about such important matters is strong, even passionate. Moreover, the points of dispute cut across components of our diverse MIT community in myriad and complex ways. The pressures of conflicting opinions can be expected to grow as the military conflict proceeds. We are likely to be more

effective in dealing with these tensions if we recognize them, talk about them, and work to understand their effect on all of us.

In the weeks and months to come we also will need to heighten our commitment to an atmosphere of respect for all the people who make up the rich tapestry of MIT life, and of tolerance for our varying perspectives on events and deeply-felt differences

faculty our role and responsibility is special. We are the ones who stand in front of students each day, and all of us serve as some form of visible supervisory or wider leadership role within our departments and laboratories. What we do will set the tone.

Finally, we need to keep the show on the road. Classes and research supervision need to move along

In the weeks and months to come we also will need to heighten our commitment to an atmosphere of respect for all the people who make up the rich tapestry of MIT life, and of tolerance for our varying perspectives on events and deeply-felt differences in judgment about what is right in this situation.

in judgment about what is right in this situation. One of the pillars of academic life is respect for differences of viewpoint and encouragement of free and open discussion. Maintenance of these values requires the most conscious effort when feelings run deepest, and tempers rise.

Also, many of us have relatives and friends in the midst of the conflict. They are residents of the countries involved, combatants on one side or another, or perhaps both. Personal anxiety for their well being, and grief over loss, will no doubt become a part of campus life over the course of the spring. We need to keep our antennae tuned for these situations, and help one another where we can.

It is the job of every member of the Institute - faculty, staff or student - to stand firm for mutual respect, tolerance, and openness in this time of anxiety and stress, and to look out for those especially affected. But as

smoothly, and we must not lose track of important faculty business that is coming up this spring. For example, after a two-year period of discussion and experimentation the faculty likely will be asked to decide before the end of the term about changes in the composition of the science requirement of the undergraduate curriculum. Recommendations will be coming forth from Professor Tom Greytak's Committee on the Science Requirement and the Committee on the Undergraduate Program about the inclusion of biology in the core and associated changes in the science distribution. These questions should be resolved this spring if at all possible, which means we faculty need to reserve some attention for the proposals as they proceed on their way to a faculty vote. Other important activities include the various discussions and advisory committees associated with the start-up of the new administration.

Report From The Committee On Discipline**On Academic Honesty**

Sheila Widnall

From time to time, the chair of the faculty Committee on Discipline (COD) has made reports to the faculty regarding the specifics of all of the cases that the Committee has handled. However, because of the special responsibility that the faculty shares for setting standards of academic conduct, I thought it might be useful to report here directly to the faculty on some of the issues concerned with cases of academic dishonesty that have come before the COD this year.

As a faculty committee, the COD is particularly interested in the responsibility of each faculty member to make clear to students his or her expectations regarding permissible academic conduct in their subjects and research groups; to set a climate which promotes high standards of academic honesty; and to provide mechanisms for dealing with cases of cheating that may arise from time to time. In 1985, the Office of the Provost and the ODSA, working with COD, developed a set of guidelines relating to academic honesty, spelling out the responsibilities of individual faculty and the role of departments in dealing with individual cases, as well as the procedures for bringing a case to COD. This policy in its entirety appears periodically in *Tech Talk* and is contained in Policies and Procedures.

The policy sets out several issues. First, that individual faculty have a responsibility to make clear their expectations regarding academic conduct in their specific subjects at the beginning of the term, particularly in such troublesome areas as the degree of collaboration that is permissible on homework assignments. Based on our experiences this semester, it is suggested that this should be done in writing.

The policy recommends that within each department there be a senior member of the faculty who can provide guidance to faculty and students in cases of suspected academic dishonesty. The policy also discusses what procedure should be followed should a faculty member have reason to believe that a violation of academic standards has occurred. Briefly,

the policy urges that the faculty member arrange for a meeting with the student. If after such a meeting the faculty member concludes that the student has behaved dishonestly, he/she may decide to refer the case to COD for a formal resolution. The faculty member may also wish to take direct action affecting a student's grade, giving the student a make-up assignment, and so forth.

The past semester has been historic for COD. One case of alleged violation of academic standards...Involved 78 students in a single subject.

In less serious violations, where the faculty member does not pursue the case through COD, he/she may wish to write a letter to the student setting out the facts of the case. A copy of this letter may be sent to the ODSA to be placed in the student's file. This letter would be available to the COD only if a subsequent offence occurs. The student may also write a letter to the file if the facts in the incident are in dispute. The policy also lays out procedures that a student may follow if he or she disagrees with the faculty member's disposition of the case.

The past semester has been historic for COD. One case of alleged violation of academic standards was submitted to us that involved 78 students in a single subject. In this case, there was no question that the faculty member in charge of the subject had gone to great lengths to communicate clearly to the students his expectations regarding academic conduct. Briefly, in this subject (a computer course in which a substantial part of the grade was based on computer programming assignments) the policy regarding student collaboration is that the students may discuss the problem sets and the possible approaches, but must

do the actual coding individually. In the second half of the semester, a student complained about widespread violation of this policy which placed students not engaged in similar behavior at a disadvantage. The faculty member in charge then developed an algorithm specifically to check for duplicate code and found 100 students having apparently submitted duplicate code in violation of the stated policy, out of a total enrollment of 250. He met individually with each student and eventually submitted the names of 78 students to COD for disciplinary action. The COD has now completed hearings on essentially all of these cases.

Several themes emerged during our deliberations. One of the strongest was the prevailing culture among the students regarding collaboration and/or the actual turning in of someone else's work as their own. Although students were aware of the policy in the subject, this awareness did not deter their behavior because many regarded the policy as being counter to the dominant student culture. Groups of students coalesced for the purpose of joint coding and/or sharing code with friends. Little attention was paid to the role of the assignments in learning the material in the course. In some cases, students would wait at a printer and intercept someone else's problem solution as it came off and then turn it in as their own. Solutions were even retrieved from wastebaskets. In one case, a student "broke in" to another student's file and "stole" code, submitting it as his own. Although most students were forthright when confronted by the faculty member there were a few who lied or conspired to fabricate stories about their involvement.

In our discussions with students during the COD hearings, many students said that, to avoid future problems, they would never again collaborate with other students. We feel that this is not the answer. Collaboration is an important part of the educational process. We also feel that it

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On Academic Honesty

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is a skill which needs to be learned. Giving proper credit to the work of others is basic to scholarship and turning in the work of others as one's own is never acceptable behavior. The solution is not for students to refrain from all collaboration but to incorporate it properly into their education and acknowledge the source. Faculty should give some guidance to their students regarding this issue and should adjust the workload in their subjects to the degree of collaboration desired.

Another theme that emerged during the COD hearings is the extent to which students put their professional careers at risk by their actions. Many of the sanctions that the COD employs carry a substantial risk for the student's future careers. Formal probation is often noted on the student's transcript, which is required for application to graduate school or for employment. Suspension from MIT is also noted on the transcript and "missing" year(s) are sure to raise questions. Law schools and medical schools pay particular attention to any involvement in disciplinary procedures. Many of the long and anguishing hours that we spent on these hearings were taken up with these issues in the individual cases that we heard. Balancing MIT's responsibility to standards of scholarship and conduct with our concern for the individual students is not easy.

Yet another theme was that the faculty member, initially unaware of the widespread collaboration going on in the subject, was impressed at how much work the students were able to accomplish. The grades on the assignments were consistently high. He consequently felt no need to reduce the level of difficulty of the problems. This situation can be unstable and can lead to a situation where increased workload and increased collaboration can proceed to a point where the assessment of individual student's accomplishments becomes impossible.

After hearing each individual case, the COD applied a range of sanctions that we felt were appropriate to the circumstances of the case. These ranged from dismissing

the case, to informal probation, internal probation with a letter to the faculty advisor, formal external probation with a notation on the transcript, and finally to suspension from MIT, which is also noted on the student's transcript.

In addition to this single large case, the COD has also recently considered several

What is emerging from our experiences is a sense that many MIT students see the Institute as an obstacle course set up by the faculty. Many feel that the required work is clearly impossible to do by straightforward means, and that any means that makes survival possible is allowed. We have been told by some students that

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other cases of individuals charged with academic dishonesty. In one case, a student admitted to a charge of adding material to a quiz by placing an extra sheet, done after the quiz was over, into the TA's office. The student actually did this twice when the student felt that the TA had misplaced the first sheet so that the TA ended up with two copies of "quiz problem #3." We also dealt with two cases of quizzes being altered and returned for additional credit. In both cases the faculty members, because of earlier incidents involving the students or because of the general policy followed in the subject, had xeroxed the quizzes before returning them. The record was thus clear that new material was added to the quiz. To our surprise, we learned that some subjects now require students to submit a written request to have a quiz regraded. In another case, a student admitted to repeatedly breaking into a faculty member's office to change grade sheets and to remove subject materials. We have also dealt with several cases of clear-cut plagiarism in which the turgid prose of, say, an Oxford Don was submitted as the work of an MIT undergraduate student - an immediately suspect situation.

they feel that developing survival skills, many of which would be considered academic misconduct by the faculty, is necessary in the MIT environment and by implication some feel that the faculty expects them to do this. We found students who felt that the major problem was getting caught. The view was often expressed that the only appropriate sanction was to receive a zero on any fraudulent work turned in - if you got caught. Any further sanction was regarded as unfair.

Service on COD becomes most difficult when we must deal with some of the consequences of the academic pressure felt by the students. We see our role as primarily educational and the length of our deliberations indicates our concern with the student(s) involved, balanced with our responsibilities to the academic integrity of MIT. The COD hearing itself is an important part of the educational process for the student and we insist on high standards of academic conduct during the hearing. We applaud the willingness of the faculty to carry through with what must seem a long and difficult process whenever academic misconduct is alleged and a case brought to the COD.

K-12 Science & Math Education: What Can & Should MIT Do?

Judah L. Schwartz

In recent years it has become apparent that our pre-college educational system is not serving the students in schools and the society as a whole as well as it should. The last decade has seen a flood of reports pointing to the breadth and depth of the problem and its extraordinarily complex nature. To be sure, part of the problem lies in the changing nature of the American home and family. Part of the problem lies in the inadequate compensation we offer to people who choose to devote their professional lives to the

kind of society we could be then we must marshal all the appropriate resources the society has available. The Massachusetts Institute of Technology is one of the country's premier educational resources. How might it contribute to the easing of the country's educational problems?

I believe that two aspects of the country's educational problems are of particular concern to us at the Institute, and that we might be particularly well-positioned to address them: We are not educating the overwhelming majority of our

launching a nationwide wave of education reform. Since that time, there have been many diverse efforts at MIT to improve American education. In large measure these efforts reflect the commitment of small groups of faculty, staff, and students to do what they can to help address a societal problem of the greatest importance, difficulty, and urgency.

The Institute should continue to encourage a variety of entrepreneurial efforts in K-12 education on the part of its faculty and staff. In order to enhance the effectiveness of these efforts, I believe that a coordinating office should be established to help these fledgling efforts seek support without stepping on one another's toes. This office should be able to allocate small amounts of seed money to help new efforts get started without having to wait until external funding is in hand.

While the Institute has always encouraged such efforts on the part of individuals and small groups, and will, I hope, continue to do so, I believe that the time has come to explore what contribution MIT as an institution could and should make to the improvement of pre-college math and science education in the United States.

I propose that we explore both the viability and desirability of the following courses of action. I recognize that the implementing of any or all of these will require substantial detailed planning, and

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Unfortunately education research, as it is done in many institutions, is often intellectually impoverished and clouded with inappropriate and ill-understood mimicking of research methods that are more appropriate to electrons than people. If the Institute were to decide to do so, it could establish a research effort that might serve as the model for a School of Education, different in kind and quality from any other.

education of our youngsters. If only students were better motivated. If only we could eliminate the scourge of drugs and violence in the schools. If only we could fix it so that kids need not come to school hungry. If only we as a society could discard our "Quarterly Return on Investment" mentality.

Addressing each aspect of the problem is necessary and not sufficient. If we are to become the

youngsters adequately in the areas of mathematics and science, and we are not attracting large enough numbers of youngsters from minority communities to the study of mathematics and science.

The universities of the country have traditionally played a variety of roles in helping to shape the nature of elementary and secondary education. Indeed, more than thirty years ago the Institute played a seminal role in

K-12 Science & Math Education: What Can & Should MIT Do?

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consideration of many issues. Nonetheless, I believe that the thrust of each of these recommendations is both workable and desirable.

- o The Institute should establish two kinds of pre-service teacher education programs. The first of these would be addressed to that small fraction of our own undergraduate student body that expresses an interest in teaching careers in the primary and secondary schools. A variety of incentive mechanisms, such as loan forgiveness programs and partial tuition remissions and/or scholarships for subsequent graduate study in scientific fields, could be made available to those who enter science and mathematics teaching in the public schools.

The second pre-service teacher education program should be addressed to mid-career professionals in science and engineering fields who are interested in making a career shift after working in their fields for two decades or more. There is a small but significant number of people in the country who seek to make this sort of career shift and we could be helpful to them, and through them the schools and the students in them.

- o I would like to see a collaborating group of Institute faculty and high school teachers undertake a long-term curriculum development effort in K-12 mathematics and science. The quality of the content and the pedagogy of the curricular materials currently in widespread use is poor. Many of the teachers who teach with these materials are themselves often

poorly educated in the very subjects they are asked to teach. We must have better curricular materials not only to educate our youngsters, but also our teachers.

Building on such a curriculum development effort, we should launch a growing network of summer teacher training institutes, initially here in Cambridge, and in subsequent years around the country. The nature of exponentials being what it is, the effect of such a program can be widespread in a relatively brief period.

- o The Institute has a tradition of

as it is done in many institutions, is often intellectually impoverished and clouded with inappropriate and ill-understood mimicking of research methods that are more appropriate to electrons than people. If the Institute were to decide to do so, it could establish a research effort that might serve as the model for a School of Education, different in kind and quality from any other.

- o As members of the faculty of MIT, we are, individually and collectively, relatively visible in this society. We have an obligation to

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doing research on a wide range of the important, difficult, and urgent problems facing society such as energy, health care, transportation, and defense. It is notable that education is not on this list. I believe we should establish an academic group that would do research on a variety of cognitive, economic, political, and social issues that affect the way in which education functions, in the small and in the large, in this country and elsewhere. Unfortunately education research,

call the attention of all those with whom we come into contact to the urgency of our country's educational problems, and the consequences, for every aspect of life in this country, of maintaining the educational status quo.

I offer this set of suggestions as an appropriate and do-able set of initial steps. I believe that taking these steps will enable us, as an institution, to help change our country's primary and secondary education system for the better. I hope we do.

MIT and Industry: Friends or Foes?

James M. Utterback

MIT is notable for its broad and long-standing relationships with and influence on industry. The Institute receives substantial and growing support from industry, primarily for research, but also for basic funding of teaching programs, scholarships and professorships, fees for Industrial Liaison Program services, and for patent licenses and royalties. Recently concerns have been raised about these relationships, notably those with foreign and especially Japanese firms.

Are we harming U.S. interests by accepting research funding from or communicating research results to

spirit of cooperation with industry and the community at large was clearly stated in 1861 in MIT's charter, which established one of our prime goals as, "instituting and maintaining a.....school of industrial science and aiding generally by suitable means, the advancement, development, and practical application of science in connection with the arts, agriculture, manufactures and commerce." The Institute was physically located in Boston, rather than William Barton Rogers' native Virginia, in part because this was then, as it is now in computers and biotechnology, the center of an industrial revolution.

George Eastman contributed funds for the campus and main building we enjoy today in gratitude for help given in the development of color film and Kodak's research laboratories. The list could be extended to include catalytic refining of petroleum, the computer core memory, synthesis of penicillin, and many other innovations, but the point is that connections with industry are at the very heart of our uniqueness, and have been since the beginning.

If we know anything about the process of technological change it is that ideas move when people move. Our culture is one of teaching by doing in projects and laboratories, and our primary connection with the world is through the flow of our students into larger companies and entrepreneurial firms. The most important connection between MIT and industry is the fact that the majority of our students find employment in research, engineering, manufacturing, and management positions in industry.

That this generative process continues can be seen today in hundreds of companies across the country founded by our graduates - from Digital Equipment Corporation, Raytheon, and Thinking Machines in Massachusetts, to Intel and Genentech in California - as well as through the long list of graduates who have shaped the achievements of major firms here and abroad. If we are to increase the material well-being of society through our ideas and research, then a manufacturing firm which employs our students or is founded by them

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Close connections with industry seem to me to be fundamental to the basic purposes of the Institute and to its future. MIT was founded as a radical experiment at a time of great optimism about the potential for technology to better the human condition.

foreign firms? More generally, some may feel that taking resources from industry at all biases or distorts the character of work and freedom of any university. Should MIT have close relationships with industry at all? If so how should such relationships be structured and governed?

Close connections with industry seem to me to be fundamental to the basic purposes of the Institute and to its future. MIT was founded as a radical experiment at a time of great optimism about the potential for technology to better the human condition. The inspiration for today's

Given these founding purposes, it is not surprising that some of the first sponsored research at MIT focused on safety in food preservation, a fact now reflected in the Underwood-Prescott chair honoring the company and professor involved. When Alexander Graham Bell arrived in Boston he soon developed a friendship with Professor Charles Cross, which was instrumental in the development of both his ideas and the Bell Telephone Company, now A.T.&T. Professor Elihu Thompson's dynamo and the company he founded in Lynn are now a central part of General Electric.

MIT and Industry: Friends or Foes?

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will often be the conduit through which ideas are developed and expressed. More subtly, we need and benefit from the feedback and challenges we receive through this process in thinking about and choosing the problems on which we work.

Clearly, the various programs through which industrial sponsorship is secured and relationships are maintained are not the cause of our ties with industry. They are simply a reflection of our professional and institutional aim to create change in the world around us both directly, and indirectly through our students. Perhaps this sounds hopelessly naive in a world in which anti-scientific and anti-technology biases are on the rise and in which the painful consequences and costs of the use and misuse of science and technology are becoming all too clear. But if we abandon our optimism about the positive role and goals of technological change, then we will give up much that is distinctive about ourselves and this place.

We often strongly express the view that MIT should welcome talented students, researchers, and faculty colleagues from all corners of the world. Perhaps we are too quick to generalize this viewpoint to firms and their representatives from other countries. Of course knowledge increases most rapidly when many contribute, just as productivity and quality improve most rapidly when many compete. We must, however, guard against the openness of our laboratories and markets to others becoming a one-sided bargain to our disadvantage.

In a reflection of this concern, one

of the most debated ideas in Japanese industrial circles today is that expressed by Professor Taizo Yakushiji (Course XVII Ph.D., 1977) of Saitama University. He is urging Japanese firms not to be insular and possessive of their technological gains, fearing that they will soon be left behind by the United States and Europe if they do not reciprocally share research findings and technological advances. We should ask no less.

Nor should we be unduly sanguine about the pressures and proprietary demands or conflicts of interest for faculty which may come with large

constant and vigilant attention to our core values as faculty. If we are to be agents of creativity and change then we will almost by definition be constantly at risk. If we become too comfortable with important sponsors and relationships, we not only run the risk of their changing priorities, but more importantly, we risk not attending to emerging possibilities and challenges, including those posed by the dangers the use of technology can create.

In conclusion, we must seek greater support from industry while we also diligently seek to maintain balance, reciprocity, and mutual

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chunks of funding from a corporation; any source of funding brings its own set of priorities and pressures. Some members of the faculty have observed that MIT may have moved too far from industry in the years since the start of World War II when industry was the major source of our support, and that we may have become correspondingly too dependent upon government sources of funds among which defense and energy are prominent. This is a dilemma that can only be approached through

understanding of the distinctive roles of a university and its sponsors. This means building close communication through the Liaison Program, Collegia and other means, constantly seeking to build ties with a more diverse group of sponsors in order to provide the means to address new areas of work, as well as convincing sponsors of the need for basic funding for renewal of the Institute and development of younger faculty in conjunction with increased support for research.

Office of Minority Education: The Challenge and Excitement of the Quest for Excellence

J. J. Pitts

Reports published in recent years by the MIT Minority Student Issues Group have assessed the racial climate on campus. Their goal has been to create an academic environment which is conducive to personal and intellectual growth, and academic fulfillment for all MIT students. Achieving the goals outlined in the October 1986 Report of the Racial Climate at MIT remains on the MIT agenda: To provide an environment in which:

there are clear signals that the presence of minorities is desired;

the contributions of minorities are encouraged, recognized, and valued;

genuine efforts are made to increase the presence of minorities on campus, especially in the student body and on the faculty, as well as to retain those already present; and

instances of racism are dealt with swiftly and firmly.

To create that environment, the Office of Minority Education (OME) at MIT was established in 1975 as a four-year experiment. Fifteen years later, the purpose of the office remains to "coordinate, improve and create academic services and programs which are likely to increase minority student survival at the Institute." It was run initially on a part-time basis by one of the professors who helped to establish it, with a reporting relationship to the Office of the Provost. In 1985, the office began reporting to the Dean for Student Affairs.

In the fifteen years of its existence, the OME has been under the directorship of at least eight individuals from different areas and offices in the Institute. That constitutes an average tenure of little better than one and a half years per director. An assistant director position was added in the early 1980's; at least four different individuals have served in that capacity. As a result of this pattern, one of OME's goals is to provide greater continuity and consistent quality of programs and services.

Current personnel in the office consists of the director, a budget manager, and an

administrative assistant. Although they have been in the office less than one and a half years, the commitment to fulfilling the purpose of the office is very strong. The staff rely heavily on whatever assistance students can work into their schedules, while the search for a new assistant director gets under way this spring. With the

The success of under-represented minority students, like that of all MIT students, is a responsibility that belongs to the students, the faculty, and the staff alike.

ambitious agenda on which the staff is working, the hope is for, eventually, a larger staff to provide adequate servicing of the students who need the office. Presently, quite a few enter the OME and must wait while over-subscribed office personnel try to meet their needs.

The number and needs of the students the OME was set up to serve have changed quite a bit over time. In 1975, the freshman class included 49 underrepresented minority students. If the retention rate were 100% from the sophomore, junior, and senior classes of that year, the total underrepresented minority enrollment would have been approximately 200. The 144 underrepresented minority students in this year's freshman class bring the current total enrollment of African American, Mexican American, Native American, and Puerto Rican students to nearly 600. Recently, increasing needs of Asian American students add urgency to the situation already experienced by those in the traditional focus groups. The results of a summer survey showed that more than 200 Asian Americans in the current freshman class would like to be served by

the OME. Full participation by 800 potential users of the office would create a very difficult situation.

Two of OME's largest programs of greatest benefit to freshmen are: the eight-week, Project Interphase, held in the summer; and Program XL, a six-credit seminar. Program XL has enjoyed so much success that the one-semester experiment has developed into a year-long offering. The OME/BSU Tutorial Program serves upperclass students as well as freshmen. A mixed group of freshmen and sophomores benefit from the Buddy Program and from the Secrets and Strategies for Academic Success (SSAS) Program. While all of these programs meet with a good measure of success, the staff is striving for greater improvement. A newly formed Industrial Advisory Council for Minority Education (IACME) was installed by OME in October 1990. As an agenda item at its February meeting, the IACME will work out the details of a mentor program so that students using the OME will have the advantage of a personal resource person from the corporate world. The IACME will provide several other exciting benefits for participants in OME programs.

The success of underrepresented minority students, like that of all MIT students, is a responsibility that belongs to the students, the faculty, and the staff alike. While the OME may play a leadership role in helping to create and nurture an effective environment for student personal growth and academic fulfillment, the staff do not see this as a task that can be accomplished solely by that office. We consider our goals to be shared by the full MIT community, which will make the value of their accomplishment even greater. We are reaching out to departments and faculty for increased participation in MIT's minority educational efforts. We look forward to working with you as we implement a schedule of contact for that purpose. Please let your ideas and cares be expressed.

MIT Undergraduate Admissions in the Nineties

Michael Behnke

The decade of the 1990's holds special challenge for MIT undergraduate admissions. The challenge is the result of external demographic forces and of a continuing internal debate about the future role of MIT and the make-up of the student body. What we do depends on where we want to be. What follows here is my sense of the issues.

Demographic Realities

The number of high school graduates in the United States will reach a low point in 1992. There was a 15% decline

As the number of high school graduates increases after 1994, the ethnic makeup will be changing dramatically. In 1980, 20% of the school age population consisted of students of color. They will make up 33% in the year 2000, and 39% in 2020 when 52% of the students will be White, 20% Black, and 24% Hispanic. Anticipating an increasingly multi-racial society, MIT has been very successful in diversifying the undergraduate student body. We have a strong program to attract underrepresented minority

to maintain our successful record in enrolling underrepresented minority students. Strong leadership from the top continues to be essential in this important area.

Breadth of Student Interests

MIT has for many years struggled with the place of the three smaller schools and especially the School of Humanities and Social Science. In the last decade, that debate has been impacted by two related concerns: the problem of over enrollment in Course Six; and, a developing conviction that engineers need a broadly based undergraduate education and that MIT has a role to play in educating technically oriented students for careers in such areas as law, business, and public service. In response, the Admissions Office, guided by faculty (Committee on Undergraduate Admissions and Financial Aid - CUAFA) articulated a number of institutional goals including the following: 1) To solve the enrollment problem in Course Six and to achieve a better balance of majors across all MIT departments; and, 2) To admit students whose intellectual interests bridge humanities, arts, and social science on the one hand, and science and engineering on the other.

Some members of the community suspected that there was a plot to turn MIT into a liberal arts school. The intention, however, was not to attract more humanities majors; indeed the entering classes of over 1000 never included more than ten students with humanities as their stated first choice interest. The objective was to admit students with somewhat broader intellectual and career interests. Our success was reflected in the fact that interest in Course Six fell from 311 to

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In addition to increasing the racial diversity of the student body, MIT has been successful in the enrollment of women who have made up at least one-third of recent undergraduate classes.

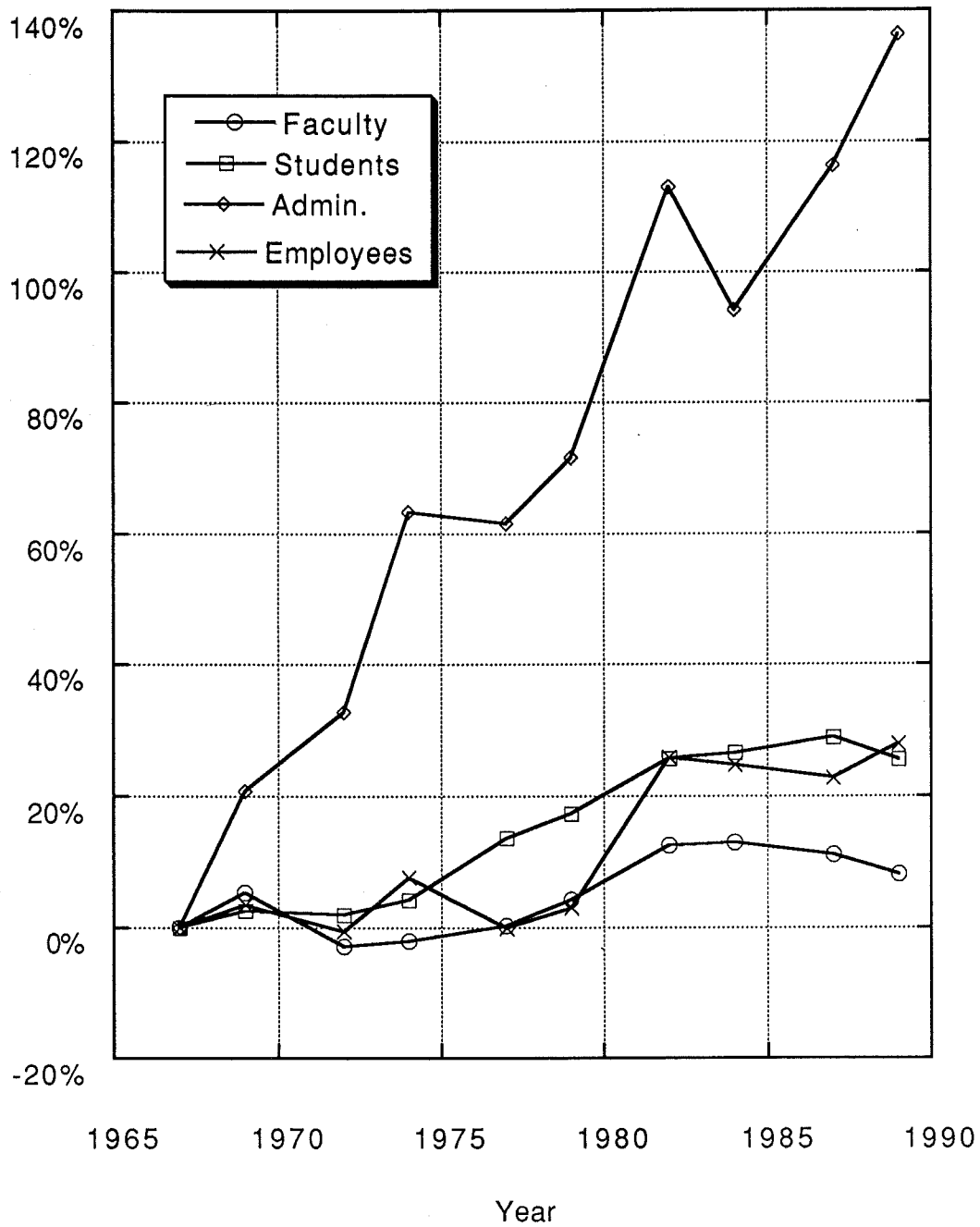
between 1979 and 1986. Between 1986 and 1988, there was a slight increase and then a decline of 12% to 1992. In recent years, applications have fallen at most institutions, and many have been unable to meet enrollment goals, let alone maintain the quality of the student body. MIT was fortunate to start from a strong base, but since our high point in 1988, applications from U.S. citizens and permanent residents have fallen. Other institutions, especially those not meeting enrollment goals, are making extraordinary efforts to attract students with special attention and price discounts. The 1990's will be highly competitive years in admissions. We will need to monitor our losses closely to make sure that we don't experience serious erosion in our competitive position and the quality of our entering class.

students. This year's entering class is 6% Black, 5% Mexican American, 2% Puerto Rican, and 1% Native American. In addition, we attract a large number of Asian American students, who make up 27% of the entering class. The percentage of white male freshmen has decreased from 61% in 1980 to 36% in the class entering in 1990.

In addition to increasing the racial diversity of the student body, MIT has been successful in the enrollment of women who have made up at least one-third of recent undergraduate classes. Success in both these areas has not come without substantial effort. Paul Gray, throughout his administrative career at MIT, was the catalyst and willing supporter of these efforts. Chuck Vest, both in his past actions and in his statements at MIT, has indicated forcefully that he intends

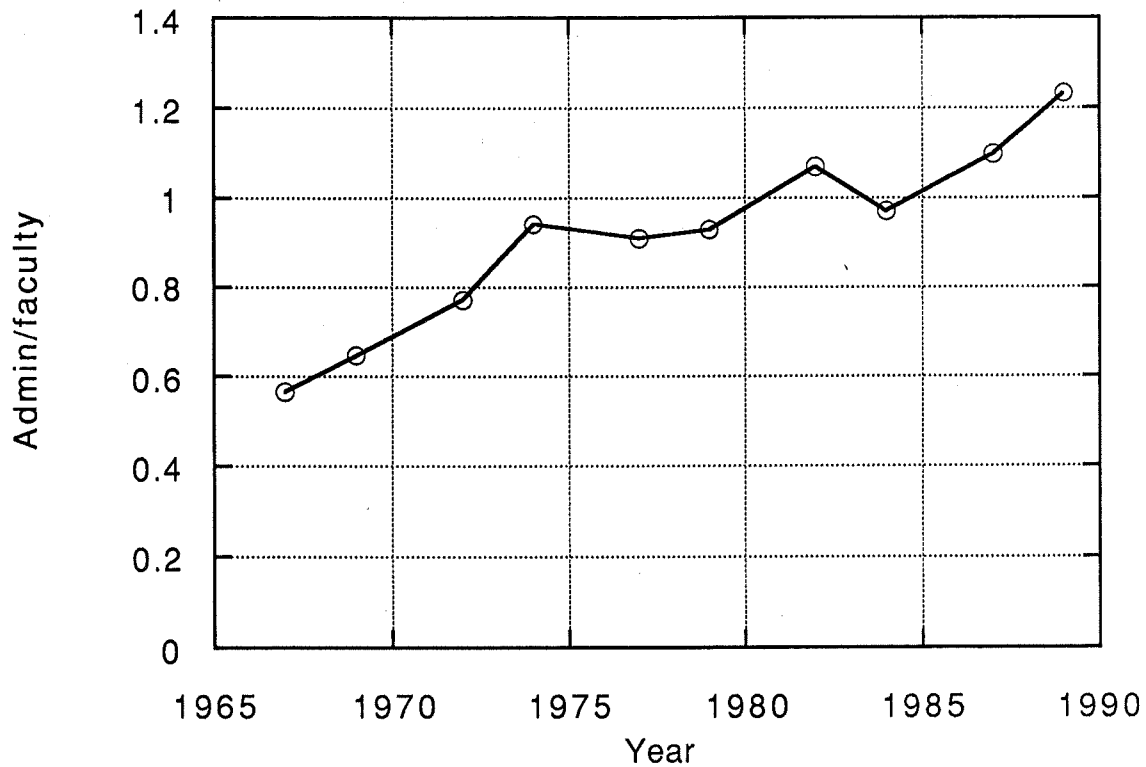
M.I.T. Numbers

Institute Personnel % Increase Since 1965



M.I.T. Numbers

Adminstrators Per Faculty Member



Total On-Campus Employees

	<u>FY1969*</u>	<u>FY1974*</u>	<u>FY1979*</u>	<u>FY1984</u>	<u>FY1989</u>
Faculty	962	894	952	1,031	988
Other Academic	1,070	1,465	1,389	1,694	1,837
Research	814	869	799	1,019	1,011
Medical				150	152
Administrative	622	841	884	1,000	1,217
Support	1,612	1,490	1,322	1,628	1,691
Service	<u>1,323</u>	<u>1,100</u>	<u>1,029</u>	<u>1,193</u>	<u>1,019</u>
Total	6,403	6,659	6,375	7,715	7,915

*Does not include part-time employees.

Source: MIT Factbook; Prepared by the Planning Office, June 1990.

In Memoriam

Remarks at the Memorial Service for James R. Melcher

Markus Zahn

Since my junior year at MIT in 1966, Prof. James R. Melcher was my teacher, advisor, colleague, and mentor. Best of all throughout those years, he was my friend. We all knew Jim as a hard and productive worker with a social conscience, an excellent teacher, superb researcher, a paragon for healthy and moral living, and exemplary as a role model of how engineering achievements should be applied to human needs. Jim was a social/political activist trying to make MIT a leader in addressing national problems and educated his students and colleagues of their wider responsibility to the nation. Jim had the special knack of asking the right questions to bring out the very best in his students and colleagues. That was especially true for me. Because the impact he has had on my life is representative of the positive influences he has had on all he worked with, I will briefly review my experiences.

My first meeting with Prof. Melcher was in 1966 through his course, then being developed with Herb Woodson, Fields, Forces, and Motion, still taught today at MIT and other universities. He then supervised me in special projects for credit and for hourly pay. I assisted him in setting up some experiments for his films "Complex Waves." He asked me to write the solutions manual to Part III of his text written with Herb Woodson, Electromechanical Dynamics. As a graduate student teaching assistant, Prof. Melcher asked me to teach and be in charge of an evening course of Fields, Forces, and Motion during the 1968 summer. This was a doubly pivotal point in my life as I am a professor today because of that early teaching experience, and also because it kept me in Massachusetts rather than my originally intended summer job in California. My then casual dating led to a serious romance and then marriage in 1969, with Jim attending my wedding. My successful summer teaching led to recitation teaching the next academic year and then promotion to Instructor rank. Jim Melcher supervised my doctoral thesis. He and Janet attended my children's Bat and Bar Mitzvah's.

My student years at MIT working in Prof. Melcher's group had some unwritten rules: a) occasionally swimming laps with Prof. Melcher at the MIT pool (he daily swam 100 laps to my occasional 10); b) attending barbecues at the Melcher home as an excuse to help him put up a ham radio antenna; and c) letting him know immediately if any of the fluids we worked with in his Electrohydrodynamics Laboratory grew hair. Winter laboratory gatherings at the Melcher home also included ice skating, skiing, and tobogganing in their back yard. My youngest child learned to ice skate on the Melcher pond. Jim valued time with his family. He often described the great pleasure he had working on family projects at home until he was weary, such as the hand digging of his home swimming pool and construction

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Eulogy for James R. Melcher

Scott Paradise

For a non engineer like myself, it is impossible fully to understand and appreciate Jim Melcher's technical accomplishments. We only guess from hearsay of his creativity, productivity, and the standards of excellence he demanded from himself and his students.

In addition, he sustained a marriage, and with Janet raised three children. He dug a swimming pool behind the house, played the piano, played with his ham radio, and with Janet climbed mountains and paddled on rivers, watched the news on television and discussed the day's events.

For the ordinary man this would have been enough, a full and satisfying life. But Jim wanted more.

He broadened his purview. He looked at where society was going. He evolved a moral vision. It was spiritually based. It may have had roots in his preacher father. But it was not religion stressing the afterlife, but a religion of contributing to the enhancement of this life for all people. He always insisted that he was a Midwestern conservative. And when his moral vision led him into political activism, which increasingly it did, he sometimes found himself speaking at meetings organized by radicals. His motivation, as was clear on these occasions, was not leftist ideology or fanaticism, but an appeal to common sense and the common good.

It was Jim's moral vision that led him to the discernment that for more than the past decade American policies were disastrously misguided.

Increasingly he found himself travelling and speaking around the country calling for a change in national direction. At the heart of these misguided policies stood the American addiction to weaponry and our swollen military budgets. In a succession of efforts he tried to move MIT to help turn American policy around.

Jim became himself deeply committed to this moral vision. His activities in its behalf exacted a price. The policies implied by Jim's vision are highly controversial and led to painful controversies with faculty and staff colleagues. Many of these colleagues were close friends with decades of history together. These friends meant more to him than any others in the world. This made such conflict doubly painful.

For most, the satisfaction of professional success and the blessings of a family would have been enough. For most the added commitment to a moral vision and activism in its behalf would have been more than enough. Jim wanted more.

At the time of the Arab oil boycott almost two decades ago, Jim and Janet sold their second car, and Jim began commuting the nine miles to MIT on his bicycle, in all weather, in all seasons. In doing this he was claiming some integrity. If we are

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In Memoriam

Jim Melcher

Hermann A. Haus

I visited Jim for the last time on December 22, just before leaving for Japan. I learned of Jim's passing in Japan. I had missed his last days and his memorial service. This is deeply saddening to me. In his memory, I want to tell my colleagues of my deep professional respect for Jim and of the friendship with which Jim honored me.

One cannot write of Jim without starting with his commuting by bicycle. When I worked as late as Jim, which was not as often as he did, and when I had biked to work, which was not as regular as Jim's commuting by bike, I enjoyed riding back to Lexington with him, dodging the traffic and discussing the state of MIT and the world. Jim's dedication to MIT, to his graduate students, and to undergraduate teaching were beyond compare. The state of MIT was, of course, intimately connected with what and how we teach our students. The kind of research done at MIT was his other great concern.

Uppermost on his agenda was the question how MIT can contribute to the economic health of the nation. He was a spokesman of his belief that research directed toward improved technical and industrial productivity and the protection of the environment should be the primary role of engineering research.

He had a unique ability to inculcate the teaching of field theory with vivid lecture demonstrations and practical examples. His teaching challenged the student to think of technical applications and technical solutions using electric and magnetic fields. We collaborated on the undergraduate electromagnetic fields subject for 20 years, writing a text under joint authorship. When finished, it was clear that Jim's contributions outweighed mine; yet he insisted that the authors' names appear in alphabetical order, one of the many expressions of Jim's modesty.

The last months of his life were racked by physical pain. Yet every time I visited him, he did not show any pain, his mind was clear, his recollection total, and we talked as usual about research and MIT. On his sickbed he wrote an account of his activism on behalf of the direction of education and research that he considered proper for MIT. I asked his permission to send an extensive excerpt to Chuck Vest, because I knew it would please him to know that our new president's future actions will be taken in full cognizance of Jim's vision of the role of MIT. I was informed that President Vest sent a personal note to Jim that reached him before he passed away.

Jim was unique and is irreplaceable. I am grateful for the many stimulating hours we shared working on educational and technical problems. I know he affected profoundly and positively the careers of many others, his colleagues and his students. He lived a life of purpose and scope and faced his painful illness with courage. He is an example to us all.

James R. Melcher

(Continued From Page 1)

the first Arab boycott in 1973, as a personal response to the need for a coherent and consistent national energy policy involving decreased dependence on oil.

There are many other examples of this commitment to action: his work with the Southern New England Conference of the United Methodist Church on a resolution condemning militarism and calling for the conversion of industry from weapons manufacture to making socially beneficial products; his discussions with engineering colleagues at MIT about the implications of asking for SDI funding; his work on the MIT Committee on Lincoln Laboratory (Smullin Report); his support for and work on the MIT Committees on the Impact of Military Funding on Education and Research (Kaysen Report); and his many lectures on the follies of the 1980's. As he so eloquently wrote last fall, these are now coming to fruition in the Persian Gulf crisis, and the probability of an unjust and disastrous war.

The MIT community will miss his informed and strong, but never strident, voice. The members of the *Faculty Newsletter* board will miss him greatly.

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Eulogy for James R. Melcher

(Continued From Page 16)

going to free ourselves from our addiction to oil and all that entails, we need to be willing to change our ways of living. And Jim demonstrated not only that such change was possible, but also that it was fun. And so the very means he chose for travelling from his place of work became a witness to what he stood for.

In all this Jim gradually achieved a wholeness, an integrity. The different parts of his life hung together and made sense. What he said he believed was consistent with what he did. Even with his early death he achieved more completeness than most of us will though we live three decades longer.

Jim and I saw each other at meetings. In addition, in the last several years I took a sandwich to his office once every few weeks and we would have lunch together. Wonderful conversations we had. Sometimes the flood of ideas pouring from him would leave me struggling to keep up. Other times he would listen closely to what I said. I left these lunches strengthened and elated. I'm sure there are more than a few of us who will deeply miss him.

When I left the house just two hours before he died, Janet said to me as we stood in the doorway, "Jim said it was because of your being there at MIT that he felt he could integrate his work, his political activism, his religious faith, and his family." In sharing this with me, Janet gave me a great gift.

Jim gave a greater gift to us all. He demonstrated in his life that such integrity, such wholeness was possible.

In doing that Jim left us a challenge. He also bequeathed to us who are left behind strength and hope.

The Role of Engineering in Society

Ernst G. Frankel

This is a note about engineering, about its purpose, its content, and the way engineering is done. It represents the views of someone who has practiced engineering for over 40 years and who has attempted, often unsuccessfully, to achieve the basic objectives of engineering as I see them. These are to develop technology, put it to use, and teach how and when it is to be used. Engineering includes technological decision making and the effective management of technology.

I do not perceive engineering to end with research and development of technology or the design of some technology. Engineers are technology developers, designers, makers, and trainers. Their principal function is to develop effective uses of science or scientific principles, in terms of some potentially useful technology, design it, develop a method for building, manufacturing, or otherwise implementing it, and to establish effective uses for it. The last includes the development of technology operations and the training or education of potential users.

As such, engineers are therefore the ultimate integrators and their principal calling is the development and integration of the various activities required to bring a technological opportunity based on some discovery to ultimate use.

Engineers who consider their role more restrictive, usually end up as narrow engineering scientists, designers, industrial or operating engineers, with very limited roles, and most importantly, practically no decision or policy making powers. They become hired hands or confined investigators. They either are given tasks by others usually not trained in engineering, such as managers or

administrators, or they work on narrow problems defined by them or others without any role in if, how, when, where, and by whom the results of their investigation or their infant technology is to be used.

Engineers in the Western World, and in particular in the United States, have become narrow and specialized. Most see their function as performing some particular role in research, investigation, design, manufacturing, or operation of technology. As a result,

the inventiveness of its engineers, and which surpassed the industrial powers of Europe in productivity by sheer technological originality and courage of its engineers. In fact, it is probably no exaggeration to say that the U.S. owes its greatness to the inventiveness of its engineers and their ability to not only invent technology but to show how it can be implemented and used. Our engineering forefathers were not narrow engineering scientists or designers. They were technology

In a modern society, engineers must assume more responsibility and face the issues created by technology because only they truly understand the capability of technology...

engineering as a profession is difficult to define and some may argue that it is really not a profession. Its scope varies from highly sophisticated and often abstract scientific investigation, to technology development, engineering design, to technical management, repair or technology operation. The public perception of engineers is even more vague. It includes auto mechanics, boiler operators, designers of bridges and other infrastructure, as well as applications engineering. The last is assumed to be the transformation of scientific discoveries or invention into usable technology.

Few today would call some of our greatest inventors, such as Bell, Ford, Watts, etc. engineers, although most were engineers by choice. These are curious developments, particularly in a country such as the U.S. which throughout its history benefitted from

developers and integrators who changed our way of life, the world around us, and our role as a nation.

This is no longer so. We still make scientific or technological discoveries, but are more and more unable to translate them into actual and useful applications. Our engineers and engineering scientists have become narrow specialists who usually do not recognize or care about technological opportunities. They consider their role as narrow contributors to knowledge of technology without any responsibility for its broader development or use.

This is the result of the focus of our narrow often highly specialized engineering education, the structure of our industry and society, the perception of engineers by society, and the self perception of engineers. It is caused by our decision and policy

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The Role of Engineering in Society

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making hierarchy in government, industry, academia, and society in which engineers seldom assume a leading policy or decision making role. But, most importantly, it is the result of the way engineers live, work, communicate, interact, organize themselves, and respect themselves which affects their contribution to society. At this time, when technology drives nearly everything, the role of engineers is actually less than at earlier times, when technology was barely recognized as an important contributor to society.

This may become dangerous as the gap between technology developers and those deciding on its use - including the ultimate users - continues to grow. Technology is becoming not only increasingly complex and pervasive, but it has ever larger impacts on society, our way of life, and on the environment.

Engineers will have to participate or even lead the decision making processes, particularly those affecting or effected by technology. In a modern society, engineers must assume more responsibility and face the issues created by technology because only they truly understand the capability of technology, its potentials, potential dangers, and the opportunities for technological development.

Seldom do engineers take the responsibility for technological and technology use decisions. While this may sometimes be the result of lack of opportunity, because so few engineers are in senior management or government positions, I find that it is in a major way also due to the basic unwillingness of engineers to take responsibility or make difficult, often risky, choices. Engineers are trained to be risk averse and to make decisions only when outcomes can be predicted

with reasonable certainty.

Engineering education is at least partially to blame for it, as it does not encourage engineers to take risks and does not train them in management or decision making. Engineers are similarly ill equipped as communicators and - as a result - negotiators.

While early engineers were creators who developed new concepts or devices and used their mental and physical skill to come up with solutions to

is necessary not only in the content but also the method of engineering education, in such a way as to challenge engineers to uncover opportunities, recognize the limitations of the environment in which technology works, judge economic and social implications of technology use, and realistically integrate technological developments in the real world with all its frailties, uncertainties, and consequent risks.

Engineers will have to learn that

For engineers to play an essential role in society and assure effective use of technology for the good of society will require a radical change in engineering education. This change is necessary not only in the content but also the method of engineering education....

problems or new technologies in terms of products, processes, or services, modern engineers in the West have degenerated into operating engineers, design engineers, or engineering scientists. Few engineers work independently and most serve decision makers in other disciplines who may have little, if any, technical knowledge. In other words, engineers have largely become solvers of problems, set or chosen by others who often have little knowledge or appreciation of technology - except for its potential uses.

For engineers to play an essential role in society and assure effective use of technology for the good of society will require a radical change in engineering education. This change

they cannot cover up risks or lack of knowledge by safety factors but that risks must be confronted by rational analysis of the levels of uncertainties. This will require much greater abilities in communications, systems analysis, and management.

This does not mean downgrading or dilution of education in scientific and engineering principles and theory, but the teaching of these principles and theories in the framework of the real and not ideal world.

In conclusion, and as a consolation, I should say that other professions such as economists may have an even greater need in assuring the relevance of economic education to real world processes and needs.

THE PLEASURES AND PRESSURES OF BEING A JUNIOR FACULTY MEMBER AT MIT Today

Daniel Hastings

MIT has built its reputation on the basis of the excellence of the faculty and of the students. This emphasis on a culture of excellence is what attracts many young people to MIT to become students and faculty. A key part of a culture of excellence is a set of rewards for success. For faculty at MIT these include the ability to work with extraordinarily capable students, to pursue fundamental research in a climate that supports it and by interaction with colleagues to be continually

difficult it is also challenging and has been the way in which MIT has built and sustained its excellence. A valid question to ask, is whether the process today is any more difficult for junior faculty than previously.

A number of trends indicate that life for junior faculty is more stressful than twenty or thirty years ago when the senior leaders in the departments were junior faculty. An extremely important shift has occurred in the economics and work force of America in the last twenty years. In many

specific areas are technically competitive with MIT and financially superior. This, coupled with the political pressure to spread research money as broadly as possible, makes winning research grants more difficult. However, even when won, the federal agencies are often now requiring various types of matching. Of course this takes up yet more time.

Finally, in external trends almost all the funding sources are now demanding more and more for less and less. The tendency of the contract monitors is to approve only funding increases from year to year which match the national rate of inflation. The fact that the university rate has been increasing faster than the consumer price index is invisible to them. Therefore, multiyear proposals which are desirable for stability end up by the final year sub-optimal in terms of their funding.

Within the School of Engineering two other trends have increased the pressure on junior faculty. First, there has been an increased emphasis on the quality of teaching by the faculty. This is highly desirable since the students deserve the highest quality experience possible. However, without any diminution of the research demands, it represents an additional burden on the junior faculty. This is especially true since teaching is learned on the job and there is no formal or well understood way to teach how to teach or to evaluate teaching.

The other trend is indicated in the
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While all junior faculty face increased pressures, for women and minority junior faculty the stresses are particularly acute....For individuals in these groups the issue of mentoring is key....For women and minority faculty, it is almost impossible to find the senior faculty who can be role models and understanding advisers.

intellectually challenged. All of these things make MIT a wonderful place for faculty, junior and senior, to pursue the things that they enjoy.

While MIT can be a tremendous place to work, for junior faculty it poses a well known set of challenges. Junior faculty are expected to carve out an independent research expertise, document this by substantial high quality publications, while at the same time contributing to the teaching in the university. In addition, contributions to the service functions of the department and university are expected.

However, while this process is

families both spouses work and child rearing is shared equally. The consequence of this for junior faculty who have children or wish to have children is that substantial time has to be committed to the task of child raising. In contrast in the past, the spouse (usually the woman) stayed home and raised the children while the junior faculty member devoted the bulk of their time to the research.

External trends which have challenging consequences for faculty at MIT are the growing competitiveness of other universities, especially the state universities. Often proposals from these universities in

THE PLEASURES AND PRESSURES OF BEING A JUNIOR FACULTY MEMBER AT MIT TODAY

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table. While the number of students to faculty as a whole at MIT has not changed much in the last twenty years, in the Engineering School it has increased by 70% with increases both of graduates and undergraduates. In particular, the increase in the undergraduate population translates directly into more time spent in advising and interacting with students who often do not contribute directly to the research endeavor.

While all junior faculty face increased pressures, for women and minority junior faculty the stresses are particularly acute. The Institute has made efforts over the past twenty years to bring these underrepresented groups onto the faculty. With women there has been some success, with minorities the situation is much more bleak. For individuals in these groups the issue of mentoring is key. To be successful, all junior faculty need strong mentors from the senior faculty to advise them and to argue their case in councils where the junior faculty cannot go. For women and minority faculty, it is almost impossible to find the senior faculty who can be role models and understanding advisers. This places the burden of being path breakers on these junior faculty, who already shoulder all the burdens of their white male colleagues.

This lack of ready mentors is particularly important in the key issue of networking. So much of the business of establishing a presence in a field and in a department flows from the ability of the mentor to

help the junior faculty member establish links, and this is a particular problem for young women and minority faculty.

Junior women faculty face another pressure, which is the pull between

While these trends suggest that life as a junior faculty is more difficult than twenty or thirty years ago, life here at MIT still offers the chance to be the best in a technical field and interact with extraordinarily capable

Student/Faculty Ratio

<u>1970</u>	<u>School of Engineering</u>	<u>MIT Total</u>
Graduate	4.2	3.7
Undergraduate	3.3	4.4
Total	7.5	8.1
<u>1990</u>	<u>School of Engineering</u>	<u>MIT Total</u>
Graduate	6.5	5.3*
Undergraduate	5.8	3.7*
Total	12.2	9.0*

* = FY89 data, all others 1990 data.

career and child bearing. Many junior women faculty decide to postpone child bearing and concentrate on their careers. Others have children during junior faculty years and find the lost time puts their tenure prospects at serious risk.

faculty and students in a culture of excellence. Junior faculty, like all faculty, are here because they choose to be here. The issue for the nineties, is how the Institute can help alleviate the negative effects of the pressures while retaining the positive.

Remarks at the Memorial Service for James R. Melcher

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of rock walls. He loved hiking and camping deep in the woods of Maine with Janet and his dog Rudy.

Since 1973, daily swimming was replaced by daily bicycle commuting. He did this, first of all, because it was fun and also because it was a useful way to obtain his needed exercise while accomplishing the task of getting to and from work. It was a personal way for him to demonstrate the need for a national energy policy of non-polluting energy self-sufficiency. It had the great secondary benefit of attracting kindred spirited students to his laboratory who had similar values, resulting in a bicycle as the laboratory symbol on sweatshirts.

My first job at the University of Florida was offered to me by attendees at a workshop that Jim had organized at MIT on a new approach for teaching electromechanical dynamics. I collaborated long distance with Jim over these years. He was an early riser. When visiting MIT I gave a seminar to his research group and spent the night before at the Melcher home. We awoke at 5 a.m. and were in the office before 7 a.m. I spent the 1976-77 academic year on sabbatical with Jim at MIT.

Since 1980 I have been at MIT where Jim was my lab director at the High Voltage Research Laboratory and then was director of the Laboratory for Electromagnetic and Electronic Systems. Over this time we continuously collaborated on a number of research projects related to electrohydrodynamics and electrical insulation, especially as applied to electric power apparatus. We co-supervised numerous graduate students. Travel was required as part of our research obligations, many times to EPRI in California, and we always shared hotel rooms. We were both "news-junkies", so it became a joke

between us as television news was perpetually on during our waking hours in the hotel rooms, leading to wonderful discussions, especially during the Reagan years, as I always agreed with Jim's remarkable insights on public policy issues. On one of our

project report to the Lord Corporation. He and I worked together on a journal publication of our past two years' work on the Absolute Charge Sensor which he invented. When I gave him manuscript drafts, just as always, his extensive editing greatly improved the

Since 1973, daily swimming was replaced by daily bicycle commuting....It was a personal way for him to demonstrate the need for a national energy policy of non-polluting energy self-sufficiency.

California trips we arrived at the hotel about 1 a.m. California time, 4 a.m. Boston time. On arrival, CNN was put on and I went to bed. As a diabetic, Jim had to be careful about his diet. As I was falling asleep, Jim discovered that he needed some food. No place local was open, so we hopped in the rental car and found an open Jack in the Box, where we ate hamburgers.

My teaching responsibilities at MIT have included all the undergraduate and graduate fields courses that he developed or co-developed: 6.013, 6.601, 6.671, and 6.672. I was complimented when he asked me to teach the electromagnetism course that his daughter Jennifer was taking. Jim and I have also made a series of videotapes on demonstrations of electromagnetic principles as a complement to his book Electromagnetic Fields and Energy with Hermann Haus. We had great fun writing scripts and performing before the cameras.

Over the six months of Jim's illness, he was remarkably productive. He read and contributed to Neil Goldfine's doctoral thesis and he completed a

finished product. We discussed two other papers now in progress and planned for jointly written books on our recent research and on computer applications for electromagnetic education. We discussed the progress of his graduate students and he continued to contribute new ideas.

Most important to Jim was the article he completed during his illness entitled "America's Perestroika" which compares his own personal deteriorating health to the poor health of the country due to the unwillingness of our leaders to honestly define and address the problems of our present way of life. The paper discusses such topics as the need for a national energy policy and examines the role of our military in our budgetary and competitiveness problems. An edited version of this paper will be published in *Technology Review*. A complete version will be given to Jim's friends.

Jim's wisdom on technical and human matters will be missed by all. It has been my fortune that I've closely shared life and work with Jim. I'll miss him.

From the MIT Planning Office

Report On Housing

MIT has recognized the importance of housing for students, faculty, and staff since the Institute moved to Cambridge. Beginning with the first undergraduate housing in 1916 and the first graduate residence in 1938, the focus has been principally on student housing. With the leasing of land by MIT to the New England Life Insurance Co. for an apartment house development at 100 Memorial Drive in 1948, the Institute sought to encourage rental housing opportunities for faculty and staff near the Institute; close to half of the apartments in that building are now occupied by members of the MIT community.

The development of additional housing for the MIT community has been based on surveys, studies, and reports that have recommended that all of the undergraduates be accommodated in Institute-sponsored or approved housing, that fifty percent of the graduate student body be offered housing on the campus, and that provision for faculty and staff housing near the campus should be one of MIT's goals.

Over the last thirty years we have provided for essentially all of the undergraduates and about thirty percent of the graduate students. During this same period, there has been a continuing concern for faculty and staff housing needs, most recently expressed in the report of the Ad Hoc Committee on Family and Work. Some efforts have been made to expand housing opportunities for the faculty through the development of a mortgage assistance plan and the purchase of units in new condominium projects near the campus for rental to MIT affiliates.

Changes in the demographic character of the MIT population during the next decade will affect the demand for housing resources. The size of the undergraduate community has, over the last twenty

years, been driven in large part by the availability of housing. The continued growth (albeit modest) of the graduate student body partially explains the difficulty we have had in meeting our goal of housing fifty percent of this community. During the same period, the number of faculty have generally held steady although we anticipate some

Some efforts have been made to expand housing opportunities for the faculty through the development of a mortgage assistance plan and the purchase of units in new condominium projects near the campus for rental to MIT affiliates.

changes in the years ahead.

The costs of our housing program have typically been financed by low-interest loans, tax-exempt bonds, and gifts. With the demise of the College Housing Loan Program which offered very low-interest loans, we have had to devise alternate methods for financing campus housing. For example, rent levels for graduate student housing is held at ten percent below market by policy. Income over costs is placed in a housing fund that is available to finance new housing. Both Green Hall and the new Edgerton House have been assisted by this program. The remaining seventy percent of our graduate students living off campus must compete on the open market for housing where they typically pay from thirty to fifty percent of their budget for housing.

Housing accommodations for faculty and staff vary as a function of rank and age. Tenured faculty members are generally older, have higher incomes,

live in homes with lower interest mortgages, and pay a lower percentage of their incomes for housing. Non-tenured faculty must generally pay less for their housing and they tend to get less for their rental or purchase dollar due to the inflation in housing costs in the Boston area during the last decade.

If current trends continue, the Institute can anticipate events that will affect its ability to mount housing programs in significant ways. These include: a probable fifty percent turnover in the faculty during the next 15 years bringing many younger people into the faculty ranks; pressure by Cambridge on MIT to devote some of its limited land resources to public purposes such as parks; Cambridge transportation policies that seek to reduce the amount of parking available to commuting faculty, students, and staff, and thereby further increasing demand in the Cambridge housing market; down-zoning efforts to reduce the development capability of Cambridge land for any purpose (including housing); and greater demands for supporting services such as day care facilities to meet the needs of dual professional families, single parents, etc.

MIT's response to these trends will require some difficult choices. Our land resources are insufficient to meet all of the expressed desires, and the financial resources available will have equal demands placed on them by academic needs. The setting of priorities for housing will be an important task for the community although it is likely that our traditional view that students should be served first will continue. However, there is a recognition that the housing needs of the faculty and staff are a serious issue whose resolution requires imagination and innovation. A number of housing policy alternatives are currently being discussed by the Academic Council and the new administration.

An Interview With Mel King

Faculty Newsletter: Much has been made of President Vest's hopes and plans for the future of MIT. In this issue of the *Newsletter* we're focusing on specific guidelines that he might follow when making some of these decisions. Where do you think his emphasis should be?

Mel King: I think there are basically two issues. The first is the overall mission of the Institute, and the second

improve the quality of life for all people. **FNL:** Rather than a specific plan, is it more a philosophical understanding that we do influence the world, and that we could potentially guide things in a more conscious way than we currently do?

MK: I think that the guidance would come from the way we related to and provided for the development of the entire MIT community...and I mean

have to be engaged in the process of their own development and it must be viewed as life long. I like the approach that Freedom House takes: "developed people plus resources equals developed communities."

The administration should provide the leadership in modeling learning and awareness particularly around understanding ways in which people are oppressed. Having an historical frame of reference would mean that issues such as racism and sexism would be examined. Failure to understand and eliminate inappropriate action in one's behavior would be seen as an indication of a deficiency in one's development. It's a question of appreciating the people who come to study and work here. In valuing all the people who are here and working to maximize and develop their creative selves we would be offering the planet a new model.

FNL: Would you want specific programs or courses implemented?

MK: Yes. Of course specific techniques and programs would have to be developed. The way the courses would be developed must be consistent with the opportunity for input from the diverse school population. They would also reflect ways in which we want to practice issues in power, development, technology, and democracy. Recently, Prof. Frank Jones described a discussion on ways to build an attitude of caring into the education of the students at a local university.

Several months ago at a conference on the "Peace Dividend", Susan Gordon, a writer from the *Boston Globe*, made a strong pitch for becoming a nation of care givers. It would be interesting to have members of this community researching and

(Continued On Next Page)

To sit in this place with the level of genius here and know that every day 42,000 babies die from malnutrition, hunger-related illness, or from lack of potable water is obscene. For us to know and not be providing serious leadership in finding both technical and political solutions is hard to understand and indefensible.

is specific implementation. One should not be able to walk away from this institution at anytime without a sense of an overall mission that the institution has on the planet. And I say on the planet because we have people who come here from all over the world.

If we know we want to have an impact on the planet, then we have to be very conscious about being inclusive and who we bring here - and why. This means making a concerted effort to admit people from every part of the planet. Then we should give them the degree at matriculation. I once heard someone say that once you accepted people, you should give them the degree when they walk in the door. Then we would work with them in designing a program to acquire the personal, political, technical skills and knowledge needed to be successful at creatively using one's talents to

all those who work either as students or employees. It's important to say that we want to function in a way so that everybody who is here has a sense of the way to move in this world. That sense could come from redefining democracy, power, technology, and development. This should lead us to create new paradigms. To use Vincent Harding's words "to move toward a new and transformed society, not equal opportunity in a dehumanized one." **Democracy** valuing all the people and where all the people are valued. **Power** helping others to get where you are and beyond and to feel good about it. **Technology** beating our swords into plowshares is a way of saying that what enhances life is technology, and here we need a technology that brings out the best in us. **Development** "must be seen in human terms" thus the buildings, roads, etc. are tools; people

An Interview With Mel King

(Continued From Page 24)

inventing techniques helping people to be caring and respectful of others.

FNL: The Institute has been accused of having basically no sense of community - either within MIT or as an influence on the world community.

MK: To sit in this place with the level of genius here and know that every day 42,000 babies die from malnutrition, hunger-related illness, or from lack of potable water is obscene. For us to know and not be providing serious leadership in finding both technical and political solutions is hard to understand and indefensible.

FNL: Would you see it more as an educational process, as opposed to MIT attempting to influence politically?

MK: Given that the world does not require any more technology for weapons of destruction, we should provide leadership by not accepting any military contracts. This is an educational institution, and one of the questions that we need to ask is what are those techniques that will free humanity from the study of war. You ask is it education - education is supposed to move us to a higher level of expression of our humanity. And a higher level of expression would be one in which we would say here's a new technique for dealing with world problems. And yes, this institution must be political and educational. We must have politics that represent a commitment to peace with justice.

Another example of a way to combine education and policy is found with the Community Fellows Program in the Department of Urban Studies and Planning. The Program is attempting to deal with the developmental needs of youth in the country, by bringing in people who

work in city government, and helping them to do the research and development and acquire the skills and techniques that will enable them to improve the policies and programs in their communities.

FNL: So that for instance a press release stating that after careful economic study it is the concerted opinion of this group of MIT faculty, researchers, etc., that the economic

technical knowledge that they may not even know how to apply in personal situations.

MK: We have to deal with whole people, who are going to live in whole environments. But if I go back to the point that Frank Jones was making, about caring - that we must have an Institute that cares and helps to develop people who will care.

FNL: Would you advocate MIT taking

Given that the world does not require any more technology for weapons of destruction, we should provide leadership by not accepting any military contracts. This is an educational institution, and one of the questions that we need to ask is what are those techniques that will free humanity from the study of war.

sanctions against Iraq are positive and will be successful, etc. - that's the type of public statement the Institute should make?

MK: Absolutely.

FNL: You don't expect that to happen, do you?

MK: Yes, I do expect that to happen. We have to expect and work for the emergence of leadership consistent with a pursuit of higher order methods of solving problems. We have to have a high level of expectation for the possibilities of this institution. You know I get out on the steps because I expect they're going to do the right thing in South Africa; divestiture, etc.

FNL: It seems really imperative from your perspective to send these people out there with something more than

a more direct role in local/Cambridge politics? Serving on committees or commissions or boards?

MK: There are people here with skills that can be shared wherever they are - be it locally or wherever. They can be working with the people to help the process of growth to continue.

FNL: So it's really less that MIT should have people who sit on committees, and more that MIT produce people who have the knowledge and desire to assist areas, simply because they live there.

MK: There also has to be an understanding that it works both ways. There's knowledge, creativity, beauty out there - there's "wisdom in these communities." It's not a one-way street. MIT can learn as well as teach.

The Bilateral Trade of Ideas

(Continued From Page 1)

international ties imploded by nationalistic policies which assume that the United States really doesn't have anything to learn from the scientific and technical communities in foreign countries.

The issue has suddenly surfaced because of the United States' trade deficit and current economic weaknesses. The discussion is clouded by emotions and double standards.

criticized for the reason that those in control, I am told, will see to it that all the fundamental (read: interesting) research will be done abroad (read: in Japan), and the United States will host nothing but screw-driver factories. An irony, by way of example, is that NEC has just opened a basic research laboratory in Princeton, New Jersey, which deflates this argument. And yet now they are the scapegoat and

shortsightedness of American industry is the real problem, not the research university. How can a country invest in the future if the so-called "future" is only a few quarters away? Worse, when times get tough, what is cut first? Research.

In the case of the *Times* story, the tone was that MIT was doing something un-American. The story did not report that the agreement was encouraged by and negotiated with the USA/ Japan Committee for Promoting Trade Expansion, co-chaired by Congressman Richard Gephardt and Diet Member Susumu Nikaido. The Committee's premise is that trade frictions must be resolved in the longer term by a bilateral exchange of ideas. Surely MIT endorses that view.

What I have learned from *The New York Times* episode is that when we are accused of aiding the "enemy" in achieving our own economic decline, it is not satisfactory simply to redirect the blame (as I did above). Similarly, it is not constructive to point out how extraordinarily generous and forthcoming Japanese companies have been with endowment (some will say they owe it to America).

The only line of argument that makes any sense comes from the answer to the question: do we learn as much as we give? If the answer is "yes, we learn more", the case is closed.

The answer to this question is sure to vary from field to field, from personality to personality. Those of us who enjoy a broad range of personal contacts in Japan and who feel that the benefits are a two-way street, must articulate this with understandable and, insofar as possible, documented examples. Those of us who do not find a parity, must be hell bent to make one. I am absolutely convinced that the bilateral trade of ideas is all that counts, not just to critics, but to ourselves.

For example, when I read accusations of "selling out" to foreign powers, to me what people really mean is "Japan", and the tone is undeniably racist. Dealing with Sony is somehow worse than working with Philips....The shortsightedness of American industry is the real problem, not the research university.

For example, when I read accusations of "selling out" to foreign powers, to me what people really mean is "Japan", and the tone is undeniably racist. Dealing with Sony is somehow worse than working with Philips. Nobody blinked when Philips bought Magnavox, Bull bought Zenith Data Systems, and Thomson bought RCA. Nobody cared when Maxwell bought MacMillan. Similarly, when business judgement says "manufacture off shore" or "just over the border", the public is prepared to accept this as a fact of life.

The line between domestic and foreign has become increasingly blurred over recent decades when one looks at the big multinationals, many of American origin, which today transcend any country, employ the citizens of many different countries and also tend to operate under the laws of many nations. A seemingly simple question like, "is a company American?", turns out to be not so simple at all. My tendency is to look at jobs, not ownership, but this is

have come under great criticism for poaching on American talents. They are damned if they do and damned if they don't.

Recently, a front page story in *The New York Times* carried the following scary headline: "M.I.T. Deal With Japan Stirs Fear on Competition." The inaccuracies and omissions produced the impression that the *Times* had exclusively uncovered a devious, secret plot whereby the Media Lab was selling critical U.S. "know-how" to the "enemy." But, in the end, what seemed to matter most was not the story's fabrications and distortions, but its mere presence on the front page. Why was a four-year old endowment agreement sharing typeface and newspaper real estate with Saddam Hussein?

It appeared on the front page of the *Times* in large part because many people are scared that our competitiveness will continue to erode and that the United States will become number "two" (or "three" or "four") in more and more areas. The

Letters

MIT Undergraduate Admissions in the Nineties
(Continued From Page 13)

To The Faculty Newsletter:

John Deutch wrote, in the December, 1990, *FNL*, that he had come to believe that "an orientation on good research practice should be offered to every student and research worker who comes to MIT."

We in the faculty could start by setting a good example in class, particularly with respect to citations. We widely use material from publications in our classroom presentations and in our handouts without any acknowledgement of the sources. In their reports, undergraduates copy this bad practice.

Let us set an example of good ethics by meticulously citing all sources, and demand the same of our students. They will continue these good habits into their research and into the wide world beyond.

David Gordon Wilson
Professor, Mechanical Engineering

To The Faculty Newsletter:

Let me congratulate you on sustaining this excellent project! You have reached maturity with the courageous and thoughtful editorial in the November issue.

Haynes Miller
Professor of Mathematics

Dear Colleagues:

The *Faculty Newsletter* is a most welcome and useful addition to the list of MIT publications. Such an opportunity for the staff freely to express their views on Institute and world affairs is something new and commendable in the development of MIT.

I was particularly immersed with the recent Chomsky and Chorover articles on the Middle East crisis.

Keep up the good work!!

C. Fayette Taylor
Professor Emeritus

Erratum

I would like to correct an error in my letter in the December issue. In summarizing U.S.-U.K. documents of 1958, I described as U.S.-British "agreement" what were in fact the proposals of the British Foreign Secretary, later presented in a similar form in a USG NSC memorandum. The facts are known only in part; relevant documents have been declassified only with heavy deletions.

Noam Chomsky

.....
Got something to say? We'd love to hear from you. Please send all letters to: *MIT Faculty Newsletter*, Bldg. 38-160, or reach us by E-Mail at: **FNL@ZEISS.MIT.EDU**.

204 between 1985 and 1988 while interest in architecture increased from 9 to 25, in management from 9 to 26, and in economics from 7 to 21. At the same time, many faculty members who teach humanities subjects saw an increase in the number of students who, while still majoring in engineering and science, had strong backgrounds and serious interest in these subjects.

As these goals were achieved, visible faculty support for them lessened and was replaced by a growing concern over performance in the core science courses and by a desire to reverse a 20 year trend of declining standardized test scores. CUAFA studied these concerns and issued a report in 1989 recommending, among other things, that applicants with a wide intellectual range should continue to be highly valued and sought after, but that admissions decisions should place greater weight on demonstrated capability in MIT's traditional strengths of mathematics and science and, in particular, on a strong commitment to these disciplines. CUAFA also recommended that there be less emphasis placed in the selection process on non-academic activities, talents, and personal qualities.

The last two entering classes reflect the carrying out of these recommendations. The issues which face us in the future are the following: 1) How far to go. (CUAFA recommended a relatively modest shift in direction. Some faculty members favor a more dramatic shift toward emphasizing the narrower criteria.); and, 2) How to deal with the return of over enrollment in Course Six.

IN DEFENSE OF DIFFERENTIALS

(Continued From Page 1)

Fact 1: MIT "does not discriminate against individuals on the basis of race, color, sex, sexual orientation, religion, handicap, age, or national or ethnic origin in administration of its educational policies, employment policies,...and other Institute-

for devising this compensation scheme and for refining it over time, to generate The New Principle of Justice. This Principle says that compensation claims must be anchored in empirical, incontrovertible, quantifiable, and measurable indicators (such as weight)

Greater weight entails heavy risks: potential alterations in cholesterol readings, alterations in blood pressure, etc., as well as invariable entanglements in the debilitating dilemmas of institutional bargaining. All of this might be regarded by some faculty units as too high a cost to incur for inducing a shift in the compensation slope.

Conclusion: *These facts force us to recognize the obvious rule of impartiality: Each faculty unit is compensated according to its weight. The greater the weight, the higher the compensation.*

administered programs and activities...."

Fact 2: The faculty is composed of gentlemen (men) and ladies (women).

Fact 3: Men (including gentlemen) have, on the average, higher weight (using conventional measures) than women (ladies).

Conclusion: These facts force us to recognize the obvious rule of impartiality: Each faculty unit is compensated according to its weight. The greater the weight, the higher the compensation. The light-er of weight are less-er in value and therefore lower in compensation (defined by salary).

The genius of this compensation scheme is that it draws upon - but substantially improves - the now-obsolete Marxist precept (to each according to...) superseding the underspecified notions of equity in democratic societies.

The Institute should be commended

and not in incidentals such as productivity, performance, publications, research, professional recognition, to name a few of the more subjective and rather imperfect measures of true "value."

The Institute should also be commended for standing firm. Having discovered The New Principle of Justice, it has refused to deviate from what is clearly an optimum moral position.

The behavioral implications are obvious: The propensity to increase compensation is determined by the probability of increasing weight. If faculty units (as defined by a discrete faculty position currently occupied) wish to obtain greater compensation (measured by the conventional "salary" variable), they must increase their weight - individually and collectively. The directive is clear, but there may be some non-negligible implications.

Under these combined circumstances, the only rational recommendation, therefore, is to urge the Institute to never, under any circumstances, depart from such an obviously successful and impartial compensation practice. The New Principle of Justice eliminates any kinds of subjective differentials. And for this insightful contribution to broader social justice and evolving conceptions of equity, the previous administration should be strongly commended. The new management must show resolve in the use of such a creative precedent.

This analysis might be assailed on grounds of faulty logic, incomplete information, model mis-specification, or on other related grounds. Nonetheless, we should not allow such considerations to shake our confidence in the inherent wisdom and technical robustness of The New Principle of Justice. We cannot let matters pertaining to the logic of scientific inquiry call into question the moral basis of The New Principle.

*[A. V. Litewait is a pseudonym for a faculty member known to the Editorial Board who wishes to remain anonymous.]