

The MIT Faculty Newsletter

Vol. II No. 6

May, 1990

Presidential Search Continues June Selection Possible

Robert M. Solow

The search for Paul Gray's successor has not been going on forever. It only seems like forever. The Faculty Search Committee thought it had sent its last communication to our colleagues. Not quite.

The two committees went back to work at the beginning of March. After reflection, we made two decisions. The first was that we would not restrict ourselves to the pool of candidates that had figured in the earlier phase of the search. We thought it better for the Institute and for the process if we took the time to enlarge the list by adding both from inside MIT and from outside. We have done this successfully, and the committees are now working with a promising pool of potential presidents, new and old, inside and outside.

The second decision was more or less implied by the first: We would not impose any tight deadline on the search. The Corporation said as much in asking us to resume our work, and we had and have every intention of sifting through our enlarged list carefully.

Obviously it would be a great convenience, not to say a relief, if we could have our new president signed and sealed, even if not yet delivered, by the end of June. As of now, that seems possible. We will know more as interviews and discussions continue.

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Newsletter Highlights Teaching

This issue of *The MIT Faculty Newsletter*, the last for this semester, focuses on teaching at MIT.

Beginning on Page 6, are several articles dealing with a variety of perspectives, including innovative teaching techniques, recommendations for changes in the core curriculum, reflections on undergraduate teaching, and more.

There are also articles dealing with the Family and Work Committee report, and an update on the Context initiative.

A Presidential Platform For Women Faculty at MIT

The following statement was approved by the EOC (Equal Opportunity Committee).

MIT is not utilizing some of the most talented and qualified researchers and teachers in the world: women. The platform set forth here presents an MIT solution for this MIT problem. By dramatically increasing the number of tenured women on its faculty, the Institute will enhance its position as the academic leader in technological innovation, not only in the quality and responsibility of its engineering, but in the exuberance of its commitment to intellectual and cultural democracy in the technological enterprise. The MIT solution will initiate a solution for the American research university in the 21st century.

We propose that the EOC formulate a platform and an agenda for the new president and the entire community on the issue of women faculty at MIT, to be publicly issued in May 1990 and printed in *Tech Talk*. This platform can be elaborated further next year by the EOC and other appropriate committees or offices at the Institute. The EOC should also develop procedures for implementing each of its planks.

The problem: There is a minuscule number of women faculty at MIT; the environment here is not conducive to hiring or to retaining them. Women have, for the first time, plentiful job opportunities outside of the university system with far more attractive situations in terms of salaries, benefits, and, often, atmosphere. Universities compete - badly - with business and industry for the most talented women Ph.D.s.

MIT has a time-limited window of opportunity for remedying this unnecessary shortage of women faculty in a stratum of positions that are becoming available in all departments as a result of retirements in the generation of faculty hired after WWII. We can realistically increase the percentage of women faculty at

(Continued On Page 15)

INSIDE: From The Faculty Chair - Page 5
The Work and Family Nexus in the New Age - Page 9
From The Context Support Office - Page 11
Table of Contents - Page 2

Table of Contents

Presidential Search Continues June Selection Possible	1
A Presidential Platform For Women Faculty at MIT	1
Editorial - Civility	3
From The Faculty Chair Lessons Remembered/Lessons Learned	5
A New Way of Teaching Modern Biology to Freshmen	6
Life Sciences in the Core Curriculum	6
"Once more into the breach..."	7
Some Reflections on Undergraduate Teaching and Education at MIT	7
A Semester at Delft T.H. An American in Holland	8
The Work and Family Nexus in the New Age	9
Junior Faculty and Children	9
From The Context Support Office "All the News That's Fit to Print..."	11
M.I.T. Numbers	17

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Editorial

Civility

Stylistic opposites are always difficult. Creative flair and rigor; sympathetic tutelage and uncompromising scholastic standards; cutting edge excellence and civility.

A major news magazine recently characterized experimental high energy physics as "driven", "merciless", "not pretty", directed by scientists who are "insensitive", "abusive", "relentlessly ambitious", "intolerant", "highhanded", possessed of "monumental egos" as well as extraordinary insight and ability. Small wonder. Anyone who has witnessed the birth of new technology or science knows how jealously Nature guards her secrets. Only the daring, the unyielding, the feistily aggressive, and yes, frequently the uncivil can hope to succeed.

Yet civility, mere pairwise decency in simple day-to-day interactions, defines our social bond. An institution can survive with little or no civility, but its spirit is likely to be mean and brutish. How then to wed these opposites and ensure their continuing vitality?

National trends have not simplified the task. The eighties were an uncivil decade: Churlish, self-centered greed negates civility, as does desperate poverty. Nor has it helped that bitterly divisive issues have been allowed to enter and dominate the U.S. political arena. In any complex situation, civility demands an openness to the views and vulnerabilities of others that requires more intellectual and emotional energy than is available from a culture whose theme song has been "Don't worry...Be happy." All of which points to the urgency of our own need, here at MIT, to ensure a

model for our future that maintains a relentless excellence in a civil environment.

Our problem would be easier if we were solely a great institute of research, for which technical and scholarly accomplishments dominate all other considerations.

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Unfortunately, the level of civility that characterizes a research institute often is not optimal for guiding gifted young men and women toward intellectual and emotional maturity. Especially in its early years the undergraduate experience calls for different styles and standards. Some institutions have tried to resolve this problem by creating research and teaching enclaves, each with its faculty and subculture. This is not our model. A major strength and identifying characteristic of MIT is its extraordinary interactiveness, which bridges administrative boundaries, both in research and education. Leading from that strength, we have to wed excellence and civility the hard way, by understanding their proper balance and by devoting constant vigilance to achieving it.

The easy aspect of civility deals with isolated deviations, and these we handle reasonably well. Every university encounters a sad parade of thoughtless or aggressive acts that degrade the quality of individual and community life. The rights of minorities or dissenters may be compromised; particular teachers may be incompetent; evaluations of academic merit can be rigid or worse, arbitrary; administrative structures can acquire a lofty isolation or an insolence of office; student life can be punctuated by insensitive and brutish acts. The remedy for all these problems is a willingness on the part of the general community or of an appropriate subgroup to be aware of each problem and to devote time and energy to its resolution.

Less visible problems are less easily remedied. We owe more to our support staff than we like to think. Staff and hourly personnel become all too frequently invisible people whose interests we ignore. Yet theirs are often the small acts of courtesy and consideration that define the quality of day-to-day life for the rest of us. For them civility is often not reciprocated.

Civility within groups of professionals focused on a common problem is one of the major strengths of any institution, yet it is usually slow to develop and always fragile. Insensitive structural changes can overnight destroy these civil bonds, leaving a lingering residue of graceless distrust. Undeniably, disruptive change is part of the tariff that civility rightfully owes to excellence. Nevertheless, we must constantly ensure that excellence at

(Continued On Page 4)

Civility

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the cutting edge is truly at issue, not some less estimable quality masquerading in its robes.

Over time the functional rights and responsibilities that attend any administrative position can drift in untenable directions, and personnel can find themselves accountable for arenas over which they have little or no control. Incivility is then built into the job. We need a mechanism for identifying and restructuring administrative chimeras.

An MIT report from the early 1970's defined the ultimate in incivility as a willful refusal to listen. Listening takes time, attentiveness to civility takes time, and all of us have little time to spare. Most of us at MIT are constantly pressured by independent constituencies, often from outside the community. In this day of meager federal budgets, who can ignore an emergency call from a federal grants administrator asking for a major proposal review and attendance at a grant review session?; or a sudden request from a colleague at another university for a careful evaluation of a difficult tenure case? Unpredictable, capricious demands on time and effort occur weekly for any professional, yet they degrade the quality of teaching, they remove the time for truly reflective research, they constrain the proper functions of family life, and they compromise the atmosphere in which civility can flourish. Unless the perceived level of desperation can be reduced, attention to civility is likely to remain a nicety, cultivated by the few.

The easy answer is that nothing can be done about time pressures. The glib conclusion is that those who aim at salting the tail of the unknown should expect to devote consummate energies to the pursuit.

Yet let us look again. Surely some of our duties can be defined with more plasticity, without diluting either their effectiveness or our intensity of commitment. Teaching and committee work are examples. Rather than being compelled to do all things simultaneously and none of them well, many of us would welcome experiments with models in which we do fewer things at a time - a block of pure teaching, followed by a block of travel or of intense research. Buying into such a model could create precious extra time but more important, it could enhance our sense that we are in control of our professional lives. Civility is, after all, partly a state of mind.

Editorial Committee

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Next Issue

This is the final issue of the Faculty Newsletter for this semester, and we'd like to take this time to thank all of those who have contributed to its success, both with comments and commentary.

However, this being the last issue does not mean that we don't need your continued support. The Newsletter Editorial Board is in need of some fresh blood, and we strongly encourage anyone with interest to please let us know.

We will also be planning the first issue for next semester over the summer, and will be in need of copy. Although not definite, the theme of that issue is likely (hopefully) to be the new MIT president and administration.

Please forward submissions on any topic of interest to the MIT community to: MIT Faculty Newsletter, 38-160; or to any member of the Editorial Board. You can also reach us at 253-7303.

Letters

To The Editor:

One emendation to your editorial "What's Wrong With MIT?". In your footnote referring to Brahms's six-year delay in premiering his First Symphony, you discourage Wagnerians from writing that Brahms's decision was correct.

Most music historians agree that the Brahms-Wagner controversy has been dead since about 1910. And though Wagner was not Brahms's boon companion, (was he anyone's in the world of music?); Brahms proudly called himself "the best of Wagnerians."

Ira Braus (Ph.D., Musicology)
Undergraduate Administrator,
Course 9

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Errata

Last issue's back page list of "MIT's Nobel Prize Laureates" did not include the name of MIT Professor of Economics (and nobel laureate) Robert M. Solow. This was not an oversight on our part.

Prof. Solow is Chair of the Faculty Presidential Search Committee, and in the interests of the Institute, it was decided that our acknowledgement would be held in escrow, until such time as the Committee has completed it's search, and a new Institute president has been selected.

We apologize to Prof. Solow for any inconvenience our decision might have caused.

A good way to learn is to study; the best way to learn is to teach.
St. Francis de Sales

FROM THE FACULTY CHAIR**Lessons Remembered/Lessons Learned**

Henry D. Jacoby

There have been some difficult moments in the last few weeks of student protest: physical confrontations between students and police, injuries, arrests, faculty resolutions, meetings, colloquia . . . and more demonstrations. The events have taught new lessons and refreshed old ones.

The first point, I must confess, is easier to say in the quiet of my study than when the bullhorns are at full cry. It is that we should not just tolerate the expression of political dissent on campus, but welcome it. One can disagree with the rhetoric and disapprove of leaders' tactics and nonetheless be pleased that we have students who are aware of the world around them and serious enough about social justice to become personally involved. A university is a caldron of ideas and appropriately a place of questioning, challenging, and protest. In the interplay of faculty and students there is teaching and learning not just about Lagrange and Melville but about how to live in the world.

Second, we should remember that not all the actors know the script. At a March meeting of the Faculty Policy Committee our undergraduate member pointed out, "All of you had a chance to learn how to protest in the 1960's. We hadn't even been born yet!" At the April 6 protest, these words came echoing back. Students were told that their shanty was unauthorized and would not be allowed to stay on the Stratton lawn, and they were asked to step away so it could be removed. They were warned that if they did not do so the campus police would have to move them, which would require arrest. The response: the shanty door was nailed shut with 10 or so protesters inside, another 12 or 15 formed around the front and locked arms, and most of the demonstrators struggled with the police. It was a very physical 20 minutes, and we are lucky there were only minor injuries.

It turns out that some of the student protesters had no idea how to behave in an arrest. They had chosen civil disobedience and were willing to be arrested, and they intended non-violent protest. But they did not know about handcuffs and they did not know that struggling with police officers during arrest was outside the well-established bounds of non-violent demonstration. (Others understood these procedures very well; the MIT officers spotted the response and those arrests took place with minimal physical contact.) Similarly, at the April 9 demonstration students did not draw the crucial distinction between protest on campus and off, as they sat down to block traffic on Memorial Drive, nor did they understand the implications of crowd action to interfere with the MDC police.

Primary responsibility for training in these matters must rest with those who plan and lead demonstrations. But faculty and administrators also need to remember that each new class brings students who have absolutely no experience in this area, and try to find other ways to inform them.

Other lessons arise from the fact that the demonstrations so often probe the limits of acceptable protest. Indeed, one way to call attention to a cause is to step over the limits. If the authorities are provoked to a response which a substantial part of the community disapproves, so much the better for it raises the emotional temperature and expands the base of support. When the adrenalin is flowing, there is a risk of escalating confrontation and an ever deeper split in the community.

Several thoughts about this process: First, it is vital that faculty, administration and students maintain a broad consensus that there are limits, and roughly where they lie. Also, we need to be clear with students that the

president, key members of the administration, and the campus police have the responsibility for enforcing these limits, and most importantly for making the difficult judgments about what to do when they are challenged. We can take comfort in the knowledge that administrators have the guidance of civil laws, rules and regulations, precedents, and counsel, and that they ultimately are answerable for decisions taken, in the MIT context not just to the civil law and the trustees but to faculty and students. (Those who decry the lack of "democracy" at MIT understand precious little about the degree to which governance depends on a broad base of support from these last two constituencies.) But we should not allow confusion about the fact that the job appropriately is theirs.

On the other hand, precisely because of our unique place in the university community, faculty can play a crucial role. So long as protesters do not want to alienate the faculty (a condition that may not always hold but which we have enjoyed this spring) we can mediate in confrontations and serve as a moderating influence at the point of the action. For this to work, however, the administration needs to try to keep open a "window for mediation" when confrontation looms. Also, faculty have to be willing to play these roles, which are time consuming and uncomfortable.

In these past weeks we have been well served by faculty who were asked to help. And for the move back from the brink in April we owe thanks to creative student mediation, hard work by a number of people in the administration, and courageous moves by Paul Gray as he put himself on the line in the effort to move from conflict to dialogue. We should continue efforts to understand what went well and what went badly, because these demonstrations are a natural part of what we are.

A New Way of Teaching Modern Biology to Freshmen

Vernon M. Ingram

Three faculty members, Ronald Latanision (Materials Science), Robert Silbey (Chemistry), and Vernon Ingram (Biology), have come up with an exciting and logical way to teach freshmen "Chemistry, Materials Science and Biology" in two semesters. Let me speak about the Biology portion of this endeavor.

A freshman science course should emphasize concepts; it should not be a survey course or a comprehensive topics course. Of course, a concepts course uses topics, but they are selected for their usefulness in illustrating the most important concepts. The concepts of modern biology from biochemistry, cell biology to genetics, neurobiology and developmental biology are continuous and inseparable from the concepts of chemistry in its various aspects - physical, inorganic, and organic. The two semester sequence of SP01/SP02 offers a marvelous opportunity to present basic materials science [inorganic chemistry], physical and organic chemistry, molecular biology and genetics in one logical and mutually supportive sequence.

I do not claim that the three of us have in this first experimental year achieved the smoothness of transition that is desirable, but we have produced some very useful progressions from one area to another and we now know how to do things even better next year.

For example, in the area of molecular biology, the concepts of the crystal structure of inorganic solids, itself preceded by atomic structure and bonding ideas, led directly and smoothly into a study of protein structure via the results of x-ray structure and determination of crystalline proteins. Again, having understood the basic concepts of chemical reaction kinetics and of thermodynamics, students were ready to look at enzyme structure and enzyme kinetics. The concepts of linked biochemical reactions and of biochemical cycles came much more easily, because these could be logically presented from a chemical point of view.

Here are other examples: the concepts of oxidation/reduction reactions connect directly with the ideas underlying the electron transport chain in cellular energy production. The discussion of electrochemical potentials and concentration cells led directly into the concepts basic to the functioning of excitable membranes, neurons, muscle cells, and mature eggs. It was a real pleasure to me to be able to link all these biological processes to the chemical concepts discussed by my colleagues.

Finally, the marvelously powerful technique of recombinant methods is pure chemistry and must be taught

(Continued On Page 16)

Life Sciences in the Core Curriculum

Brent H. Cochran and Paul T. Matsudaira

Over the past fifteen years, there has been a quantum leap in our understanding of life on Earth. The application of recombinant DNA and gene transfer technologies to the study of higher organisms, including humans, has laid the groundwork for a comprehensive understanding of living processes at the molecular level. It is largely for this reason that the sense of the faculty has been to include the life sciences in the Institute core curriculum. There can really be no doubt at this time that a technically literate citizen must understand the fundamentals of modern biology as well as basic math, physics, and chemistry.

In contrast to the other core courses however, an Institute Life Sciences requirement will likely only be a prerequisite for those students who go on to major in Biology. This fact has two important consequences for the Life Sciences requirement. The first is that the necessity or pressure to take the Life Sciences Biology course in the freshman year will be reduced. The second is that not being a prerequisite allows for a great deal of flexibility in the curriculum of the course. This naturally leads to the question of what the educational goals of the Institute Life Sciences requirement should be. As it is clearly impossible to cover all of biology in a one semester course, we believe that the goal of the Institute Life Sciences requirement should be to give students a grounding in biological knowledge upon which they can build in future encounters with biology in their studies, in their careers, and in their personal lives. With this end in mind, we have been teaching a new version of the 7.01 Introduction to Biology course this spring.

We have divided the course into four broad sections. The course starts out with a discussion of the interplay between biodiversity, ecology, and evolution while using Mendelian and population genetics to provide a framework for understanding the co-evolution of organisms and their environment. In the next section, we stress the central dogma and the genetic code, and how the expression of genetic information can be understood as a biochemical process. Subsequently, we discuss the basic principles for understanding regulation, differentiation, and development in higher organisms. Finally, all of these concepts are applied to an understanding of topics in mammalian physiology,

(Continued On Page 10)

"Once more into the breach..."

A. P. French

In an article in the April issue of this *Newsletter*, Professor Daniel Kemp discussed the continuing sense of concern regarding the character and effectiveness of the science core. He pointed to our repeated failures, during more than four decades, to come even close to the creation of a core program that is widely viewed as successful by either faculty or students. A renewed interest in these questions has been building up over the past two or three years, and I should like to describe one of the fruits of this interest - a radically new approach to introductory physics that was started last year and has continued on a trial basis this year with the support of the Physics Department and the Dean for Undergraduate Education. Its chief architects have been John G. King, Felix Villars, and myself; and, in the implementation of it, Philip and Phylis Morrison have played an important role.

In their chemistry courses, students are expected to make extensive use of a knowledge of atomic structure as described by quantum theory, yet the physical basis for this, even the observational evidence for our belief in the very existence of atoms, is not part of the introductory physics course.

The purpose of the science core at MIT, as stated in the Catalogue, is to help MIT graduates to emerge as "broadly educated citizens in a world deeply influenced by science and technology." This should mean giving all of them some sense of what we know about the world today in scientific terms, and how we know it. It should also give students some direct acquaintance with the scientific method as a means of analyzing and understanding various aspects of the world on the basis of personal observations that lead from the unknown to the known.

The current standard versions of freshman physics do not, in my opinion, satisfy these criteria to any significant extent. In the first place, the subject matter is pretty much limited to classical mechanics and electromagnetism, both of which (except for such new topics as chaos theory) had reached essentially final form well over a century ago. In their chemistry courses, students are expected to make extensive use of a

(Continued On Page 13)

Some Reflections on Undergraduate Teaching and Education at MIT

John B. Southard

MIT undergraduates deserve better than we give them. Every semester I leaf through that student course-evaluation guide that comes in the campus mail before each semester, mostly to see my own subject's rating and read those cute comments the students must try so hard to think up, but also to see the ratings of other subjects, taught by instructors known and unknown. The anecdotal information I get from students tells me that the all-too-common low averages are deserved. (I contend that none of us professors knows much about the quality of course teaching at MIT: only the victims know that.)

But I suppose I can understand why our teaching falls so short of perfection. It takes so much time and effort to perfect course content and teaching style. I've been teaching MIT undergraduates for an uncomfortably long time, and I still find so much room for improvement. I embarrass myself thinking back to how bad my early teaching was. I try some new twists each time around; some work out, and others I quietly abandon. It's such an open-ended thing.

Last year I had what I thought was the brilliant idea of staging a two-hour field trip to look at MIT's building stones during the regular class session in 12.01 soon after our class work and lab work on rocks. (You might be surprised at how many kinds there are. If you want to see some spectacular stylolites, try the toilet stalls in the rest rooms in the main building sometime. Or risk the embarrassment of close inspection of the zillions of tiny fossils in the limestones of the exterior of Hayden Library.)

I loved it - even though we had to sweep off some snow - but as it turned out, the students hated it. This year's brainstorm for 12.016 was Sedimentology Bowl (ever have to watch College Bowl?) to keep students honest about facts and literacy after a large dose of book-learning and just before a spring vacation week of intensive field work in the Mojave Desert. I urge all of you to try crazy new things; some of them will work out.

Another thing: MIT undergraduates appreciate being known. They report almost unanimously that except in the smallest classes, their instructors have no idea who they are. How can you understand someone you don't know at all? (And that cuts in both

(Continued On Page 16)

A Semester at Delft T.H. An American in Holland

C. Fayette Taylor

In 1955 I accepted an invitation to be a visiting professor at the Delft Technical Institute (Delft Technische Hogeschool) in Holland for the spring term of that year. Alice and I arrived in Delft in early February, found a delightful apartment in the Hague about 10 miles from Delft, with excellent

Aside from an accounting and records-keeping department, there seems to be no academic "administration" such as we have at MIT.

public rail service between the two cities. We also had a small English car, owned by a group of MIT faculty, rented on a cost-sharing basis to faculty members visiting Europe. We, of course, received a most cordial welcome and generous help from our Delft T.H. sponsors.

The following notes are the result of my personal observations without serious research, but I believe my conclusions are essentially correct for that time.

In Holland, as in other Germanic countries in Europe, students headed for higher education are expected to complete their general education in secondary school, including humanities, elementary science and mathematics and foreign languages (three in the case of Holland). Nearly all students and staff at Delft spoke excellent English.

In the Germanic countries the technical colleges are professional schools similar to our schools of law, medicine, and business. Incidentally,

in Holland and also in Switzerland and Denmark where I have lectured for shorter periods, engineers enjoy a status fully equal to that of physicians, judges, and scientists.

Delft, like the other two technical schools mentioned above, is a nationally-supported institution and all strictly academic facilities and activities are state-supported. Aside from an accounting and records-keeping department, there seems to be no academic "administration" such as we have at MIT. Here, professors seem to have complete freedom to carry on their academic duties in their own way. They must have some sort of committee structure, but I had no access to it.

There are no sub-grades of professor - all have equal standing. None are very young, since professional experience seems to be a requirement. I believe they are chosen by invitation from the other professors in the same field.

A "president" of Delft T.H. is elected by and from the faculty for a five-year term only. I got the impression that his duties are largely public relations and settling internal differences. He is apparently quite free from obligation to raise money.

Departments are loosely organized, and each professor seemed to have a large degree of independence, even within his own group.

There is little noticeable attention to research, though much applied research is going on, especially in the field of rivers, harbors, and sea control, probably state-supported.

Most of the professors seemed to have important industrial

connections, including consulting and even part-time positions in industry. These contacts may be brought in research contracts, but I did not learn much about this aspect of Delft activities.

Delft T.H., as well as the similar institutions in Denmark and Switzerland, is strictly for engineering.

There are no sub-grades of professor - all have equal standing.

The sciences are taught for this purpose only, and no degrees in pure science are offered.

All of the usual branches of engineering are included, as well as architecture.

In my group, devoted to internal-combustion engines, there was a well-equipped teaching laboratory in which some research may have been going on. I regret I did not inquire about this more fully.

The academic program involved lectures, laboratory work, and much design work on the drawing board. I gave about four or five very well attended lectures each week. I believe the "case method" would best define this type of teaching.

The professors were supported by laboratory assistants and technical and office staff, somewhat smaller than at MIT.

The first thing I had to get used to was the high status of a professor. I was given a large private office with three buttons to call for: (1) an assistant; (2) a secretary; and (3) a light outside my door, indicating that the great man was not to be

(Continued On Page 18)

The Work and Family Nexus in the New Age

Phillip Clay

The release of the draft of the Family and Work Committee report and its discussion of reconciling the competing demands on faculty time and attention, raise issues that have long concerned those of us who have run the tenure gauntlet.

The Committee in taking a broad look at the issues of work and family - for faculty and for others in the community - offered a number of conclusions and recommendations that, if adopted, would provide a clear statement of the Institute's commitment to support family life and personal fulfillment (variously defined and not limited to traditional nuclear family notions), provide flexibility in the timing and pace of achievement, and offer or encourage services that assist faculty members in meeting their obligations at the institute and at home. As a member of the Work and Family Committee, I want to offer a couple of personal comments.

The issues and challenges facing faculty today are different from those faced by our senior colleagues in the 1960s and 1970s. They are also different from those of our non-academic professional colleagues. Two decades ago, the cost and supply of housing and other elements of the good life were more reasonable. One academic salary was minimally adequate, at least for the 5-7 year period when writing and research requirements were at their peak. Spouses could afford not to work, or if they did work, child care was affordable.

At present, young families struggle to achieve middle class status with two incomes. The need for two incomes, even if they are adequate, introduces additional pressures to a family struggling to meet the challenge of two emerging careers and pressing family obligations. It is a sign of real anguish that colleagues have to postpone or forego children - or worse - place the care and development of children at risk by not being available or having to settle for second-class child care.

While other professionals, e.g., lawyers and doctors, do have an apprenticeship period, academics are different in the sense that they are required to "prove themselves" in the eyes of a subset of 3-4 dozen institutions, some of which have to be ruled out as inappropriate locations for a spouse's career. Faculty have only a half dozen years to achieve this feat. For the confirmed scholar, the R & D or research center route is no substitute for the academy.

(Continued On Page 12)

Junior Faculty and Children

Paul Hoffman

The Committee on Family and Work has made its recommendations to the faculty. The message to junior faculty is this: If you want tenure at MIT, don't let your children interfere with your research.

The implications for women faculty members, given that almost all are two-career women (women whose spouse's job commitment is equal to or greater than theirs) are (i) that they should not take the option of paid or unpaid maternity leave but should instead try to arrange a semester-in-residence devoted to research,

...I suspect that a significant percentage of children born to MIT junior faculty face the prospect of going to full-time child care by the age of four months.

and (ii) that they get that baby into full-time child care as soon as possible, and certainly by the end of the research semester. The implications for two-career men are roughly the same, except that men don't have the option of paid paternity leave that they should forego.

The implications for one-career men (men whose spouse's job commitment is less than theirs) are somewhat different depending upon their salary. Some, those whose MIT salary is at least \$46,000 or \$47,000 and who have no outstanding debts, such as student loans, can probably support their spouse to take care of the children. The rest face a choice either of putting their children in full-time child care as soon as their wives have to return to work or of going (further) into debt. I have no idea how many junior faculty men at MIT make at least \$46,000 or \$47,000 and have no outstanding debts, but I suspect that a significant percentage of children born to MIT junior faculty face the prospect of going to full-time child care by the age of four months.

In my view, this is a dismal prospect. Here is not the place to argue the point, but I do think it is important that MIT openly acknowledge and debate the consequences of its policies and practices for the children of its employees instead of sweeping them under the rug. Certainly it needs to be acknowledged

(Continued On Page 14)

Life Sciences in the Core Curriculum

(Continued From Page 6)

including immunology, neurobiology, endocrinology, AIDS, and cancer.

In addition, throughout the term, we have been assigning short articles on topics of current interest from *The New Scientist*, *The Wall Street Journal*, *The New York Times*, etc. These articles, which have covered topics such as genetic screening, identifying the gene for cystic fibrosis, preserving the diversity of medicinal plants, and understanding the hazards of retinoic acid to the developing embryo are discussed by students in recitation. The idea is not only to get students to understand these particular topics, but also to get students used to the idea of applying basic biological concepts in a critical manner to topics not specifically covered in lecture. It is our hope that these skills will carry over after the students have finished the course.

Though our 7.01 course this term has been designed in this way, it is easy to envision other flavors of 7.01 which could equally as well serve to satisfy a Life Sciences requirement. One such course is the SP01/SP02 sequence, which attempts to combine solid state and liquid chemistry with the study of biology. Our course differs from this sequence in two principal ways. One is that biology in the SP01/SP02 series is embedded within the context of chemistry. 7.01 depends critically on chemical concepts, but attempts to treat biology as a subject that is broader than chemistry per se. The other major difference between 7.01 and SP02 is that 7.01 is taught over the course of an entire term, whereas biology in SP02 is approximately two-thirds of a semester. This gives us time to not only introduce more topics to the students, but also allows

students a greater opportunity to apply the central genetic and biochemical concepts of biology to several different biological problems. It is our experience that even with a full term, there is hardly adequate time to cover the material as well as we would like.

For these reasons, we do not support the proposal that SP01/02 become the sole or principal manner by which a Life Sciences requirement be fulfilled. A better proposal would

In sum, there is little doubt that the time for integration of the Life Sciences into the Science core has come.

be to offer several flavors of 7.01 or SP02. Versions that emphasized biotechnology, medicine, or perhaps neurobiology could easily be envisioned. By providing a diversity of offerings, each of which covered core biological concepts in genetics and biochemistry in addition to their other emphasis, the problem of maintaining student interest in a required course would also be minimized.

Another question which frequently arises in the discussion of an Institute Life Sciences requirement is whether students who take solid state chemistry (3.091) will be adequately prepared for a biology course that will draw primarily on solution chemistry. The answer to this question appears to be yes. Though conceptually solution chemistry is more relevant to the study of biology on the whole, our data from this term indicate that students who have taken 3.091

performed equally as well as 5.11 students even in the most heavily biochemical part of the course. Thus, it appears that whatever deficiencies these students may have are readily made up within the context of the presented material.

A somewhat larger concern is whether students who might be taking this course during the first term of their freshman year would be adequately armed with the chemical concepts needed to understand fundamental biology. However, since this course will not likely be a precursor to other courses, we think this problem could be adequately dealt with by encouraging those students who feel that their high school chemistry background is weak to delay taking their Life Sciences requirement until second term or beyond.

In sum, there is little doubt that the time for integration of the Life Sciences into the Science core has come. Other universities such as Caltech are already considering this path. The biggest obstacles to implementing such a requirement lies not with the chemistry background of a given student, but rather with the logistics and scheduling difficulties of implementing such a requirement. These problems can best be overcome by offering students flexibility in the way that this requirement is satisfied, combined with dropping at least one of the other Institute requirements. Adding a Life Sciences requirement on top of those that already exist would significantly constrain students' flexibility in exploring new intellectual avenues, especially during the freshman year. Relaxing the science distribution requirement would be one way of accomplishing this.

FROM THE CONTEXT SUPPORT OFFICE**"All the News That's Fit to Print...and Then Some"**

An unfortunate headline to an otherwise fairly reasonable article in the *New York Times* "Campus Life" section at the end of March provoked a number of phone calls and letters to the Context Support Office from people both inside and outside of MIT.

We heard from MIT colleagues who had never heard of the Context initiative but who read the *Sunday Times* faithfully and were curious about the reports of an MIT educational experiment that had "fizzled"; we heard from colleagues who told us that they had always thought the idea of Context subjects was a bad one and were just calling to tell us that the *Times* had confirmed it; we also received calls from faculty teaching perfectly healthy Context subjects who were surprised to read in the *Times* that their subject had been canceled. And we've received inquiries from colleges and other educational programs around the country interested in what MIT is trying to do.

This recent bout with the media has added to our sense that people don't read like they used to. Many of us are so pressed for time that we're allowing headlines to digest a news story for us. In the case of the *Times* article, the headline was very misleading; buried in the text was what we had really told the *Times* (actually, what we told an MIT student stringer for the paper): The Context program is alive and well even though some of the special Context subjects were canceled this year because of low enrollments. But the number of actual cancellations is three - not ten. At the same time, the Context program is moving away

from being strictly a set of formal separate subjects, and is heading toward serving as a catalyst for the incorporation of contextual studies and approaches in established MIT subjects and programs.

Over the past year, we've sponsored a number of successful events following the Context Review Group recommendation that a variety

This recent bout with the media has added to our sense that people don't read like they used to. Many of us are so pressed for time that we're allowing headlines to digest a news story for us.

of approaches would be much more attractive to faculty and students than a single set of formal subjects. During January, the Context Support Office sponsored three seminars: The first was a faculty forum, "Should MIT try to influence public policy?" moderated by President Gray and inspired by the call from many faculty for increasing MIT's involvement in public policy areas which would benefit from the sort of expertise found here. Panelists were Professors Richard Lester, James Melcher, Daniel Roos, and Eugene Skolnikoff. "Is Nature Dying?" was stimulated by the "End of Nature" *New Yorker* series that formed the basis of the book by William McKibben. Featured panelists ran the gamut from Associate Provost Jay Keyser to Dr. Michael Connor, chief scientist of the Boston Harbor clean-

up project, and sparked debate about whether technological fixes were either desirable or beneficial. Finally, a panel discussion, "Is the Arms Race Winding Down?" provided the viewpoints of six faculty members on such topics as whether or not MIT science and technology will benefit from the peace dividend.

In April, the Context Support Office co-sponsored an all-day forum run by two STS graduate students. A full day of historical and current policy perspectives on "Error, Fraud, and Misconduct in Science" brought together a panel that included Professors John Deutch and Frank Solomon as well as Harvard professor Gerald Holton, *New England Journal of Medicine* Executive Editor Marcia Angell, and others. We would like to see more students - graduate and undergraduate - organizing activities like this one, and we have funds to help them. We would also like to see more happen in students' living groups and hope to draw on the good will of the Faculty Fellows program to help make that happen. In the meantime, plans are in the works to co-sponsor (with the Undergraduate Association) a regular series of topics on contemporary affairs - stressing their relevance to MIT students.

This term, a Context-sponsored seminar on MIT and its environment has brought together a group of enthusiastic graduate and undergraduate students with members of Physical Plant. At least one interdisciplinary research project will result from this term's seminar, as well as the possibility of beginning a student internship program with Physical Plant.

(Continued On Page 19)

The Work and Family Nexus in the New Age

(Continued From Page 9)

Lawyers and doctors have a much wider choice of places to go and settings in which to practice, including the opportunity to design and start their own practice. They are less tied to rigid time expectations, and are better paid.

While the pace and pressure of MIT are legendary and embedded in the formal expectations and rules of the place, they seem equally grounded in the personalities of people who are attracted here. As individuals and as a community of scholars and teachers, we will work long hours regardless. All our families pay some price for our career choices, but many families of our newer colleagues pay an unsustainably high price.

Ultimately, our concern about work and family places us in a quandary. We will work hard and expect our colleagues to work hard, but we want to offer ways for the pace and pressure to yield at particular times for some members of the community who need the relief. At the same time we do not want to promote jealousy, inequality, sloth, and we do not want overall performance or discipline to suffer. We want to institutionalize sensitivity and flexibility so that these are rights, not a private accommodation or a concession for which individuals must beg. We also want to avoid rigid rules about flexibility.

Given the way faculty work and are accountable to their colleagues and themselves, it is not hard to figure out what works. For example, some department heads do ask (of at least some junior faculty) "...how might we help you arrange your professional life to deal with multiple demands...?" This is still too

rare, too uneven, (or comes too late). Faculty who are in such supportive settings, no doubt, find dealing with the pace and pressure far easier. For some the consideration they receive makes the difference in their success here and in their home life. Those who leave are less bitter and remain colleagues in their new setting.

Beyond a statement of the goals from MIT and some adjustments in benefits and other services, we have to fall back on the notion of a "community" looking after the needs of each individual both because it is the right thing to do, and also because the long-term interests of the community are best served in that way. I believe we are close to the time when the idea of community-building as the framework for dealing with work and family is not "hokey." It may be the source of our survival as a first-rate faculty. Over the next decade or so, American colleges and universities will have to replace a good share of the professorate. We will need to keep top people and attract others. We will have to recruit new blood into advanced study, into teaching and to MIT instead of other places, including top-rated academic research centers such as the Research Triangle in North Carolina. While prestige has its value, a close analysis might find that its underlying value may be eroding. MIT could simply become a great place from which to search for another position.

We have to make this an attractive place from a long-term point of view, so that sacrifice and pressure can be kept in reasonable bounds and relief can be framed that is consistent with personal and institutional goals. If we fail, we may

find our best prospects taking jobs at other institutions. If we and our peer institutions fail, we will not get the best minds coming into academia.

Addressing the family and work concerns will not be easy. They will not even be easy to frame, because our lifestyle and "family" arrangement are far more complicated and dynamic than they used to be. While we are still committed to colleagues who have parental responsibilities, we are equally concerned with pressures associated with commuter marriages, personal nonwork goals, obligations to partners and parents, and urgent matters that don't fit our neat categories, but nevertheless weigh heavily on our colleagues' energies and time.

While the committee report will outline resource needs (which are both significant and critical), the equally critical need is for creativity and flexibility in a context of shared commitment to each other as persons as well as colleagues. As sugary as this sounds, a supportive community of scholars is potentially the surest route to reconciling the twin challenges of a productive work life and a fulfilling personal life.

[A summary and recommendations of the Family and Work Committee report were distributed with the call of the March 1990 faculty meeting. Copies of the report are available at the Information Desk in 7-111. The full report and recommendations will be published in Tech Talk in the fall. Your comments and inquiries about the report are welcomed and should be addressed to Work and Family Committee Chair, Professor Peter Elias, NE43-317.]

"Once more into the breach..."

(Continued From Page 7)

knowledge of atomic structure as described by quantum theory, yet the physical basis for this, even the observational evidence for our belief in the very existence of atoms, is not a part of the introductory physics courses.

The typical introductory biology course gives great prominence to molecular biology and brings students close to the frontiers of biological research. But the triumphant conclusion of 8.01/8.02, typically, is the demonstration of the existence of electromagnetic radiation by Heinrich Hertz in 1888. Even in terms of content alone, this can hardly be regarded as a reasonable or satisfying representation of physics for students whose contact with the subject may end at this point. More serious than this, however, is the failure of our present courses to give students any adequate exposure to the process by which we learn about the physical world. Most of the efforts of the students are directed toward the solving of essentially mathematical problems that are completely defined and that have unique correct answers. And the situation is aggravated by the absence of any required laboratory work, at least in the "mainline" sequence 8.01/8.02.

The new courses, 8.01X and 8.02X, seek to change the situation in several ways. So far as course content goes, we have concentrated on presenting some of the main aspects of the physicist's description of the world. This has meant looking at the whole picture, not just tacking on some modern physics to the topics now contained in 8.01 and 8.02. For example, although we consider some discussion of atomicity and quantization to be essential, we also feel that a general physics course that says nothing about wave motion in

general is omitting one of our major sources of information about the universe. (Just consider how much of our knowledge of the universe at large comes from studies of wavelengths and Doppler shifts of various kinds of radiations.) And an

Instead of the old "cookbook" laboratories, which were justifiably abandoned in 1964 as having little educational value, the new course is based on take-home kits, with which students work at places and (even more importantly) times of their own choosing.

acquaintance with energy in all its forms, with their interconversions, offers far more to a student than does a narrow concern with mechanical energy alone. We have therefore deliberately broadened the content of the course relative to the standard version of freshman physics. We believe that, by focusing on essentials, we can do this without opening ourselves to the charge of superficiality. To be sure, many details are left unsaid, but the student who needs them can get them later. The responsibility of introductory physics, as we see it, is to give a balanced view of the physical world suitable for all students - future physics majors included.

Even more important than the change of content, however, is the introduction of hands-on experience, closely integrated with the classroom teaching and bearing a full third of the course credit. Instead of the old "cookbook" laboratories, which were justifiably abandoned in 1964 as having little educational value, the new course is

based on take-home kits, with which students work at places and (even more importantly) times of their own choosing. The creator of this system is Professor King, who has devised a wide variety of ingenious and instructive experiments based on simple and inexpensive materials.

At the beginning of the course, each student is given a tool kit containing a soldering iron, screwdrivers and other small tools, various accessories, and a multi-range test meter (volts, ohms, amps) that plays a central role in most of the experiments. There is immediate immersion into the problems of measurement and making things work; nothing is pre-packaged. Students measure the speed of sound, the interconversions of mechanical, thermal and electrical energy, the properties of oscillating systems, the forces between electric charges and currents, the wavelength of radiation from their own spark transmitter - to name only a few. This is real experimental science, not a bloodless textbook exercise. It can be frustrating, of course (which in itself is a valuable piece of education), but most of the students have responded to it enthusiastically. Our own belief is that this presentation of physics as something rooted in first-hand experience is the right way to go. Moreover, it transforms the status of the student. Instead of being a passive receptacle for information, he or she is free to play, explore and innovate. We have seen gratifying evidence of this in the experiment reports that students submit each week; they become active participants with us in an educational enterprise.

We hope that this broadened approach to introductory physics, with its hands-on basis, will become the norm instead of being, as it is now, an interesting experiment. Stay tuned!

Junior Faculty and Children

(Continued From Page 9)

that these new attitudes toward infants and toddlers represent an incredible change from those of a generation ago. And this change invites questions of intergenerational fairness. If the wives of MIT's one-career junior faculty men of previous generations had been forced to subsidize their salaries the way our wives are forced to subsidize our salaries, just think how much richer MIT would be today. (If previous generations of one-career junior faculty men also had to teach four outside classes to make ends meet, then I take it back. But I would be curious to know how many such marriages survived.)

In response to this intensification of the conflict between career and children, most junior faculty have stopped having children. In 1968, 84% of Harvard's junior faculty had children. In 1984, only 36% of Harvard's junior faculty had children, even though they were four years older on average than the junior faculty were in 1968. MIT's current figures might be higher (if they are I would suspect it is because in having so many junior faculty in engineering, its junior faculty are paid more on average than Harvard's junior faculty). But I think it is important to bring MIT's figures out into the open. As the report stands now, those figures are hidden, because instead of dividing the faculty into those with tenure and those without, the faculty is divided into those over age 45 and those age 45 or less. I also think it is important to bring out into the open any differences in parenthood rates that may exist among junior faculty in the different schools of MIT.

If I am not merely a voice in the wilderness and a majority of the MIT community agrees that it is appropriate for junior faculty to have a fair chance at tenure without farming out their children after the first few months, what changes need to be made? The clock cannot be turned back to the 1950s and 1960s. Mom is in the workplace to stay. So both Mom and Dad need to be allowed to slow down during their reproductive years in order to spend more time at home. In other words, the message is the exact opposite of the Committee's message: Junior faculty need to be allowed to let their parental responsibilities interfere with their research. That means either the standards of evaluation (especially in regard to quantity but perhaps also in regard to quality) have to be lowered or the tenure clock has to be stretched out to a minimum of ten years.

It would be nice if MIT, in its position of prestige and influence in our country, would take beginning steps to lead our culture away from the hubris of placing our own careers ahead of our children's lives. At the very least, I hope that MIT does not adopt a statement of - "MIT wishes to work with the members of its diverse community to reach an accommodation between their work and their personal lives which minimizes stress and maximizes productivity" - that could easily inspire the epitaph in a *New Yorker* cartoon: Prof. Ralph Jones, MIT, Minimized Stress and Maximized Productivity. Surely, at least in principle, MIT should aspire to a richer conception of academic life than that.

"If we wish to become exact and fully furnished in any branch of knowledge which is diversified and complicated, we must consult the living man and listen to his living voice. I am not bound to investigate the cause of this, and anything I may say will, I am conscious, be short of its full analysis; perhaps we may suggest that no books can get through the number of minute questions which it is possible to ask on any extended subject, or can hit upon the very difficulties which are severally felt by each reader in succession. Or again, that no book can convey the special spirit and delicate peculiarities of its subject with that rapidity and certainty which attend on the sympathy of mind with mind, through the eyes, the look, the accent, and the manner in casual expressions thrown off at the moment, and the unstudied turns of familiar conversation...Whatever be the cause, the fact is undeniable. The general principles of any study you may learn by books at home; but the detail, the colour, the tone, the air, the life which makes it live in us, you must catch all these from those in whom it lives already."

Cardinal Newman

A Presidential Platform For Women Faculty at MIT

(Continued From Page 1)

MIT from its current 10% to 20% or even 30% if we use this opportunity to hire them.

In addition to setting up mechanisms for generating a pool of women candidates for each department - and hiring from each pool as positions open - the EOC

According to the NSF, women in science and engineering are paid on the average \$10,000/year less than their male counterparts. We must find out if this hold true for MIT salary levels.

needs to address those factors that keep the numbers of women faculty at MIT depressingly low. We have identified the following factors as central in discouraging women from choosing to work at MIT.

Salary Levels

It must be determined if there are discrepancies in the salaries paid to women and men, both at incoming levels and as they progress professionally. According to the NSF, women in science and engineering are paid on the average \$10,000/year less than their male counterparts. We must find out if this holds true for MIT salary levels. Any woman considering a high level position at MIT will ask if this differential obtains at our institution and we must be able to answer.

Sexual Harassment

Women will not choose to work in a hostile environment, in the absence of academic collegiality and

respect for their research, or where their safety and dignity are not guaranteed. Women faculty expect a strongly enforced sexual harassment policy whose efficacy has been proved and made public.

Child Care Policy

The United States is the only industrialized country in the "western world" that does not provide child care for its working men and women. Given this situation and the necessity of such provision for professional women in their childbearing years, MIT must subsidize child care for its women faculty. Faculty mothers conducting research for long hours at MIT require flexible child care facilities near the Institute to facilitate their normal working schedules. If MIT provided such high quality child care for its women faculty, it could recruit and retain the most talented women in the country.

Maternity

It is a remarkable fact that no junior faculty woman who has stopped the tenure clock for child care reasons has been awarded tenure at MIT. Faculty mothers who have made use of fully supported academic leave for their childbearing or child care needs, such as fellowships for research, have had greater success in achieving tenure. The present personal leave policy is clearly not a viable option for women faculty at MIT. The Institute will have to undertake a careful study of the dynamics of this situation to design creative new ways in which to encourage, rather than penalize, its childbearing faculty. For example, it ought to be possible for women to choose among several options: on-site infant day care, part-time appointments, a more generous maternity leave, and so forth.

Tenure Attrition

We must determine why MIT does not retain junior women faculty at the same rate that it retains junior men faculty. The wide variation in attrition among departments also

It is a remarkable fact that no junior faculty woman who has stopped the tenure clock for child care reasons has been awarded tenure at MIT.

deserves study. The Institute must not only hire more women faculty, it must remedy the causes behind their substantially higher rate of attrition. Mechanisms for addressing this problem must be specified: to address its dimensions, ultimately to remove its causes, and in the short term to pay close attention to inequitable practices and attitudes in the tenure review of women faculty.

Faculty Committee on the Status of Women

We recommend that a faculty committee which reports directly to the President monitor progress on all planks of this platform. The mandate of this committee is to ensure full implementation of the platform.

Submitted by the ad hoc Subcommittee on Women Faculty of the EOC. Heather Lechtman, Maya Paczuski, Ruth Perry, Louise Raphael.

Note: All references in the above article were omitted due to production requirements, and can be obtained from the EOC or from the authors.

Some Reflections on Undergraduate Teaching and Education at MIT

(Continued From Page 7)

directions.) Every year at the first class meeting I'm confronted with that sea of unknown faces, but after several calls of a makeshift index-card roll, I manage to associate most of the names with the faces, and after that they're real people. One of the enjoyable consequences of my addiction to teaching is getting to know the students in my classes. I can recommend it without reservation. I've wondered what's the maximum class size for which that's feasible; fifty is easy (it takes a few weeks), but admittedly a hundred would probably be difficult.

Knowing our students makes it easier for us to be self-revealing, and I think it's important for students to know us as we really are - for better or for worse. Moreover, getting to know the students helps to break into their passivity. I probably don't need to tell you that MIT undergraduates in their classroom habitat tend to be silent, absorbent sponges. The contrast with my Harvard Extension students, who tend to be older and more focused (and, largely, no less intelligent!) is striking. It's unsatisfying, and difficult to have fun, teaching sponges.

Finally, I want to address a problem I've worried about for many years: MIT undergraduates are overworked. (I can almost hear the hackles being raised.) I experienced it myself in these same halls, and I see it happening still, despite so many changes in MIT undergraduate education over the decades. Students tend to fall behind their imposed load even while the semester is still young, and lose sleep scrambling to keep from falling even further behind for the rest of the semester. Efficiency drops precipitously, and there's seldom any time for calm reflection

on the intellectual content of their course work. Both effects are inimical to real learning.

MIT professors don't usually lose sleep over their work, even though many if not most are

I probably don't have to tell you that MIT undergraduates in their classroom habitat tend to be silent, absorbing sponges... It's unsatisfying, and difficult to have fun, teaching sponges.

workaholics like me. I see them coming to work at the beginning of the day and leaving at the end of the day, just like real, normal people. Whatever sleep we professors lose is extracurricular, except for those infrequent bouts with an unbreakable deadline that throw us back into the student mode. The same goes for our grad students, except during unusually stressful times. You or I would never tolerate such an arrangement in our working lives. So why do we do what we do to our undergrads? All of my discussion sessions with students tell me that this is the big number-one problem of the MIT experience. And they think, rightly or wrongly, that we try to cultivate this effect as a matter of machismo. The problem, of course, is that it's always the other guy who's assigning too much work, and we're forced to do the same in self-defense. I implore you all to engage in a little honest self-examination to try to rationalize the working lives of our undergraduates.

A New Way of Teaching Modern Biology to Freshmen

(Continued From Page 6)

in those terms. The modern concepts of molecular genetics, bacterial and eukaryotic, cannot be taught without a firm basis of chemistry, preferably within the same lecture series so that one knows exactly what has been discussed before.

I for one strongly object to teaching genetics in an abstract quasi-mathematical way, using black boxes for genes. The subject and its concepts can only be understood when discussed in terms of the chemistry of DNA and the chemistry of proteins. I felt that I did not have to teach the chemistry underlying these concepts, as I had to do when teaching 7.01, "General Biology", for many years. Our students understood the chemistry from earlier or parallel sections of SP01/SP02.

The two semester sequence will leave the MIT graduate with a firm grounding in the concepts of chemistry and biology. On these he or she will be able easily to build more advanced courses in chemistry or in biology. In addition, students who become engineers will have the necessary physical and inorganic chemistry background to deal with more advanced areas that border on chemistry. Most importantly, I feel confident that they will know the concepts of modern biology well enough to be able to decide whether or not to tackle an engineering project that contains elements of biology/medicine/ecology and where to turn for help and advice in tackling such projects, which, by the way, are becoming increasingly common.

It is a disservice to our graduates in this day and age to let them be ignorant of modern biology, a professional area that they will often encounter. While SP01/SP02 is not necessarily the only way to achieve this goal, it is a damned good one!

M.I.T. Numbers

Average Salary By Rank¹

Institution	Professor	Assoc. Prof.	Asst. Prof.	Instr.	Average
Berkeley	72,400	47,400	39,900	-----	63,500
Caltech	80,700	61,300	48,400	-----	72,500
Harvard	82,700	44,600	42,000	29,900	62,300
M.I.T.	75,600	53,600	43,900	27,300	62,400
Stanford	79,200	55,300	43,800	-----	68,300
U. Mich.	67,300	50,000	41,800	-----	53,700

Faculty Average Age, Average Salary, and Percentage of Faculty,
by Category, Academic Rank, and Gender, 1989-90²

Academic Rank	Average Age	Average Salary	Percent Faculty	Average Age	Average Salary	Percent Faculty
		MEN			WOMEN	
Professor	54	68,440	53.7	52	60,350	19.6
Associate	44	46,930	20.1	45	43,470	22.7
Assistant	37	40,340	20.6	39	36,350	36.5
Instructor	37	30,240	1.9	38	29,770	6.4
Lecturer	43	37,760	2.6	44	29,010	10.6
No Rank	46	n/a	1.1	44	n/a	4.2
All Combined	48		100.0	43		100.0

¹All numbers on this page were taken from *Academe*, the Bulletin of the American Association of University Professors, March-April 1990.

²Sample includes 27,546 faculty members nationwide, from institutions conferring doctoral-level degrees.

A Semester at Delft T.H.

(Continued From Page 8)

disturbed short of a fire alarm.

My assistant was a very mature and conscientious older student who called on me every day on my arrival at the office, asking me what I needed, reminding me of classes and appointments, and offering personal help such as tickets for concerts, repairs on my car, and advice on what to see and where to go in Holland. He became a valued friend with whom we still keep in touch. One day I inadvertently pressed the red button and was isolated for a couple of hours until I went out to see what was the matter.

"Jan" also warned me that a professor was not supposed to enter a classroom until all students were there. The students were to stand when I entered and to be seated at my request. Classes were always straight lectures, and I never succeeded in getting a single question, although I always asked for them.

I did notice that other professors had personal assistants. Probably, I was given this service because of my guest status and unfamiliarity with the language and country.

There is no requirement for students to attend classes or laboratories. No quizzes or examinations are given, except for the following: In order to receive a degree, a student must pass two sets of examinations. These are apparently set by professors in his special field and may be oral and/or written.

The first set of exams is given after the student has completed (in the opinion of himself and his teachers) about half the subject requirements. The final exam for a

degree is usually oral, before one or more professors, and includes a complete design of a machine, structure, or other engineering work with calculations, etc., which the student must explain and defend to the examiners.

When students fail to pass an exam, there is no record of "failure." He is simply advised to try again. I do not know if any limits are placed on the number of such retrials.

There is no requirement for students to attend classes or laboratories...In order to receive a degree, a student must pass two sets of examinations....When students fail to pass an exam, there is no record of "failure." He is simply advised to try again.

Whatever we may think of this method of engineering education, a measure of its success is the fact that the Dutch lead the world in ocean, harbor, and river engineering and are at or near the top in marine engineering, ship building, heavy machinery, and electrical petroleum engineering. Holland's other universities, such as Leiden and Utrecht, are world famous in science and other humanities.

As in most European universities, Delft T.H. takes no responsibility for non-academic life or activities of students or staff. Living arrangements, athletics, cultural activities, etc., are entirely up to the individuals concerned.

Except for the Delft residents, students who choose to live in Delft must use private facilities,

some of them cooperative, for room and board.

About one-third of the student body belongs to the "Student Corps", which manages all athletic facilities, including gymnasium, rowing (on the canals), soccer, etc., and also has facilities for student meetings. The cost of belonging to the "Corps" is appreciable in a student's budget. The student managers of the Corps often drop out of classes for the time of their service.

Since Holland is such a small country and has excellent rail and trolley facilities, a considerable portion of students live at home in other towns and cities and commute to Delft by rail. From nearby towns the bicycle is used. Few automobiles were used in 1955, either by students or staff, but I assume that this situation has changed drastically by now.

In those days, for students who lived at home and did not belong to the Corps, academic expenses included only the cost of transportation, books, and the very small tuition charges then in force. This must have made a college degree cost only a tiny fraction of the corresponding costs in this country. I hope this situation has not changed in the 35 years since I was there!

There was a great deal of cultural activity in the Delft area, including music, theatre, lectures, etc., much of it taking place in university auditoriums. I never asked how these were funded. Holland itself, of course, is one of the great cultural centers of the world. Living there for as long as we did was an artistic, cultural, and historical experience never to be forgotten.

"All the News That's Fit to Print...and Then Some"

(Continued From Page 11)

Contrary to what the *Times* reported, Context subjects are still being taught with very respectable enrollments. For instance, "Ethical Issues in the Work Life of Engineers and Scientists" is being taken by 20 students this term. Under the guidance of Dr. Caroline Whitbeck and faculty from departments in engineering and science, students are being given a chance to develop skills and experience in devising constructive responses to ethical issues they will encounter in the workplace. For this course, each student undertakes a project in which they engage in an in-depth

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exploration of the means for coping with some moral problem, with such topics as the engineer's responsibility for safety; financial conflicts of interest for faculty in science and engineering; computer systems and employee surveillance; corporate and university supports for balancing career and family lives; the options for refusing to work on particular morally-objectionable projects; safety in MIT's research labs; and the MIT faculty member's challenge to balance research and teaching responsibilities.

Dr. Whitbeck says the subject is using a different approach to the teaching of ethics, emphasizing the point of view of an involved agent rather than that of a moral judge who

is apportioning praise and blame. She says that ethical issues are very much like design problems and this new method is in part modelled on design teaching within the Mechanical Engineering department. The instructors are gratified that engineering majors are discovering that the material has relevance to their education as professionals and that the subject has strong support from a number of engineering departments.

Most departments have contributed to the recently-issued list of 70+ subjects and programs offered next term that are cross-disciplinary and contextual in nature. We title the list, "Technology, Science, and Contemporary Affairs," and look forward to your suggestions for ways to add to or improve it.

We're also planning a design contest based on the observation that intellectual rapport is a strong function of propinquity. We suspect that if it were easier for the faculty to meet ("easier" measured in terms of weather exposure and transit time), interdisciplinary projects would flourish. We envision a community-wide design context (with prizes) for solutions to our geographic dispersal problem. Earlier discussions have moved some to call us with ideas, and one prominent faculty member has already volunteered to help judge. We have even stirred up recollections of the great "people mover" project of the early sixties. The contest will consider solutions of all types.

Mini-courses for faculty are in the works for next year, including one during IAP entitled, "The Art of Engineering", a rich topic and one that we hope involves faculty from all over MIT. If you have ideas for speakers, topics, or texts, we'd appreciate hearing from you.

An MIT Joke

A newspaper reporter was interviewing a doctor, a lawyer, and an MIT professor. The question posed was "Which would you rather have, a spouse or a lover?"

The doctor replied, "I'd rather have a spouse. Then I could have a warm and nurturing home life, with home cooked meals and a loving family."

The lawyer's preference was for a lover. "We could go to fancy restaurants and I could show off and we'd take romantic cruises."

"And what about you?" asked the reporter of the MIT professor.

"I'd rather have both," replied the professor.

"But how could you do that?" queried the reporter.

"Well, my spouse would think I was with my lover, and my lover would think I was with my spouse, and I could spend all night in my lab!"

Some joke, eh boss?

"If a little knowledge is dangerous, there is no man who has so much as to be out of danger."

T. H. Huxley

