The MIT Faculty Newsletter

Vol. V No. 5 **May 1993**

Freshmen Need A Running Start

Travis Merritt

Amen, plus, to Kim Vandivcr's April Newsletter piece about the Edgerton Center. Here's the plus.

MIT likes to think of itself as a hands-on kind of place. The Institute is by tradition (and name) distinguished from most universities and colleges by its insistence on teaching students to do, so that they may he effective makers and solvers for the world, in their professional lives, and it achieves this by getting them to do while they arc here. The mission is manifest in many ways: UROP: design contests; subjects/ seminars/lAP prqjects devoted to finding out how machines and other constructs work, making them work better; internships which establish an immediate link with the "real" worlds of industry, business, and public enterprise: a nationally enviable athletics operation which stresses broadly participatory intramural and intercollegiate involvement as opposed to spectator shows, rankings, and playoffs; a multifaceted arts program

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Robert Jaffe To Chair Faculty
Physicist Has A Happy Lab

Newsletter Staff

The new chair of the faculty for a two-year term beginning June 15th is Robert L. Jaffe, professor of physics and member of the Center for Theoretical Physics.

Jaffereceived his A.B. in physics from Princeton University in 1968, and his MS. and Ph.D. also in physics from Stanford University in 1971 and 1972, respectively. He came **to** MIT as a post-doc in 1972 and joined the faculty in 1974.

Ruina Steps Down As Faculty Secretary – Page 13

Bob was born in Bath, Maine and grew up on the shore of Long Island Sound in Stamford, Connecticut, where he played baseball, combed the beaches and nearby woodlands, and attended the local high school. At Princeton he majored initially in Chemical

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Editorial

GM, IBM, :

Our Turn Now?

In the 1960's and early 70's, General Motors was the world's preeminent automobile manufacturer. Its products set the standard, everything it made was easily sold, and the public waited in anticipation for the yearly unveiling of the new models. The profit margins were large and GM grew arrogant and complacent. Management burgeoned and became ever more structured and inflexible. Although the workers knew that standards were slipping and the sales staff realized that the external world was changing, management resisted substantive change for so long that it became nearly impossible to respond at all. And when GM's problems finally became too severe for management to deny, they responded by reducing productive staff.

In the 1970's and early 80's IBM was the world's preeminent computer manufacturer. Its products set the standard and major corporations pleaded with IBM to bring out new products so they could buy them. Profit

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MIT Faculty Newsletter

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Subscriptions: **$15/year** On-Campus
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Editorial

GM, IBM, MIT: Our Turn Now?

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margins were high. Gradually, IBM built up amulti-layer, rigid management with strong ties to the existing way of doing business. IBM actually went to the extreme of hobbling new product introductions when they threatened the profitability of existing product lines. The research workers and sales staff knew better, but management responded with cuts in research support and capital investment. It is unlikely that IBM will survive in anything like its 1980's form.

In the 1980's and early 90's, MIT was among the world's preeminent research universities. Governments the world over tried to find ways to clone the Institute. MIT had comfortable arrangements with its major sponsors in the US government, and overhead rates were sufficient to maintain the health of the Institute. Almost any well-conceived research proposal could hc assured of finding funding somewhere, and entrepreneurs were rewarded. Now the situation has changed. The government no longer sees itself as working in collaboration with MIT for the good of the country, hut instead sees MIT as one potential supplier among many, to be hargaincd with for the best price. To cxaccrhatc the situation. the choice of research supplier is no longer hascd on just rcscarch cxccllcncc, hut now includes issues of balance and power.

The MIT administration. to it5 credit, sawthesechangescomingandresponded by beginning to shift as quickly as possible to hard money. Unfortunately, it also responded by adding multiple levels of "support" to interact with the outer world and to assure compliance with even more detailed and intrusive reporting requirements. At the same time. MIT is cutting back on the infrastructure needed to support w,orld class research, is making it more expensive to hire research staff, and is imposing overhead costs on more and more aspects of research-related costs, even where overhead is hard to justify (considcroverheadon self-bookedairline tickets, for example). The administration has been unahlc to preserve the environment for its teaching and research staff that made MIT a world-class institution.

When their worlds changed, GM and IBM chose the path of incrementalism and could not keep up with the pace of change. They may or may not survive their miscalculations, but MIT is too small to flirt with such hazards. We must consider major changes while we still have the resources and the reputation to institute those changes.

Now comes the hard part. What change'? There are two levels of change. The easier consists of generating an optimal response to the situation as it exists. Of course, this option requires the ability to recognize the situation accurately. This level ofresponse might be called management rather than leadership, hut even this level ofresponse can lead to apparently radical changes. We give an example of this approach below. The second and more difficult level of change calls for leadership capable of choosing, motivating, and enabling a new path into the future. It is here that MIT's faculty and administration must work together to maximize our potential.

Let us first consider our world as it is. The model used to validate the current governance scheme and to inform decisions at MIT is based on the old picture of MIT as a teaching institute that does research. The managing structure is consonant with that model. and we interact with the external world with that model in mind. But that model is wrong. MIT is composed of a first-class teaching institute and a first-class researchestablishment in close proximity - sharing facilities and people. The benefits of this arrangement arc ohvioua and will not he belabored here. The difficulty isourinahilityorunwillingncss to reconcile our old model with reality. But the use of the old model imposes constraintson theresearchestablishment and fails to allow for the separate optimizationoftheteachingandresearch entities to the mutual benefit of both. What if we rethink the aituation?

Suppose, for example, MIT's research programs were largely consolidated in a separate entity purchasing support services from many potential vendors, including the Institute. The research entity would pay for services used at the Institute. including space rental, but would he free to contract with anyone for such services as purchasing, accounting, and support staff. Faculty would have specific obligations to the Institute, primarily teaching. The benefits for faculty affiliation with the Institute would he the ones most prized now: affiliation with a vibrant intellectual community, the joy of teaching, and the ability to interact with young scholars in the course of one's research. The benefit to the Institute would he a cohesive cadre of world-class researchers, interested in teaching, as well as a source of partial monetary support for its students. The Institute de jure structure would come much more nearly to resemble its de facto

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Our Turn Now?

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structure: a world-class research institute (or institutes) with a highly regarded teaching university at its core. The Whitehead Institute shows just how well this scheme can work and may serve as a paradigm for more tar-reaching changes. The old model of a school that just happens to do research may once have been valid, hut the disparity between model and reality can no longer be tolerated.

We call upon the administration to appoint a commission charged with developing a long-range plan. That commission must possess intellectual vigor, wisdom, and enthusiasm because the changes called for may be momentous. The commission must be able to consider such options as completely revamping the existing departmental structure, as converting to a university hub with a number of research institutes, and as redefining what it means to be a faculty member.

The "modest proposal" described above is a straw man, illustrating one possible implementation of the form follows function adage. It certainly makes clear that the changes currently being considered by the administration are trivial compared to those that might be considered. **even** necessary. But the largely financial ("management") problems addressed by such institutional changes are overshadowed by the far more difficult intellectual and political problems that might be solved first. We should not arrange for form to follow function until we know what our function is. What is the good of all our scholarship and research'! This is the harder question alluded to above.

In the past decade or so. events outside MIT combined to render our old vision of our role in the country and the world obsolete. We have not yet developed a new vision. The technological challenges of the future are all being treated **on** an ad hoc basis by MIT. Energy, environment, infrastructure, information competitiveness and productivity. societal concern with true technological cost and benefit analysis. sustainability. rate of industry in R&D. etc., are each confronted by yet another subset of our faculty and staff often overlapping in confusing and probably suboptimal ways with our existing research support structure and not yet well integrated into our teaching.

We have not come to grips with the problem of defining MIT's role as a teaching and research institute in light of technological, economic, and political reality. We have not been able to make convincing intellectual arguments regarding MIT's potential contributions to the amelioration of current problems and to development of beneficial new technology. Only after we have done this, only after we ourselves know what we hope to accomplish, can we hope to decide what and how to teach, how best to seek financial support for our research efforts, and how to maximize the efficiency of our internal structure.

We must develop a strategy that will ensure not just the survival, but the vigorous health of MIT. That strategy possibly will call for a major change in the way the Institute is structured, but the strategy, based on a sound vision of our future. must motivate the change. We call upon the administration to appoint a commission charged with developing a long-range plan.

That commission must possess intellectual vigor, wisdom, and enthusiasm because the changes called for may be momentous. The commission must be able to consider such options as completely revamping the existing departmental structure. as convetting to a university hub with a number of research institutes. and as redefining what it means to bc a faculty member. It must then be able to convince the administration and faculty of MIT that its conclusions are correct and that itsrecommendationsshould be followed.

Only a few schools have the standing to blaze a path for others to follow. MIT has done it before and can do it again. The faculty of MIT, who benefit from the health of both teaching and research. have a responsibility to help develop our new strategy and to ensure that change follows from a rigorous. realistic, intellectual assessment of the situation.

Editorial Committee

This is the final issue of the Newsletter for the academic year. Over the summer we will be working on our special September issue. We encourage articles on any subject of interest to the MIT community. Information on reaching us can be found on Page 2.

From The Faculty Chair

Issues for the Future

J. Kim Vandiver

Since the Chair's gavel will soon be passed on to Prof. Bob Jaffc. (Physics), it seems appropriate for me to bring to your attention some issues that I believe will be particularly important in the next few years to the faculty of MIT. The issues are the budget, rctircmcnt and tenure policies, and community tensions.

The Budget Deficit

All of us now recognize that MIT must reduce its operating deficit. By now most faculty have heard of the 2% cuts from the academic budgetsfornext year. Less well known is that by cuts on the non-academic administrative side we hope to reduce the deficit by another $2 million next year.

In future years we will have to make much deeperreductions in both academic and administrative budgets. The only way to accomplish this with civility is to work together. A case in point is the perception of unchecked growth in what we think of as administration. The truth of the matter is that the actual number of employees reporting to vice prcsidcnts on the administrative side of the house is approximately the same as 1976. So where has the growth occurred'? As shown in the 1991-92 President's Report the largest growth has occurred in research staff (17% growth) and in administrative, support, and service staff (16%) in academic sectors (schools, departments, and laboratories). Many of these positions were created in response to the desires of the faculty Reducing costs in these academic- and research-related areas are in part our responsibility.

In non-academic areas of administration we can also be useful participants. As part of one of the four Academic Council taskforces this spring, I chaired a subgroup which looked at the utilizationof administrative and support staff and their use of computers and office automationequipment. Wechosc three academic arcas and two administrativeorganizationsasexample cascs. One was the Office of Sponsored Programs. As a result of the study it became apparent that standardizing and networking OSP computational rcsourccs would substantially incrcasc the efficiency of the office, particularly in interactions with the faculty and other offices with which OSP exchanges information.

In the case of OSP, what is probably needed is to spend some money initially so as to have a lower cost, and more efficient serviceinthelong term. Faculty participationinidcntifyingopportunities for improving efficiencies and services will, in tny opinion, yield more savings in the long term than simple cuts in budgets.

Some very positive things are happening, which will help keep the deficit under control. One is the area of utilities. Although we can all cite examples of waste e.g., having the heat on and windows open), conservation efforts haveyieldcdrcsults. For examplc, MIT's peak steamheating load occurred in 1967, even though we have added 2.5 million square feet of space since then. Two years from now the MIT cogcncrationplantwillgo intooperation. We will bc self-sufficient in electricity generation and will use the waste heat to produce steam. resulting in a twofold increase of thermal efficiency and a reduction of tens of thousands of tons of atmospheric pollutants per year. The cogeneration plant will yield tens of millions of dollars in savings in utility costs.

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Retirement and Tenure Policies

Faculty retirementhasbecome an issue recently, due to the change in federal law, eliminating mandatory retirement at age 70. If significant numbers of faculty choose to delay retirement. it will become increasingly difficult to renew the faculty with younger talent. Finding the right combinations of rctircmcnt incentives will require thoughtful faculty input.

Criteria for tenure is also likely to become a matter attracting greater attention. I anticipate much more discussion about the values on which

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Issues for the Future
(Vandiver from preceding page)

we base our tenure decisions. For example, as research funding shifts to industrial sources, it seems likely that we will have to develop new measures ofcrealivity and significance of original contributions. Publications in refereed journals may not be the best measure of really creative minds engaged in industrially-oriented research.

created an environment in which the barriers to reporting incidents and seeking help are very low. As a consequence, our reported cases are less severe on average than most workplace environments.

On the subject of racial harmony, we have been quite fortunate. Thanks to the efforts of the Admissions Office and extraordinary recruitment efforts by many individuals in the community, WC have a substantial population of minority undergraduate students. Greater numbers must be encouraged to go on to graduate school, so as to increase the number of candidates for faculty positions around the country. I believe the key to encouraging undergraduate students to pursue graduate school is better mentoring. That is largely our responsibility as faculty. In faculty recruitment we have worked very hard with limited success at finding and hiring minority faculty. The administration is committed to continuing the search and to creating openings when qualified candidates are found. We the faculty have a major role participating in searches for qualified candidates.

In closing, a recent event comes to mind, which at the time reminded me of the challenges of being a member of the MIT faculty in the climate of the 1990's. I was watching a group of young boys put on a skit whose theme was "What is the meaning of life?" In the ensuing discussion one of the boys said "Life is like a trombone: it's pretty quiet until you blow it." Eventually the discussion came around to the realization that "Life is what you make it." For faculty and administration alike, the challenges and potential pitfalls are many. but with them come opportunities for productive change.+

With respect to sexual harassment, we have made considerable progress and have been a leader in setting policies and examples. We can take pride in the fact that we were among the first major employers in the United States to specifically recognize sexual harassment as a workplace issue requiring attention.

Community Tensions

The issues which come immediately to mind are harassment, free speech. and racial tensions. There is an unresolvable and probably healthy tension between our desire to protect individual rights to freedom of expression and our desire to provide a harassment-free campus for students, faculty. and staff. It is appropriate that we pursue a middle course and resist demands of small but vocal groups who would push us too far in either direction.

With respect to sexual harassment, we have made considerable progress and have been a leader in setting policies and examples. We can take pride in the fact that we were among the first major employers in the United States to specifically recognize sexual harassment as a workplace issue requiring attention. Over the last twenty years the efforts of many at MIT have

Minority Groups Representation (1992-93)

	Und Grad	Grad
Vative American	36	7
Asian American	1,144	288
African American	254	89
Hispanic American	372	81
TOTAL	1,806	465

Votes:

United States minority group representation is 40% of the undergraduate population and 9% of the graduate population.

In 1992-93 there were 1,506 women enrolled as undergraduates (33%) and 1,216 as graduate students (23%).

Source: *MIT Facts 1993*, prepared by the Office of Communications, Resource Development.

Academic Interdisciplinary Cooperation: Fact or Fiction?

Ernst G. Frankel

Societal, as well as technological, problems increasingly rcquirc or involve multi-disciplinary solutions. Although we at MIT are lauded and credited with innovative multi-disciplinary programs in education and research, such as the Lcadcrs for Manufacturing (LFM), Managcmcnt of Technology (MOT), and similar programs, as well as research associated with thcsc programs. the actual involvement of faculty across schools and departments as part of multi-disciplinary groups working on multi-disciplinary problems is largely illusory.

Both the above-named programs are largely run by Sloan faculty. MOT, for example, although formed as a joint School of Engineering and School of Management effort designed to build a new management approach on MIT's rich technology base, has attracted very few engineering faculty, even though the program has developed a most excellent reputation and is popular with some of the foremost technological organizations and corporations. In fact, most of the students in the program have an engineering or science background.

The Leaders for Manufacturing program and the Technology and Policy program (as well as others) have similarly attained wide recognition, and the MIT administration loses few opportunities to point to these programs as MIT's great contribution to society and the U.S. in particular. In fact. we as an Institute often try to distinguish ourselves from other renowned institutions by emphasizing these programs as a sign of involvement in the application and not just development -of technology.

Yet at the same time. while we take credit for these innovative programs largely designed to solve or teach how to deal with larger interdisciplinary problems involving science and technology, there is a virtual lack of incentives to encourage faculty to participate in these programs. Indeed. it appears that while we present a view of broad concern with societal problems and the development of multi-disciplinary solutions to the outside. concentration on narrowly-focused education and research remains the de facto policy, and is the only approach encouraged and rewarded, at least at the departmental Icvcl. As a result. the number of engineering and science faculty involved in thcsc programs remains pitifully small, and those who do participate in these endeavors (for which the Institute garners so much credit) often find themselves not only unrecognized but ignored or even shunned or rejected by their disciplinary peers.

If the Institute truly bclicvcs that interdisciplinary education and research in the effective use of science and technology in solving societal problems is an appropriate undertaking and wants to take credit for the contributions of these innovative programs, then the least the administration must do is recognize those among the faculty who make it happen. notwithstanding peer criticism and a general lack of incentives and rewards.

At the same time, more general involvement by the faculty in these endeavors may go a long way towards assuring the relevance of some of our focused research and education. Few problems we face today can be solved by narrow disciplinary solutions. Although I believe that we murt continue to encourage basic research and development, it is increasingly evident that unless we learn to link it to an understanding of issues and problems, much of our work may become increasingly irrelevant or. as many on the outside may say. academic. +

If the Institute truly believes that interdisciplinary education and research in the effective use of science and technology in solving societal problems is an appropriate undertaking and wants to take credit for the contributions of these innovative programs, then the least the administration must do is recognize those among the faculty who make it happen, notwithstanding peer criticism and a general lack of incentives and rewards.

Engineering and the Study of Humankind

Michael W. Golay

This note discusses choices confronting the Engineering School as it considers strategies to remain a vital leader. This is a particular concern as the external world continues to change so rapidly. Important questions include those of how our educational program might be improved and our research emphases changed. Interest in these topics has been of growing importance during recent years, hut has not yet led to many new programs. This discussion is intended to draw attention to some potentially promising activities.

The external changes of greatest interest include the end of the Cold War, the impoverishment of the American public sector, increasing governmental regulation, and greatly increased commercialcompctition. Theseeffects, among others, are challenging the established order, and the Institute's positionwithinit. Theyarealsochanging the mix of skills needed for our students to become leaders in their chosen activities. Change is in the air and is likely to persist.

It is widely recognized that our engineering graduates are well prepared as critical thinkers and effective doers, particularly concerning well-defined problems of a physical, scientific sort. Problem solution ofteninvolves systems analysis and sequential solution of individual problems into which the overall problem has been reduced. Practical experiences and problem solutions through informational synthesis tends to be less emphasized in our current engineering education, with the most common exercises being in design and seminar subjects. Experiences in problem and solution strategy formulation and critical refinement are much rarer still. This approach has served our students and us well during the post-WWII era, but may not continue to do so during the post-Cold War period.

Forexample, ourengineeringstudents are often poorly educated for dealing with people – individually, as organizations and as a society. Reflecting this, the education that we offer them does not require study of history, psychology, economics, or languages. Also, the culture of the Engineering School encourages our students to ignore. as being arbitrary, the human aspects of the problems that they face. Consequently, it is not surprising that they sometimes do badly with the emotional public, unquantitative lawyers and the gut-feel-based businessmen and politicians. Effectively our engineers have become more scientific and quantitative, but in the process may have become less adept at dealing with messy, imprecise complexity.

In trying to meet the challenges noted above, we would be unwise to give up our strengths in science and physical-problem solving while attempting to add capabilities in new areas. Rather, we could think in terms of broadening the range of our strengths and of the spectrum of educational preparation available to our students. In doing this the range of types of engineers that we produce would be increased. The easy part of doing this is to add to the engineering curriculum more material from the Schools of Humanities and Social Sciences, and Management; topics from areas such as political science, sociology, economics, history, psychology, organizational behavior, and more experiences in synthesis, problem formulation, and critical reflection.

Thedifficultpart ofsuchchange would he finding room in the engineering curriculum for very many new subjects and experiences. The engineering curricula. as currently constituted, have no space for such studies beyond the eight HASS electives. These are viewed as being important enrichments, but not of direct professional value.

However. the changesuggested above

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It is widely recognized that our engineering graduates are well prepared as critical thinkers and effective doers, particularly concerning well-defined problems of a physical, scientific sort.... Practical experiences and problem solutions through informational synthesis tends to be less emphasized in our current engineering education....Experiencesinproblemandsolution strategy formulation and critical refinement are much rarer still.

Engineering and the Study of Humankind

(Golay from preceding page)

could be accommodated either by reducing the number of specialized engineering subjects in the B.S. course of studies and treating the replacement subjects as being professional ratherthan broadening topics, or by forming a B.S.-level pre-engineering curriculum, with concentrated engineering studies commencing in graduate school (e.g.. the Nuclear Engineering Department has always accepted entering graduate students on this basis). A professional engineering curriculum would require foundation level studies inmathematics. physics, chemistry, biology, and some engineering fundamentals, with the remaining subjects being selected as in a liberal arts curriculum. Such curricula are available, usually as improvisations, but sometimes formally (e.g., the Thayer School of Engineering at Dartmouth Collcgc). Also. a collaborative program with MIT and New England liberal arts colleges formerly provided their students with engineering degrees in addition to those awarded by their home institutions.

The hope is that this type of education would provide students with the strengths of the traditional engineering education -in terms of systems analysis, scientific competence, technological sophistication, confidence, and independent thinking. coupled to those of a liberal arts education – in terms of synthesis, criticism, problem formulation and understanding A proposal for a broadened curriculum will undoubtedly be criticized as being likely to produce dilettante engineers who will neither know history nor design plumbing that will hold water. This is always a danger. which can be avoided only by ensuring that physical and practical engineering studies take primacy to the extent needed to respect theinexorablechallengesofnatureupon the designs of our graduates.

The reason for considering a curriculum revision effort, however, is that society is demanding a new type of engineer, one who would expand the range of our graduates. The essence of engineering is responding with practical solutions to society's problems. If the Institute is to remain as great as we believe it to be, we must be creative in responding to the current demands for breadth and humanistic competence. A curriculum utilizing more material from the Humanities and Management Schools would he likely to produce demands upon these schools for new subjects, tailored for engineers. Historically the different Schools of MIT have not cooperated strongly. It would remain to he seen whether the needed cooperation would result in this case, It is likely that special efforts would be needed to make it happen.

It is noteworthy that several relevant efforts are already underway at MIT. These include the Leaders for Manufacturing, and Management of Technology Programs (between the Engineering and Management Schools), and the Technology and Policy Program (which has involved faculty from the Engineering, Humanities. and Management Schools). Also, two new-large scale systems subjects are beingdevelopedforoffering during AY '93.'94; one is conccrncd with the effects of organizational structure upon the performance of firms and the other examines how to meet clean air and associated transportation needs in Southern California. as an example of a complex socio-technological problem.

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These efforts arc valuable explorations into how we can evolve successfully. Hopefully they will provide a foundation for fruitful growth in the Engineering School. But the questions of how to evolve well arc subtle and difficult. Consequently, they will persist. and cannot be ignored. They constitute both a challenge and an opportunity. A successful response will rcquirc the efforts and cooperation of many within the Institute. And original innovation within the Institute in the past supports the hope for success in the future. +

The Center Does Not Hold: Peripheralization at MIT

Samuel Jay Keyser

Cultural change is like growing old. We look at ourselves in the mirror every day and every day we appear as young as the day before until, one day. we inadvertently come upon a picture of ourselves in our youth. That is why it is so difficult to pinpoint cultural change. It happens without our knowing it. That notwithstanding, I shall take a stab at what seems an important cultural change in the way in which members of our community relate to one another. For want of a better term call this cultural change pcriphcralization, a process whereby smaller and smaller intcrcst groups form and separate themselves from a central core.

The failure of the dining halls at MIT is a good place to start. The notion of people coming together for a common meal at the end of the day, talking among themselves, establishing and enjoying a common experience. has given way to small, diverse, and widely separated dining areas. Students eat on the run in places like Pizza Hut, or in public areas like Lobdell, which are essentially anonymous. They are unwilling Lo support common dining areas. They patronize faceless eateries like the ARA niche in Building 12, or the donut stand in Lohhy 7, or the falafel wagons that congregate outside Building 20.

Of course MIT authorized the falafel wagons, the niches, and all of the other local eating nodes. It did so in response to a cultural change that it was unaware of, hut supply licenses it did, and we are now beginning to become aware of the consequences of peripheralization.

To stay with food for a moment, the faculty club is no longer a club for faculty. The evening meal has stopped and lunch time will disappear soon. Now the faculty eat alone, or not at all, or in small groups associated with their research teams and/or colleagues. Attempts to bring them together, such as the faculty lunchroom in Building 9, are only moderately successful, attracting customers who are, as it were, in the neighborhood.

In the early 70's it was commonplace for faculty and students to take time out for lunch at Walker, to meet around tables to talk about work or whatever. That practice has virtually disappeared. There was a time when a faculty member without a dining partner could go to the faculty club and find company at the roundtable. a table where unaccompanied faculty would go to find someone with whom to have lunch. The table closed down when the faculty club was renovated several years ago and attempts to revive it when the club reopened failed. Recently, when I spoke of this to one of my colleagues, he recalled long conversations about work that began at the roundtable and lasted for several hours. He wondered why he and his colleagues had the time then but don't seem to now. The usual explanations – not enough time, the press of work, too much more to do – all seemed to fall flat.

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Peripheralization is not only associated with food. Consider the inexorable march from mainframe, centralized computers, to individual PCs in one's own laboratory, office, or, for that matter, dormitory room. Only the Athena enclaves dotted around the Institute are reminiscent of a more centralized, common area and even here the major interaction is not among individuals but between an individual and his/her monitor. And, ingeneral, we prefer to take our devices for connecting with thelargerworldintoourownprivate spaces – our labs, offices, homes, bedrooms – places from which we can reach out for whatever we need or want, andrapidly retreat, turtle fashion back to safety.

To move outside the MIT boundaries for a moment, retreat to a private space is responsible for the great success of video movies, and soon television sets will he capable of tuning in 500 separate channels. One might ask what one will do with 500 channels. The answer is shop. The television set in one's hedroom will replace the department store, the mall, the boutique as one checks through Eddie Bauer's inventory on the tube, or L.L. Bean's or Sears'. Shopping channels, originally aimed at a middle and working class market, have recently gone upscale in New York, preparing to sell items from Barney's, Bloomingdales. and Herve Benard.

(Continued on next page)

Peripheralization at MIT

(Keyser, from preceding page)

The same drive toward peripheralization is rcsponsiblc for the phenomenal success of the walkman, a device which isolates theuserfromotherpeople while. at the same time, allowing for fulfillment of a second human need. to be among people but not with them. Another device that accomplishes these apparently contradictory goals is the Citizen Band radio. This device enables people to have contact with other human beings while at the same time being protected from them. I know this at first hand. I and my fellow CBers maintained a friendly, chatty existence with one anotherbut always at a distance. For one thing, we never used our real names, but always monikers, or handles. (Mine was Newcomer.) For another, we rarely talkcd to one another for more than a few minutes and even then we were traveling at speeds in excess of 60 miles an hour, often in opposite directions. What could bc safer?

Peripheralization has long been a part of the MIT milieu. Consider, for example, R/O Week. The entire thrust of this activity is to help students to fragment as quickly as possible into compatible living units; that is, to find small groups that are essentially homogeneous and to remain in those enclaves as a shelter and a haven for the next four years. Ethnic, gender and sexual preferences produce similar pressures and the living group system at MIT has long developed local identities to the exclusion of any sense of being a member of a larger community. The failure of dining halls and the faculty club, the rise of the personal computer, the walkman; and electronic shopping, all abet the drive toward less and less human contact.

Obviously it is not possible to guess where this splintering will lead nor is it likely that this process can be controlled or reversed. One thing seems clear. Peripheralization reduces human contact and that is not a desirable thing. If one were to attempt to influence the impact of pcriphcralization on the MIT community, one would want to think of strategies designed to increase human contact. One such strategy is the introduction of small group interactions where the group members are, in fact, drawn from separate and independent entities at the Institute. The random faculty dinners that have been sponsored by the Provost's Office arc a good example of providing such opportunities. The fact that there are members of the faculty who have returned three. four and five times indicates that these occasions have tapped into a real need at the Institute.

However. my own view is that while such activities are good and beneficial and desirable, they do not combat the root cause of peripheralization and that is something that I suspect is beyond MIT's capability. Nonetheless, there may be sonic value in naming the disease even if not to cure it, and let mc take a stab at that as well.

I believe that peripheralization is a direct result of the insecurity of the times. Let me use an analogy from developmental biology.

Almost a quarter of a century ago one of ourcolleagues, Jerry Lettvin, did a set of classical experiments in which he, through a combination of intuition, insight, and sheer creativity, managed to identify five separate neurons in the optic nerve of the American green frog and to associate separate functions with each of those neurons. One neuron fired, for example, whenever an edge was introduced into the frog's field of vision, one when a small, round, dark object moved in a trajectory toward the center of an imaginary circle, one whenever ambient light dimmed, one whenever the color blue was introduced into the frog's field of vision, and one which fired whenever there was any change of state whatsoever. This latter he called an event detector.

Given these five neurons, here is how the frog has managed to survive, in Lettvin's terms, unscathed by evolution for the past two million years. When the edge detector and the small round object detector fire together, the frog eats the small round object since the odds are very high it is an insect alighting on the edge of a twig or plant. Whenever the event detector fires, the frog's threshold of action is lowered. Its attention has been gotten. And if the light dims, the frog jumps toward blue: i.e. water reflecting the color of the sky (a frog's enemies always attack with the sun behind them to blind the frog so that the closer the attacker comes the more light is blocked out).

I don't think we are much different from frogs. Like rana pipiens, when we perceive danger and insecurity around us, like the frog, we jump toward blue. In our case, jumping toward blue is the equivalent of gravitating toward whomever we perceive to be most like ourselves. Inthcinnercities thesegroups are called gangs, elsewhere cults. and elsewhere yet "ourkindofpeople." This. I suspect, is our unconscious defense against insecurity and is the mechanism responsible for the fragmentation and fractiousness of contemporary society, both within and outside of MIT. It is an attempt to defend ourselves against insecurity, sometime dimly felt, other times quite overtly.

Society at Iarge and MIT to a lesser but still palpable extent is beginning to resemble a vial of mercury that has been dropped on the floor. The best way to reassemble itself is by finding ways to provide everyone with a sense of security. When that happens. we will find that each of us will begin to look tikc everyone else.+

Robert Jaffe To Chair Faculty

(Continued from Page 1)

Engineering, but switched to physics after a year of stoichiometry and a summer joh as an operator on the Princeton Cyclotron. Bob credits his summer of midnight to 8:OO am shifts in the basement of Palmer Physics Laboratory with ending his career as an experimental& but allowing him a Ieisurely reading of the Literary Canon.

He was Valedictorian of the Class of 1968 and spoke about personal responsibility in the pursuit of radical reform at a troubled commencement, shortly after the assassinations of Martin Luther King and Robert Kennedy.

At Stanford, Jaffebegan work on the short distance structure of sub-atomic particles at the Stanford Linear Accelerator Center. He was also involved in anti-Vietnam War activities.... In 1970, he and two other students founded the Stanford Workshops on Political and Social Issues....

At Stanford, Jaffc began work on the short distance structure of subatomic particle!, at the Stanford Linear Accelerator Center. He was also involved in anti-Vietnam War activities on the Stanford Campus. In 1971) he and two other students founded the Stanford Workshops on Political and Social Issues. which to this day still develops and coordinates seminar format courses on issues of public policy at Stanford.

When he came to MIT he became deeply involved in the development of Quantum Chromodynamics - the theory of the quark substructure of the nucleons which form the nucleus at the center of the atom. Beginning in 1973 Jaffc and his colleagues in the Center for Theoretical Physics formulated and dcvclopcd the "MIT Bag Model" of quark confinement which describes the dynamics of quarks permanently confined to the interior of nucleons. In subsequent years hc has continued to develop the theoretical understanding of the dynamics of quarks and leptons and has worked on wider issues in quantum field theory and quantum mechanics.

Jaffe first became involved in faculty governance when he served a term on the old CEP (Committee on Educational Policy) in the mid- 1980's. He helped fashion the reorganization which split the responsibilities of the CEP between the Faculty Policy Committee and the Committee on the Undergraduate Program. Later he served on the Committee on Faculty Administration and as Chair of the MIT-Wel lesley Committee.

He has had a long-standing interest in issues of work and family at MIT including a term on the Board of the Technology Children's Center and a role in fashioning the FRAP Dependent Care Benefit. He is well known for his teaching and shared the first Science Council Teaching Prize (with biologist Frank Solomon) in 1982. Hc also receivedtheC;raduateStudentCouncil Prize for Teaching in 1988. In the late 1980's Jaffe helped establish the "Symposium at MIT" a group of faculty from all Schools which meets monthly for dinner followed by a presentation of one of the member's research.

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Bob lives in Newton with his wife, Diana Bailey, an architect whose firm specializes in public and private residential projects. They have two chi ldren Rebecca (13) and Sam (l 0) interested primarily in horses and bugs, respectively, and a happy black Labrador, Lily, interested primarily in inducing the family to take long hikes near large ponds.+

Ruina Steps Down As Faculty Secretary

Newsletter Staff

This May's faculty meeting will be the last one "noted" by Professor Jack Ruina (EECS). After 14 years as faculty secretary, Ruina is retiring from the post, in anticipation of his July 1994 Institute retirement.

Although rarely involved in faculty affairs. seldom attending faculty meetings. and disliking writing, Ruina was prevailed upon by then Provost Walter Rosenblith to accept the position as secretary after an unexpected resignation. It took three or four phone calls from Rosenblith, but in September 1979 Ruina finally acquiesced.

Acknowledging that faculty meetings are not always the most exciting events to read **about,** Ruina has attempted to addanoteoflevity tohismeetingminutes **-and** has rarely had complaints. Once a colleague protested the way he was quoted in the minutes, and was so upset, that Ruina made a transcription of the meeting to prove that the quote had been accurate. The colleague agreed that he had been quoted correctly, but then added, "But a good secretary should improve on what you say!"

The faculty meetings that Ruina recalls as most interesting (and well-attended) were those dealing with the formation of the Whitehead Institute, and those that discussed the abolition of the Department of Applied Biological Sciences (ABS). Most other meetings, he admits, were usually pretty routine. Nevertheless, Ruina always took his job seriously, because after all it "afforded me an opportunity to not have to accept other Institute jobs."

Overall, Ruina treasures his experiences as faculty secretary and his entire tenure at MIT (which began in 1963). "I can't imagine a better university than MIT to bc associated with," he states u Although believing the "family" nature of the Institute has declined significantly in recent years, he still finds much more of the family or collegiality feeling here than at any other university he has experienced. "In my view, theMITadministrationhasalways **been most** humane, concerned. and sympathetic toward the needs of f&ulty."

Ruina will be replaced as secretary by Professor Irene Tayler (Literature). +

Corporate Relations Committee Seeking Faculty Input

In the past few years, some members of Congress have become concerned about U.S. relationships between research universities and foreign governments and corporations, particularly through liaison programs. The central issue of concern is the transfer of technology to economic competitors. The concern is particularly acute with regard to research supported by federal monies. There have been hearings in the recent past that singled **out** MIT and our Industrial Liaison Program. Further hearings will be held in the near future. The likelihood of legislation is unclear.

The provost's office at MIT commissioned a faculty study of such issues in 1990. The committee, chaired by Professor E. Skolnikoff, published a report in May 1991 entitled "The International Relationships of MIT in a Technology Competitive World." A further assessment of faculty interactions with international organizations was conducted by Professor D. Westney and reported in September 1992. The report is entitled "Report on MIT Survey of Faculty International Relations."

The Corporate Relations Committee is a standing committee of the **faculty** concerned with the relationship of activities of the Office of Corporate Relations, andrelatedefforts. to activities of members of the faculty. The Committee has been kept informed of recent events and participated in the evolution of an MIT position.

Committee members are now engaging in an informal solicitation of faculty attitudes and opinions concerning MIT international relations, and would welcome opinions and expressions of interest from colleagues. Please feel free to contact any of the Committee members listed below.

Prof. Thomas Allen (3)) FAX: 3-2660; tallen@sloan.mit.edu): Prof. Kent Hansen, Chair (3-7384: FAX: 3-853 1); Prof. Alex Klibanov (3-3556; FAX: 8-8676); Prof. Andreas Mortenson (3-6626; FAX: 8-8836; morten@eagle.mit.edu); Prof. George Stephanopoulos (3-3904; FAX: 3-9695; geosteph@fungus.mit.edu); Prof. Richard Valelly (3-5236; FAX: 8-6164). +

Alumni/se Travel Program Offers Lecturing/Travel Opportunities

Melissa Chapman

The AIumni/ae Travel Program is in its third year of operation as part of the Association of Alumni and Alumnae of MIT: prior to this, it had been under the auspices of the Quarter Century Club. Throughout the last three years the Program has been redesigned to offer more of an MIT presence. The **Program** has hosted meetings for the travelers with domestic and international MIT Clubs and has invited faculty to lecture whenevcr possible to enhance the travel experience for **curious** MIT alumni.

Highlights over the past few years include a dinner party with the MIT Club of Turkey which was held at a restaurant owned by Mark and Nedret Butler, both of whom received their master's degrees in architecture from MIT in 1976.

Brussels resident Lester Gimpclson '57 hosted a pub crawl in the city for a small group beginning a tour of Holland. And Johan Andersen '41, who had the plcasurc of the Club of Turkey's hospitality, was inspired lo schedule a reception for MIT travelers in the Leeward and Windward Islands at his self-dcsigncd, custom-built "residential cave."

MIT clubs in Nairobi, Singapore. Par i s . and Shanghai have welcomed our traveling alumni to their countries as have clubs in New Orleans. Northern California, and Anchorage.

The Travel Program is also highlighting the MIT presence by asking MIT faculty to lecture on some of their programs. Ann Brazier, director of the MIT Alumni/ae Travel Program, is looking to invite members of the faculty to lecture to alumni/ae throughout some of these tours.

Ann Brazier, director of the MIT Alumni/ae Travel Program, is looking to invite members of the faculty to lecture to alumni/ae throughout some of these tours. Specifically, Ann is looking for a faculty member to lecture on the upcoming "Charlemagne's Dream" cruise, July l8-31, 1993. This program begins in Munich, ends in Vienna, and will include tours of Nuremberg, Regensburg, Passau, Linz, and Melk.

Specifically. Ann is looking for a faculty member to Iccturc on the upcoming "Charlemagne's Dream" cruise, July 18-31 1 9 9 3 This program begins in Munich, ends in Vienna, and will include tours of Nuremberg. Regensburg, Passau, Linz, and Melk. It will also include an eight-day cruise on the Main-Danube canal (which recently opened in Septctnbcr of last year), and on a portion of the Danube River. She would be interested in talking to faculty members who could lecture on the engineering aspects of the canal, as well as the history and the current events of the area. The faculty member's airfare. tour cost, and some spending money will be provided by the Travel Program.

Some of the upcoming highlights that will be offered by the Travel Program include a **tour** through the Canadian Rockies in June; a North Pole Expedition (Professor John Edmond lecturing), a museum **tour in London,** co-sponsored by the Museum of Science, and a France river cruise **in** July; a tour of the Scottish Highlands in August; a Vermont biking **tour in** September; acruisedown thc Columbia and Snake Rivers and a tour of China's Silk Road (Professor Lucian Pye lecturing) in October.

Please contact Ann Brazier of the Alumni/ae Travel Program if you are interested in lecturing for the Main/Danube river cruise this July. or would be interested in lecture openings in the future. She can he reached at 253-8248, FAX: 258-7886.+

Classrooms: What Do The Customers Want?

Arthur C. Smith

Classrooms are the meeting place for much that is important hcrc:

- the curriculum is played out on that stage;
- it is the market in which faculty display their intellectual wares:
- students come there to learn and are sometimes challenged and sometimes bored:
- after-hours activities of all kinds find their unofficial home in unused classroom space.
- most of us would welcome the sense of value imparted by a well-decorated, flexible space in which we could cxcrcisc our ingenuity to spark an interaction with our students that adds to our feelings of worth and well-being;
- some of us might set out to conquer our feelings of intimidalion and explore the opportunities offered by an array of computers, videos, audios, and displays which could beinterconncctcdincountlesswavs with fiber and infrared radiation (perhaps a new form of learning could emerge from such a high tech jungle).

My purpose in writing this article is to begin to find out what the customers-the faculty and students - want and expect for classrooms. I invite your comments on the state of current classrooms, classrooms that you like, classrooms that you hate, your sine qua non for teaching space, the ideal classroom, the classroom of the future, how many, how big, how furnished - whatever you can contribute to my understanding will be appreciated.

Classrooms can define the atmosphere of the educational exchange:

As dean for undergraduate education, I am trying to understand what our needs are for classrooms. Last week, I toured a number of classrooms to get some sense of the best and worst in the existing classrooms. I have talked with most of the people who share in the responsibility for maintaining and creating our classrooms. There is need for cooperation and leadership in establishing priorities for the use of limited resources to improve classrooms.

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Hard copy will reach me at 7-133 and e-mail at acsmith@mit.edu

Thanks for your help.+

MIT's Total Teaching Staff*
(1992-93)

Professors	595
Associate Professors	192
Assistant Professors	163
Senior Lecturers & Lecturers	207
Instructors	59
Technical Instructors	77
Teaching Assistants & Graduate Instructors	*650*
TOTAL	**1943**

*Excluding visiting appointments

Source: *MIT Facts* 1993, prepared by the Office of Communications, Resource Development.

Freshmen Need A Running Start

(Merritt, from Page 1)

that encourages and celebrates performance.

In fact. this emphasis on doing is so pervasive that it sometimes provokes unease. More thanafew local witnesses worry aloud that all this praxis virtually eclipses reflection, limits time for the leisurely marinating of ideas, short-circuits historical awareness. and thus too often leaves our students starved for the deep and rich understanding which, some say. is the highest product of the life of the mind. As a humanist with an unfulfilled penchant for reading, quiet thought. and the pleasures of liberal breadth in education, I have myself in the past done some grumbling along these lines, and will no doubt do so again. Today. however. I want to argue instead that MIT undergraduate education can ncverhave too much of doing, and that much of the doing WC have there now does not begin early enough.

MIT freshmen arrive here with the expectation that they will start doing right away. But they soon find themselves in a first-year regimen which is toomuchgiven topreparation, preliminaries, eligibility rituals, and waiting. In the Science Core they are treated to large if often well-crafted lectures, where their role is by definition passive, and to "recitation" sections whose size (somctimes as large as 50 students) makes truly interactive discourse virtually impossible. Most of the doing they do is the doing of problem sets – often three different streams of problems sets in high volume and seemingly endless succession – designed, as far as they can tell, to develop speed, facility and accuracy in process, with understanding as a sort of second-order by-product. HASS subjects (though not all HASS subjects) offer some respite from this. butnotcnough, particularly in view of the place HASS occupies in the student scale of priorities. Freshman Advisor Seminars provide a measure of intimacy in instructional scale, but they are not thought to be "mainstream."

That in generalthis first year is not an exciting time (cxccpt maybe socially) for most of our students is expressed in their spotty tevelofclass attendance. It is expressed in their ceaseless cultural habit of referring to nearly every feature of the freshman academic year as something they must "get out of the way" – a habit which pre-dates P/NR grading, incidentally. It is expressed most eloquently by silence, by what they *don't* say – e.g., "What a mind-blowing concept!" "What a fantastic discussion!" "What aterrificproject!" "I had no idea MIT would be as great as this!" They arc in waiting. They endure their condition, but not gladly. We have a problem.

I am happy to say that the problem is already being addressed in a number of significant ways. The new Edgerton Center is working, in the several dimensions Kim Vandiver describes, to make real for incoming students Doc's legendary invitation, "Let's I it, right now!" The IAP Pre-UROP Mentoring initiative has succeeded putting more freshmen into spring tm UROPs. The year-old City Days/ LINKS program of the Public Sevice Center has well over a hundred fir year students actively engaged sustained involvement with Cambrid elementary school students a teachers in science, math, and after-school sports, an activist commitmcnt in which they know they are makinga difference as individuals. Course Eght faculty and administrators are working hard to plan major changes in the w physics core subjects are structured and taught, by laying more emphasis on interactive instruction. tangible applications of theory, and intellectual excitement in general.

MIT freshmen arrive here with the expectation that they will start doing right away. But they soon find themselves in a first-year regimen which is too much given to preparation, preliminaries, eligibility rituals, and waiting.

Is there more that can and should done? Certainly. An agenda to promote doing by freshmen would include least the following:

1. A long, hard, imaginative look the Institute Laboratory Requireme

(Continued on next page)

Freshmen Need A Running Start

(Merritt, from preceding page)

to sharpen its definition and to find ways of extending its spirit back into the first year, realizing its intent through genuinely experimental hands-on components in the Science Core.

2. Even earlier UROP entry for more freshmen, probably by cultivating the research possibilities inherent in big introductory subjects, Freshman Advisor Seminars, and IAP projects. and surely through a specific LJROP exemption from the fall and spring term credit limits, which now force many first-year students to do UROP for pay (if pay is available) or not at all.

3. Aggressive experimentation in many freshman subjects with VSG (very small group) learning, whose virtues in breaking passivity have been amply demonstrated in many upperclass settings, most notably in the "tutorial" feature of the Course Six core and Unified Engineering.

4. Offering real incentives for frcshmcn to learn and employ the art of teamwork- so often officially praised by MIT and industry, so seldom developed in this or any academy as a set of practical skills – in pursuing their studies right from the start.

5. Increasing by about an order of magnitude the number of distinct occasions which require a freshman to articulate her ideas verbally. out loud as well as in writing.

6. Funding instruction in the arts at a level sufficient to put Arts subjects – includingespecially thosewithcreative practice and performance built in -on an equal footing with Humanities and Social Science subjects within the structure of the HASS Distribution Requirement.

If all or even some of these things were done, MIT's freshman year would be far less a waiting room than it is now Students would be stimulated to shake off passivity and assert themselves in individual thought and action. Their pleasures would move beyond the meagre satisfactions of academic survival (and the more palpable ones of comradeship in living groups) to include the excitement of intellectual exploration, initiative, and self-esteem. The Institute would be able to say with some justification that it offers education-for-leadership from the start.

Yet the first year would still remain very much its own place, set apart from the upperclass years by the freshman's lack of departmental affiliation, by a curricular regimen crammed with pre-major requirements and relatively devoid of choice, by subjects largely dedicated to development of enabling skills and basic scientific literacy, and by its own distinctive grading system.

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In the face of these realities, one might argue for a more radical approach, having freshmen designate their majors immediately, ushering them directly into the more focused, bracing, and purposeful milieu of departmental life, and shaking up or redistributing Institute Requirements enough to make this possible. It is a tempting notion, and in some ways quite in keeping with MIT's demonstrated and distinctive strength in concentrated, career-directed (as opposed to general/liberal) studies. But the labors of demolition and reconstruction would be immense. Before undertaking them, one would have to be more confident than I am that our students could be brought to make an informed choice of major before the end of the freshman year.

So let's for now keep year one as a partly separate time. and do what we can to quicken it with the spirit of adventure and achievement. Let's try it out, right now. No more waiting. +

Letters

To The Faculty Newsletter:

As a retired faculty member, I receive the Faculty Newsletter Since the last number had an article on the Edgerton Strobe Alley, I thought Mrs. Edgerton, who is a resident in the retirement center where I live, might enjoy reading the article. She tells me that she not only read the article, but the whole *Newsletter,* which she had not seen. enjoyed it, and passed it along to Mrs. Katharine Hazen, the widow of Dean Harold Hazen. late of the Graduate School, who also enjoyed it.

It occurs to me that thcrc may be widows of faculty members who were intimately associated with MIT who would enjoy receiving the *Newsletter* along with the Emeriti. Perhaps not all of them would enjoy it, and it might be wasteful to provide the lcttcr to all. On thcotherhand.itmaybe thatdepartment heads would be aware of those widows who were involved and might be interested. I offer the idea for what it may be worth. Meanwhile, I can continue to pass my copy along to Mrs. Edgerton, who may choose to provide it to Mrs. Hazen.

Charles P. Kindleberger
Professor of Economics. Emeritus

The Editorial Board is considering Prof. Kindleberger's suggestion for increased Newsletter distribution, and in the meantime is providing a complimentary subscription to Mrs. Edgerton and Mrs. Hazen.

. . . . . .

Science Auction/Raffle Supports CPSE

The MIT Club of Boston is sponsoring a black tie Science Auction Gala on Saturday, May 22. 1993, at 7:30 pm at the Muscumof Science. The Auction will benefit the MIT Council on Primary and Secondary Education (CPSE) whose goal is to encourage a public commitment to academic excellence, particularly in the areas of science and math.

The entire West Wing of the Museum of Science will be open for this unusual event. Champagne. hors d'oeuvres, and sweets will be served. In the MIT tradition, entertainment will be innovative and memorable.

The nearly 1000 auction items include Harold "Doc" Edgerton collectors' items, space shuttle artifacts, a hot air balloon ride, a variety of weekend package getaways, and much more.

Raffle prizes include a tour of 15 Switzerland for two, a Bose Acoustic Wave Music System, a pair of luxury box tickets for a Red Sox/Yankees game, and a basket of Neuchatel chocolates.

Raffle tickets are being sold at the following locations (andyoudon't have to attend the auction to win!): MIT Women's League (10-342); MITAC (2OA-053); MIT Pharmacy in the Medical Center (E23-196); MIT Child Care Center (4- 144); and Lincoln Labs Special Services Office (LIN-A-226). Raffle tickets are $10 each; 3 for $25; 7 for $50; 15 for $100.

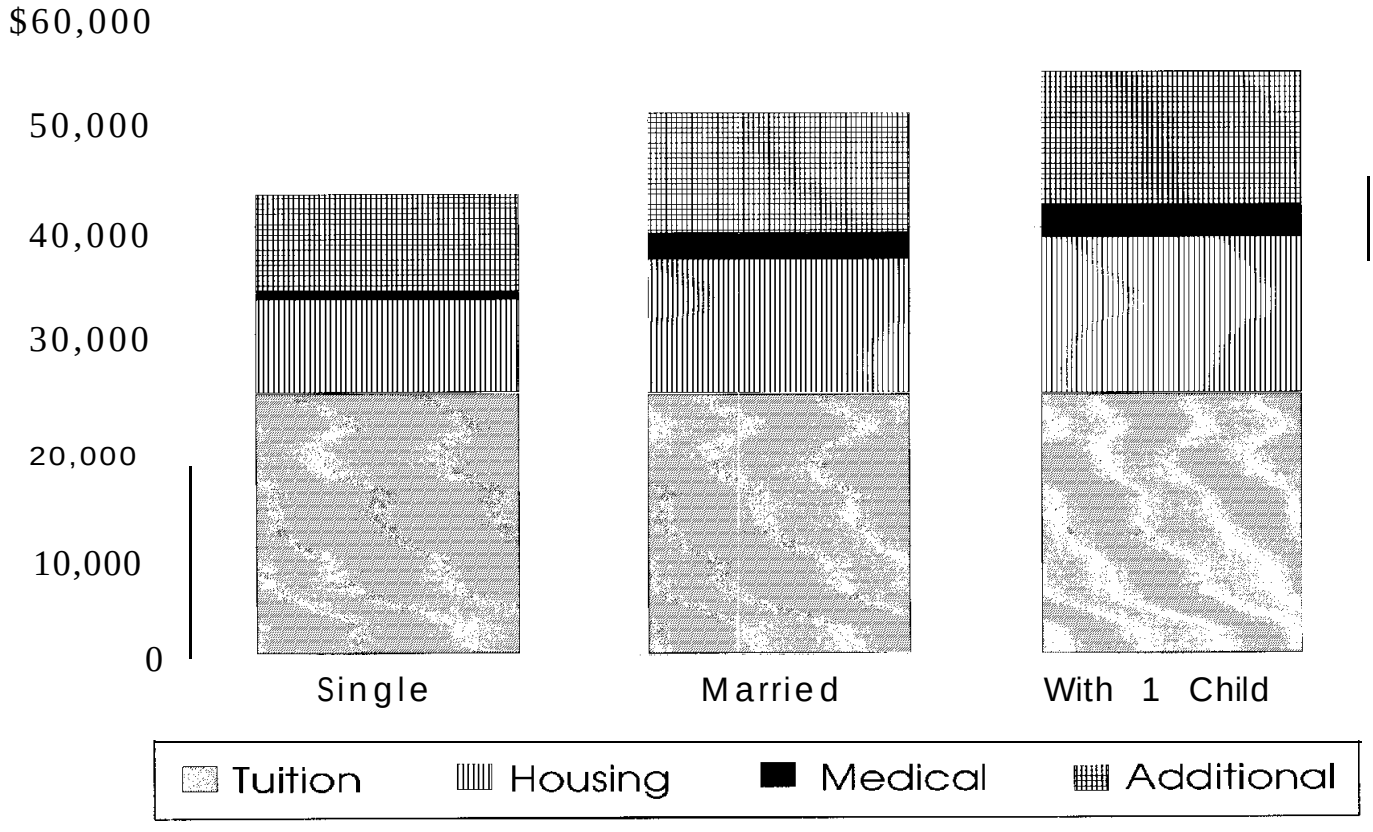
Support the MIT Council on Primary and Secondary Education and be part of an unforgettable evening. For invitations and additional information, contact Bonnie Jones (x3-X222; 10-110).

M.I.T. Numbers

Graduate Student Budgets

(Academic Year 1992193)

	Single	Married	With 1 Child
Tuition:			
Academic Year	**$18,000**	$18,000	$18,000
Summer	6,360	6,360	6,360
Housing Average (12 mos.)	8,700	12,600	14,700
Medical Costs Average	624	2,328	2,913
Additional Expenses:			
Food Costs Average (12 mos.)	4,620	6,420	7,200
Books & Supplies Average	780	780	780
Transportation	1,160	1,160	1,160
Other Expenses	2,655	3,065	3,560
TOTAL ESTIMATED EXPENSES	$42,899	$50,713	$54,673



Source: *Practical Planning Guide for New Graduate Students*

A Faculty Newsletter Quiz

- **Are you tired of always seeing the same authors in the Newsletter**
- **Would you like to see a greater variety of editorial opinion?**
- **Could you write a much better piece than . ..?**
- **Could you instigate a much better piece than . ..?**
- **Would you like to see more clip art?**
- **Do you have an issue you think should be discussed?**

If the answer to any of these questions is yes, then do something **about** it! Join the Faculty *Newsletter* Editorial Board. Responsibilities are minimal*, time requirement is brief, and prestige gained is commensurate with the responsibilities.

*Board members serve on one or two Editorial Committees per year, at which time topics are selected and material solicited for the current issue.

All faculty members are eligible and we strive for the greatest possible diversity of interests. If you would like to serve or would like more information, contact David Lewis: phone (3-7303) FAX (3-0429, or e-mail (fnl@zeiss.mit.edu).